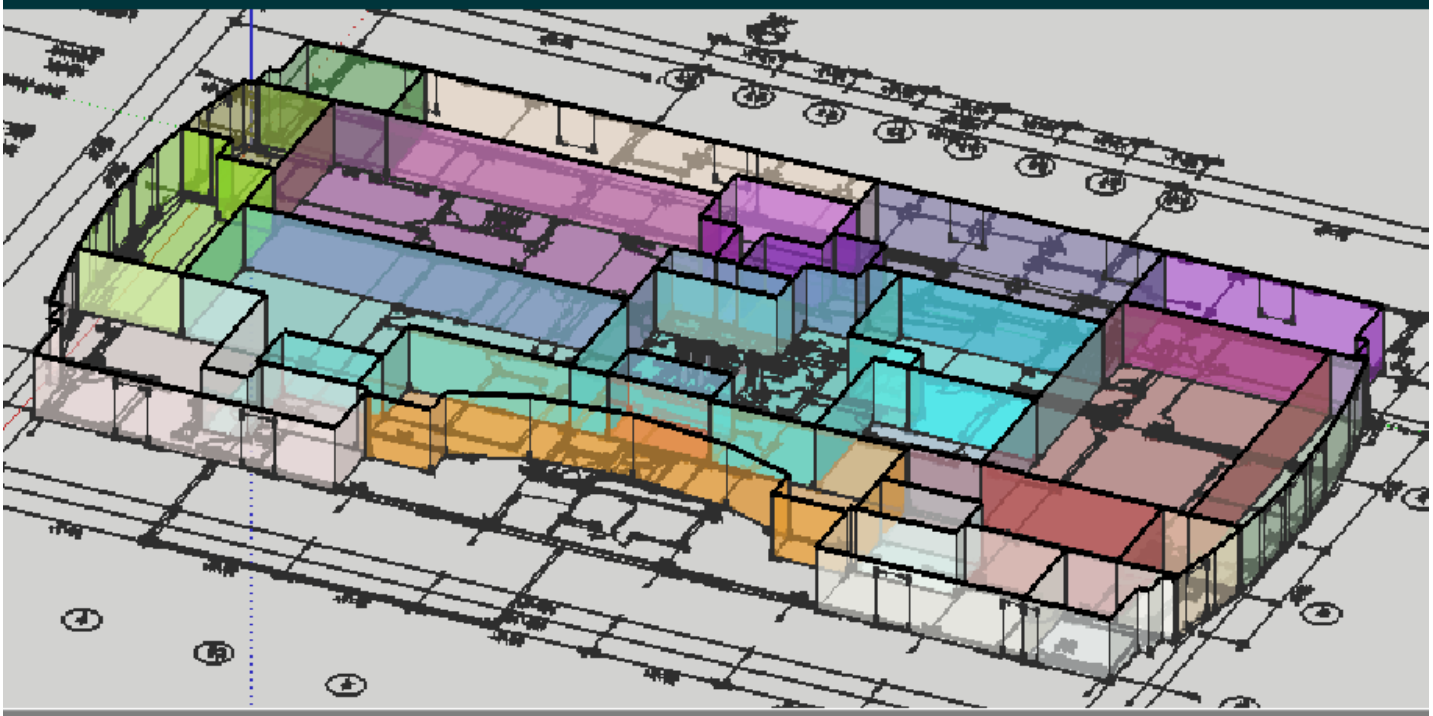

Energy Model Report

Arlington County Regulation 4.1 Site Plan Conditions

Riverhouse North – N1

Arlington, VA

ArCo 4.1 SPC Report v1.1

October 15th, 2025

SUSTAINABLE BUILDING PARTNERS

2701 Prosperity Avenue, Suite 100
Fairfax, Virginia 22031

www.sustainbldgs.com

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Purpose

Sustainable Building Partners, LLC (SBP) has developed a whole building energy simulation using Energy Plus v24.1 via the Open Studio v1.8 interface for the proposed Riverhouse - N1 multifamily building in Arlington, VA. SBP utilizes the model as a design tool for the purpose of enhancing the energy performance of the facility and to increase LEED Energy & Atmosphere Credit 2 points. SBP's modeling methodology is consistent with LEED and ASHRAE 90.1-2010 Appendix G modeling protocol and best practices.

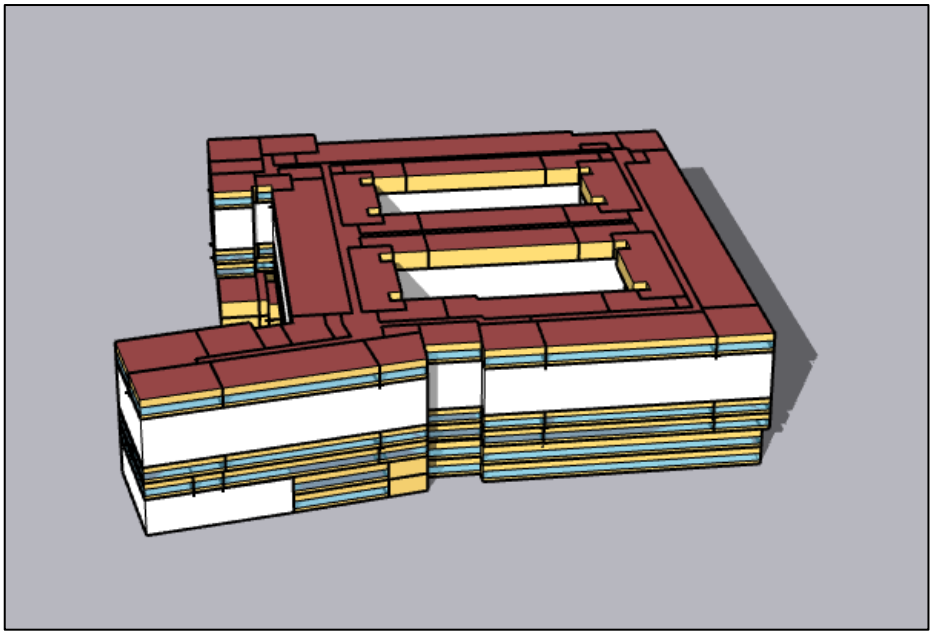


Figure 1: Energy Model Rendering of Riverhouse North – N1

Arlington Regulation 4.1 Site Plan Conditions

This energy analysis is submitted in support of Condition 18A of the Arlington Regulation 4.1 Site Plan Conditions. The analysis uses LEED v4 for the primary benchmarking with an ASHRAE 90.1-2010 Appendix G baseline condition.

Performance Disclaimer

This analysis is based on an early Schematic Design thus all results and benchmarking should be viewed as relative order-of-magnitude (RoM). This report works to establish high-level performance targets and general design standards but does not guarantee future performance.

Preliminary Energy Estimates

This section of the report summarizes the results and benchmarking of the preliminary whole building hourly energy simulations. Table 1 provides the results of the hourly energy simulations.

Summary of Performance & Primary Design Alternates

A summary of the preliminary energy performance benchmarking has been provided in Table 1.

Table 1: Annual Energy Consumption & Performance Benchmarking

Design Scheme	Description [3]	Total Energy Cost ($/sqft)	Energy Cost Savings [1]	Site EUI (kBtu/sf)	Source EUI (kBtu/sf)	GHG[2] (Tons CO2e)	Energy Star Score
4.1 SPC Target	**4.1 SPC Target**	--	**≥24%**	**--**	**--**	**--**	**≥80**
Current Design	**Current Design**	$1.30 – $1.40	**21% - 23%**	**40 - 45**	**100 - 105**	**1,850+**	**≥75**
Compliance Pathway	Current Design PLUS: • **DOAS Optimization** ○ DOAS Discharge air temperature reset • **Interior lighting power reduction** • **(10% better than code)**	$1.15 – $1.25	**≥24%**	**38 - 43**	**90-95**	**1,700+**	**≥80**

[1] ASHRAE 90.1-2010 (LEED) Baseline design
[2] Estimated based on Year 1 (current) electric grid profile (EGRID projections). Future obligations will likely be reduced as the grid generation profile shifts towards low-carbon renewable energy sources.

Design Considerations

The following subsections summarize the primary limiting factors and other unique conditions associated with this design.

Preliminary Design

Throughout the early-design process, the project team has worked to optimize the building design through the quantitative and qualitative evaluation of various Energy Efficiency Opportunities (EEOs). Many of the discussed EEOs will be incorporated later in the design process (e.g. lighting), or are still being actively evaluated at this stage. All measures are evaluated based on energy savings, first cost, maintenance considerations, operational considerations, and infrastructure limitations.

Primary Features Impacting Energy Performance

Please see the BOD section for full design details. This section provides a summary of the specific items driving overall energy performance.

Split-System Heat Pumps
- 14 SEER / 8.2 HSPF (Code Minimum)
- Equipped with ECMs

DOAS
- Air-cooled DX
- Gas-fired furnace
- Hot-gas reheat

Garage Lighting Power Reductions
- Estimated ≥50% reduction in designed lighting power (anticipated)

EnergyStar Appliances
- Fridge, dishwasher, clothes washer

Low Flow Plumbing Fixtures
- 1.75 GPM Showers, 1.5 GPM Faucets

Dedicated Outside Air System (DOAS)

Current BOD: Air-cooled DX with gas-fired furnace
Design Alternates:

- Air-source heat pump with gas-fired auxiliary
- Air-source heat pump with electric-resistance auxiliary
- Air-cooled DX with electric resistance heating

Table 3: DOAS Performance Comparison (Annualized, per 1k CFM)

DOAS Configuration	Energy Cost Per 1k CFM	Source Energy Per 1k CFM (mmBtu/yr)	GHG Emissions (tons CO2e/yr)(1)
Gas-Fired Furnace	$2,400	240	11
Heat Pump with Gas Auxiliary	$2,400	219	7
Heat Pump with Electric Auxiliary	$2,800	250	8
Electric-Resistance	$7,000	639	19
(1) Estimated based on Year 1 (current) EGRID projections			

Challenges/Limiting Factors

- Gas-fired Furnace: Counter to long-term electrification initiatives
- Heat Pumps: Size limitations (≤70-tons), auxiliary systems at low ambient temps
- Electric-Resistance: Highest operating energy, cost, and short- and mid-term emissions

Energy Efficiency Opportunities

The following is a list of specific load reduction and energy savings strategies that could increase the overall energy performance of the building. **At this phase of design, measures should be evaluated for RoM only**.

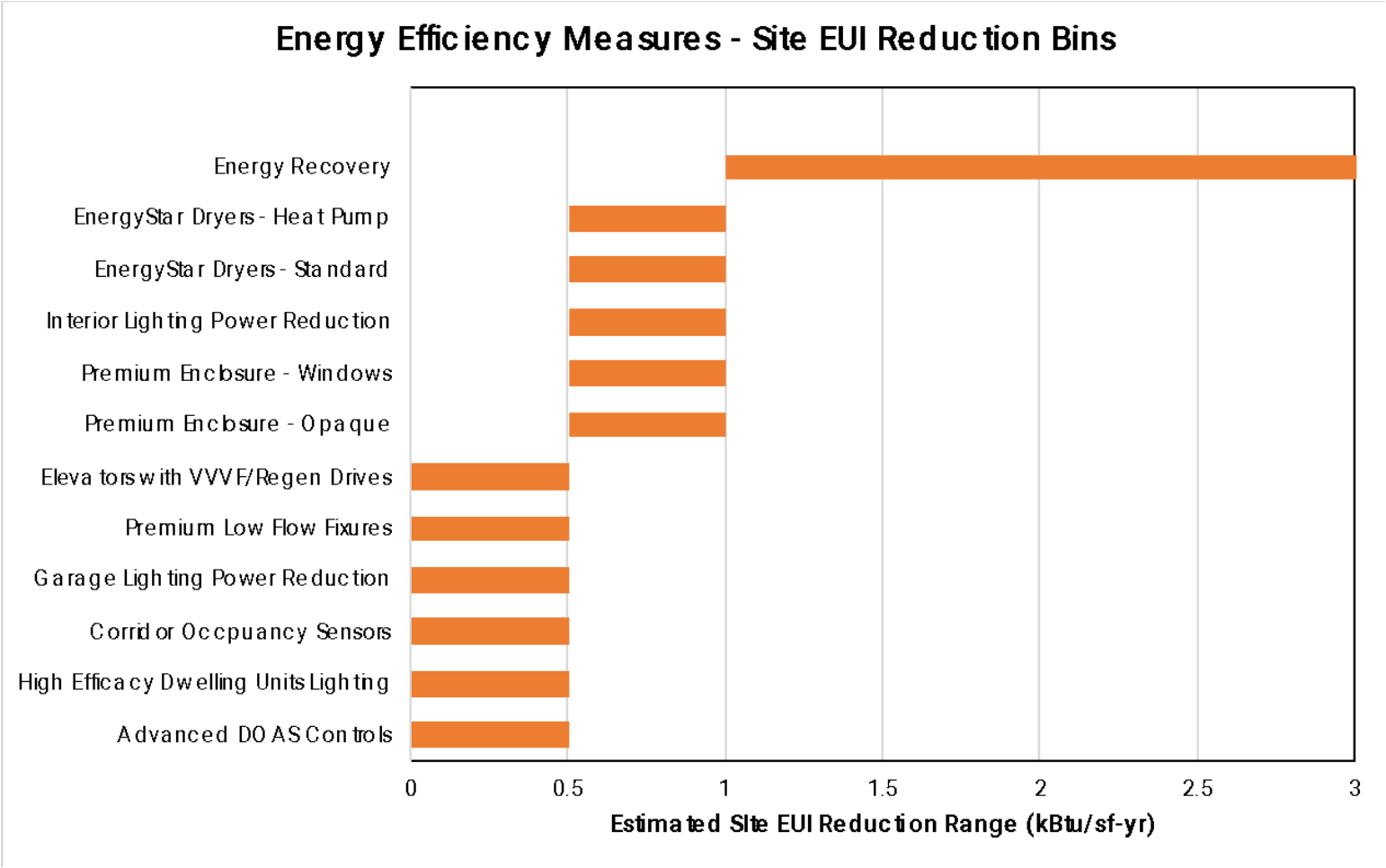


Figure 2: Estimated EEO Energy Reductions

Measure Narrative Descriptions

The subsequent tables provide general descriptions of the measures list in Figure 2 above.

Table 5: Energy Efficiency Opportunity (EEO) Summary

EEO	Measure	Category	Base Design	Measure Description	Included in Compliance Pathway
1	Premium Enclosure - Opaque	Building Enclosure	See enclosure section.	Roof: R-40+ No signif. points of wall thermal bridging	NO
2	Premium Enclosure - Windows			U-0.35 / 0.25 SHGC	NO
3	Interior Lighting Reduction	Lighting	0.60 W/sf (common & BOH areas)	0.48 W/sf	YES
4	High Efficacy Dwelling Unit Lighting		40 - 50 lumens/Watt	≥60-70 lumens/Watt	NO
5	Garage Lighting Reduction		0.12 W/sf	0.08 W/sf	YES
6	Corridor Occupancy Controls		24/7 operation	Bi-level lighting controls (50% when unocc.)	YES
7	EnergyStar Dryers	Process & Equipment	Standard Electric	Moisture Sensing OR Ventless Condensing HP	NO (base design)
8	Elevators – VVVF & Regen. Drives		Standard traction	VVVF controls + regenerative drives	NO
9	Premium Low Flow Fixtures	Plumbing	Shower – 1.75 GPM Faucets: 1.50 GPM	Showers – 1.5 GPM Lav. Faucets: 0.5 GPM	NO
10	Discharge Air Temp. Reset Controls	HVAC	Fixed DAT: 70°F	Reset based on OAT 60°F DAT @ ≥76°F	YES
11	Ventilation Energy Recovery		No Energy Recovery	Enthalpy wheel pretreats all incoming outdoor air	NO

Preliminary Basis of Design

Many assumptions and placeholders have been used in this analysis given the early nature of the design. The intent of this type of analysis is relative order of magnitude (RoM), so small adjustments to design inputs or schedules likely won't change overall findings and takeaways from the analysis. SBP asks that the subsequent section be reviewed for general accuracy.

General Design & Operational Parameters

Table 6: General Project Parameters

Project Types	Mixed-Use: Multifamily & Retail
Modeling Software	EnergyPlus V24.1 / OpenStudio V1.8
Project Location	Arlington, VA
Climate Zone/Weather	4A / TMY3 – Washington, DC
Design Day Conditions	Cooling – 92°F / 77°F, Heating – 15°F
Design Temperatures	75°F – Cooling / 70°F Heating
Quantity of Floors	8 Floors
Building Area (GSF)	~528,300 GSF Residential ~14,800 GSF Retail
Dwelling Units	509 Units
Electric Utility Rates	EIA, 2024 VA avg – Residential: $0.1454/kWh EIA, 2024 VA avg – Commercial: $0.0893/kWh
Gas Utility Rates	EIA, 2024 VA avg – Commercial: $0.92/therm

Exterior Opaque Constructions

All assemblies have been developed in accordance with the SD design package, ASHRAE RP-1365, 2017 DC Energy Code, and ASHRAE 90.1 Appendix A.

Table 7: Opaque Envelope Performance Summary

Assembly Name	Assembly Type	Description	Proposed Performance	Points of Thermal Bridging
Wood Stud Wall	Ext. Wall	Wood Stud R-20 Batt	U-0.054	--
Metal Stud Wall (nominal condition)	Ext. Wall	Metal Stud 1.5" C.I + R-13 Batt	U-0.072	Metal studs, SS brick ties
Metal Panel Wall at Floor Edge (predominant condition)	Ext. Wall	Metal Stud 1.5" C.I + R-13 Batt	U-0.134	Metal studs, SS brick ties, shelf angles
Base Roof	Roof	R-38 Batt between wood joists	0.034	--
Floor over garage	Floor	Est. R-12.6 insulation below conc. slab	0.071	--

See Enclosure Calculation section for full layer-by-layer sections.

Window Assemblies

All performance has been estimated based performance specifications provided by the design team.

Basis of Design - Glazing:
1" IGU, Double-pane, low-E, air-filled

Basis of Design – Framing:
Residential: Non-metal
Lobby/Retail: Thermally-broken aluminum

Table 8: Window Assembly Performance (frame + glass)

Window System	U-value	SHGC
Residential	0.35	0.40
Lobby/Retail	0.42	0.40

Lighting Systems

The lighting design was not available for this analysis and has been approximated based on a standard market design

Table 9: Lighting Summary

Use Type	Lighting Power (W/sf)	Occupancy / Daylighting Controls	Design Target LPD (W/sf) EEOs
Multifamily (common & BOH)	0.60	As required by 2015 VECC	0.48
Parking Garage	0.12	OS / Bi-Level	0.08
Dwelling Units *(not regulated by 90.1)*	40-50 lm/W	N/A	~60-70 lm/W

Equipment & Appliances

Table 10: Process & Equipment Summary

Component	Description
Dwelling Unit Appliances	• Fridge: EnergyStar (required by SPCs) • Dishwasher: EnergyStar (required by SPCs) • Clothes Washer: EnergyStar (required by SPCs) • Dryer: Electric, EnergyStar • Range: Electric, standard
Misc. Plug Loads	Modeled in accordance with LEED Multifamily Midrise Guidelines
Elevators	MRL Gearless Traction
Garage Ventilation	• 0.75 CFM/sf • DCV (CO/NOx controls) + VFDs

Domestic Hot Water System

The DHW system was described in the system narrative as follows.

Table 11: DHW Summary

Component	Description
Water Heater Type	Electric storage water heaters
Configuration	In-unit
Storage Capacity	40-50 gal
Efficiency	0.93 EF

Base Building HVAC Narrative

Table 12: HVAC Basis of Design

Design Component	Description
Primary System	Split System Heat Pumps • 14 SEER / 8.2 HSPF • Equipped with ECMs
Ventilation System	100% Dedicated Outside Air Unit • Air-Cooled DX • Gas-fired Furnace • Hot gas reheat • Fixed discharge air temperature (70°F)
Ventilation Rates	• Dwelling Units – ASHRAE 62.2 • Common – ASHRAE 62.1 • Corridors – 0.20 CFM/sf

Appendix – Opaque Assembly Calculations

Modeled assemblies have been developed consistent with Appendix A of ASHRAE 90.1-2010.

Wood Stud Wall (Parallel Path)		
Path 1	**Path 2**	**Layer**
0.17	0.17	Exterior Air Film
0.00	0.00	Façade (outside thermal boundary)
0.56	0.56	5/8" Gypsum Board
20.00	0.00	R-20 Batt Insulation
0.00	6.88	4x6" Wood Studs
0.56	0.56	5/8" Gypsum Board
0.68	0.68	Interior Air Film
21.97	**8.85**	**Total Assembly R-value**
75%	**25%**	**Path Area %**
0.054		**Total Assembly U-value**

Metal-Stud Wall	
R-value	**Layer**
0.17	Exterior Air Film
0.00	Façade (outside thermal boundary)
5.85	1.5" Continuous Insulation (R-7.5 nom) (derated for cladding system)
0.56	5/8" Gypsum Board
6.00	3.5" Batt Insulation (R-13 nom) between metal studs at 16" O.C.
0.56	5/8" Gypsum Board
0.68	Interior Air Film
13.82	**Total Assembly R-value**
0.072	**Total Assembly U-value**

Typical Roof		
Path 1	**Path 2**	**Layer**
0.17	0.17	Exterior Air Film
0.00	0.00	Roof Membrane (outside thermal boundary)
0.56	0.56	5/8" Gypsum Board
38.00	0.00	R-38 Batt Insulation
0.00	6.88	Wood Joists
0.56	0.56	5/8" Gypsum Board
0.61	0.61	Interior Air Film
39.9	**8.78**	**Total Assembly R-value**
90%	**10%**	**Path Area %**
0.034		**Total Assembly U-value**

Floor Over Garage	
R-value	**Layer**
0.17	Exterior Air Film
12.60	3" rigid insulation
0.38	6" concrete slab
0.92	Interior Air Film
14.07	**Total Assembly R-value**
0.071	**Total Assembly U-value**

Appendix – Supporting Information

DOAS Modulating Ventilation Controls – Sequence of Operation

C. Supply Fan(s) Control and Volume Measurement:
1. Control:
   a. Input Device: DDC controls – manually start fans to run continuously.
   b. Output Device: DDC system analog output to motor controller.
   c. Output Device: Flow metering station provide digital output of total cfm of outside air at unit.
   d. Action: Run continuously.
2. Fan Speed Control:
   a. Input Device: Static-pressure transmitter sensing supply-duct static pressure referenced to static pressure outside the duct.
   b. Output Device: DDC system binary output to alarm panel. DDC- analog output to supply fan VFD.
   c. Action: Modulate fan speed via VFD to maintain discharge static pressure setpoint. Provide minimum volume setpoint of approximately 50% of maximum in accordance with rooftop unit manufacturer's requirements. Stop fan and signal alarm when static pressure rises above excessive-static-pressure set point.
3. Display:
   a. Supply-fan-discharge static-pressure indication.
   b. Supply-fan-discharge static-pressure set point.
   c. Supply-fan airflow rate (cfm) from flow station.
   d. VFD setpoint.
   e. Supply-fan speed.

DOAS Modulating Ventilation Controls – Sequence of Operation

Corridor space temperature

d. FACTORY PROGRAM TEMPERATURE RESET: THE FOUR (4) FLOOR-LEVEL SPACE TEMPERATURE SENSORS SHALL RESET THE UNIT SUPPLY AIR DRY BULB TEMPERATURE SETPOINT ACCORDING TO THE FOLLOWING:
1) WHEN THE AVERAGE SPACE TEMPERATURE IS 74-DEGREES F (ADJUSTABLE), THE UNIT SUPPLY AIR TEMPERATURE SHALL BE 68-DEGREES F (ADJUSTABLE). SUPPLY AIR DEWPOINT TEMPERATURE SHALL BE MAXIMUM OF 60.5 DEGREES F (ADJUSTABLE).
2) WHEN THE AVERAGE SPACE TEMPERATURE IS 72-DEGREES F (ADJUSTABLE), THE UNIT SUPPLY AIR TEMPERATURE SHALL BE 70-DEGREES F (ADJUSTABLE). SUPPLY AIR DEWPOINT TEMPERATURE SHALL BE MAXIMUM OF 62.5 DEGREES F (ADJUSTABLE).
3) WHEN THE AVERAGE SPACE TEMPERATURE IS 76-DEGREES F (ADJUSTABLE), THE UNIT SUPPLY AIR TEMPERATURE SHALL BE 66-DEGREES F (ADJUSTABLE). SUPPLY AIR DEWPOINT TEMPERATURE SHALL BE MAXIMUM OF 58.5 DEGREES F (ADJUSTABLE).
4) RESET SCHEDULE SHALL BE LINEAR BETWEEN SPECIFIED END-POINTS. MAXIMUM SUPPLY AIR TEMPERATURE SHALL BE LIMITED TO 70-DEGREES F (ADJUSTABLE) AND MINIMUM SUPPLY AIR TEMPERATURE SHALL BE LIMITED TO 66-DEGREES F (ADJUSTABLE). DURING ALL OPERATING CONDITIONS, MAXIMUM SUPPLY AIR DEWPOINT TEMPERATURE MUST BE 62.5 DEGREES F.

Outdoor temperature

temperature and humidity setpoints. Unit shall operate continuously. DOAS discharge air temperature to reset based on outside air temperature to minimize dehumidification reheat operation. Reset schedule to be as follows (adjustable):

a. Below 45˚F OAT – Heating mode with a 70˚F DAT

b. 46-55˚F OAT – Heating mode with a 68˚F DAT

c. 55-70˚F OAT – Cooling mode with a 65˚F DAT

d. 71-75˚F OAT – Cooling mode with a 63˚F DAT

e. 76˚F OAT and above – Cooling mode with a 60˚F DAT

Appendix - Simulation Output Files

The following screen captures are selected simulation output files for the Design Energy Cost (DEC) or Proposed case as well as those from the Performance Rating Method (PRM) or Baseline case.

Proposed Model Output Reports

	Electricity Energy Use [kWh]	Electricity Demand [W]	Natural Gas Energy Use [therm]	Natural Gas Demand [Btu/h]
Heating -- General	171321.95	248302.27	60853.40	3128723.16
Cooling -- General	607141.52	453180.12	0.00	0.00
Interior Lighting -- General	485842.44	69971.16	0.00	0.00
Interior Lighting -- Residential	303478.59	77104.32	0.00	0.00
Exterior Lighting -- Elevators	75049.05	27233.60	0.00	0.00
Exterior Lighting -- Exterior Lighting	21780.02	5000.00	0.00	0.00
Exterior Lighting -- Garage Fans	163356.61	18648.00	0.00	0.00
Exterior Lighting -- Garage Lighting	217808.81	24864.00	0.00	0.00
Interior Equipment -- General	124001.10	27883.28	0.00	0.00
Interior Equipment -- Residential	1222404.83	288711.35	0.00	0.00
Fans -- General	332349.58	39171.79	0.00	0.00
Pumps -- General	2126.90	242.80	0.00	0.00
Water Systems -- DHW	1534930.68	371943.27	0.00	0.00

ASHRAE Baseline Building Output Reports

EAp2-4/5. Performance Rating Method Compliance

	Electricity Energy Use [kWh]	Electricity Demand [W]	Natural Gas Energy Use [therm]	Natural Gas Demand [Btu/h]
Heating -- General	0.00	0.00	68814.78	4642196.37
Cooling -- General	794902.51	533819.81	0.00	0.00
Interior Lighting -- General	485842.44	69971.16	0.00	0.00
Interior Lighting -- Residential	303478.59	77104.32	0.00	0.00
Exterior Lighting -- Elevators	75049.05	27233.60	0.00	0.00
Exterior Lighting -- Exterior Lighting	21780.02	5000.00	0.00	0.00
Exterior Lighting -- Garage Fans	265454.49	30303.00	0.00	0.00
Exterior Lighting -- Garage Lighting	453768.36	51800.00	0.00	0.00
Interior Equipment -- General	124001.10	27883.28	0.00	0.00
Interior Equipment -- Residential	1297340.34	306409.85	0.00	0.00
Fans -- General	795610.09	94008.20	0.00	0.00
Pumps -- General	32019.00	6029.40	0.00	0.00
Water Systems -- DHW	2126369.56	594818.27	0.00	0.00

Acronym Legend

AHU	Air-Handling Unit
CHW	Chilled Water
CI or C.I.	Continuous Insulation
CO2e	Carbon Dioxide Equivalent
COP	Coefficient of Performance
CRI	Color Rendering Index
CS	Core & Shell
CW	Condenser Water
DAT	Discharge Air Temperature
DCV	Demand Controlled Ventilation
DEC	Design Energy Cost
DHW	Domestic Hot Water
DX	Direct Expansion
EA	Energy & Atmosphere
ECM	Electronically Commutated Motor
EEO	Energy Efficiency Opportunity
EER	Energy Efficiency Ratio
EF	Energy Factor
E_t	Thermal Efficiency
EUI	Energy Use Index (kBtu/sf)
FCU	Fan Coil Unit
FP	Fan-Powered
GHG	Greenhouse Gas
GPM	Gallons per Minute
HP	Heat Pump OR Horsepower
HSPF	Heating Seasonal Performance Factor
HW	Hot Water
IGU	Insulated Glass Unit
LPD	Lighting Power Density
NC	New Construction
OC or O.C.	On center
PRM	Performance Rating Method
REC	Renewable Energy Credit
RTU	Rooftop Unit
SAT	Supply Air Temperature
SC	Shading Coefficient
SEER	Seasonal Energy Efficiency Ratio
SHGC	Solar Heat Gain Coefficient
SS	Stainless Steel
SSHP	Split System Heat Pump
VAV	Variable Air Volume
VFD	Variable Frequency Drive
VRF	Variable Refrigerant Flow
VRV	Variable Refrigerant Volume
VSD	Variable Speed Drive
VT	Visible Transmittance
VVVF	Variable Voltage, Variable Frequency
WSHP	Water Source Heat Pump
W/sf	Watts per Square Foot

LEED v4 for BD+C New Construction

Riverhouse North

March 10, 2025

SUSTAINABLE BUILDING PARTNERS

1	0	0	Integrative Process		Possible Points:	1
Y	?	N				
1			Credit 1	Integrative Process		1

11	4	1	Location and Transportation		Possible Points:	16
Y	?	N				
		16	Credit 1	LEED for Neighborhood Development	PATH 1	16
1			Credit 2	Sensitive Land Protection	PATH 2	1
	2		Credit 3	High Priority Site		2
5			Credit 4	Surrounding Density & Diverse Uses		5
4		1	Credit 5	Access to Quality Transit (v4.1)		5
	1		Credit 6	Bicycle Facilities (v4.1)		1
1			Credit 7	Reduced Parking Footprint (v4.1)		1
	1		Credit 8	Electric Vehicles (v4.1)		1

5	1	4	Sustainable Sites		Possible Points:	10
Y	?	N				
Y			Prereq 1	Construction Activity Pollution Prevention		Required
1			Credit 1	Site Assessment		1
	1	1	Credit 2	Site Development - Protect or Restore Habitat		2
1			Credit 3	Open Space		1
		3	Credit 4	Rainwater Management		3
2			Credit 5	Heat Island Reduction		2
1			Credit 6	Light Pollution Reduction		1

5	2	4	Water Efficiency		Possible Points:	11
Y	?	N				
Y			Prereq 1	Outdoor Water Use Reduction		Required
Y			Prereq 2	Indoor Water Use Reduction		Required
Y			Prereq 3	Building-Level Water Metering		Required
1	1		Credit 1	Outdoor Water Use Reduction		2
3	1	2	Credit 2	Indoor Water Use Reduction		6
		2	Credit 3	Cooling Tower Water Use (v4.1)		2
1			Credit 4	Water Metering		1

12	10	11	Energy and Atmosphere		Possible Points:	33
Y	?	N				
Y			Prereq 1	Fundamental Commissioning and Verification		Required
Y			Prereq 2	Minimum Energy Performance		Required
Y			Prereq 3	Building-Level Energy Metering		Required
Y			Prereq 4	Fundamental Refrigerant Management		Required
3	2	1	Credit 1	Enhanced Commissioning		6
8	2	8	Credit 2	Optimize Energy Performance		18
1			Credit 3	Advanced Energy Metering		1
		2	Credit 4	Demand Response (v4.1)		2
	5		Credit 5	Renewable Energy (v4.1)		5
	1		Credit 6	Enhanced Refrigerant Management		1

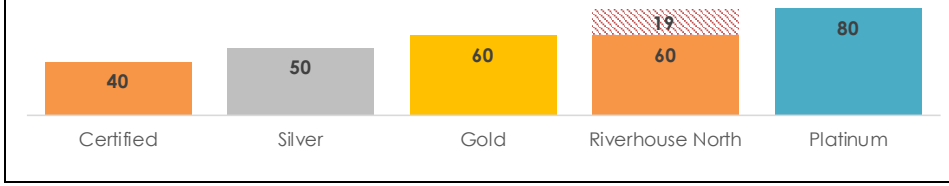
9	1	3	Materials and Resources		Possible Points:	13
Y	?	N				
Y			Prereq 1	Storage and Collection of Recyclables		Required
Y			Prereq 2	Construction and Demolition Waste Management Planning		Required
3		2	Credit 1	Building Life-Cycle Impact Reduction		5
2			Credit 2	Product Disclosure & Optimization - EPDs		2
1		1	Credit 3	Product Disclosure & Optimization - Sourcing of Raw Materials		2
2			Credit 4	Product Disclosure & Optimization - Material Ingredients		2
1	1		Credit 5	Construction and Demolition Waste Management		2

8	1	7	Indoor Environmental Quality		Possible Points:	16
Y	?	N				
Y			Prereq 1	Minimum Indoor Air Quality Performance		Required
Y			Prereq 2	Environmental Tobacco Smoke Control (v4.1)		Required
2			Credit 1	Enhanced Indoor Air Quality Strategies		2
3			Credit 2	Low-Emitting Materials (v4.1)		3
1			Credit 3	Construction Indoor Air Quality Management Plan		1
		2	Credit 4	Indoor Air Quality Assessment		2
1			Credit 5	Thermal Comfort		1
1		1	Credit 6	Interior Lighting		2
		3	Credit 7	Daylight		3
	1		Credit 8	Quality Views		1
		1	Credit 9	Acoustic Performance		1

6	0	0	Innovation		Possible Points:	6
Y	?	N				
1			Credit 1.1	Innovation Credit: Low-Mercury Lamps		1
1			Credit 1.2	Pilot Credit: Integrative Analysis of Building Materials		1
1			Credit 1.3	Innovation: O+M Starter Kit		1
1			Credit 1.4	Pilot Credit: Assess and Plan for Resiliency		1
1			Credit 1.5	Exemplary Performance: Low-Emitting Materials (90%+ in 3 categories)		1
1			Credit 2	LEED Accredited Professional		1

3	0	1	Regional Priority Credits		Possible Points:	4
Y	?	N				
1			Credit 1	Regional Priority: Access to Quality Transit (thrsh: 4 pts)		1
1			Credit 2	Regional Priority: Green Vehicles		1
		1	Credit 3	Regional Priority: Rainwater Mgmt (thrsh: 3 pts)		1
1			Credit 4	Regional Priority: Reduced Parking Footprint, Opt Energy (thrsh: 10 pts)		1

60	19	31			Possible Points:	110



LEED v4 for BD+C New Construction

RiverHouse North

March 10, 2025

4.1 Submission

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
General					
General	LEED Certification	Project is required to achieve LEED Gold as part of the Sector Plan requirements.			No action required.
Permitting	Arlington County Sustainability	The applicant recognizes the LEED Conditions Packet requirements at specific permitting milestones. Those requirements will be provided during the permitting process. The applicant will follow the conditions written in the Board Report and the guidelines here: https://environment.arlingtonva.us/energy/green-building/leed-permit-submission/			No action required.
Integrative Process					
Credit 1	Integrative Process	Required: Identify opportunities for synergies across disciplines and building systems, through an analysis of energy and water-related systems and a LEED charette. At concept design or before completion of SD: - Perform simple box energy model - Perform simple water budget analysis - Complete the BOD and OPR (commissioning requirements) Activity: SBP has completed v1 of the Energy Model to help inform design decisions. SBP has started discussing potable water reduction strategies and will be completing a water budget analysis.	1		On track. Will complete water budget analysis before end of SD.
Location and Transportation					
Credit 2	Sensitive Land Protection	Required Option 1: Locate the development footprint on land that has been previously developed. Observed: Previously developed	1		No action required.
Credit 3	High Priority Site	Required Option 3: (2 pts) Brownfield Redevelopment		2	*Provide Phase I or Phase II ESA Report to determine feasibility.*
Credit 4	Surrounding Density and Diverse Uses v4.1 credit substitution	Required Option3: (1-5 pts) Walkable Location Observed: WalkScore 79 for 3 pts	5		No action required.
Credit 5	Access to Quality Transit v4.1 credit substitution	Required Path 1: Locate the project within 1/2-mile of metro or 1/4-mile of bus lines. Demonstrate the number of weekday/weekend trips as follows: Option 1: (1 pt) 72/30 Option 2: (2 pts) 100/70 Option 3: (3 pts) 144/108 Option 4: (4 pts) 250/160 Option 5: (5 pts) 360/216 Observed: ~180 rides/day	4		No action required.
Credit 6 ★	Bicycle Facilities v4.1 credit substitution	Required: Implement all of the following: 1. Location must support a bicycle network. 2. Short term bike storage must be within 200 feet of a functional entrance and long term storage must be within 300 feet of a functional entrance. 3. For non-residential portions, provide bike spaces for: - 5% of occupants (but no less than 4) AND - 2.5% of peak visitors (but no less than 4) 4. For residential units, provide bikes spaces for: - 1 per 3 dwelling units OR 15% of residents (higher #) AND - 2.5% of peak visitors (but no less than 4) 5. For non-residential portions, provide 1 shower for the first 100 occupants and 1 shower for each 150 occupants thereafter		1	*Explore feasibility. Will only track as part of an above-Gold Scorecard.*
Credit 7	Reduced Parking Footprint v4.1 credit substitution	Required Option 2: Reduce Parking Number of spots does not exceed the minimum local code requirements for parking capacity and parking is reduced by 30% per ITE Handbook.	1		On track. Will determine based on final parking count.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 8	Electric Vehicles v4.1 credit substitution	Required: Provide electric charging spaces for 5% of parking capacity OR provide electric vehicle ready spaces for 10% of parking capacity.		1	Will explore feasibility.
Sustainable Sites					
Prereq 1	Construction Activity Pollution Prevention	Required: Erosion and Sediment Control Plan must conform to 2012 EPA Construction General Permit (CGP) or more stringent local regulations.	Y		Include compliant erosion and sediment control measures in the drawings.
Credit 1	Site Assessment	Required: Provide documentation explaining if/how the following site features influences the project design: - Topography - Hydrology - Climate - Vegetation - Soils - Human Use - Human Health Effects	1		SBP to complete site assessment credit documentation.
Credit 2	Site Development - Protect or Restore Habitat	Required Option 2 (1 pt): Preserve and protect 40% of the greenfield area on the site (if area exists). Donate $0.40 per sf (total site area) to approved conservation organiztions (i.e NFWF)		1	No action required at this time. Will action if needed to maintain Gold.
Credit 3	Open Space	Required: Provide outdoor space ≥ 30% of the total site. 25% of the outdoor space must be vegetated or have overhead vegetated canopy. Turf does not count towards vegetation. Outdoor space must be physically accessible. Activity: Courtyards represent ~ 30% of total LPB area. Targeting credit using courtyards and any other amenity space at grade level.	1		On track. Program courtyards such that 25% is vegetated. SBP will refine take-offs and provide feedback at next milestone.
Credit 5	Heat Island Reduction	Required: Option 1 (2 pts) - Nonroof and roof. Nonroof (/0.5) + Roof (/0.75) + Vegetated Roof (/0.75) > Total Site Paving Area + Roof Activity: High roof will be white TPO (or similar). Will target light covered pavers in courytard area.	1		*Explore feasibility. Will explore paver palette to determine if enough light colored pavers can be selected for Courtyard areas to meet threshold.*
Credit 5	Heat Island Reduction	Required: Option 2 (1 pt) - 75% of parking is undercover Observed: All parking is undercover.	1		No action required.
Credit 6	Light Pollution Reduction	Option 1: Backlight uplight glare (BUG) method. Can be included in luminaire cut sheets. - Uplight = U3 - Trespass = backlight & glare requirements base on mounting height and distance to lighting boundary.	1		1. Select fixtures with BUG ratings that meet B3-U3-G1. 2. Place amenity light fixtures on time clock control.
Water Efficiency					
Prereq 1	Outdoor Water Use Reduction	Required Prereq: Reduce irrigation by 30% (prereq)	Y		On track. Will limit irrigation as much as possible. Design for drip, moisture sensors, controllers where irrigation is needed.
Credit 1	Outdoor Water Use Reduction	Required Option 2: 50% Reduction (1 pt), 100% Reduction (2 pts) Strategies include drought tolerant plantings, drip irrigation, moisture control sensors, or cisterns. Activity: Plan to limit irrigation as much as possible. Courtyards may need drip.	1	1	

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Prereq 2	Indoor Water Use Reduction	Required (Prerequisite): 1. Reduce indoor water use by 20% 2. All qualifiable plumbing fixtures must be labeled EPA WaterSense 3. ENERGY STAR residential clothes washer and dishwasher. 4. Process Water: a) No once through cooling for heat rejecting equipment b) Cooling tower and evaporative condensors must have: - makeup water meters - conductivity controllers - efficient drift eliminators Activity: Project will specify low flow fixtures and ENERGY STAR appliances.	**Y**		On track. Will select fixtures that meet 1.28 gpf WC, 0.125 gpf Urinal, 1.0 gpm Lav, 1.5 gpm KS, and 1.75 gpm Shower to target 35% water use reduction. Will select all ENERGY STAR appliances.
Credit 2	Indoor Water Use Reduction	Required: Reduce demonstrate a water use reduction from UPC/IPC baseline and EPAct 1992 standards. 25% (1 pt), 30% (2 pts), **35% (3 pts),** 40% (4 pts), 45% (5 pts), 50% (6 pts)	**3**	**2**	
Prereq 3	Building-Level Water Metering	Required: Design to include whole building water meter and provide meter data to USGBC for 5 years.	**Y**		No action required. On track. Will include a whole building water meter.
Credit 4	Water Metering	Required: Install permanent water submeters for two or more of the following: Irrigation, indoor plumbing fixtures, domestic hot water, boiler (min 100,000 gal/yr), or reclaimed water. Activity: Discussed submetering units, irrigation, and domestic hot water.	**1**		On track. Will show submetering for units, irrigation, and domestic hot water.
Energy and Atmosphere					
Prereq 1	Fundamental Commissioning and Verification	Required: Contract Commissioning Agent to commission energy systems in the building. Note that Fundamental Commissioning now requires a contract at beginning of DD, includes a review of the mid-construction documents, and includes review of the building envelope.	**Y**		No action required at this time. Will hire CxA by DD.
Credit 1	Enhanced Commissioning	Option 1: Enhanced systems commissioning (3-4 pts) - Path 1: (3 pts) Enhanced Commissioning (similar to v2009) - Path 2: (4 pts) Enhanced Monitoring-based commissioning Achieve Path 1 AND include procedures and measurement points in the commissioning plan.	**3**		
Credit 1	Enhanced Commissioning	Option 2: Envelope commissioning (2 pts). Requirements include, but are not limited to: - Hire BECx before Permit Submission - Credentials must be approved by AHJ - Complete drawing reviews - Submit BECx Plan to AHJ prior to envelope installation - Submit BECx Report to AHJ prior to final inspection]		**2**	
Prereq 2 / Credit 2	Minimum / Optimize Energy Performance	Option 1: Whole-building energy simulation Meet mandatory provisions and demonstrate 12% energy improvement beyond ASHRAE 90.1-2010. (5% required for Prerequisite) 6%-1pt, 8%-2pts, 10%-3pts, 12%-4pts, 14%-5pts, 16%-6pts, 18%-7pts, 20%-8pts, 22%-9pts, 24%-10pts, 26%-11pts, 29%-12pts, 32%-13pts, 35%-14pts, 38%-15pts, 42%-16pts, 46%-17pts, 50%-18pts Activity: First energy model iteration completed to inform design decisions.	**8**	**2**	On track. Will consider EEOs for increased performance. Reference energy model report.
Prereq 3	Building-Level Energy Metering	Required: Install building energy meters to encompass all energy used by the building and provide meter data to the USGBC for 5 years.	**Y**		No action required at this time. On track. Will include a whole building energy metering point to collect whole building energy use data.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Prereq 4	Fundamental Refrigerant Management	Required: Do not use CFC based refrigerants	**Y**		On track. Will note refrigerants within mechanical schedule.
Credit 3	Advanced Energy Metering	Required: In addition to the whole building energy meters, install submeters to monitor all energy end uses that represent 10% or more of the total annual consumption of the building. Meters must use BAS or other network, must store data for minimum of 36 months, data must be remotely accessible, must record consumption and demand, must report hourly, daily, monthly and annual. Activity: VECC 2018 positions project well.	**1**		On track. Will use energy model to determine the applicable end uses that represent 10% or more of annual consumption and must be metered.
Credit 6	Enhanced Refrigerant Management	Required Option 2: Calculation of refrigerant impact. Comply with weighted average calculation: $\frac{\sum (LCGWP + LCODP \times 10^5) \times Qunit}{Qtotal} \leq 100$		**1**	*Explore feasibility. Determine if selected systems will comply.*
Credit 7	Renewable Energy v4.1 credit subsitution	Required: Purchase RECs for the threshold of annual building energy use for a period of 10 years. 1pt - 10%, 2 pts - 20%, 3 pts - 30%, 4 pts - 40%, 5 pts - 50%		**5**	Will explore at end of construction.
Materials and Resources					
Prereq 1	Storage/Collection of Recyclables	Required: Provide an easily-accessible, dedicated area for the collection and storage of paper, cardboard, glass, plastics, and metals. Additionally, provide collection areas for 2 of the following: batteries, mercury lamps, and/or electronic waste	**Y**		On track. Will provide recycling chutes and space for storing recycables and batteries/electronic waste.
Prereq 2	Construction and Demolition Waste Management Planning	Required: Develop and implement a Construction Waste Management plan that identifies 5 main materials targeted for recycling during construction.	**Y**		On track. Will include requirements in specifiations for GC to follow.
Credit 1	Building Life-Cycle Impact Reduction	Required Option 4: Whole Building LCA (3-4 pts) v4.1 Path 3 (3 pts): Conduct an LCA that demonstrates a 10% reduction in 3 of 6 impact categories, one of which must be Global Warming Potential (GWP). v4.1 Path 4 (4 pts): Incorporate building reuse for the proposed design. Conduct an LCA that demonstrate a 20% reduction in GWP and a 10% reduction in two additional impact categories. Paths 3/4: No impact category may increase more than 5% compared to the baseline building.	**3**		Will conduct LCA Kick-off after 4.1 submission filing. Kick-off will include owner, architect, and structural engineer. Will itemize early decisions that have reduced material quantity from baseline conditions and will brainstorm ways to further reduce material impact based on material choices.
Credit 2	Building Product Disclose and Optimization (BPDO): EPDs	Required Option 1: Use 20 different permanently installed products, sourced from at least 5 different manufacturers, with EPDs. - Critically reviewed LCA - 0.25 products - Industry-Wide EPD - 0.5 products - Product-Specific Type III EPD - 1 product	**1**		On track. Will include requirements in specifiations for GC to follow.
Credit 2	Building Product Disclose and Optimization (BPDO): EPDs	Required Option 2: Use products that comply with criteria for 50% by cost of the total value of permanently installed products, or at least 10 products. - Reduced impacts below industry average in 3 cateorgies - Products also locally sourced (w/i 100 miles) - double their contribution up to 200% cost or 2 products	**1**		On track. Will include requirements in specifiations for GC to follow.

Scorecard

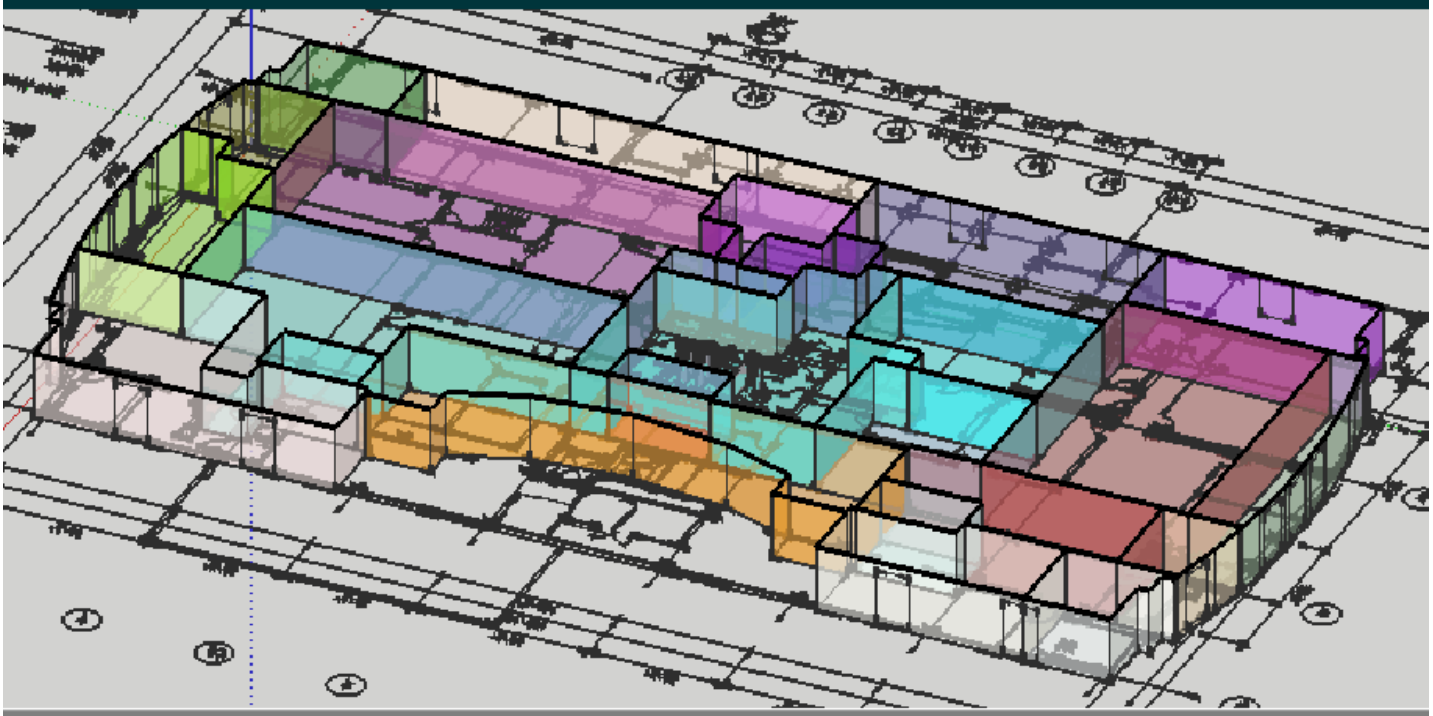
Credit		Requirement & Comments	Yes	Maybe	Action
Credit 3	Building Product Disclose and Optimization (BPDO): Sourcing of Raw Materials	Required Option 1: Raw Material Source and Extraction Reporting (1 pt) Use at least 20 products from 5 manufacturers with raw material extraction reports. - Self-Declared Reports - 0.5 products - 3rd Party Corporate Sustainability Report (CSR) - 1 product	**1**		On track. Will include requirements in specifiations for GC to follow.
Credit 4	Building Product Disclose and Optimization (BPDO): Material Ingredients	Option 1 *Material Ingredient Reporting* (1 pt) - Use at least 20 products, from 5 different manufacturers, with one of the following certifications indicating that their material ingredients have been reported and their environmental and health impacts are minimal. - Health Product Declaration - Cradle to Cradle (v2 Basic / v3 Bronze or higher) - Cradle to Cradle Material Health Certificate (Bronze or higher) - Declare - UL Product Lens Certification - ANSI/BIFMA e3 Furniture Sustainability Standard (3 points or higher)	**1**		On track. Will include requirements in specifiations for GC to follow.
Credit 4	Building Product Disclose and Optimization (BPDO): Material Ingredients	Option 2 *Material Ingredient Optimization* (1 pt) - Use products that comply with criteria for 25% by cost of the total value of permanently installed products. - GreenScreen v1.2 Benchmark - GreenScreen List Translater - 100% cost - GreenScreen Assessment - 150% cost - Cradle to Cradle Certified - Cradle to Cradle v2 Gold - 100% cost - Cradle to Cradle v2 Platinum - 150% cost - Cradle to Cradle v3 Silver - 100% cost - Cradle to Cradle v 3 Gold/Platinum - 150% cost - REACH Authorization, Restriction, and Candidate List - Product does not contain any listed ingredients - 100% cost Products also locally sourced (w/i 100 miles) - double their contribution up to 200% cost or 2 products	**1**		On track. Will include requirements in specifiations for GC to follow.
Credit 5	Construction and Demolition Waste Management	Option 1 *Diversion* Path 1: Divert 50% and 3 Material Streams (1 pt) Path 2: Divert 75% and 4 Material Streams (2 pts)	**1**	**1**	On track. Will include requirements in specifiations for GC to follow.
Indoor Environmental Quality					
Prereq 1	Minimum Indoor Air Quality Performance	Required for Mechanically-Ventilated Buildings: 1. Meet the minimum requirements of ASHRAE 62.1-2010 and demonstrate with room-by-room calculations in USGBC Calculator (https://www.usgbc.org/resources/minimum-indoor-air-quality-performance-calculator). 2. Provide airflow monitoring with alarm capabilities (when/if OA varies by 15% or more) on VAV OA equipment. Constant volume: balance outdoor airflow as defined in 62.1–2010. Install a current transducer on the supply fan, an airflow switch, or similar monitoring device. 3. Install CO sensors in any closed combustion or power vented equipment (if applicable) Activity: Confirmed DOAS provided.	**Y**		On track. DOAS equipment provided to deliver OA to units and common areas.
Prereq 1	Minimum Indoor Air Quality Performance - Residentail ONLY	Required for all Dwelling Units: 1. Meet the requirements of LEED v4.1 Multifamily EQ Prerequisite Minimum indoor air quality performance, EQ Prerequisite Combustion venting and EQ Prerequisite Radon-resistant construction. Observed: Arlington County in Radon Zone 2 - exempt from radon requirements + units located over exhausted garage.	**Y**		On track. Ensure any indoor fireplaces are direct vent with closed combustion.
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required: Prohibit smoking in the building and within 25 feet of entries, outdoor air intakes and operable windows. Provide a robust no smoking policy highlighting communication and enforcement of no smoking policy.	**Y**		On track. Will add signage. On track. Building is non-smoking and lease language will be provided.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 1	Enhanced Indoor Air Quality Strategies	Required Option 1: Enhanced IAQ Strategy (1 pt) - For mechanically ventilated implement all of the following. a) Entryway Systems - 10ft in direction of travel b) Interior Cross contamination prevention - Exhaust hazardous gas areas c) Filtration - MERV 13 filtration on all OA	**1**		Option 1 on track: 1. Will show 10' long walk-off mats inside all building entrances (not required at egress-only doors). 2. Will ensure housekeeping rooms, laundry rooms, and any rooms with chemicals have deck-to-deck partitions, hard lid ceiling, and/or self closing doors. Option 1 on track: 1. Will ensure housekeeping rooms, laundry rooms, and any rooms with chemicals are directly exhausted to the outdoors. 2. Will specify MERV 13 filters in mechanical schedule
Credit 1	Enhanced Indoor Air Quality Strategies	Required Option 2: Additional enhanced IAQ strategies(1pt)- Select one of the following: a) Exterior contaminant prevention - model contamination dispersion b) Increased ventilation - 30% over ASHRAE **c) Carbon dioxide monitoring - in all densely occupied spaces (25 people per 1,000 square feet or 1 person per 40 square feet)** d) Additional source control - for spaces where air contaminants are likely (besides CO2) evaluate potential sources of contaminants and alarm if unsafe conditions occur.	**1**		On track. Will show CO2 sensors in the following spaces (any space with the occupancy ratio of 25 people per 1,000 sf):
Credit 2	Low-Emitting Materials v4.1 credit substitution	Required: Perform Product Category Calculations for VOCs and Emissions limits for up to 5 of the following categories (2 categories-1 pt, **3 categories-2 pts**, 4 categories-3 pts, 5 categories-3pts+EP): **- Interior paints and coatings** **- Flooring** **- Insulation** - Composite Wood (ULEF) **- Ceilings** - Wall Panels - Interior adhesives and sealants - Furniture	**3**		On track. Will include requirements in specifiations for GC to follow.
Credit 3	Construction Indoor Air Quality Management Plan	Required: 1. Develop and Implement IAQ Management Plan during construction that meets updated SMACNA requirements. 2. Prohibit smoking inside the building and within 25 feet of entrances during construction.	**1**		On track. Will include requirements in specifiations for GC to follow.
Credit 5	Thermal Comfort	Required: 1. Demonstrate system meets ASHRAE 55-2010 for each space type 2. Provide thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multioccupant spaces. Activity: Discussed equipment requirements to support thermostats in 50% of single-occupant spaces and 100% of multi-occupant spaces.	**1**		On track. Will design equipment to meet thermal comfort requirements.
Credit 6	Interior Lighting	Required Option 1: Lighting Control (1pt) Provide individual controls at 3 levels (on, off, midlevel) for 90% of individual spaces. Multioccupant spaces must have 3 levels or multizones, presentation lighting controlled separately, switches must be in same location as luminaires. Activity: Discussed lighting control equipments, specifically in the units, to achieve credit.	**1**		On track. Will provide the appropriate level of lighting controls in applicable spaces.
Credit 8	Quality Views	Required: Demonstrate 75% of regularly occupied floor area has at least two of the following: - Multiple lines of sight to vision glazing at least 90 degrees - Views that include at least 2 of the following: (1) flora, fauna, sky (2) movement, (3) objects at least 25 feet from glazing - Unobstructed views located within the distance of 3x head height of vision glazing - Views with a view factor of 3 or greater. Observed: Some conceptual unit layouts may need further evaluation, specifically those with inboard bedroom with no windows or transom windows.		**1**	*Explore feasibility. Some unit layout with bedrooms without windows or only transom windows may swing the credit out of compliance depending on total quantity of such conditions.*

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Innovation					
Credit 1.1	Innovation Credit: Low-Mercury Lamps	Requirements: - For all mercury-containing lamps purchased for the building, the lamps must have an average of 70 picograms of mercury per lumen-hour or less - Lamps containing no mercury may be counted only if their energy efficiency at least equals that of their mercury-containing counterparts *Note* : This credit can be achieved by using majority (~90%+) LED bulbs.	1		Plan for integral LED lighting in units.
Credit 1.2	Pilot Credit: Integrative Analysis of Building Materials	Requirements: - Use at least 3 different permanently installed products that have a documented LCA (life-cycle assessment) with a qualitative analysis of the potential health, safety, and environmental impacts.	1		Will complete at end of project.
Credit 1.3	Innovation: O+M Starter Kit	Requirements: To achieve 1 pt, implement 2 of the following policies. To achieve 2 pts, implement 4 policies. (SBP can help to develop policy templates) - Site Management Policy - Ongoing Purchasing and Waste Policy - Facility Maintenance and Renovations Policy - Green Cleaning Policy - Integrated Pest Management	1		Select 2 policies to implement.
Credit 1.4	Pilot Credit: Assess and Plan for Resiliency	Requirements: - Must complete Hazard Assessment - Must complete a Climate Related Risk Management Plan or Emergency Preparedness Plan	1		Will complete Hazard Assessment and Climate Related Risk Management Plan for project before end of DD.
Credit 1.5	Exemplary Performance: Low-Emitting Materials (90%+ in 3 categories) or Heat Island Reducation	Low-emitting - 90%+ in 3 categories OR Heat Island - achieve both options	1		On track. Will include requirements in specifiations for GC to follow.
Credit 2	LEED Accredited Professional	1 LEED AP	1		Compliant.
Regional Priority					
Credit 1	Regional Priority	Regional Priority: Access to Quality Transit (thrsh: 4 pts)	1		On track.
Credit 2	Regional Priority	Regional Priority: Green Vehicles	1		On track.
Credit 3	Regional Priority	Regional Priority: Rainwater Mgmt (thrsh: 3 pts)		1	Not anticipated.
Credit 4	Regional Priority	Regional Priority: Reduced Parking Footprint, Opt Energy (thrsh: 10 pts)	1		On track.



Energy Model Report

Arlington County Regulation 4.1 Site Plan Conditions

Riverhouse Central – C1

Arlington, VA

4.1 SPC Report v1

March 7th, 2025

SUSTAINABLE BUILDING PARTNERS

2701 Prosperity Avenue, Suite 100
Fairfax, Virginia 22031

www.sustainbldgs.com

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Purpose

Sustainable Building Partners, LLC (SBP) has developed a whole building energy simulation using Energy Plus v22.1 via the OpenStudio v1.8 interface for the proposed Riverhouse Central – C1 residential building in Arlington, VA. SBP utilizes the model as a design tool for the purpose of enhancing the energy performance of the facility and to increase LEED Energy & Atmosphere Credit 2 points. SBP's modeling methodology is consistent with LEED and ASHRAE 90.1-2010 Appendix G modeling protocol and best practices.

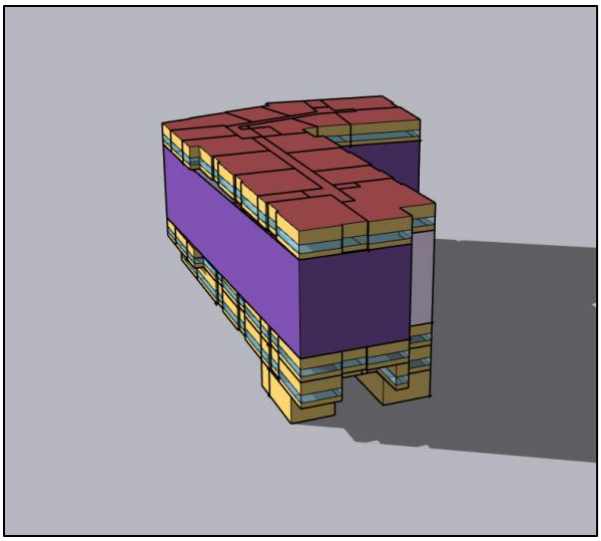


Figure 1: Energy Model Rendering of Riverhouse Central – C1

Arlington Regulation 4.1 Site Plan Conditions

This energy analysis is submitted in support of Condition 18A of the Arlington Regulation 4.1 Site Plan Conditions. The analysis uses LEED v4 for the primary benchmarking with an ASHRAE 90.1-2010 Appendix G baseline condition.

Performance Disclaimer

This analysis is based on an early Schematic Design thus all results and benchmarking should be viewed as relative order-of-magnitude (RoM). This report works to establish high-level performance targets and general design standards but does not guarantee future performance.

Preliminary Energy Estimates

This section of the report summarizes the results and benchmarking of the preliminary whole building hourly energy simulations. Table 1 provides the results of the hourly energy simulations.

Summary of Performance- Arlington SPCs

A summary of the preliminary energy performance benchmarking has been provided in Table 1.

Table 1: Annual Energy Consumption & Performance Benchmarking

Description [3]	Total Energy Cost ($/sqft)	Energy Cost Savings [1]	Site EUI (kBtu/sf)	Source EUI (kBtu/sf)	GHG[2] (Tons CO2e)	Energy Star Score
4.1 SPC Target	--	**≥20%**	**--**	**--**	**--**	**≥80**
Proposed Design	$1.20 – $1.40	**20 – 25%**	**38 - 42**	**100 - 110**	**400+**	**≥80**

[1] ASHRAE 90.1-2010 (LEED) Baseline design
[2] Estimated based on Year 1 (current) electric grid profile (EGRID projections). Future obligations will likely be reduced as the grid generation profile shifts towards low-carbon renewable energy sources.

Design Considerations

The following subsections summarize the primary limiting factors and other unique conditions associated with this design.

Preliminary Design

Throughout the early-design process, the project team has worked to optimize the building design through the quantitative and qualitative evaluation of various Energy Efficiency Opportunities (EEOs). Many of the discussed EEOs will be incorporated later in the design process (e.g. lighting), or are still being actively evaluated at this stage. All measures are evaluated based on energy savings, first cost, maintenance considerations, operational considerations, and infrastructure limitations.

Primary Features Impacting Energy Performance

Please see the BOD section for full design details. This section provides a summary of the specific items driving overall energy performance.

Split-System Heat Pumps
- 15 SEER / 8.5 HSPF (Tenant spaces)
- 18 SEER / 10 HSPF (Owner spaces)
- Equipped with ECMs

DOAS
- Air-cooled DX
- Gas-fired furnace
- Hot-gas reheat

Interior Lighting
- Currently modeled as cost-neutral

Garage Lighting Power
- Estimated ≥50% reduction in designed lighting power (anticipated)

EnergyStar Appliances
- Fridge, dishwasher, clothes washer

Low Flow Plumbing Fixtures
- 1.75 GPM Showers, 1.5 GPM Faucets

Domestic Hot Water
- In-Unit Electric water heaters

Design Considerations - Domestic Hot Water

SBP has evaluated various design alternates for the domestic hot water system. This analysis applies to the multifamily, condominium, and independent living units.

Design Alternates:

- Gas-fired condensing boilers
- In-unit electric-resistance storage (market standard)
- Heat pumps (in-unit or clustered)
- Heat pumps (central)

Table 3: DHW Performance Comparison (annualized, per avg. unit)

DHW System	Annual Energy Per Unit (avg)	Annual Cost Per Unit (avg)	Source Energy Per Unit (kBtu/yr)	GHG Per Unit (lbs CO2e/yr)(1)
In-Unit Electric Storage	2,015 kWh/yr	$240	21,400	1,300
Gas-fired Condensing	95 thm/yr	$95	10,100	1,100
Heat Pump	**705 kWh/yr**	**$85**	**7,500**	**440**
(1) Estimated based on Year 1 (current) EGRID projections				

Challenges/Limiting Factors

- In-unit Electric: Highest operating energy, cost, short- and mid-term emissions
- In-unit or clustered HPWHs: Challenging space and venting requirements
- Central HPWHs (ganged plant): Scalability, plant size
- Central HPWHs (commercial): Cost, low-temp operation
- Gas-Fired: Highest first cost, counter to long-term electrification initiatives

Design Considerations - Dedicated Outside Air System (DOAS)

Design Alternates:

- Air-cooled DX with gas-fired furnace
- Air-source heat pump with gas-fired auxiliary
- Air-source heat pump with electric-resistance auxiliary
- Air-cooled DX with electric resistance heating

Table 4: DOAS Performance Comparison (Annualized, per 1k CFM)

DOAS Configuration	Energy Cost Per 1k CFM	Source Energy Per 1k CFM (mmBtu/yr)	GHG Emissions (tons CO2e/yr)(1)
Gas-Fired Furnace	$2,400	240	11
Heat Pump with Gas Auxiliary	**$2,400**	**219**	**7**
Heat Pump with Electric Auxiliary	$2,800	250	8
Electric-Resistance	$7,000	639	19
(1) Estimated based on Year 1 (current) EGRID projections			

Challenges/Limiting Factors

- Gas-fired Furnace: Counter to long-term electrification initiatives
- Heat Pumps: Size limitations (≤70-tons), auxiliary systems at low ambient temps
- Electric-Resistance: Highest operating energy, cost, and short- and mid-term emissions

Energy Efficiency Opportunities

The following is a list of specific load reduction and energy savings strategies that could increase the overall energy performance of the building. **At this phase of design, measures should be evaluated for RoM only**.

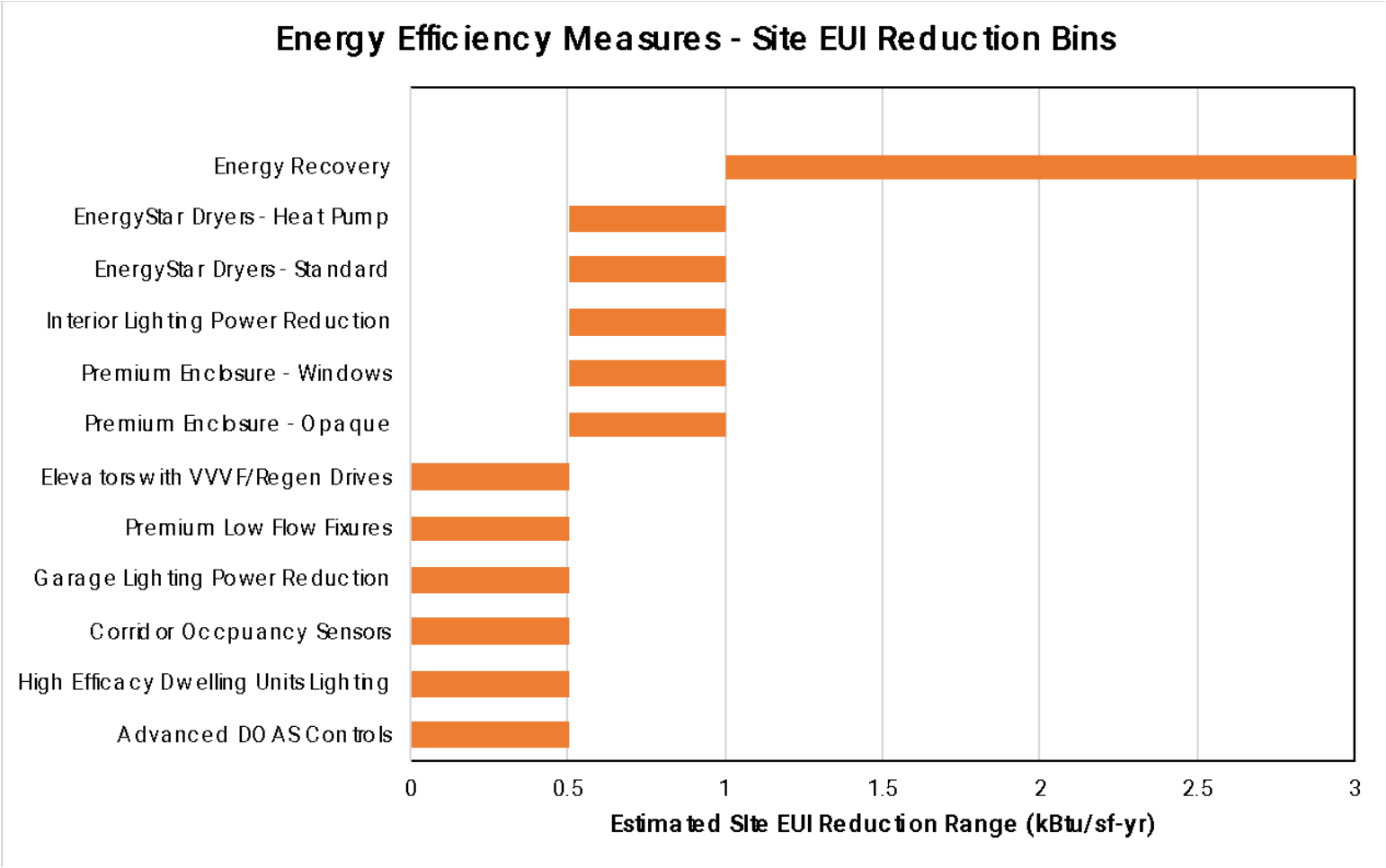


Figure 2: Estimated EEO Energy Reductions

Measure Narrative Descriptions

The subsequent tables provide general descriptions of the measures list in Figure 2 above.

Table 6: Energy Efficiency Opportunity (EEO) Summary

EEO	Measure	Category	Base Design	Measure Description	Path to 25% EUI Reduction (1)
1	Premium Enclosure - Opaque	Building Enclosure	See enclosure section.	Roof: R-40+ No signif. points of wall thermal bridging	--
2	Premium Enclosure - Windows			U-0.35 / 0.25 SHGC	**Path #2**
3	Interior Lighting Reduction	Lighting	0.60 W/sf (common & BOH areas)	0.48 W/sf	**Path #1 & #2**
4	High Efficacy Dwelling Unit Lighting		40 - 50 lumens/Watt	≥60-70 lumens/Watt	--
5	Garage Lighting Reduction		0.12 W/sf	0.08 W/sf	**Path #1 & #2**
6	Corridor Occupancy Controls		24/7 operation	Bi-level lighting controls (50% when unocc.)	**Path #2**
7	EnergyStar Dryers	Process & Equipment	Standard Electric	Moisture Sensing OR Ventless Condensing HP	**Path #2**
8	Elevators – VVVF & Regen. Drives		Standard traction	VVVF controls + regenerative drives	**Path #2**
9	Premium Low Flow Fixtures	Plumbing	Shower – 1.75 GPM Faucets: 1.50 GPM	Showers – 1.5 GPM Lav. Faucets: 0.5 GPM	--
10	Discharge Air Temp. Reset Controls	HVAC	Fixed DAT: 70°F	Reset based on OAT 60°F DAT @ ≥76°F	**Path #2**
11	Ventilation Energy Recovery		No Energy Recovery	Enthalpy wheel pretreats all incoming outdoor air	**Path #1**

(1) SBP has proposed two (2) potential design packages that help the design achieve the targeted 25% site energy reduction

Preliminary Basis of Design

Many assumptions and placeholders have been used in this analysis given the early nature of the design. The intent of this type of analysis is relative order of magnitude (RoM), so small adjustments to design inputs or schedules likely won't change overall findings and takeaways from the analysis. SBP asks that the subsequent section be reviewed for general accuracy.

General Design & Operational Parameters

Table 7: General Project Parameters

Project Types	Mixed-Use: Multifamily
Modeling Software	EnergyPlus V22.1 / OpenStudio V1.8
Project Location	Arlington, VA
Climate Zone/Weather	4A / TMY3 – Washington, DC
Design Day Conditions	Cooling – 92°F / 77°F, Heating – 15°F
Design Temperatures	75°F – Cooling / 70°F Heating
Quantity of Floors	7 floors + 1 below-grade parking
Building Area (GSF – excludes parking)	~124,400 GSF
Dwelling Units	102 units (1BD – 37, 2BD – 41, 3BD – 24)
Electric Utility Rates	EIA, 2024 VA avg – Residential: $0.1454/kWh EIA, 2024 VA avg – Commercial: $0.0893/kWh
Gas Utility Rates	EIA, 2024 VA avg – Commercial: $0.92/therm

Exterior Opaque Constructions

All assemblies have been developed in accordance with the SD design package, ASHRAE RP-1365, 2017 DC Energy Code, and ASHRAE 90.1 Appendix A.

Table 8: Opaque Envelope Performance Summary

Assembly Name	Assembly Type	Description	Proposed Performance	Points of Thermal Bridging
Wood Stud Wall	Ext. Wall	Wood Stud R-20 Batt	U-0.054	--
Metal Stud Wall (nominal condition)	Ext. Wall	Metal Stud 1.5" C.I + R-13 Batt	U-0.072	Metal studs, SS brick ties
Metal Panel Wall at Floor Edge (predominant condition)	Ext. Wall	Metal Stud 1.5" C.I + R-13 Batt	U-0.134	Metal studs, SS brick ties, shelf angles
Base Roof	Roof	R-38 Batt between wood joists	0.034	--
Floor over garage	Floor	Est. R-12.6 insulation below conc. slab	0.071	--

See Enclosure Calculation section for full layer-by-layer sections.

Window Assemblies

All performance has been estimated based performance specifications provided by the design team.

Window Area (estimated): 35%

Basis of Design - Glazing:
1" IGU, Double-pane, low-E, air-filled

Basis of Design – Framing:
Residential: Non-metal
Lobby: Thermally-broken aluminum

Table 9: Window Assembly Performance (frame + glass)

Window System	U-value	SHGC
Residential	0.35	0.40
Lobby	0.42	0.40

Lighting Systems

The lighting design was not available for this analysis and has been approximated based on a standard market design

Table 10: Lighting Summary

Use Type	Lighting Power (W/sf)	Occupancy / Daylighting Controls	Design Target LPD (W/sf) EEOs
Multifamily/Condo/Senior (common & BOH)	0.60	As required by code	0.48
Parking Garage	0.12	OS / Bi-Level	0.08
Dwelling Units *(not regulated by 90.1)*	40-50 lm/W	N/A	~60-70 lm/W

Equipment & Appliances

Table 11: Process & Equipment Summary

Component	Description
Dwelling Unit Appliances	• Fridge: EnergyStar (required by SPCs) • Dishwasher: EnergyStar (required by SPCs • Clothes Washer: EnergyStar (required by SPCs) • Dryer: Electric, Standard • Range: Electric, standard
Misc. Plug Loads	Modeled in accordance with LEED Multifamily Midrise Guidelines
Elevators	MRL Gearless Traction
Garage Ventilation	• 0.75 CFM/sf • DCV (CO/NOx controls) + VFDs

Domestic Hot Water System

The DHW system are described in the system narrative as follows.

Table 13: DHW Summary

Component	Description
Water Heater Type	Electric storage water heaters
Configuration	In-unit
Storage Capacity	40-gallons (1BD), 50-gallons (2BD/3BD)
Efficiency	0.93 EF

Base Building HVAC Narrative

Table 14: HVAC Basis of Design

Design Component	Description
Primary System	Split System Heat Pumps • 14 SEER / 8.2 HSPF • Equipped with ECMs
Ventilation System	100% Dedicated Outside Air Unit • Air-Cooled DX • Gas-fired Furnace • Hot gas reheat • Fixed discharge air temperature (70°F)
Ventilation Rates	• Dwelling Units – ASHRAE 62.2 • Common – ASHRAE 62.1 • Corridors – 0.20 CFM/sf

Appendix – Opaque Assembly Calculations

Modeled assemblies have been developed consistent with Appendix A of ASHRAE 90.1-2010.

Wood Stud Wall (Parallel Path)		
Path 1	**Path 2**	**Layer**
0.17	0.17	Exterior Air Film
0.00	0.00	Façade (outside thermal boundary)
0.56	0.56	5/8" Gypsum Board
20.00	0.00	R-20 Batt Insulation
0.00	6.88	4x6" Wood Studs
0.56	0.56	5/8" Gypsum Board
0.68	0.68	Interior Air Film
21.97	**8.85**	**Total Assembly R-value**
75%	**25%**	**Path Area %**
0.054		**Total Assembly U-value**

Metal-Stud Wall	
R-value	**Layer**
0.17	Exterior Air Film
0.00	Façade (outside thermal boundary)
5.85	1.5" Continuous Insulation (R-7.5 nom) (derated for cladding system)
0.56	5/8" Gypsum Board
6.00	3.5" Batt Insulation (R-13 nom) between metal studs at 16" O.C.
0.56	5/8" Gypsum Board
0.68	Interior Air Film
13.82	**Total Assembly R-value**
0.072	**Total Assembly U-value**

Typical Roof		
Path 1	**Path 2**	**Layer**
0.17	0.17	Exterior Air Film
0.00	0.00	Roof Membrane (outside thermal boundary)
0.56	0.56	5/8" Gypsum Board
38.00	0.00	R-38 Batt Insulation
0.00	6.88	Wood Joists
0.56	0.56	5/8" Gypsum Board
0.61	0.61	Interior Air Film
39.90	**8.78**	**Total Assembly R-value**
90%	**10%**	**Path Area %**
0.034		**Total Assembly U-value**

Floor Over Garage	
R-value	**Layer**
0.17	Exterior Air Film
12.60	3" rigid insulation
0.38	6" concrete slab
0.92	Interior Air Film
14.07	**Total Assembly R-value**
0.071	**Total Assembly U-value**

Appendix - Simulation Output Files

The following screen captures are selected simulation output files for the Design Energy Cost (DEC) or Proposed case as well as those from the Performance Rating Method (PRM) or Baseline case.

Proposed Model Output Reports

	Electricity Energy Use [kWh]	Electricity Demand [W]	Natural Gas Energy Use [therm]	Natural Gas Demand [Btu/h]
Heating -- General	49908.58	170188.22	13158.89	513232.30
Cooling -- General	155943.61	131866.89	0.00	0.00
Interior Lighting -- General	144735.42	17387.16	0.00	0.00
Interior Lighting -- Residential	78498.99	19944.11	0.00	0.00
Exterior Lighting -- Elevator	73377.96	26627.20	0.00	0.00
Exterior Lighting -- Exterior Lighting	21780.02	5000.00	0.00	0.00
Exterior Lighting -- Garage Fans	18772.70	2143.00	0.00	0.00
Exterior Lighting -- Garage Lighting	18770.51	2857.00	0.00	0.00
Interior Equipment -- General	23448.85	6029.10	0.00	0.00
Interior Equipment -- Residential	304454.90	71907.10	0.00	0.00
Fans -- General	85145.94	9719.85	0.00	0.00
Pumps -- General	0.00	0.00	0.00	0.00
Water Systems -- General	103290.93	493672.55	0.00	0.00

ASHRAE Baseline Building Output Reports

EAp2-4/5. Performance Rating Method Compliance

	Electricity Energy Use [kWh]	Electricity Demand [W]	Natural Gas Energy Use [therm]	Natural Gas Demand [Btu/h]
Heating -- General	0.00	0.00	15006.58	1524886.35
Cooling -- General	243588.53	165082.57	0.00	0.00
Interior Lighting -- General	144735.42	17387.16	0.00	0.00
Interior Lighting -- Residential	78498.99	19944.11	0.00	0.00
Exterior Lighting -- Elevator	73377.96	26627.20	0.00	0.00
Exterior Lighting -- Exterior Lighting	21780.02	5000.00	0.00	0.00
Exterior Lighting -- Garage Fans	30502.34	3482.00	0.00	0.00
Exterior Lighting -- Garage Lighting	29722.70	4524.00	0.00	0.00
Interior Equipment -- General	23448.85	6029.10	0.00	0.00
Interior Equipment -- Residential	321945.57	76038.10	0.00	0.00
Fans -- General	296816.83	33883.17	0.00	0.00
Pumps -- General	7342.38	1868.92	0.00	0.00
Water Systems -- General	138930.37	500671.17	0.00	0.00

Acronym Legend

AHU	Air-Handling Unit
CHW	Chilled Water
CI or C.I.	Continuous Insulation
CO2e	Carbon Dioxide Equivalent
COP	Coefficient of Performance
CRI	Color Rendering Index
CS	Core & Shell
CW	Condenser Water
DAT	Discharge Air Temperature
DCV	Demand Controlled Ventilation
DEC	Design Energy Cost
DHW	Domestic Hot Water
DX	Direct Expansion
EA	Energy & Atmosphere
ECM	Electronically Commutated Motor
EEO	Energy Efficiency Opportunity
EER	Energy Efficiency Ratio
EF	Energy Factor
E_t	Thermal Efficiency
EUI	Energy Use Index (kBtu/sf)
FCU	Fan Coil Unit
FP	Fan-Powered
GHG	Greenhouse Gas
GPM	Gallons per Minute
HP	Heat Pump OR Horsepower
HSPF	Heating Seasonal Performance Factor
HW	Hot Water
IGU	Insulated Glass Unit
LPD	Lighting Power Density
NC	New Construction
OC or O.C.	On center
PRM	Performance Rating Method
REC	Renewable Energy Credit
RTU	Rooftop Unit
SAT	Supply Air Temperature
SC	Shading Coefficient
SEER	Seasonal Energy Efficiency Ratio
SHGC	Solar Heat Gain Coefficient
SS	Stainless Steel
SSHP	Split System Heat Pump
VAV	Variable Air Volume
VFD	Variable Frequency Drive
VRF	Variable Refrigerant Flow
VRV	Variable Refrigerant Volume
VSD	Variable Speed Drive
VT	Visible Transmittance
VVVF	Variable Voltage, Variable Frequency
WSHP	Water Source Heat Pump
W/sf	Watts per Square Foot

LEED v4 for BD+C New Construction

Riverhouse Central - Multifamily

March 10, 2025

SUSTAINABLE BUILDING PARTNERS

1	0	0	Integrative Process	Possible Points:	1
Y	?	N			
1			Credit 1 Integrative Process		1

11	4	1	Location and Transportation	Possible Points:	16
Y	?	N			
		16	Credit 1 LEED for Neighborhood Development		16
1			Credit 2 Sensitive Land Protection		1
	2		Credit 3 High Priority Site		2
5			Credit 4 Surrounding Density & Diverse Uses		5
4		1	Credit 5 Access to Quality Transit		5
	1		Credit 6 Bicycle Facilities (v4.1)		1
1			Credit 7 Reduced Parking Footprint (v4.1)		1
	1		Credit 8 Electric Vehicles (v4.1)		1

PATH 1	16
PATH 2	1

5	1	4	Sustainable Sites	Possible Points:	10
Y	?	N			
Y			Prereq 1 Construction Activity Pollution Prevention		Required
1			Credit 1 Site Assessment		1
	1	1	Credit 2 Site Development - Protect or Restore Habitat		2
1			Credit 3 Open Space		1
		3	Credit 4 Rainwater Management		3
2			Credit 5 Heat Island Reduction		2
1			Credit 6 Light Pollution Reduction		1

5	2	4	Water Efficiency	Possible Points:	11
Y	?	N			
Y			Prereq 1 Outdoor Water Use Reduction		Required
Y			Prereq 2 Indoor Water Use Reduction		Required
Y			Prereq 3 Building-Level Water Metering		Required
1	1		Credit 1 Outdoor Water Use Reduction		2
3	1	2	Credit 2 Indoor Water Use Reduction		6
		2	Credit 3 Cooling Tower Water Use (v4.1)		2
1			Credit 4 Water Metering		1

12	10	11	Energy and Atmosphere	Possible Points:	33
Y	?	N			
Y			Prereq 1 Fundamental Commissioning and Verification		Required
Y			Prereq 2 Minimum Energy Performance		Required
Y			Prereq 3 Building-Level Energy Metering		Required
Y			Prereq 4 Fundamental Refrigerant Management		Required
3	2	1	Credit 1 Enhanced Commissioning		6
8	2	8	Credit 2 Optimize Energy Performance		18
1			Credit 3 Advanced Energy Metering		1
		2	Credit 4 Demand Response (v4.1)		2
	5		Credit 5 Renewable Energy (v4.1)		5
	1		Credit 6 Enhanced Refrigerant Management		1

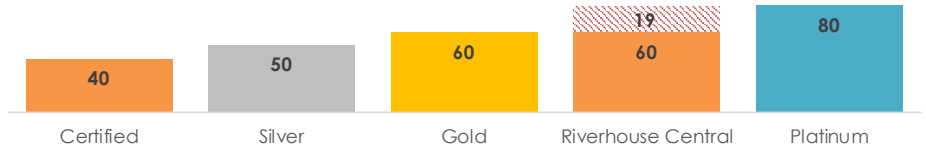
9	1	3	Materials and Resources	Possible Points:	13
Y	?	N			
Y			Prereq 1 Storage and Collection of Recyclables		Required
Y			Prereq 2 Construction and Demolition Waste Management Planning		Required
3		2	Credit 1 Building Life-Cycle Impact Reduction		5
2			Credit 2 Product Disclosure & Optimization - EPDs		2
1		1	Credit 3 Product Disclosure & Optimization - Sourcing of Raw Materials		2
2			Credit 4 Product Disclosure & Optimization - Material Ingredients		2
1	1		Credit 5 Construction and Demolition Waste Management		2

8	1	7	Indoor Environmental Quality	Possible Points:	16
Y	?	N			
Y			Prereq 1 Minimum Indoor Air Quality Performance		Required
Y			Prereq 2 Environmental Tobacco Smoke Control (v4.1)		Required
2			Credit 1 Enhanced Indoor Air Quality Strategies		2
3			Credit 2 Low-Emitting Materials (v4.1)		3
1			Credit 3 Construction Indoor Air Quality Management Plan		1
		2	Credit 4 Indoor Air Quality Assessment		2
1			Credit 5 Thermal Comfort		1
1		1	Credit 6 Interior Lighting		2
		3	Credit 7 Daylight		3
	1		Credit 8 Quality Views		1
		1	Credit 9 Acoustic Performance		1

6	0	0	Innovation	Possible Points:	6
Y	?	N			
1			Credit 1.1 Innovation Credit: Low-Mercury Lamps		1
1			Credit 1.2 Pilot Credit: Integrative Analysis of Building Materials		1
1			Credit 1.3 Innovation: O+M Starter Kit		1
1			Credit 1.4 Pilot Credit: Assess and Plan for Resiliency		1
1			Credit 1.5 Exemplary Performance: Low-Emitting Materials (90%+ in 3 categories)		1
1			Credit 2 LEED Accredited Professional		1

3	0	1	Regional Priority Credits	Possible Points:	4
Y	?	N			
1			Credit 1 Regional Priority: Access to Quality Transit (thrsh: 4 pts)		1
1			Credit 2 Regional Priority: Green Vehicles		1
		1	Credit 3 Regional Priority: Rainwater Mgmt (thrsh: 3 pts)		1
1			Credit 4 Regional Priority: Reduced Parking Footprint, Opt Energy (thrsh: 10 pts)		1

60	19	31	Possible Points: 110



LEED v4 for BD+C New Construction

RiverHouse Central - C1 Multifamily

March 10, 2025

4.1 Submission

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
General					
General	LEED Certification	Project is required to achieve LEED Gold as part of the Sector Plan requirements.			No action required.
Permitting	Arlington County Sustainability	Not pursuing GBIP.			No action required.
Integrative Process					
Credit 1	Integrative Process	Required: Identify opportunities for synergies across disciplines and building systems, through an analysis of energy and water-related systems and a LEED charette. At concept design or before completion of SD: - Perform simple box energy model - Perform simple water budget analysis - Complete the BOD and OPR (commissioning requirements) Activity: SBP has completed v1 of the Energy Model to help inform design decisions. SBP has started discussing potable water reduction strategies and will be completing a water budget analysis.	1		On track. Will complete water budget analysis before end of SD.
Location and Transportation					
Credit 2	Sensitive Land Protection	Required Option 1: Locate the development footprint on land that has been previously developed. Observed: Previously developed	1		No action required.
Credit 3	High Priority Site	Required Option 3: (2 pts) Brownfield Redevelopment		2	*Provide Phase I or Phase II ESA Report to determine feasibility.*
Credit 4	Surrounding Density and Diverse Uses v4.1 credit substitution	Required Option3: (1-5 pts) Walkable Location Observed: WalkScore 79 for 3 pts	5		No action required.
Credit 5	Access to Quality Transit v4.1 credit substitution	Required Path 1: Locate the project within 1/2-mile of metro or 1/4-mile of bus lines. Demonstrate the number of weekday/weekend trips as follows: Option 1: (1 pt) 72/30 Option 2: (2 pts) 100/70 Option 3: (3 pts) 144/108 Option 4: (4 pts) 250/160 Option 5: (5 pts) 360/216 Observed: ~180 rides/day	4		No action required.
Credit 6	Bicycle Facilities v4.1 credit substitution	Required: Implement all of the following: 1. Location must support a bicycle network. 2. Short term bike storage must be within 200 feet of a functional entrance and long term storage must be within 300 feet of a functional entrance. 3. For non-residential portions, provide bike spaces for: - 5% of occupants (but no less than 4) AND - 2.5% of peak visitors (but no less than 4) 4. For residential units, provide bikes spaces for: - 1 per 3 dwelling units OR 15% of residents (higher #) AND - 2.5% of peak visitors (but no less than 4) 5. For non-residential portions, provide 1 shower for the first 100 occupants and 1 shower for each 150 occupants thereafter		1	*Explore feasibility. Will only track as part of an above-Gold Scorecard.*
Credit 7	Reduced Parking Footprint v4.1 credit substitution	Required Option 2: Reduce Parking Number of spots does not exceed the minimum local code requirements for parking capacity and parking is reduced by 30% per ITE Handbook.	1		No action required.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 8	Electric Vehicles v4.1 credit substitution	Required: Provide electric charging spaces for 5% of parking capacity OR provide electric vehicle ready spaces for 10% of parking capacity.		**1**	Will explore feasibility.
Sustainable Sites					
Prereq 1	Construction Activity Pollution Prevention	Required: Erosion and Sediment Control Plan must conform to 2012 EPA Construction General Permit (CGP) or more stringent local regulations.	**Y**		Include compliant erosion and sediment control measures in the drawings.
Credit 1	Site Assessment	Required: Provide documentation explaining if/how the following site features influences the project design: - Topography - Hydrology - Climate - Vegetation - Soils - Human Use - Human Health Effects	**1**		SBP to complete site assessment credit documentation.
Credit 2	Site Development - Protect or Restore Habitat	Required Option 2 (1 pt): Preserve and protect 40% of the greenfield area on the site (if area exists). Donate $0.40 per sf (total site area) to approved conservation organiztions (i.e NFWF)		**1**	No action required at this time. Will action if needed to maintain Gold.
Credit 3	Open Space	Required: Provide outdoor space ≥ 30% of the total site. 25% of the outdoor space must be vegetated or have overhead vegetated canopy. Turf does not count towards vegetation. Outdoor space must be physically accessible. Activity: Grade level site elements will provide significant open space.	**1**		On track. Grade level site elements anticipated to meet requirements. SBP will refine take-offs and provide feedback at next milestone.
Credit 5	Heat Island Reduction	Required: Option 1 (2 pts) - Nonroof and roof. Nonroof (/0.5) + Roof (/0.75) + Vegetated Roof (/0.75) > Total Site Paving Area + Roof Activity: High roof will be white TPO (or similar).	**1**		*Explore feasibility.*
Credit 5	Heat Island Reduction	Required: Option 2 (1 pt) - 75% of parking is undercover Observed: All parking is undercover	**1**		No action required.
Credit 6	Light Pollution Reduction	Option 1: Backlight uplight glare (BUG) method. Can be included in luminaire cut sheets. - Uplight = U3 - Trespass = backlight & glare requirements base on mounting height and distance to lighting boundary.	**1**		1. Select fixtures with BUG ratings that meet B3-U3-G1. 2. Place amenity light fixtures on time clock control.
Water Efficiency					
Prereq 1	Outdoor Water Use Reduction	Required Prereq: Reduce irrigation by 30% (prereq)	**Y**		On track. Will limit irrigation as much as possible. Design for drip, moisture sensors, controllers where irrigation is needed.
Credit 1	Outdoor Water Use Reduction	Required Option 2: 50% Reduction (1 pt), 100% Reduction (2 pts) Strategies include drought tolerant plantings, drip irrigation, moisture control sensors, or cisterns. Activity: Plan to limit irrigation as much as possible. Courtyards may need drip.	**1**	**1**	

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Prereq 2	Indoor Water Use Reduction	Required (Prerequisite): 1. Reduce indoor water use by 20% 2. All qualifiable plumbing fixtures must be labeled EPA WaterSense 3. ENERGY STAR residential clothes washer and dishwasher. 4. Process Water: a) No once through cooling for heat rejecting equipment b) Cooling tower and evaporative condensors must have: - makeup water meters - conductivity controllers - efficient drift eliminators Activity: Project will specify low flow fixtures and ENERGY STAR appliances.	**Y**		On track. Will select fixtures that meet 1.28 gpf WC, 0.125 gpf Urinal, 1.0 gpm Lav, 1.5 gpm KS, and 1.75 gpm Shower to target 35% water use reduction. Will select all ENERGY STAR appliances.
Credit 2	Indoor Water Use Reduction	Required: Reduce demonstrate a water use reduction from UPC/IPC baseline and EPAct 1992 standards. 25% (1 pt), 30% (2 pts), **35% (3 pts),** 40% (4 pts), 45% (5 pts), 50% (6 pts)	**3**	**2**	
Prereq 3	Building-Level Water Metering	Required: Design to include whole building water meter and provide meter data to USGBC for 5 years.	**Y**		No action required at this time. On track. Will include a whole building water meter.
Credit 4	Water Metering	Required: Install permanent water submeters for two or more of the following: Irrigation, indoor plumbing fixtures, domestic hot water, boiler (min 100,000 gal/yr), or reclaimed water. Activity: Discussed submetering condos; will not be submetering Sr Living units but has Central Hot Water	**1**		*Explore feasibility for Senior Living & Apartments. Submetering of Apartment Units will likely achieve v4.1 credit. Submetering any two of central hot water, irrigation, common area process (like Sr Living Central Kitchen) will meet credit.*
Energy and Atmosphere					
Prereq 1	Fundamental Commissioning and Verification	Required: Contract Commissioning Agent to commission energy systems in the building. Note that Fundamental Commissioning now requires a contract at beginning of DD, includes a review of the mid-construction documents, and includes review of the building envelope.	**Y**		No action required at this time. Will hire CxA by DD.
Credit 1	Enhanced Commissioning	Option 1: Enhanced systems commissioning (3-4 pts) - Path 1: (3 pts) Enhanced Commissioning (similar to v2009) - Path 2: (4 pts) Enhanced Monitoring-based commissioning Achieve Path 1 AND include procedures and measurement points in the commissioning plan.	**3**		
Credit 1	Enhanced Commissioning	Option 2: Envelope commissioning (2 pts). Requirements include, but are not limited to: - Hire BECx before Permit Submission - Credentials must be approved by AHJ - Complete drawing reviews - Submit BECx Plan to AHJ prior to envelope installation - Submit BECx Report to AHJ prior to final inspection]		**2**	
Prereq 2 / Credit 2	Minimum / Optimize Energy Performance	Option 1: Whole-building energy simulation Meet mandatory provisions and demonstrate 12% energy improvement beyond ASHRAE 90.1-2010. (5% required for Prerequisite) 6%-1pt, 8%-2pts, 10%-3pts, 12%-4pts, 14%-5pts, 16%-6pts, 18%-7pts, 20%-8pts, 22%-9pts, 24%-10pts, 26%-11pts, 29%-12pts, 32%-13pts, 35%-14pts, 38%-15pts, 42%-16pts, 46%-17pts, 50%-18pts Activity: First energy model iteration completed to inform design decisions.	**8**	**2**	On track. Will consider EEOs for increased performance. Reference energy model report.
Prereq 3	Building-Level Energy Metering	Required: Install building energy meters to encompass all energy used by the building and provide meter data to the USGBC for 5 years.	**1**		On track. Will include a whole building energy metering point to collect whole building energy use data.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Prereq 4	Fundamental Refrigerant Management	Required: Do not use CFC based refrigerants Activity: Systems include DOAS and split systems.	**Y**		On track. Will note refrigerants within mechanical schedule.
Credit 3	Advanced Energy Metering	Required: In addition to the whole building energy meters, install submeters to monitor all energy end uses that represent 10% or more of the total annual consumption of the building. Meters must use BAS or other network, must store data for minimum of 36 months, data must be remotely accessible, must record consumption and demand, must report hourly, daily, monthly and annual. Activity: VECC 2018 positions project well.	**1**		On track. Will use energy model to determine the applicable end uses that represent 10% or more of annual consumption and must be metered.
Credit 6	Enhanced Refrigerant Management	Required Option 2: Calculation of refrigerant impact. Comply with weighted average calculation: $\frac{\sum (LCGWP + LCODP \times 10^5) \times Qunit}{Qtotal} \leq 100$		**1**	*Explore feasibility. Determine if selected systems will comply.*
Credit 7	Renewable Energy v4.1 credit subsitution	Required: Purchase RECs for the threshold of annual building energy use for a period of 10 years. 1pt - 10%, 2 pts - 20%, 3 pts - 30%, 4 pts - 40%, 5 pts - 50%		**5**	Will explore at end of construction.
Materials and Resources					
Prereq 1	Storage/Collection of Recyclables	Required: Provide an easily-accessible, dedicated area for the collection and storage of paper, cardboard, glass, plastics, and metals. Additionally, provide collection areas for 2 of the following: batteries, mercury lamps, and/or electronic waste	**Y**		On track. Will provide recycling chutes and space for storing recycables and batteries/electronic waste.
Prereq 2	Construction and Demolition Waste Management Planning	Required: Develop and implement a Construction Waste Management plan that identifies 5 main materials targeted for recycling during construction.	**Y**		On track. Will include requirements in specifiations for GC to follow.
Credit 1	Building Life-Cycle Impact Reduction	Required Option 4: Whole Building LCA (3-4 pts) v4.1 Path 3 (3 pts): Conduct an LCA that demonstrates a 10% reduction in 3 of 6 impact categories, one of which must be Global Warming Potential (GWP). v4.1 Path 4 (4 pts): Incorporate building reuse for the proposed design. Conduct an LCA that demonstrate a 20% reduction in GWP and a 10% reduction in two additional impact categories. Paths 3/4: No impact category may increase more than 5% compared to the baseline building.	**3**		Will conduct LCA Kick-off after 4.1 submission filing. Kick-off will include owner, architect, and structural engineer. Will itemize early decisions that have reduced material quantity from baseline conditions and will brainstorm ways to further reduce material impact based on material choices.
Credit 2	Building Product Disclose and Optimization (BPDO): EPDs	Required Option 1: Use 20 different permanently installed products, sourced from at least 5 different manufacturers, with EPDs. - Critically reviewed LCA - 0.25 products - Industry-Wide EPD - 0.5 products - Product-Specific Type III EPD - 1 product	**1**		On track. Will include requirements in specifiations for GC to follow.
Credit 2	Building Product Disclose and Optimization (BPDO): EPDs	Required Option 2: Use products that comply with criteria for 50% by cost of the total value of permanently installed products, or at least 10 products. - Reduced impacts below industry average in 3 cateorgies - Products also locally sourced (w/i 100 miles) - double their contribution up to 200% cost or 2 products	**1**		On track. Will include requirements in specifiations for GC to follow.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 3	Building Product Disclose and Optimization (BPDO): Sourcing of Raw Materials	Required Option 1: Raw Material Source and Extraction Reporting (1 pt) Use at least 20 products from 5 manufacturers with raw material extraction reports. - Self-Declared Reports - 0.5 products - 3rd Party Corporate Sustainability Report (CSR) - 1 product	1		On track. Will include requirements in specifiations for GC to follow.
Credit 4	Building Product Disclose and Optimization (BPDO): Material Ingredients	Option 1 *Material Ingredient Reporting* (1 pt) - Use at least 20 products, from 5 different manufacturers, with one of the following certifications indicating that their material ingredients have been reported and their environmental and health impacts are minimal. - Health Product Declaration - Cradle to Cradle (v2 Basic / v3 Bronze or higher) - Cradle to Cradle Material Health Certificate (Bronze or higher) - Declare - UL Product Lens Certification - ANSI/BIFMA e3 Furniture Sustainability Standard (3 points or higher)	1		On track. Will include requirements in specifiations for GC to follow.
Credit 4	Building Product Disclose and Optimization (BPDO): Material Ingredients	Option 2 *Material Ingredient Optimization* (1 pt) - Use products that comply with criteria for 25% by cost of the total value of permanently installed products. - GreenScreen v1.2 Benchmark - GreenScreen List Translater - 100% cost - GreenScreen Assessment - 150% cost - Cradle to Cradle Certified - Cradle to Cradle v2 Gold - 100% cost - Cradle to Cradle v2 Platinum - 150% cost - Cradle to Cradle v3 Silver - 100% cost - Cradle to Cradle v 3 Gold/Platinum - 150% cost - REACH Authorization, Restriction, and Candidate List - Product does not contain any listed ingredients - 100% cost Products also locally sourced (w/i 100 miles) - double their contribution up to 200% cost or 2 products	1		On track. Will include requirements in specifiations for GC to follow.
Credit 5	Construction and Demolition Waste Management	Option 1 *Diversion* Path 1: Divert 50% and 3 Material Streams (1 pt) Path 2: Divert 75% and 4 Material Streams (2 pts)	1	1	On track. Will include requirements in specifiations for GC to follow.
Indoor Environmental Quality					
Prereq 1	Minimum Indoor Air Quality Performance	Required for Mechanically-Ventilated Buildings: 1. Meet the minimum requirements of ASHRAE 62.1-2010 and demonstrate with room-by-room calculations in USGBC Calculator (https://www.usgbc.org/resources/minimum-indoor-air-quality-performance-calculator). 2. Provide airflow monitoring with alarm capabilities (when/if OA varies by 15% or more) on VAV OA equipment. Constant volume: balance outdoor airflow as defined in 62.1–2010. Install a current transducer on the supply fan, an airflow switch, or similar monitoring device. 3. Install CO sensors in any closed combustion or power vented equipment (if applicable) Activity: DOAS provided in Condo and Senior Living, considering horizontal ventilaton for Apartment.	Y		On track. DOAS equipment provided to deliver OA to units and common areas in Condo and Senior Living. *Explore outdoor air options in Apartment. DOAS vs horizontal ventilation.*
Prereq 1	Minimum Indoor Air Quality Performance - Residentail ONLY	Required for all Dwelling Units: 1. Meet the requirements of LEED v4.1 Multifamily EQ Prerequisite Minimum indoor air quality performance, EQ Prerequisite Combustion venting and EQ Prerequisite Radon-resistant construction. Observed: Arlington County in Radon Zone 2 - exempt from radon requirements + units located over exhausted garage.	Y		On track. Ensure any indoor fireplaces are direct vent with closed combustion.
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required: Prohibit smoking in the building and within 25 feet of entries, outdoor air intakes and operable windows. Provide a robust no smoking policy highlighting communication and enforcement of no smoking policy.	Y		On track. Will add signage. On track. Building is non-smoking and lease language will be provided.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 1	Enhanced Indoor Air Quality Strategies	Required Option 1: Enhanced IAQ Strategy (1 pt) - For mechanically ventilated implement all of the following. a) Entryway Systems - 10ft in direction of travel b) Interior Cross contamination prevention - Exhaust hazardous gas areas c) Filtration - MERV 13 filtration on all OA	**1**		Option 1 on track: 1. Will show 10' long walk-off mats inside all building entrances (not required at egress-only doors). 2. Will ensure housekeeping rooms, laundry rooms, and any rooms with chemicals have deck-to-deck partitions, hard lid ceiling, and/or self closing doors. Option 1 on track: 1. Will ensure housekeeping rooms, laundry rooms, and any rooms with chemicals are directly exhausted to the outdoors. 2. Will specify MERV 13 filters in mechanical schedule
Credit 1	Enhanced Indoor Air Quality Strategies	Required Option 2: Additional enhanced IAQ strategies(1pt)- Select one of the following: a) Exterior contaminant prevention - model contamination dispersion b) Increased ventilation - 30% over ASHRAE **c) Carbon dioxide monitoring - in all densely occupied spaces (25 people per 1,000 square feet or 1 person per 40 square feet)** d) Additional source control - for spaces where air contaminants are likely (besides CO2) evaluate potential sources of contaminants and alarm if unsafe conditions occur.	**1**		On track. Will show CO2 sensors in the following spaces (any space with the occupancy ratio of 25 people per 1,000 sf):
Credit 2	Low-Emitting Materials v4.1 credit substitution	Required: Perform Product Category Calculations for VOCs and Emissions limits for up to 5 of the following categories (2 categories-1 pt, **3 categories-2 pts**, 4 categories-3 pts, 5 categories-3pts+EP): **- Interior paints and coatings** **- Flooring** **- Insulation** - Composite Wood (ULEF) **- Ceilings** - Wall Panels - Interior adhesives and sealants - Furniture	**3**		On track. Will include requirements in specifiations for GC to follow.
Credit 3	Construction Indoor Air Quality Management Plan	Required: 1. Develop and Implement IAQ Management Plan during construction that meets updated SMACNA requirements. 2. Prohibit smoking inside the building and within 25 feet of entrances during construction.	**1**		On track. Will include requirements in specifiations for GC to follow.
Credit 5	Thermal Comfort	Required: 1. Demonstrate system meets ASHRAE 55-2010 for each space type 2. Provide thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multioccupant spaces. Activity: Discussed equipment requirements to support thermostats in 50% of single-occupant spaces and 100% of multi-occupant spaces.	**1**		On track. Will design equipment to meet thermal comfort requirements.
Credit 6	Interior Lighting	Required Option 1: Lighting Control (1pt) Provide individual controls at 3 levels (on, off, midlevel) for 90% of individual spaces. Multioccupant spaces must have 3 levels or multizones, presentation lighting controlled separately, switches must be in same location as luminaires. Activity: Discussed lighting control equipments, specifically in the units, to achieve credit.	**1**		On track. Will provide the appropriate level of lighting controls in applicable spaces.
Credit 8	Quality Views	Required: Demonstrate 75% of regularly occupied floor area has at least two of the following: - Multiple lines of sight to vision glazing at least 90 degrees - Views that include at least 2 of the following: (1) flora, fauna, sky (2) movement, (3) objects at least 25 feet from glazing - Unobstructed views located within the distance of 3x head height of vision glazing - Views with a view factor of 3 or greater.		**1**	*Explore feasibility.*

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Innovation					
Credit 1.1	Innovation Credit: Low-Mercury Lamps	Requirements: - For all mercury-containing lamps purchased for the building, the lamps must have an average of 70 picograms of mercury per lumen-hour or less - Lamps containing no mercury may be counted only if their energy efficiency at least equals that of their mercury-containing counterparts *Note* : This credit can be achieved by using majority (~90%+) LED bulbs.	1		Plan for integral LED lighting in units.
Credit 1.2	Pilot Credit: Integrative Analysis of Building Materials	Requirements: - Use at least 3 different permanently installed products that have a documented LCA (life-cycle assessment) with a qualitative analysis of the potential health, safety, and environmental impacts.	1		Will complete at end of project.
Credit 1.3	Innovation: O+M Starter Kit	Requirements: To achieve 1 pt, implement 2 of the following policies. To achieve 2 pts, implement 4 policies. (SBP can help to develop policy templates) - Site Management Policy - Ongoing Purchasing and Waste Policy - Facility Maintenance and Renovations Policy - Green Cleaning Policy - Integrated Pest Management	1		Select 2 policies to implement.
Credit 1.4	Pilot Credit: Assess and Plan for Resiliency	Requirements: - Must complete Hazard Assessment - Must complete a Climate Related Risk Management Plan or Emergency Preparedness Plan	1		Will complete Hazard Assessment and Climate Related Risk Management Plan for project before end of DD.
Credit 1.5	Exemplary Performance: Low-Emitting Materials (90%+ in 3 categories) or Heat Island Reducation	Low-emitting - 90%+ in 3 categories OR Heat Island - achieve both options	1		On track. Will include requirements in specifiations for GC to follow.
Credit 2	LEED Accredited Professional	1 LEED AP	1		Compliant.
Regional Priority					
Credit 1	Regional Priority	Regional Priority: Access to Quality Transit (thrsh: 4 pts)	1		On track.
Credit 2	Regional Priority	Regional Priority: Green Vehicles	1		On track.
Credit 3	Regional Priority	Regional Priority: Rainwater Mgmt (thrsh: 3 pts)		1	Not anticipated.
Credit 4	Regional Priority	Regional Priority: Reduced Parking Footprint, Opt Energy (thrsh: 10 pts)	1		On track.

RiverHouse South
3/7/25
Townhome Energy Performance Scenarios

Table 1: Townhome Energy Performance Scenarios

				NEW		Revised	NEW
Element	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 3.5**	**Scenario 4**	**Scenario 5**	**Scenario 5.5**
Slab	R-10 (2/2)	R-10 (2/4)	R-10 (2/2)	R-10 (2/2)	R-10 (2/2)	R-10 (2/2)	R-10 (2/2)
Framed Floor	R-38	R-49	R-38	R-49	R-38	R-38	R-49
Rim Joist	R-21	R-21 + 10	R-21	R-21 + 10	R-21	R-21	R-21 + 10
AGW	R-21	R-21 + 10	R-21	R-21 + 10	R-21	R-21	R-21 + 10
Window U/SHGC	.30/.29	.20/.20	.30/.29	.20/.20	.30/.29	.30/.29	.20/.20
Glass Door U/SHGC	.30/.29	.20/.20	.30/.29	.20/.20	.30/.29	.30/.29	.20/.20
Ceiling	R-38	R-49 + 20	R-38	R-49 + 20	R-38	R-38	R-49 + 20
Heating	24k 10 HSPF	18k 10 HSPF	18k 10 HSPF	18k 10 HSPF	18k 4.0 COP **GSHP**	18k 10 HSPF	18k 10 HSPF
Cooling	24k 18 SEER	18k 18 SEER	18k 18 SEER	18k 18 SEER	18k 20 EER **GSHP**	18k 18 SEER	18k 18 SEER
Water Heater	50g .93UEF	50g .93UEF	50g 3.45UEF **HP**	50g 3.45UEF **HP**	50g .93UEF	50g 3.45UEF **HP**	50g 3.45UEF **HP**
PV	None	None	None	None	None	**3 kW**	**3 kW**
Appliances	ENERGY STAR	ENERGY STAR	ENERGY STAR	ENERGY STAR	ENERGY STAR	ENERGY STAR	ENERGY STAR
Lighting	ENERGY STAR Equiv	ENERGY STAR Equiv	ENERGY STAR Equiv	ENERGY STAR Equiv	ENERGY STAR Equiv	ENERGY STAR Equiv	ENERGY STAR Equiv
Unit Air Sealing	5 ACH 50	**0.6 ACH**50	5 ACH 50	**3 ACH** 50	5 ACH 50	5 ACH 50	**3 ACH** 50
Configuration	BASE	PASSIVE HOUSE (PH)	HP Dhw	HP Dhw + PH + 3ACH	GSHP HVAC	HP Dhw + PV	HP Dhw, PH, 3ACH, PV
ArlCo Target	60	60	60	60	60	60	60
HERS Index	59	48	54	45	55	27	19

Notes:
1) The HERS Score represented above is for a small end-unit with a crawl space and roof deck.
2) HERS Index is dependent on unit size, location (middle/end), and configuration. A +/- 1-5 HERS point swing can occur between this unit and others.
3) 3ACH 50 unit air leakage represented in scenarios 3.5 and 5.5 are DC and MD code requirements. SBP's projects under these codes are meeting these requirements.

LEED for Homes v4

RiverHouse South

March 10, 2025

SUSTAINABLE BUILDING PARTNERS

2	0	0	Integrative Process	Possible Points: 2
Y	?	N		
2			Credit	Integrative Process

14.0	1	0.0	Location and Transportation	Possible Points: 15	
Y	?	N			
Y			Prereq	Floodplain Avoidance	Required
7	1		Credit	Site Selection	8
3			Credit	Compact Development	3
2			Credit	Community Resources	2
2			Credit	Access to Transit	2

1	3	3	Sustainable Sites	Possible Points: 7	
Y	?	N			
Y			Prereq	Construction Activity Pollution Prevention	Required
Y			Prereq	No Invasive Plants	Required
	2		Credit	Heat Island Reduction	2
		3	Credit	Rainwater Management	3
1	1		Credit	Non-Toxic Pest Control	2

6	2	4	Water Efficiency	Possible Points: 12	
Y	?	N			
Y			Prereq	Water Metering	Required
6	2	4	Credit	Total Water Use	12

24	9	5	Energy and Atmosphere	Possible Points: 38	
Y	?	N			
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Energy Metering	Required
Y			Prereq	Education of the Homeowner, Tenant or Building Manager	Required
22	7		Credit	Annual Energy Use	29
		5	Credit	Efficient Hot Water Distribution	5
1	1		Credit	Advanced Utility Tracking	2
	1		Credit	Active Solar-Ready Design	1
1			Credit	HVAC Start-Up Credentialling	1

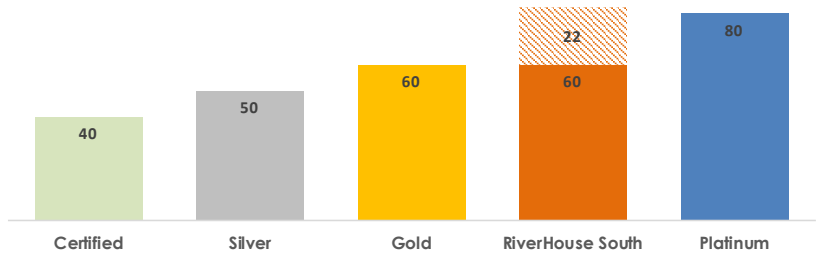
2.5	2	5.5	Materials and Resources	Possible Points: 10	
Y	?	N			
Y			Prereq	Certified Tropical Wood	Required
Y			Prereq	Durability Management	Required
1			Credit	Durability Management Verification	1
0.5	1	3	Credit	Environmentally Preferable Products	4
1	1	1	Credit	Construction Waste Management	3
		2	Credit	Material-Efficient Framing	2

3.5	3	9.5	Indoor Environmental Quality	Possible Points: 16	
Y	?	N			
Y			Prereq	Ventilation	Required
Y			Prereq	Combustion Venting	Required
Y			Prereq	Garage Pollutant Protection	Required
Y			Prereq	Radon-Resistant Construction	Required
Y			Prereq	Air Filtering	Required
Y			Prereq	Environmental Tobacco Smoke	Required
Y			Prereq	Compartmentalization	Required
1		2	Credit	Enhanced Ventilation	3
		2	Credit	Contaminant Control	2
		3	Credit	Balancing of Heating and Cooling Distribution Systems	3
		1	Credit	Enhanced Compartmentalization	1
1	1		Credit	Enhanced Combustion Venting	2
	2		Credit	Enhanced Garage Pollutant Protection	2
1.5		1.5	Credit	Low Emitting Products	3

4	2	0	Innovation	Possible Points: 6	
Y	?	N			
3	2		Credit	Innovation	5
1			Credit	LEED AP Homes	1

3	0	1	Regional Priority Credits	Possible Points: 4	
Y	?	N			
1			Credit	Site Selection (5 pts)	1
1			Credit	Community Resources (2 pts)	1
		1	Credit	Rainwater Management, Outdoor Water Use	1
1			Credit	Access to Transit, Material Efficient Framing (3pts), Total Water Use	1

60.0	22.0	28.0	Possible Points: 110



Note:
- min 8 points total in LT and EA required
- min 3 points in WE required
- min 3 points in EQ required

LEED v4 for Homes

RiverHouse South

March 10, 2025

4.1 Submission

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
General					
General	LEED Certification	Project is required to achieve LEED Gold as part of the Sector Plan requirements.			No action required.
Permitting	Arlington County Sustainability	Not pursuing GBIP.			No action required.
Integrative Process					
Credit 1	Integrative Process	Option 1. Integrative Project Team (1 pt) - Team includes 3 skill sets - Team involved in 3 phases of design and construction - Team conducts monthly meetings Option 2. Design Charrette (1 pt) - 1 full day or 2 half day workshop no later than DD Option 3. Trades Training (1 pt) - Combined 8 hours of green training for subcontractors	**2**		On track. Will keep track of meetings and perform Trades Training.
Location and Transportation					
Prereq 1	Floodplain Avoidance	**Option 1. Project is not built in 100-year floodplain** Option 2. Project building in flood hazard area iaw local flood provisions Option 3. Project is previously developed building and hardscape Observed: Project not built in 100-year floodplain	**Y**		No action required.
Credit 1	Site Selection	Option 1. Sensitive Land Protection (3-4 pts) Path 1. Previously Developed (4 pts) - 75% of buildable land located on previously developed land. Path 2. Avoidance of Sensitive Land (3 pts) - Project does not consist of prime farmland, public parkland, 100-year floodplain, endangered species habitat, w/in 50' wetlands, w/in 100' water Observed: Projects built on previously developed land	**4**		No action required.
		Option 2. Infill Development (2 pts) - 75% of land w/in 1/2 mi of project boundary is previously developed Observed: >75% of land w/in 1/2 mile of the project is previously developed	**2**		No action required.
		Option 3. Open Space (1 pt) **-** Built w/in 1/2 mi public open space > 3/4 acres or public open space provided on project Observed: Projects are built within 1/2 mi of public space.	**1**		No action required.
		Option 4. Street Network (1 pt) **-** Project is in area w/ existing streets and sidewalks that create 90 intersections per sqmi Observed: Projects are built in compliant area.	**1**		No action required.
		Option 5. Bicycle Network (1 pt) **-** Meet all of the following: - Provide bike storage w/in 200 yds of bike network that connects to ≥ 10 uses, school or employment center, or bus rapid transit/rail/ferry terminal w/in 3 mi of project - Short term bike parking = **9** (2.5% occupants) - Long term bike parking = **53** (15% occupants)		**1**	*Review achievement.*
		+1 EP for earning all 9 points		**1**	
Credit 2	Compact Development	Required: Meet the following density (dwelling units/acre) > 7 (1 pt) > 12 (2 pts) **> 20 (3 pts)** > 35 (+1 EP)	**3**		Anticipated, no action required.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 3	Community Resources	Required: Provide community resources w/in 1/2 mi walking distance: 4-7 uses (1 pt) 8-11 uses (1.5 pt) 12-15 uses (2 pt) 16-19 uses (+0.5 pt EP) **20 uses (+1 pt EP)**	**2**		Anticipated, no action required.
Credit 4	Access to Transit	Required: - 1/4 mi walking distance of bus OR - 1/2 mi walking distance of bus rapid, lt/hvy rail, ferry AND - Meet min transit stops below Multiple Transit / Rail/Ferry Weekday Weekend Pts — Weekday Pts 72 40 1 — 24 1 144 108 1.5 — 40 1.5 **360 216 2 — 60 2** Observed: Project is 0.5 miles from Pentagon Metro with Blue and Yellow lines.	**2**		No action required.
Sustainable Sites					
Prereq 1	Construction Activity Pollution Prevention	Required: 1. Include ESC measures in drawings - stockpiling topsoil - manage path/velocity of runoff - protect storm sewers/streams/lakes - divert surface water from hills - stabilize soils +15% slope - prevent air pollution from dust) 2. Provide ESC drawings that meet 2012 EPA CGP or local codes	**Y**		Include compliant erosion and sediment control measures in the drawings.
Prereq 2	No Invasive Plants	Required: Do not install invasive plants Activity: No invasive plants planned; designing to increase native plant palette.	**1**		On track. Will develop a plant schedule that includes native and drought tolerant plants.
Credit 1	Heat Island Reduction	Option 1. Shading: Shade hardscape and roof w/ 10 year plant canopy Option 2. Nonabsorptive Materials: Use any of the following for hardscape and roof: - ENERGY STAR roofing material (SR≥0.65) - Vegetated Roof - Open Pavers - Paving w/ 3-year SR ≥ 0.28 (or initial SR ≥ 0.33) Total Area met by Option 1 or Option 2: 50-75% (1 pt) >75% (2 pts)		**2**	*Explore feasibility. Consider rooftop decks and any county directed site paving requirements.*
Credit 3	Nontoxic Pest Control	Required: - Implement IPM Plan (Reqd) Up to (2 pts, each additional +0.5 pt EP up to 1 EP: - Steel mesh barrier termite control system (1 pt) - Physical termite barrier system (1 pt) - Below grade walls solid concrete, masonry w/ bond beam, concrete filled block (0.5 pt) - Post-tension slabs (0.5 pt) - Borate treatment of wood framing (0.5 pt) - Non-wood structural elements (0.5 pt) - Ports/openings at slab plumbing penetrations (0.5 pt) - 6"+ space btw landscape grade/nonmasonry siding (0.5 pt) - Seal cracks/joints/penetrations, install pest screens (0.5 pt) - Water discharge points 24"+ from foundation (0.5 pt) - 18"+ btwn landscape and exterior wall (0.5 pt)	**1**	**1**	On track. 1 pt anticipated for sealing crack/penetrations and solid walls. Explore feasibility of 0.5-1 pt additional.
Water Efficiency					
Prereq 1	Water Metering	Required: Install water meter for each unit or entire building	**Y**		On track. Will install individual meters.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 1	Total Water Use *Performance Path*	Required: Reduce total water use (indoor + outdoor) 10% (1 pt) to 65% (12 pts), 70% (+1 EP). 35% - 6 pts Activity: Outdoor Water Use - Intend to limit irrigation. Indoor Water Use - Will target the following rates: - Water Closet = 1.28 gpf - Lav = 1.2 gpm - Shower = 2.0 gpm - Kitchen = 1.5 gpm - Dishwasher = ENERGY STAR (3.5 gpc). - Clothes Washer = ENERGY STAR (4.1 WF)	**6**	**2**	On track. Will select fixtures that meet targeted flow rates. Will select ENERGY STAR appliances.
Energy and Atmosphere					
Prereq 1	Minimum Energy Performance	Required: 1. Complete all mandatory measures of Energy Star v3. - Rater Design and Field Checklist (HERS Rater) - HVAC Design Report (MEP) - HVAC Commissioning Checklist (HVAC Subcontractor doing start-ups) - Water Management System Builder Requirements (Builder) - Thermal Enclosure Checklist (HERS Rater) Includes requirements for - Duct leakage (<4cfm25 per 100 sf rough-in, <8cfm25 per 100 sf final) 2. Do not exceed Energy Star Hers Index Target 3. Provide load calculations, system selection, and duct sizing calculations. 4. Install at least one of the following Energy Star appliances: - Refrigerator - Dishwasher - Clothes Washer 5. All duct runs must be fully ducted	**Y**		On track. Design direction is on track to achieve HERS ≤ 60 as required by the Green Home Choice Program. See attached for energy performance information.
Prereq 2	Energy Metering	Required: 1. Electric submeters in each Unit 2. Whole building gas meter or submeter in each Unit Observed: Gas option intended.	**Y**		On track. Will provide required metering.
Prereq 3	Education of Homeowner, Tenant or Building Manager	Required: 1. Provide O&M binder/CD to those responsible for maintaining Units 2. Perform 1-hr walkthrough of home with occupants and building manager	**Y**		No action required at this time. SBP will help develop materials.
Credit 1	Annual Energy Use	Required: Achieve HERS 60 (14 pts) or better (ArlCo Green Home Choice) Observed: Worst case unit current projecting 8 HSA pts. Base design on track to achieve HERS ≤ 60	**22**	**7**	On track. Design direction is on track to achieve HERS ≤ 60 as required by the Green Home Choice Program. See attached for energy performance information.
Credit 3	Advanced Utility Tracking	Option 1. Electric and Water (1 pt): Meet one: - Units: permanent energy-monitoring system at 1-hr interval - Irrigation: irrigated area 1,000sf+ w/ submeter AND/OR **Option 2. Third Party Utility Reporting (1 pt):** Meet one: - Share utility data with USGBC - 50% of unit owner share utility data with USGBC for 1 year +1 EP for metering 4 end uses (i.e. space heating, DHW, lighting, plug loads)	**1**	**1**	On track. Energy benchmarking intended.
Credit 4	Active Solar Ready Design	**Option 1.** PV Ready (1 pt): Meet EPA's requirements for PV ready home Option 2. Solar Hot Water Ready (1 pt): Meet EPA's requirements for solar hot water ready home		**1**	*Explore feasibility.*

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 5	HVAC Start-up Credentialing	Use an HVAC contractor credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO) The technician must complete the ENERGY STAR for Homes, version 3, HVAC system quality installation contractor checklist.	**1**		Include requirements in specficiations for GC to follow.
Materials and Resources					
Prereq 1	Certified Tropical Wood	Required: All wood is nontropical, reused/reclaimed, FSC	**Y**		On track. Will select non-tropical finishes or require FSC certification.
Prereq 2	Durability Management	Required: Implement the following: - Nonpaper faced backer board in baths/showers/spas - Water-resistant flooring in kitchen/bath/laundry/spa - Water-resistant flooring in entry w/in 3 feet exterior door - Drain+pan, pan+auto water shut off, or FD+slope for tank water heaters and clothes washers over living space - Exhaust clothes dryers	**Y**		On track. Will include non-paper faced backerboard and drain pans/drains.
Credit 1	Durability Management Verification	Required: ENERGY STAR for Homes v3 Water Management System Checklist verified by Verification Team		**1**	No action required at this time. Determine before end of design.
Credit 2	Environmentally Preferable Products	**Option 1. Local Production:** 50% of products extracted, processed, and manufactured w/in 100 mi project site - Framing (0.5 pt) **- Concrete aggregate (0.5 pt)** - Drywall and interior sheathing (0.5 pt) Option 2. Environmental Preferable Products: Provide 25% reclaimed / extended producer responsibility, 25% pre and 50% post consumer, FSC, sustainable agriculture standard, 30% fly ash/slag+50% recycled aggregate/90% recycled for 90% of the following - no floor covering (2 pts) - flooring (1 pt) - insulation (1 pt) - sheathing (1 pt) - framing (1 pt) - drywall (1 pt) - concrete (1 pt) - roofing (1 pt) - siding (1 pt) - 3 of the following (1 pt): doors, cabinets, counters, interior trim, decking/patio, windows For Option 2, earn 4 points to earn another +2 EP	**0.5**	**1**	On track. Will include requirements in specifiations for GC to follow.
Credit 3	Construction Waste Management	Required: Recycled and/or salvage nonhazardous construction and demolition materials. Calculations can be by weight or volume but must be consistent throughout. Path 1. Divert 50% and three material streams (1 pt) Path 2. Divert 75% and four material streams (2 pts)	**1**	**1**	On track. Will include requirements in specifiations for GC to follow.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Indoor Environmental Quality					
Prereq 1	Ventilation	Required: 1. Local exhaust - Meets ASHRAE 62.2-2010 Sections 5-7 for baths (50 cfm) and kitchens (100 cfm) - Exhausted to outdoors - Bath fans ENERGY STAR - Kitchen exhaust > 400 cfm as makeup air 2. Whole Unit mechanical ventilation that meets ASHRAE 62.2-2010 Sections 4-7. 3. Non-Unit spaces met ASHRAE 62.1-2010 Sections 4-7. Calculations must be completed using the USGBC Calculator.	**Y**		On track. OA and exhaust fans will comply.
Prereq 2	Combustion Venting	Required: 1. No unvented combustion appliances (ovens/range excl) 2. CO monitor in each unit 3. Fireplaces must have doors or glass enclosure, closed-combustion or power-vented or passes BPI/RESNET 4. Combustion space and water heating must have closed combustion, or power-vented exhaust, or in detached building/open air facility	**Y**		On track. Will comply and include in drawings.
Prereq 3	Garage Pollutant Protection	Required: 1. Locate all AHU equipment and ductwork outside garage 2. For conditioned space next to/above garage - Seal surfaces - Seal penetrations and connecting floors/ceilings - Weather strip doors - CO detectors in rooms that share door w/ garage - Seal penetrations and cracks Observed: Some homes will have garage.	**Y**		On track. Will include in drawings.
Prereq 4	Radon-Resistant Construction	Required: For Zone 3, install qualifying passive radon ventilation system (parking garage is an acceptable alternative). Observed: Project located in Zone 2.	**Y**		No action required.
Prereq 5	Air Filtering	Required: Recirculating Space Conditioning - MERV 8 filters OA Systems - MERV 6 filters	**Y**		On track. Will comply and include in drawings.
Prereq 6	Environmental Tobacco Smoke	Required: Include signage that prohibits smoking in - interior common areas - outside the building except in designated smoking areas within 25 feet of all entries, OA intakes, operable windows	**Y**		On track. Will provide non-smoking language.
Prereq 7	Compartmentalization	Required: Meet all of the following for Units: 1. Seal all penetrations 2. Weatherstrip all doors to common halls 3. Weatherstrip all exterior door and operable windows 4. Achieve max leakage rate of 0.23 cfm50 per sqft (if average unit size is < 1,200 sf max 0.30 cfm50 per sqft)	**Y**		On track. Will include air sealaing details in drawings to achieve.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 1	Enhanced Ventilation	Option 1. Enhanced Local Exhaust (1 pt): Provide one of the following for bath exhaust fans in Units: - occupancy sensor - automatic humidistat controller - continuous fan - timer that runs fan for 20+ min post occupancy AND/OR Option 2. Enhanced Whole-House Ventilation (2 pts): Provide whole-house ventilation system that meets ASHRAE 62.20-2010 Sections 4-7 in each Unit. Do not exceed requirements by more than 10%. Note: Exhaust only and Supply only systems not eligible.	**1**		*Explore feasibility. Will continue to discuss options.*
Credit 5	Enhanced Combustion Venting	Option 1. No Fireplaces or Woodstoves (2 pts) OR Option 2. Enhanced Combustion Venting Measures (1 pt): Meet the following: - wood/pellet burning fireplace is power or direct vented - gas/propane/alcohol stove is approved by testing facility and is power or direct vented - gas/propane/alcohol stove has permanently fixed glass front or gasketed door and electronic pilot	**1**		On track. Will meet and comply with at least one of the options.
Credit 6	Enhanced Garage Pollutant Protection	Option 1. Exhaust Fan on Controls for Garage (1 pt): Meet all of the following: - ASHRAE 62.1-2010 garage ventilation requirements - Negative pressure created - Self-closing doors - Deck-to-deck partitions or hard lid ceiling - Continuous exhaust fan OR CO sensor activated at 35 ppm OR Option 2. Detached Garage or No Garage or Carport (1 pt): No garage or a detached garage has been constructed.		**2**	*Explore feasibility. Will determine whether option 1 can be implemented relative to exhaust fans.*
Credit 7	Low-Emitting Products	Required: Meet requirement for at least 90% of the following components (up to 3 pts): **- Site-applied interior paints/coatings: CA 1350 (0.5 pt)** - Site-applied interior adhesives/sealants: CA 1350 (0.5 pt) - **Flooring: CA 1350 (0.5 pt)** **- Insulation: CA 1350 (0.5 pt)** - Composite wood products: CARB ULEF (1 pt)	**1.5**		On track. Will include requirements in specifiations for GC to follow.
Innovation					
Credit 1.1	Innovation: EPDs	Select 20 materials with EPDs	**1**		Include requirements in specficiations for GC to follow.
Credit 1.2	Innovation: Material Ingredient Reports	Select 20 materials with MIRs.	**1**		Include requirements in specficiations for GC to follow.
Credit 1.3	Innovation: Green Power and Carbon Offsets OR Green Vehicles	Offset 50%-100% of energy use for 5 years (1 - 2 pts) Provide EV charging station spaces for 5% of parking spaces.		**1**	Consider offsetting 50% of energy use with RECs and carbon offsets for 5 years.
Credit 1.4	Pilot Credit: Assess and Plan for Resiliency	Requirements: - Must complete Hazard Assessment - Must complete a Climate Related Risk Management Plan or Emergency Preparedness Plan	**1**		Will complete Hazard Assessment and Climate Related Risk Management Plan for project before end of DD.

Scorecard

Credit		Requirement & Comments	Yes	Maybe	Action
Credit 1.5	Exemplary Performance: Community Resources or Compact Development	See credit.		**1**	Finalize calculations.
Credit 2	LEED Accredited Professional	1 LEED AP	**1**		Compliant.
Regional Priority					
Credit 1	Regional Priority	Site Selection (5 pts)	**1**		No action required.
Credit 2	Regional Priority	Community Resources (2 pts)	**1**		No action required.
Credit 3	Regional Priority	Rainwater Management, Outdoor Water Use		**1**	Not anticipated.
Credit 4	Regional Priority	Access to Transit (2 pts)	**1**		No action required.