

Arch 464
ECS
Spring 2020

Name _____

Quiz #3

"Is the Green House Green?"

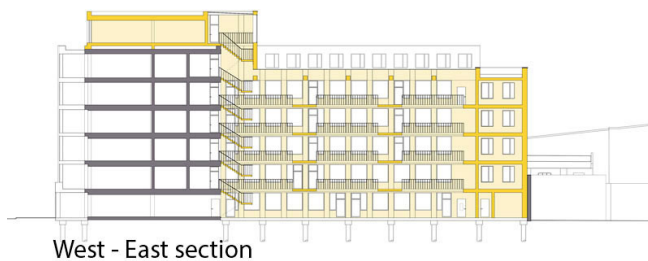
Read and look at everything before you write!



The northwest corner view (above) of the Green House. The west façade of the old building has the double-glazed wall and the north façade of the addition has deep-set punched windows.

The southwest corner view (right) shows the adjacent buildings to the south.

The East-West section (below) shows the new double wall structure to the west and the neighboring building to the east



West - East section



The Green House

Waugh Thistleton Architects has added CLT extensions to an existing concrete frame structure to create a new building for the Ethical Property Company and halved the CO₂ emissions of the building.

The practice has completed work on the Green House, an environmentally friendly office building in Bethnal Green, East London. The sustainable six-storey commercial property is a retrofit of a derelict 1960s office block and is now a flexible workspace for up to 50 social-change organisations.

The concrete frame was retained in order to minimise waste, pollution and reduce carbon emissions that usually occur through demolition. Waugh Thistleton added a new six-storey rear extension and atrium to provide 7,050m² of useable office space, with further workspace located in a single-storey rooftop extension. All additions have been built from prefabricated CLT and glulam, reducing the building's carbon footprint.

The west façade, which faces onto Cambridge Heath Road, is predominantly glazed, providing passive regulation of noise, heat, sunlight, and ventilation. The windows are set back from the external skin of the façade to provide solar shading and acoustic protection; this also gives a layered effect to the front of the building.

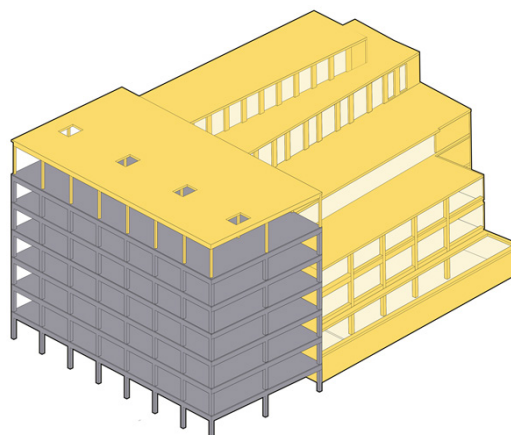
Photovoltaics on the roof offset energy consumption, while wildflower green roofs at second and sixth-floor levels [*third and seventh in US lingo*] encourage biodiversity.

A large south-facing communal terrace on the fourth floor provides outdoor breakout space for informal meetings, while there are also over 80 bicycle parking spaces along the ground floor north wall to encourage commuting by bike.

At the centre of the building is a full-height atrium which opens up the lobby space at ground floor, brings in natural light and provides sky views from every level in the stair core. The central exposed CLT cantilevered staircase is the key connection between the existing concrete building and the timber extension. The cantilever has been engineered using resin-bonded steel rods inserted into the treads, with the half-landings suspended from a steel tension system.

On every floor, open-plan kitchens encourage active collaboration. Recycled carpet tiles, low-energy lighting, and water-saving technologies all contribute to reduce volatile organic compounds (VOCs), and electricity and water consumption.

The building halves CO₂ emissions in use from the notional benchmark of 91.7 tonnes per year to 45.8 tonnes per year.



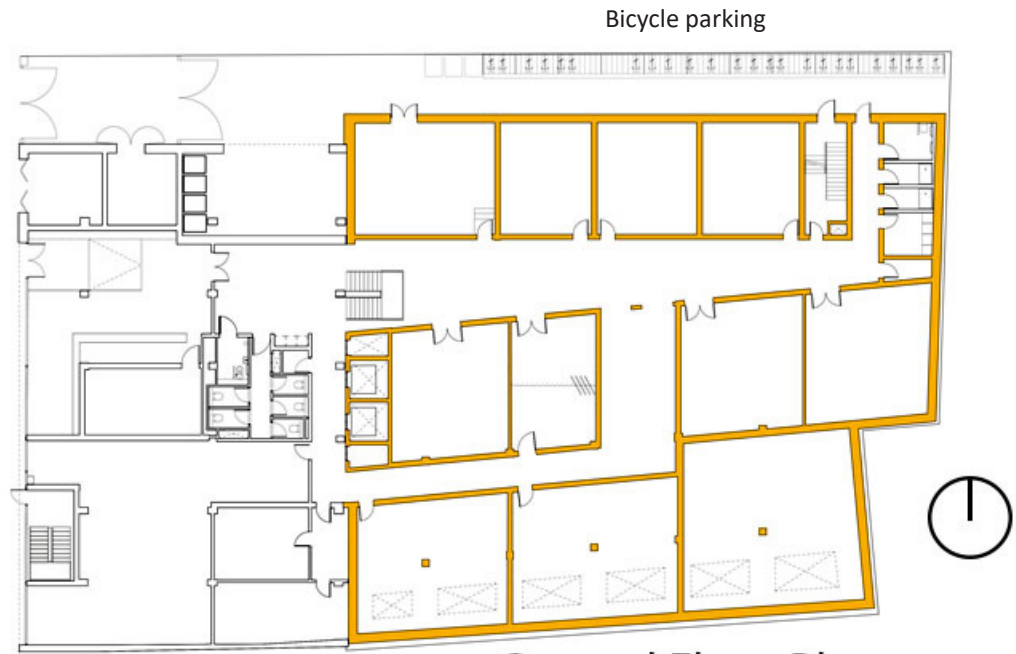
The structure and floor plates of the existing building is represented in gray and the addition in yellow.

—FRAN WILLIAMS, 30 JULY 2019 AJ

Site Energy

1. The architect opted for on-site energy generation via photovoltaics. **Make a case** for or against supplementing the PV array with a building-mounted array of wind turbines. **Discuss** the merits, placement, and drawbacks of a wind turbine array. Use diagrams to **illustrate** your ideas.

3 points



Ground Floor Plan

The old building (not poched) and the addition (yellow poche) occupy the entire site, with a street to the west, an alley to the north, and neighboring buildings to the south and east.

Regeneration-Based Checklist for Design and Construction

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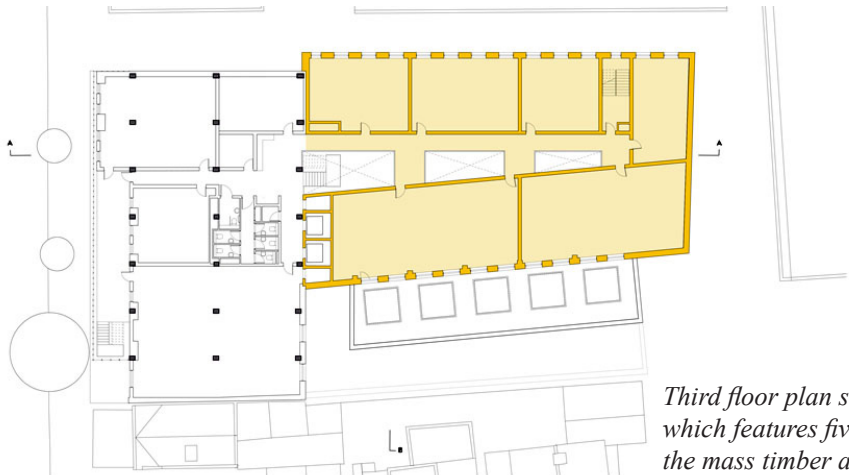
Project: _____

For one point rate the building for each of the checklist items and give a total score.

		degeneration				sustainability				regeneration		
		-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always		
the site	pollutes air										cleans air	
	pollutes water										cleans water	
	wastes rainwater										stores rainwater	
	consumes food										produces food	
	destroys rich soil										creates rich soil	
	dumps wastes unused										consumes wastes	
	destroys wildlife habitat										provides wildlife habitat	
	imports energy										exports energy	
	requires fuel-powered transportation										requires human-powered transportation	
	intensifies local weather										moderates local weather	
	the building	excludes daylight										uses daylight
		uses mechanical heating										uses passive heating
uses mechanical cooling											uses passive cooling	
needs cleaning and repair											maintains itself	
produces human discomfort											provides human comfort	
uses fuel-powered circulation											uses human-powered circulation	
pollutes indoor air											creates pure indoor air	
is built of virgin materials											is built of recycled materials	
cannot be recycled											can be recycled	
serves as an icon for the apocalypse											serves as an icon for regeneration	
is a bad neighbor											is a good neighbor	
is ugly											is beautiful	

negative score 2200 possible	positive score 2200 possible
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final score: _____



Third floor plan showing atrium (middle) and roof deck, which features five skylights to the second floor, (south) of the mass timber addition.

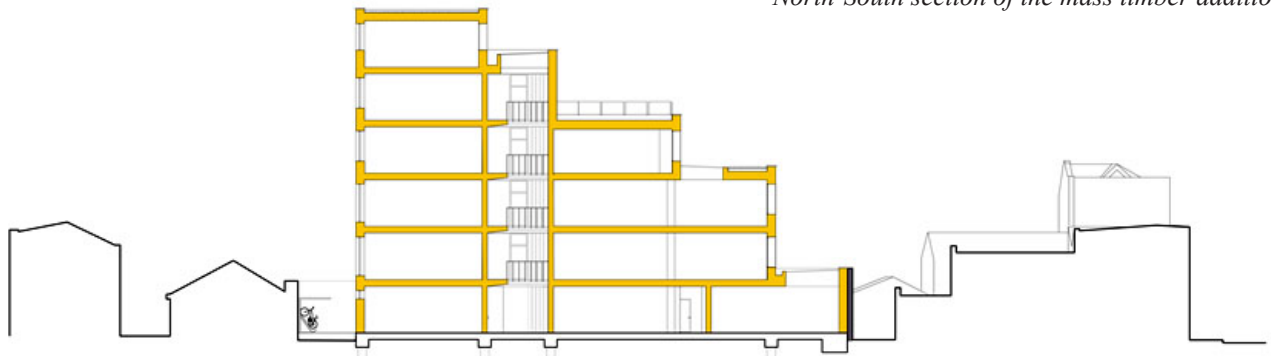
Building Regeneration

2. The building is on level ground in a borough of London, which has a mild humid climate similar to Seattle.

Given the building plans and orientation **point out and discuss three** features of the **building design** to which you awarded regeneration points on the SBSE checklist (facing page) and **one** feature of the **building design** that to which you awarded degeneration points on the SBSE checklist.

2 points

North-South section of the mass timber addition.



1+

2+

3+

1-

Embodied Carbon

3. **Fully discuss two strategies implemented** that significantly reduce embodied energy in the adaptive reuse and addition.

4 points

1



Atrium view of the CLT cantilevered stair with LED lighting fixture in the foreground.

2