



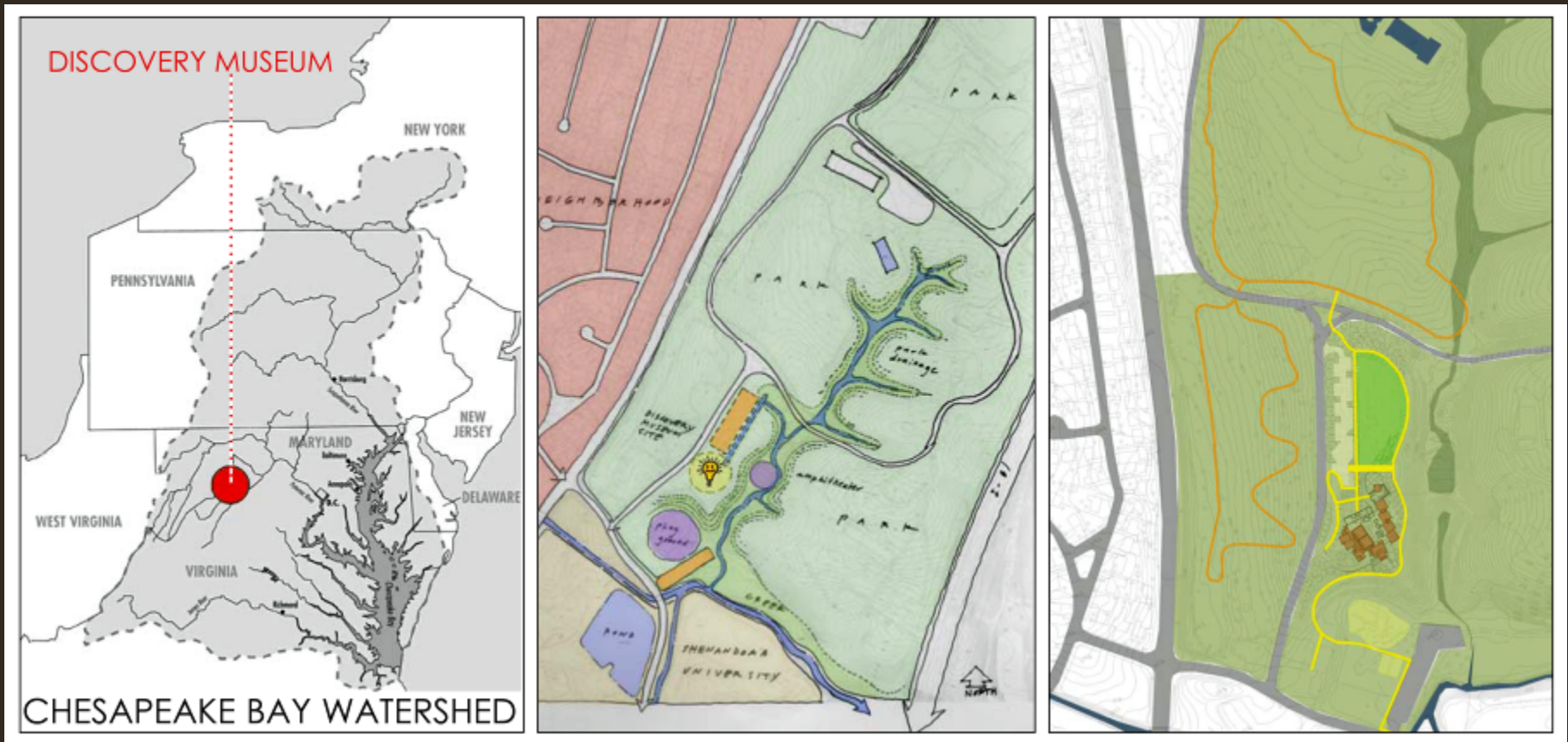
Shenandoah Valley DISCOVERY MUSEUM



Shenandoah Valley Discovery Museum



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Existing Site



Shenandoah Valley Discovery Museum



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What is “Green” Design?

Design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants in five broad areas:

- Sustainable site planning
- Safeguarding water and water efficiency
- Energy efficiency and renewable energy
- Conservation of materials and resources
- Indoor environmental quality

Leadership in Energy and Environmental Design (LEED™)

- Achieve LEED™ Platinum Certification
 - Create a national (even international) attraction
 - Achieve the highest standard of energy efficiency and environmental intelligence
 - Use the project as a tool that teaches and promotes a deeper understanding of the environment and promotes environmental stewardship

LEED® V2.1 Checklist

LEED® V2.1 Checklist				Cost Implications		Comments	
Yes	Y	No		No	Low	High	
9	3	2	Sustainable Sites	14 Points	10	2	Low = \$0 - \$10,000 Medium = \$10,000 to \$50,000 High = >\$50,000
Y			Prereq 1 Erosion & Sedimentation Control	Required	Y		local code is less stringent than EPA BMPs
	N		Credit 1 Site Selection	1			project is located on public parkland; investigate CTRs and may consider regenerative approach to pursue credit intent
	?		Credit 2 Density Development	1	N		investigate compliance with LEED CI requirements - proximity to residential zone and public services
	N		Credit 3 Brownfield Redevelopment	1			
	?		Credit 4.1 Alternative Transportation, Public Transportation Access	1	N		investigate bus stop locations and the number of bus lines within 1/4 mile
Y			Credit 4.2 Alternative Transportation, Bicycle Storage & Changing Rooms	1	N		FTE of 30 including 20 permanent staff and 40 transient occupants (40 visitors/day for 2 hrs each) - two bike slots and one shower req'd
	?		Credit 4.3 Alternative Transportation, Alternative Fuel Refueling Stations	1	N		consider biodiesel fueled vehicle or purchase of hybrid vehicle to replace existing van
Y			Credit 4.4 Alternative Transportation, Parking Capacity	1	N		about 60 spaces will be required by local zoning (400 sq/acre) which cannot be exceeded - carpooling program needs to be established and 2 preferred carpool spaces designated
Y			Credit 5.1 Reduced Site Disturbance, Protect or Restore Open Space	1		M	restoration of native habitat may qualify even though it is previously undeveloped but previously disturbed - inventory of existing species and demonstration of restoration efforts on at least 1.5 acres may meet credit intent
Y			Credit 5.2 Reduced Site Disturbance, Development Footprint	1	N		Winchester Parks & Rec must designate open space equal to the building footprint for the life of the building
Y			Credit 6.1 Stormwater Management, Rate or Quantity	1	N		green roof, cistern, infiltration trenches will retain or infiltrate all stormwater on site
Y			Credit 6.2 Stormwater Management, Treatment	1	N		infiltration should accommodate treatment requirements - automatically earned if all stormwater for 2-year 24-hr. event retained on site.
Y			Credit 7.1 Landscape & Exterior Design to Reduce Heat Islands, Non-Roof	1	N		combination of light colored surfaces and shade will exceed 30% AND pervious parking spaces for over 50% of parking lot
Y			Credit 7.2 Landscape & Exterior Design to Reduce Heat Islands, Roof	1		M	green roof for over 50% or combination of qualifying sloped roofing material/green roof for 75% of roof area - current budget includes about 1/3 green roof
Y			Credit 8 Light Pollution Reduction	1	N		may need variance from city parking lot lighting requirements

Yes		No			No	Low	High	
5			Water Efficiency	5 Points	4	1		Comments
Y			Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1	N		
Y			Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1	N		no irrigation of landscaping will achieve both points
Y			Credit 2	Innovative Wastewater Technologies	1		M	dual flush toilets, waterless urinals, rainwater harvesting for toilet flushing, constructed wetlands are possible technologies being considered
Y			Credit 3.1	Water Use Reduction, 20% Reduction	1	N		strategies will include low flow lav faucets (0.5 GPM), metered faucets, low flow shower (1.5 GPM), waterless urinals, and dual flush toilets
Y			Credit 3.2	Water Use Reduction, 30% Reduction	1	N		rainwater harvesting will achieve over 40% savings and qualify for an enable an exemplary performance innovation credit
				Total				

Ma			No			Low			Med			High					
16	1		Energy & Atmosphere						17 Points	16	1		Comments				
Y			Prereq 1	Fundamental Building Systems Commissioning						Required	Y						
Y			Prereq 2	Minimum Energy Performance						Required	Y						
Y			Prereq 3	CFC Reduction in HVAC&R Equipment						Required	Y						
Y			Credit 1.1	Optimize Energy Performance, 20% New / 10% Existing						2	N				Focus on load reductions with early stage modeling. . . Critical issues include thermal envelope and lighting issues - reduce LPD to 1W/sf or less and include photosell sensors, Roof R-values 30-40, walls R-value 25-30		
Y			Credit 1.2	Optimize Energy Performance, 30% New / 20% Existing						2	N				Consider demand controlled ventilation, ICFs for masonry components, SIPs, fiberglass windows		
Y			Credit 1.3	Optimize Energy Performance, 40% New / 30% Existing						2	N				Strategies will include GSHPs, augmented insulation, daylighting, VFDs, some exhibit spaces will require light dampers/humidity control - but can accomplish this efficiently with separate zoning		
Y			Credit 1.4	Optimize Energy Performance, 50% New / 40% Existing						2	N				Target 60-75% energy savings		
Y			Credit 1.5	Optimize Energy Performance, 60% New / 50% Existing						2	N				Business plan based on 80-120k visitors/year - open 360 days/year		
Y			Credit 2.1	Renewable Energy, 5%						1	N				\$350k budgeted for PVs and wind - must investigate site wind capability and gather data with on site weather station that can be purchased now and re-used on the building - Marcus to research cost of station/tower installation. . . Should engage experienced solar consultant to assist design, perhaps Aiden Hathaway at Environmental Resources Trust or Steven Strong at Solar Design Associates		
Y			Credit 2.2	Renewable Energy, 10%						1	N				Will pursue revenue generation by selling renewable attributes to Old Mill Power Company in Charlottesville		
Y			Credit 2.3	Renewable Energy, 20%						1	N				System size being considered should easily achieve 20% target		
Y			Credit 3	Additional Commissioning						1	N				Additional Cx in budget		
Y			Credit 4	Ozone Depletion						1	N				Easily accomplished with GSHPs		
Y			Credit 5	Measurement & Verification						1			M		Must create an M&V plan - may consider this as an educational function with real time displays of energy consumption at kiosks		
?			Credit 6	Green Power						1	N				May consider buying renewable energy certificates, but Owner needs to understand implications		
Total																	

10	3	Materials & Resources	13 Points	8	1	1
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Comments

Y		Prereq 1	Storage & Collection of Recyclables	Required	Y		Will designate recycling area - local infrastructure for recycling exists
		Credit 1.1	Building Reuse, Maintain 75% of Existing Shell	1			
		Credit 1.2	Building Reuse, Maintain 100% of Shell	1			
		Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell	1			
Y		Credit 2.1	Construction Waste Management, Divert 50%	1	N		Investigate local recycling opportunities - contact state and local solid waste organizations - contact local waste haulers for turn-key waste management
Y		Credit 2.2	Construction Waste Management, Divert 75%	1	L		Ass will accept corrugated waste and source separate - possible innovation point at 95% diversion from landfill
Y		Credit 3.1	Resource Reuse, Specify 5%	1	N		5% = approx. \$80,000 - salvaged log building to be used on site, barn salvage (beams, lumber, foundation stone), old truck, truck, interior doors
Y		Credit 3.2	Resource Reuse, Specify 10%	1	N		
Y		Credit 4.1	Recycled Content, Specify 5%	1	N		steel, CMU (bottom ash), concrete, drywall, rubber flooring, carpet, etc will contribute - investigate the recycled content of additional materials
Y		Credit 4.2	Recycled Content, Specify 10%	1	N		10% should be achievable
Y		Credit 5.1	Local/Regional Materials, 20% Manufactured Locally	1	N		easy credit to attain in this area - innovation point available at 40% or by achieving 20% within 200 miles
Y		Credit 5.2	Local/Regional Materials, of 20% Above, 50% Harvested Locally	1	N		concentrate effort on the high cost, heavy materials (CMU, concrete, brick), plantings
Y		Credit 6	Rapidly Renewable Materials	1	N		cork, linoleum, wheatboard (casework and waicocot), bamboo are intended materials, perhaps utilize interface com-based carpet and investigate engineered wood. 5% = approx. \$80,000
Y		Credit 7	Certified Wood	1		M	minimize wood and consider SIPs, wheatboard, straw bale walls, etc. - investigate FSC sources of framing lumber, OSB, doors
Total							

Yes	1	No				No	Low	Med	High
10	4	1	Indoor Environmental Quality	15 Points	7	3	4		

Comments

Y		Prereq 1	Minimum IAQ Performance	Required	Y		
Y		Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required	Y		
Y		Credit 1	Carbon Dioxide (CO ₂) Monitoring	1	L		Already pursuing demand controlled ventilation - low cost if we have an EMS in conjunction with EAc6 and EQc7.2. Roger will investigate controls strategies. Owner needs to consider operational expense of firing controls contractor to operate systems
		Credit 2	Increase Ventilation Effectiveness	1		M	Will not pursue underfloor air, but perhaps displacement ventilation system with low supply/high return
		Credit 3.1	Construction IAQ Management Plan, During Construction	1		M	HVAC Engineer will investigate cost of MERV 13 filter boxes added to ductwork - may be difficult with distributed GSHP units
Y		Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1	L		Will pursue IAQ testing compliance path
Y		Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1	N		Easily achievable with good specs and submittal reviews
Y		Credit 4.2	Low-Emitting Materials, Paints	1	N		Easily achievable with good specs and submittal reviews
Y		Credit 4.3	Low-Emitting Materials, Carpet	1	N		Easily achievable from all major carpet manufacturers - consider Interface com-based carpet
Y		Credit 4.4	Low-Emitting Materials, Composite Wood	1	N		Be careful in spec and submittal reviews of plywood and particle board - will specify stave or wheatboard core wood doors
Y		Credit 5	Indoor Chemical & Pollutant Source Control	1	N		Must isolate and ventilate Paleontology Lab and JCs
		Credit 5.1	Controllability of Systems, Perimeter	1			Will have operable windows in offices, but limited ability to achieve this given museum function
		Credit 5.2	Controllability of Systems, Non-Perimeter	1		M	Could be possible with distributed GSHP small zones, variable speed fans, and multiple light switching and sensor capability
Y		Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	1	N		Will not require humidification to comply with latest ASHRAE 55 comfort ranges
Y		Credit 7.2	Thermal Comfort, Permanent Monitoring System	1	L		Easily accomplished if EMS controls installed - which makes sense in light of other credits, but will require humidistats
		Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1		M	Will need to analyze with daylight modeling
Y		Credit 8.2	Daylight & Views, Views for 90% of Spaces	1	N		Should be achievable with some reconfiguration - think about relocating trombe wall so views provided from Ahs space and all spaces
Total							

Yes	1	No					No	Low	Med	High
5			Innovation & Design Process	5 Points	5					

Comments

Y		Credit 1.1	Innovation in Design: WEc3 Exemplary Performance	1	N		should achieve 40% water savings
Y		Credit 1.2	Innovation in Design: MRc3 Exemplary Performance	1	N		should achieve 40% locally manufactured materials
Y		Credit 1.3	Innovation in Design: MRc2 or MRc4 Exemplary Perf. or Blended Cement	1	N		perhaps achieve 15% recycled materials or 80% diverted construction waste or 40% blended cement displacement in concrete mixes
Y		Credit 1.4	Innovation in Design: Education/curriculum - demonstration	1	N		The building's reason for being - curriculum, tours, case study for active education
Y		Credit 2	LEED™ Accredited Professional	1	N		
Total							

Yes	T	No		No	Low	Med	High
55	8	6	Project Totals	69 Points	50	4	9

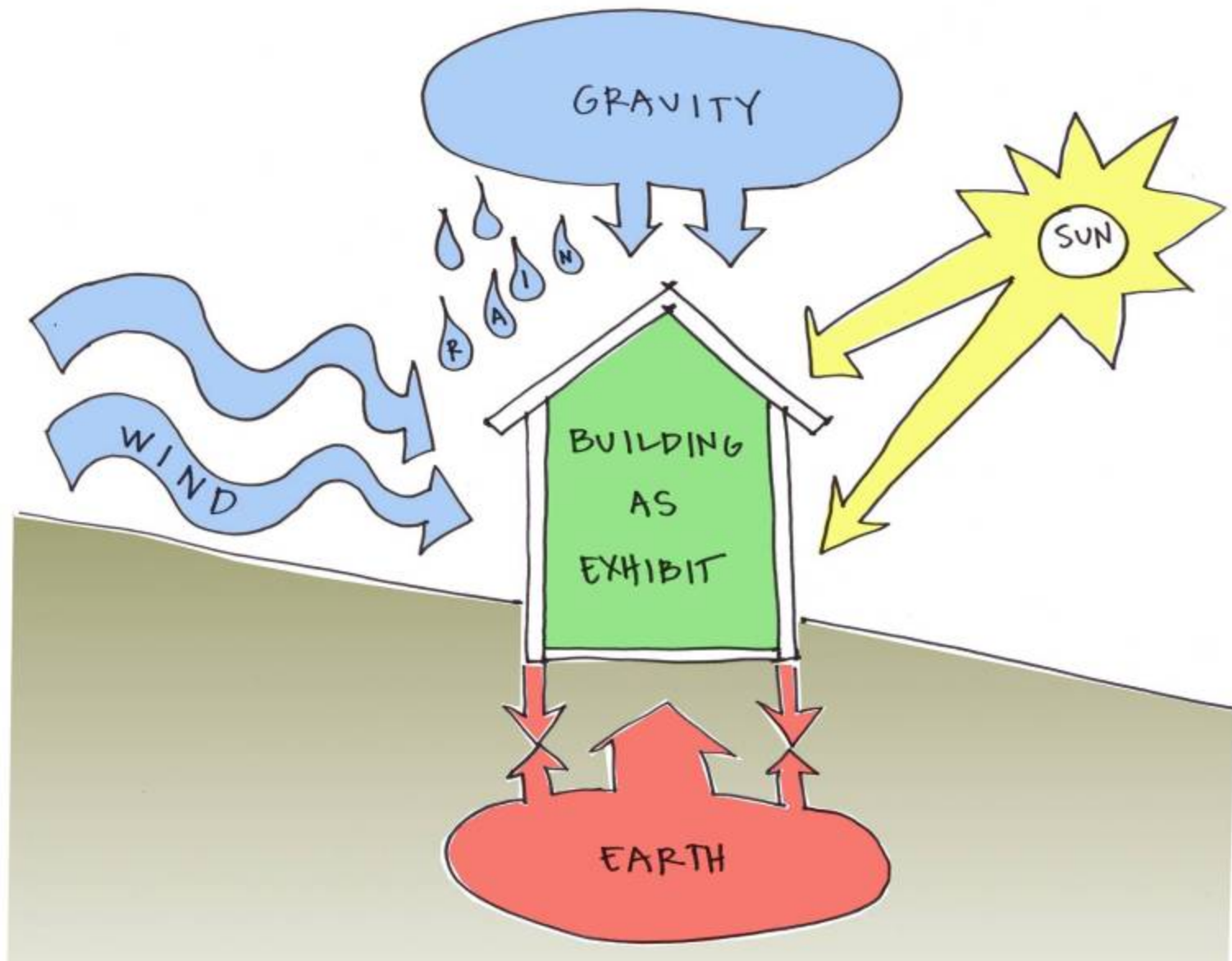
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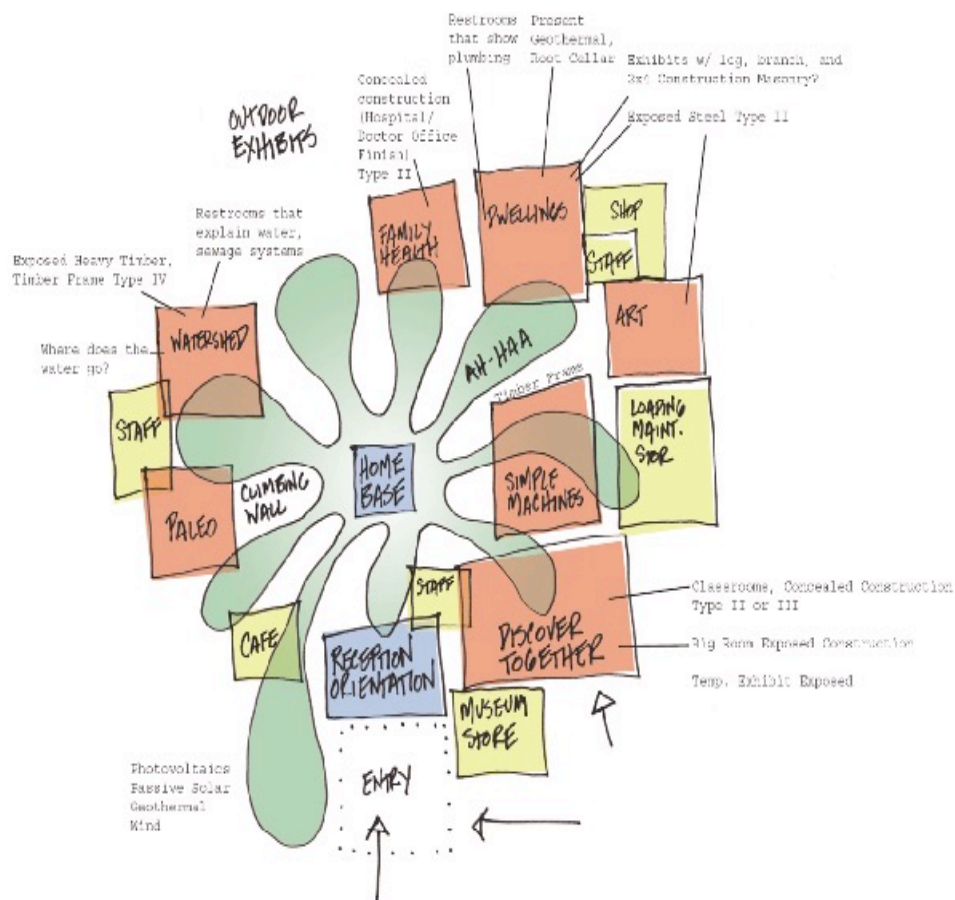
Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points

LEED™ Targeted Credits by Cost Implications

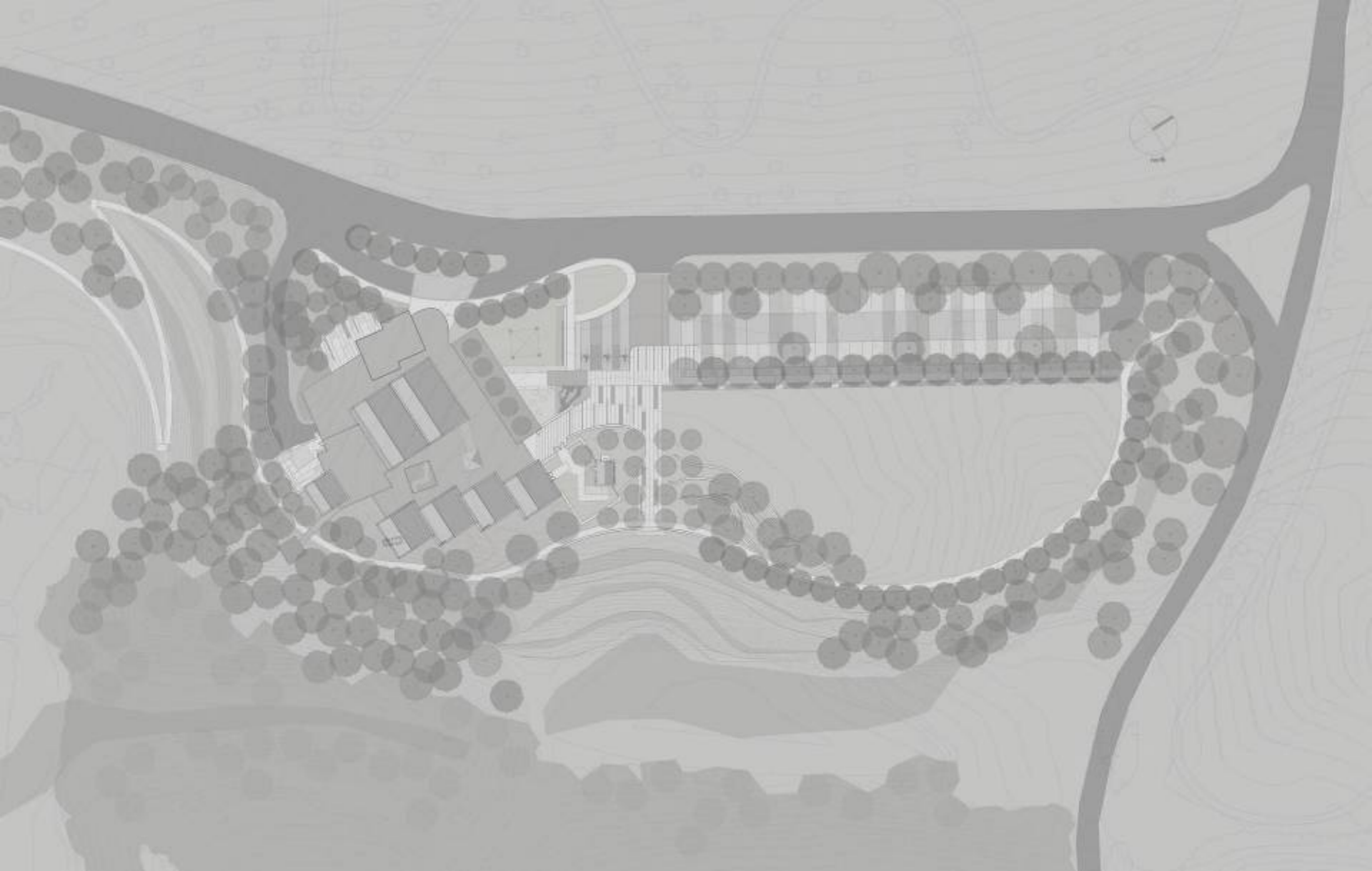
No Cost	Yes	No	Total
Low Cost	4	4	8
Mid Cost	5	4	9
High Cost	0	0	0
Total	9	8	17

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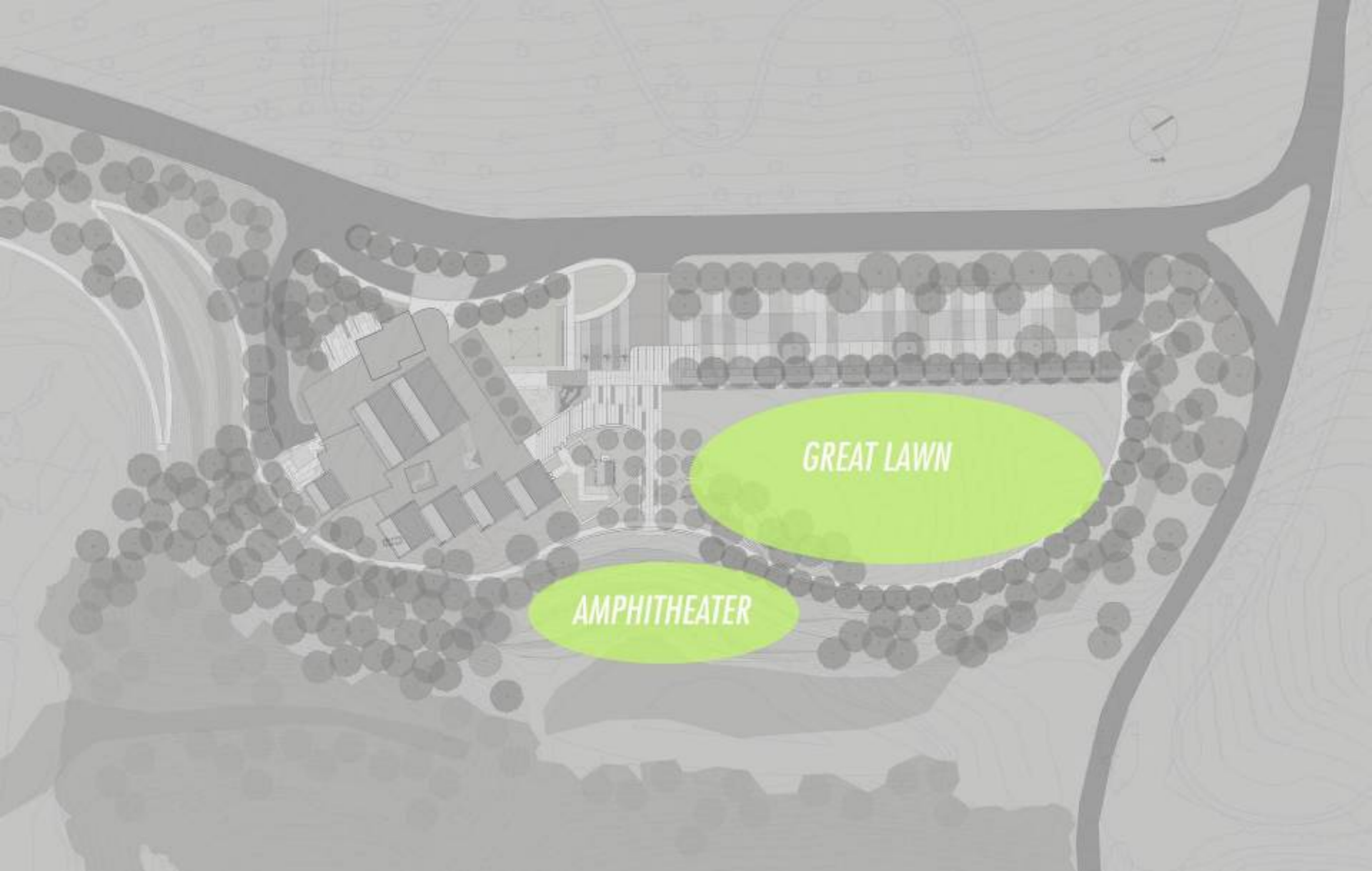




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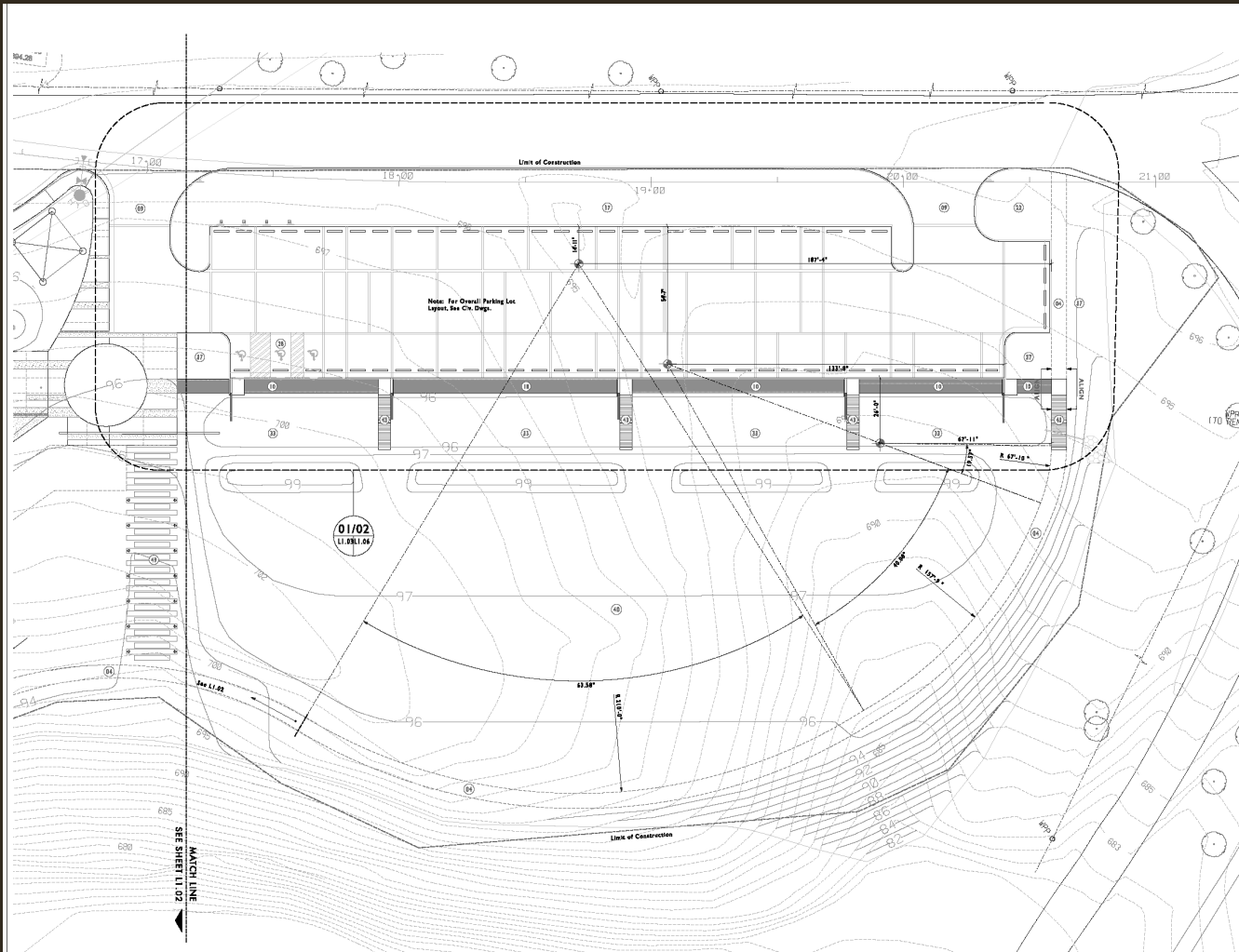
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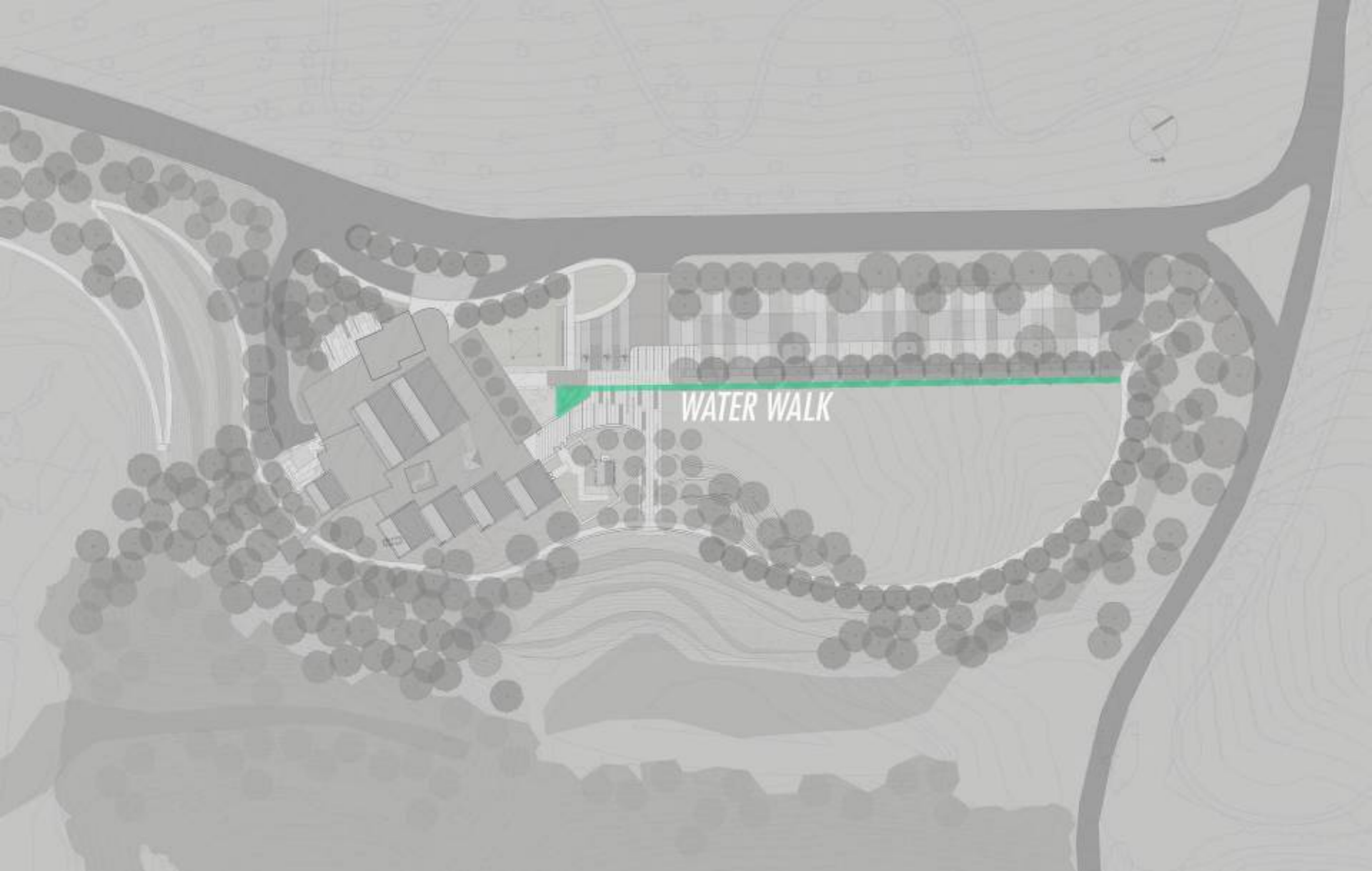
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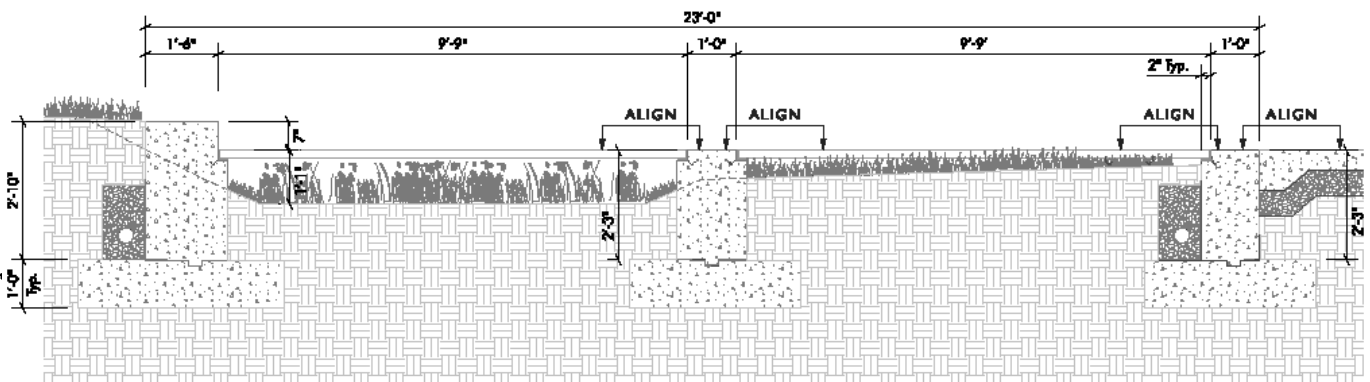
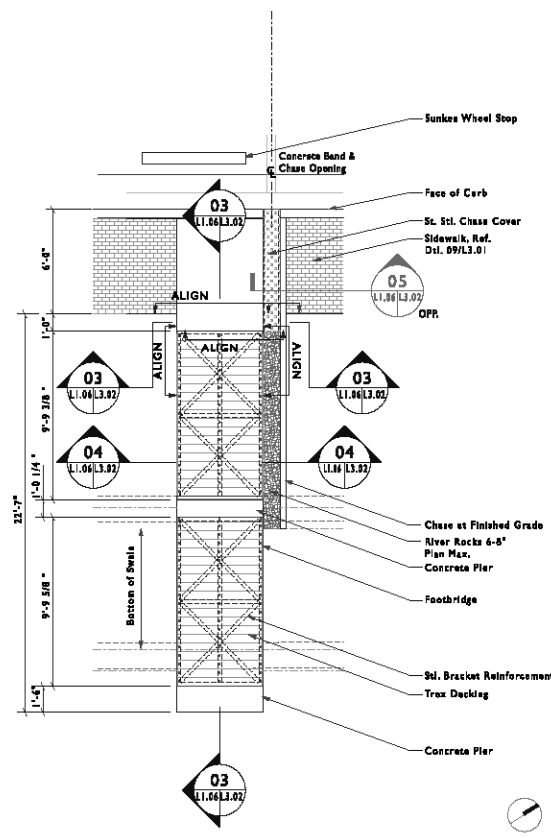
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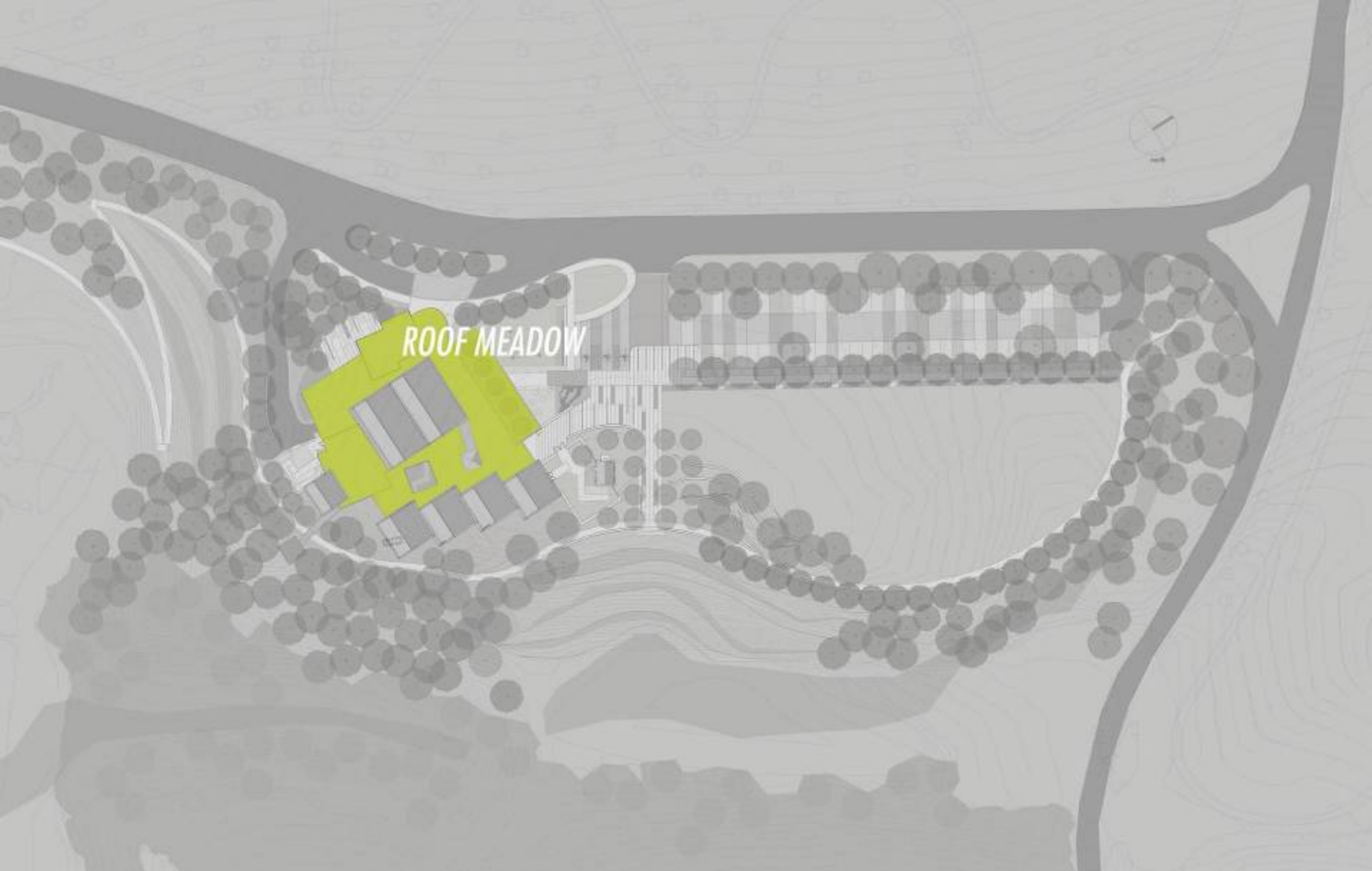
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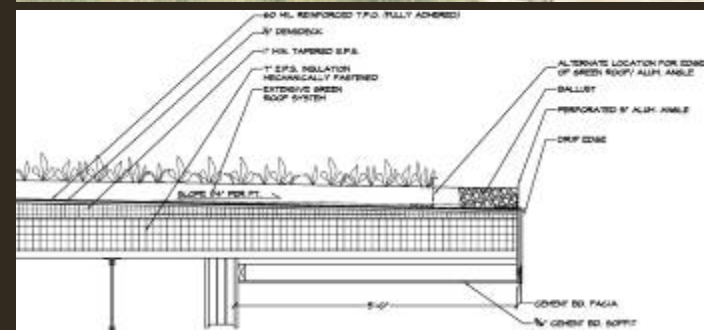
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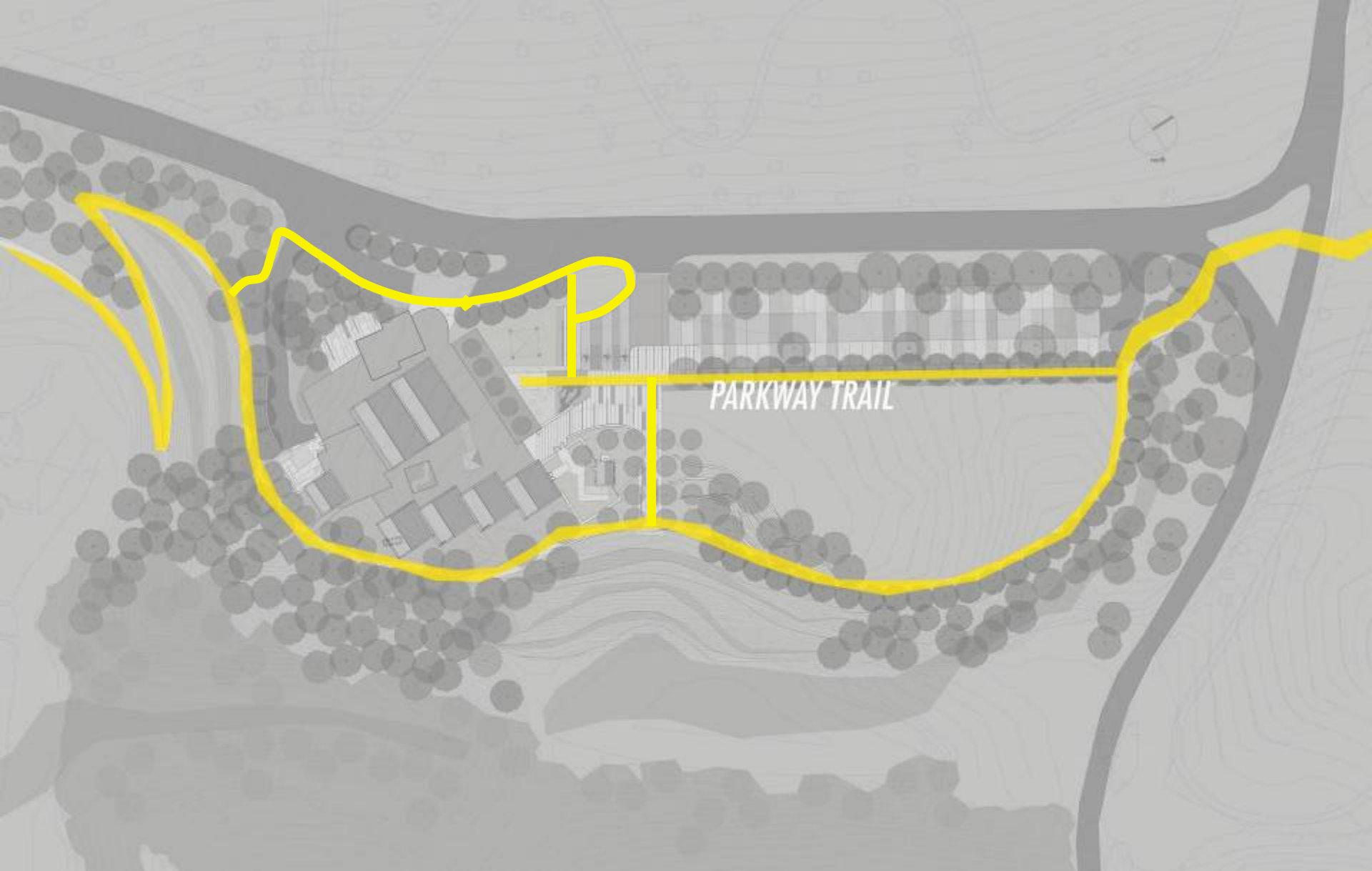
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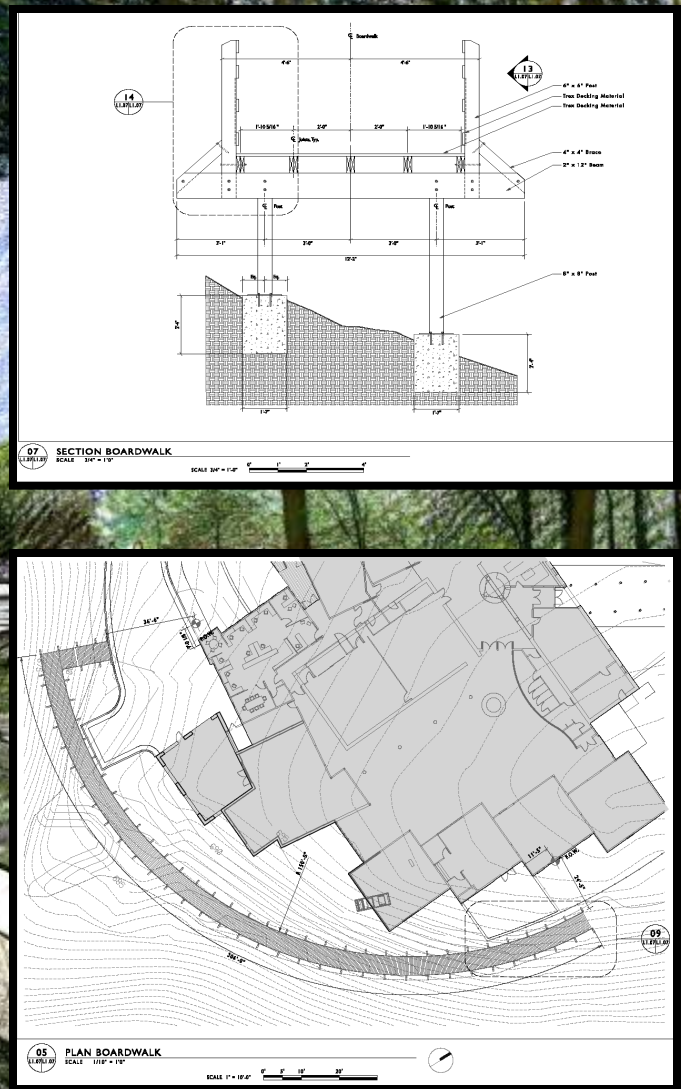


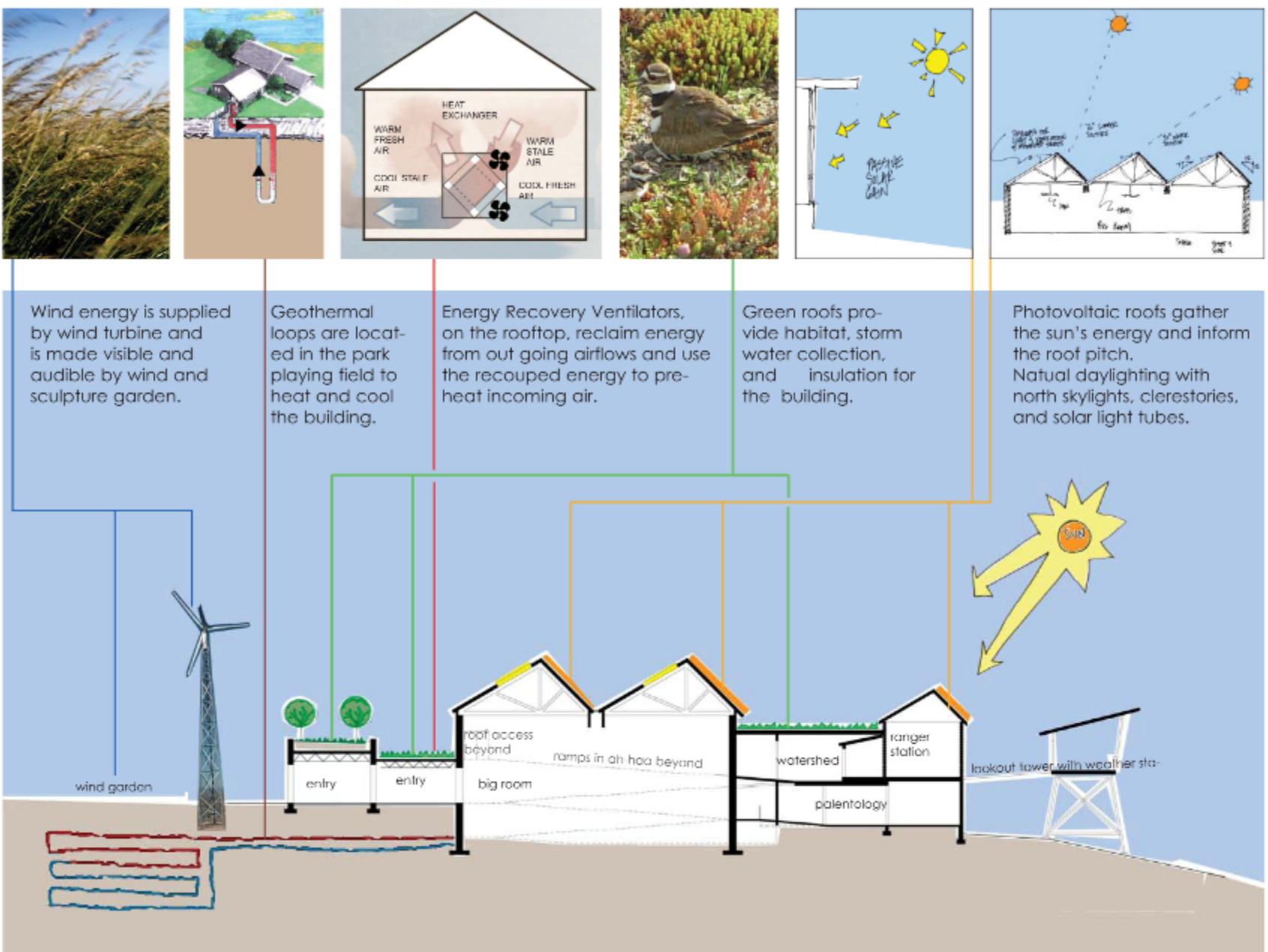


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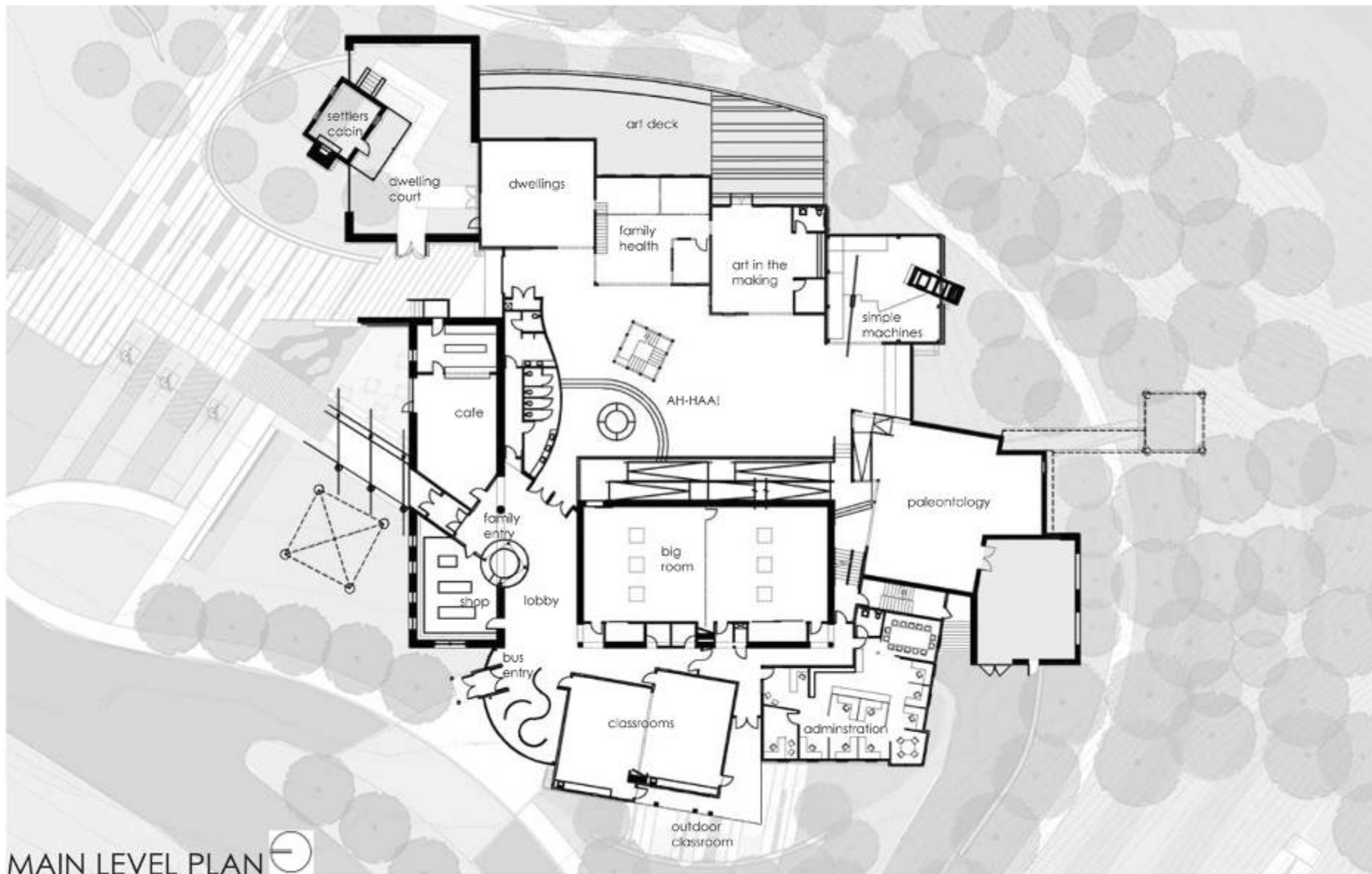


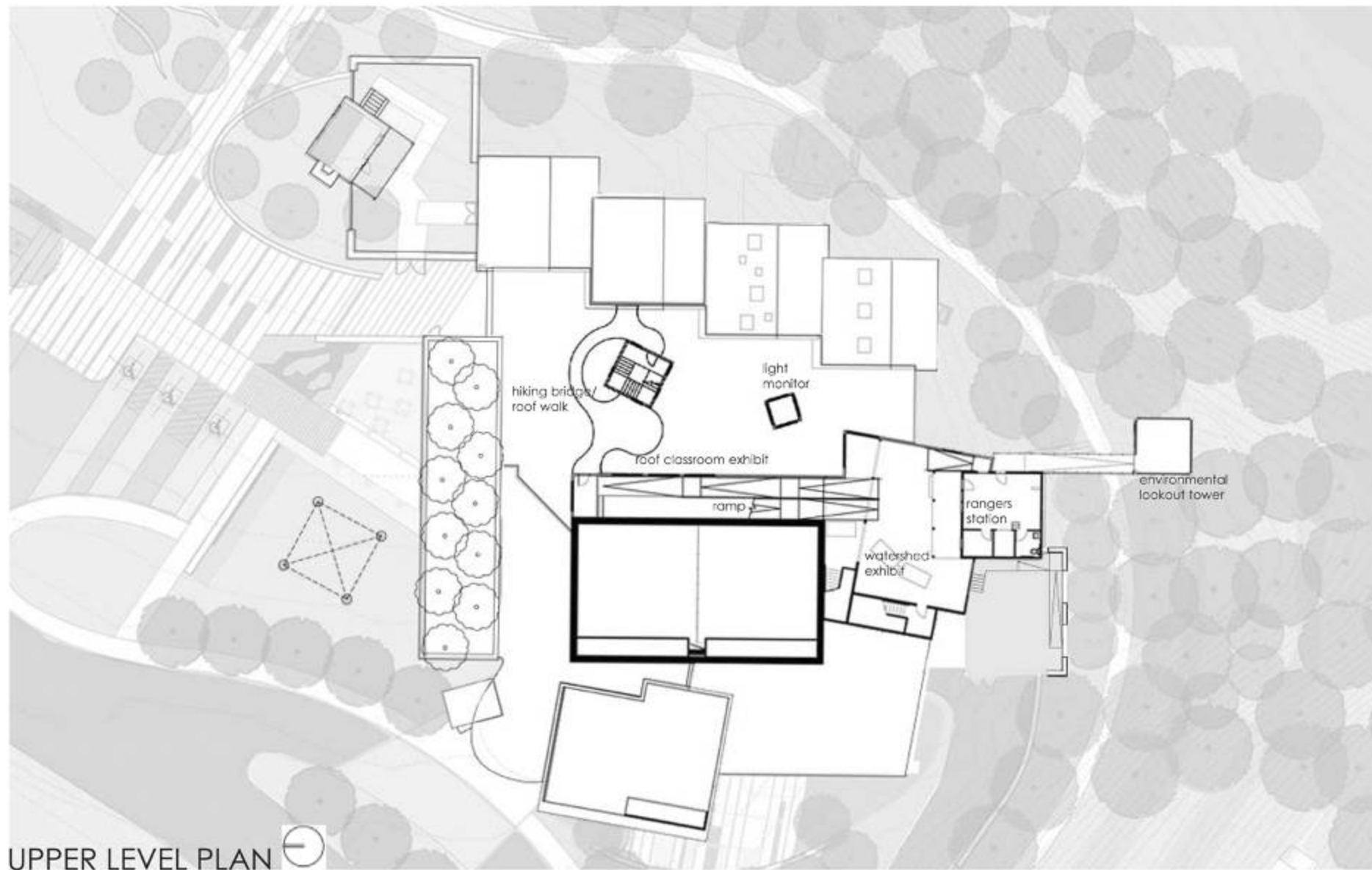
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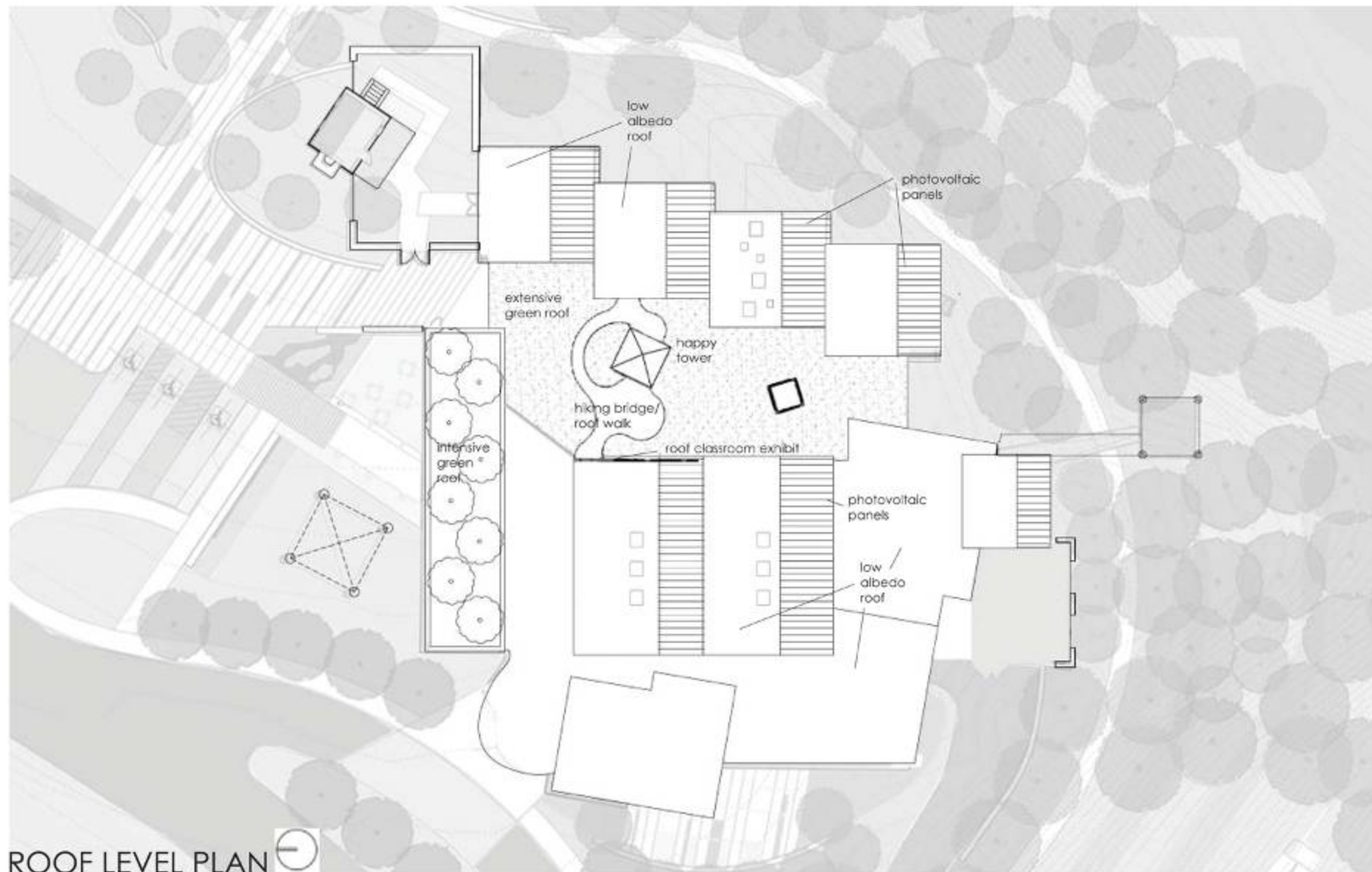


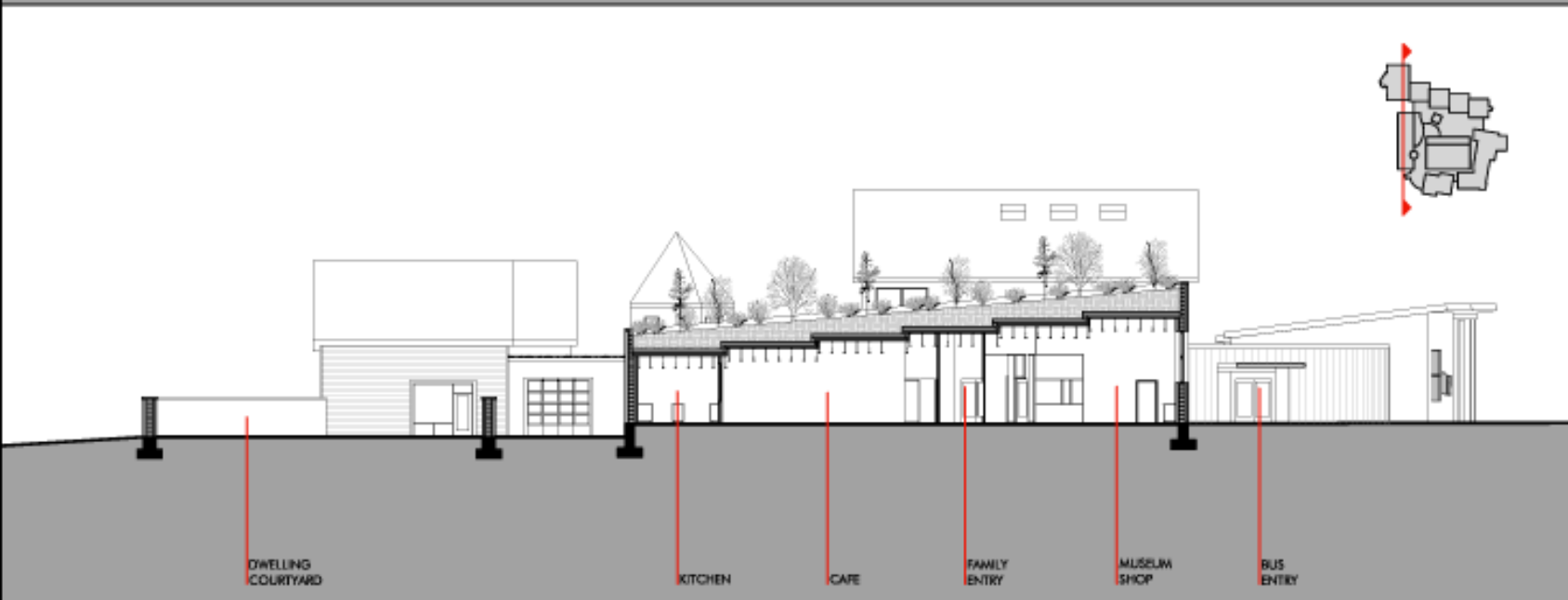
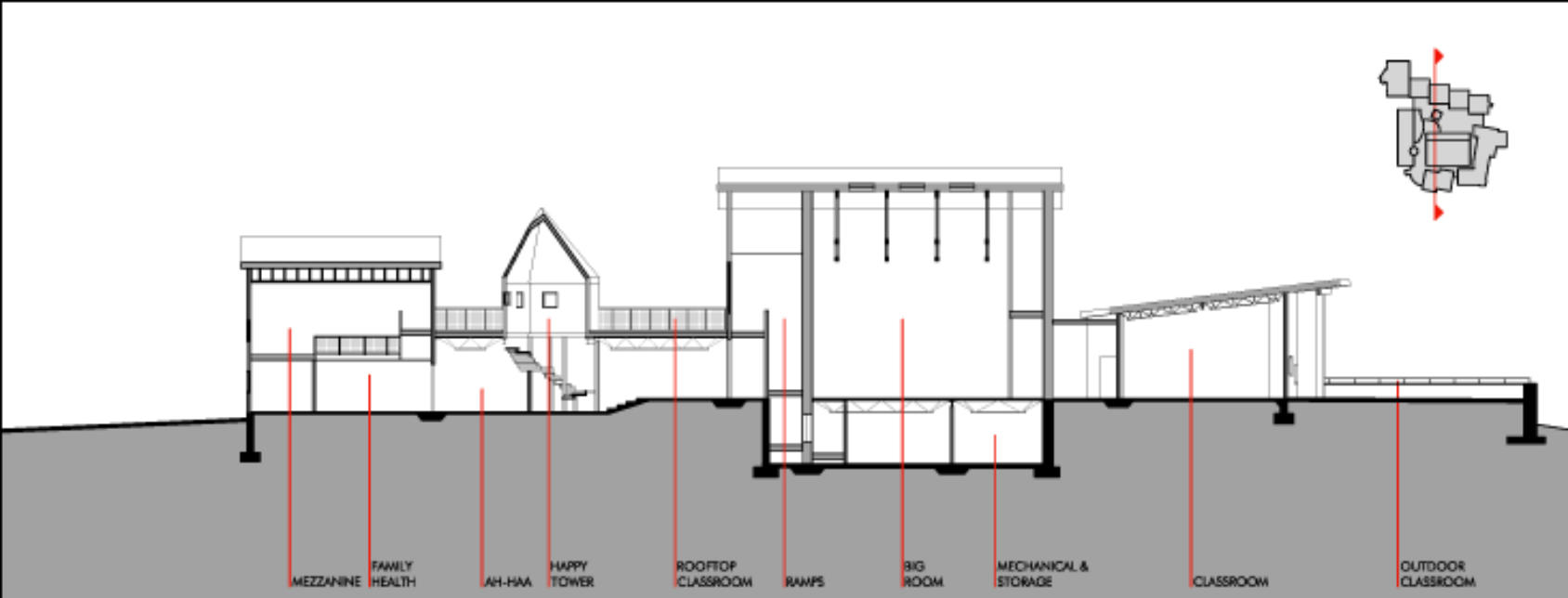
LOWER LEVEL PLAN



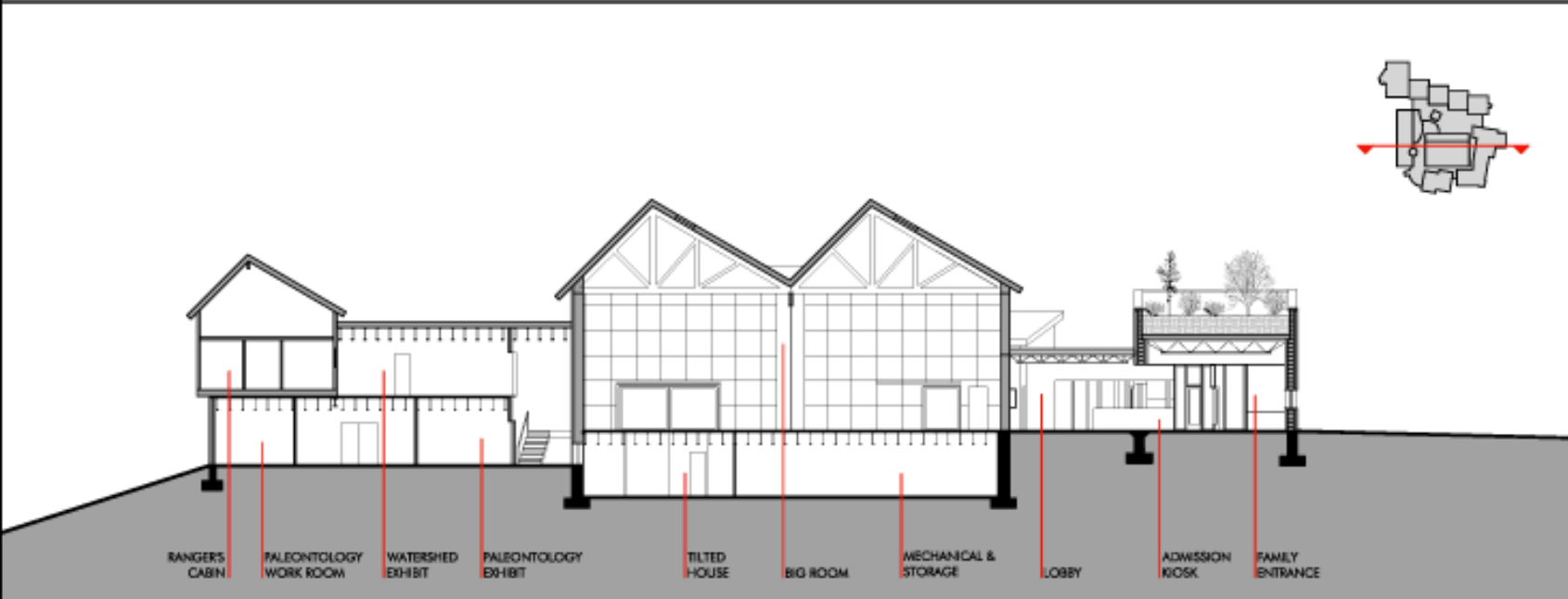
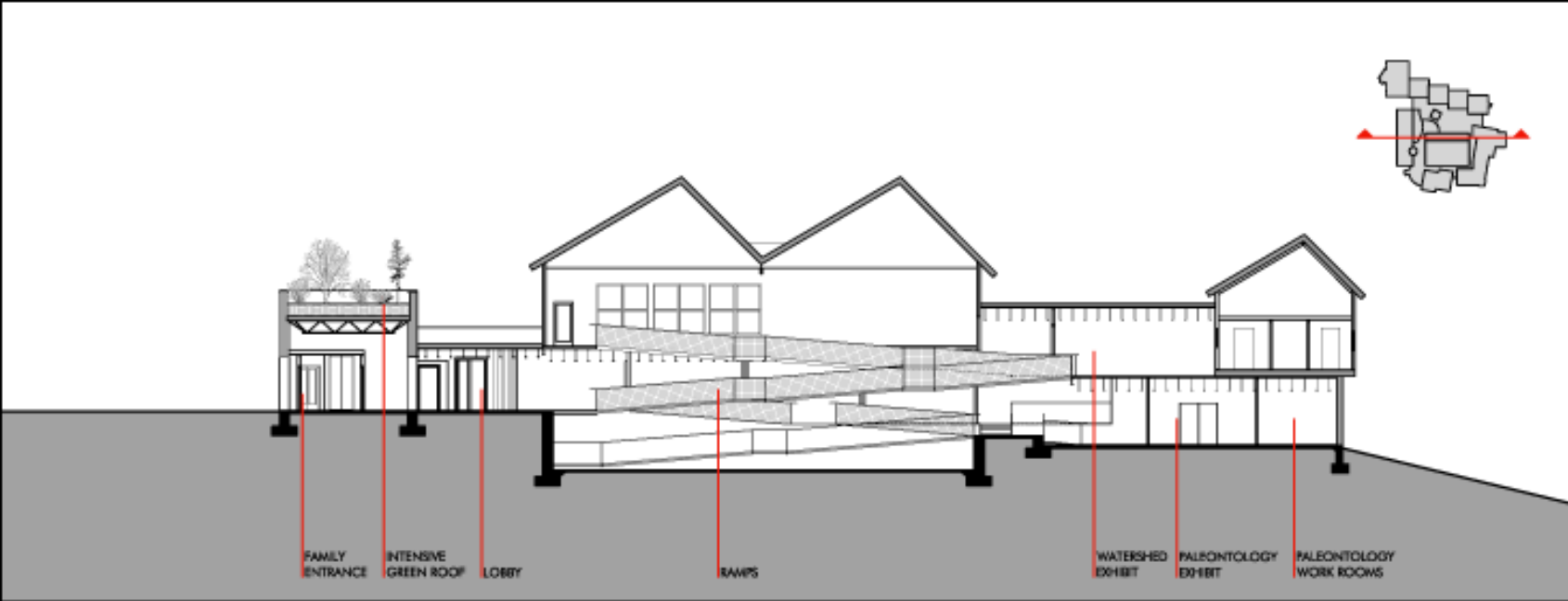








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