

Title: **How Can a Tall Building Improve the Public Realm and Private Lives?**

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Subjects: Urban Design
Wind Engineering

Keywords: Community
Density
Façade
Public Space
Workplace

Publication Date: 2019

Original Publication: 2019 Chicago 10th World Congress Proceedings - 50 Forward | 50 Back

Paper Type: 1. Book chapter/Part chapter
2. Journal paper
3. **Conference proceeding**
4. Unpublished conference paper
5. Magazine article
6. Unpublished

How Can a Tall Building Improve the Public Realm and Private Lives?



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Karen Cook, Founding Partner of PLP Architecture, leads the design of 22 Bishopsgate, the City of London's tallest tower, which uses new technologies to improve well-being in the workplace and the public realm, offering a vertical village of amenities to meet, learn, nourish and stimulate. Cook recently led PLP Architecture's finalist team in the international competition to re-imagine Tour Montparnasse, Paris, taking public realm and gardens up into the tower. Previously a partner at KPF, Cook led the competition-winning design for Tour First, introducing new multi-story breakout spaces and transforming the skyline of La Défense with its tallest office tower.

Abstract

During the last decade, the City of London has experienced a surge in daily commuters from less than 400,000 to nearly 500,000, with another 100,000 anticipated by 2030. How can a tall building mitigate urban pressures, especially given that technology has changed the way people live and work? Twenty two, also known as 22 Bishopsgate, the tallest building in London's financial district, will comprise a community of 12,000 individuals when complete. It is a tall building designed to support the individual while contributing to the public realm. It holds London's largest bike park and its highest free public viewing gallery. A consolidated delivery-management strategy reduces vehicle trips to the building, and consequently air pollution, with the aim to create a vehicle-free environment during peak travel times.

Keywords: Community, Density, Façade, Public Space, Wind, Workplace

What Does Our Future City Look Like?

Globally, cities are densifying and undergoing rapid and extensive change. This trend is true in London as well, which has changed since the turn of the millennium, undergoing a formal and structural shift analogous to that of the Victorian era. Climate change is indelibly altering the world, increasing drought, fire, storms, floods and sea levels. Some people are relocating for survival; others for more stimulating work. Artificial Intelligence is replacing certain jobs and technology facilitates advances in well-being and in sustainability and the boundary between work and private life has become less distinct as the office space has also become a social space. The trajectory of 22 Bishopsgate, which is the tallest tower in City of London, makes an informative case study when examining the role the tall building can play in cities that are on the brink of significant morphological change (see Figure 1).

London is Densifying

With a population of one million people in 1815, London was already the world's largest city, but it continued to grow rapidly during the Industrial Revolution with factories creating new jobs and increasing productivity and real wages, yet with the corollary of increasing poverty and crime. Still, it quickly reached three million people in 1860 and seven million by 1910. London's urban design, shaped by new technologies and materials such as steel and trains, grew outward and took a new form, still recognizable today. From 1939 to 1988, London's population decreased by more than 20 percent but, with the new millennium, the population has been growing by roughly one million people per decade. According to the Greater London Authority (GLA), today more than 8.8 million people inhabit London; forecasts predict over eleven million people by 2050.

London's penchant for attracting top-talent of all different backgrounds has helped in turn make it the world's preeminent financial center, while increasing pressures on urban life and land values, reflected in the high cost of housing and long commutes. London has had to face the question, as available brown field sites are built over: should it sprawl into green belt or build up? In response, efforts must be made to strengthen communities, by conceiving of the built environment with a new model. London's population density is low compared to Paris, with approximately 5,400 compared with over 20,000 people per square kilometer. Increasing London's

population density would help to support investment in public transport, schools and health services and to support locally owned shops.

Planning in London and City Demographics: Skyline Morphology

The City of London's street network originates with a few long, straight Roman roads, with Bishopsgate a principle route connecting the River to fields north of the city. A medieval capillary network overlays these early arteries, connecting nodes of significant functions, such as markets. These winding streets with historically narrow pavements led to a perspectival approach to viewing ornamental and architectural design, which persist as a predominant form of planning assessment.



Figure 1. View of 22 Bishopsgate from Bank Junction in London. © Michel Denancé

In 1965, 32 boroughs were formed, comprising the rest of Greater London. The City of London has enjoyed its own local government since 1075 when King William granted its citizens limited rights independent of the monarchy. Guilds, or the makers and merchants of that time, remain among the City's most enduring companies and landowners.

The City of London was largely rebuilt after the Great Fire of 1666, but with each economic boom a new era of buildings is evident. The Industrial Revolution saw a large number of Portland Stone edifices, with some nationally important centers of finance and government rebuilt, such as the Royal Exchange, The Bank of England, and Mansion House, all centered around the main origin node of the City, Bank Junction. The destruction of World War II left new development sites, which today are some of the only non-conservation areas.

St. Paul's Cathedral, rebuilt after the Great Fire and surviving the 1940 Blitz, stands as a cultural symbol of togetherness, suffering and survival, and a national monument of British resilience and courage. The most important tall building in the City, its dome occupies a prominent position when viewed from Westminster, the seat of national government, and from across the wide-open Thames River, London's primary orienting geographical feature (see Figure 2).

The London View Management Framework protects views of the Cathedral from historically important vantage points and is a key rule in determining where tall building construction is permitted. London's planning system is defined by guidelines; not by prescriptive code as in Paris, Berlin, New York City or Chicago. This interpretive legislative context works based on precedent and negotiation.

In 1986, the deregulation of the London Stock Exchange and the automation of pricing led to the so-called "Big Bang," and Canary Wharf developed a zone for larger buildings in London's eastern Borough of Tower Hamlets. The City recognized that it would need to permit the construction of larger buildings to retain large financial services tenants.



Figure 2. "London: The Thames from Somerset House Terrace toward the City," a painting by Giovanni Antonio Canal (Canaletto), 1750 (left) and "St. Paul's Survives," a photograph by Herbert Mason, 1940 (right). © Public domain (left); Herbert Mason/Daily Mail/Shutterstock (right)

In 2003, the City of London's most prominent tall building was Siefert's Tower 42 (formerly NatWest Tower, originally completed in 1980), which divided public opinion and set a new benchmark height of 183 meters (approximately 168 meters above street level). The city planners initially set forth that all new tall buildings should match this height, a limit applied to St Mary Axe and to Heron Tower. During Pinnacle pre-application discussions with city planners, architectural historian Robert Tavernor suggested a different townscape idea that the new tall buildings should form a group with an apex, leaving open sky around St. Paul's Cathedral dome, and the Eastern Cluster emerged. Initially the towers materialized as individual objects, while with the subsequent completion of additional towers, including 22 Bishopsgate, the skyline appears as a single cluster (see Figure 3).

Changing Work, Changing Workplace

During the nineteenth century, an industrial economy transformed urban life. During the twentieth century, the office workplace resembled factory assembly lines, with people arranged in rows of offices or rows of desks. To achieve more in one's career required investing more hours at the office.

Today, Artificial Intelligence and technology have changed the way people work. Increased computing power and easier access to information has shifted the industrial economy to a knowledge economy. Working longer hours no longer leads to increased productivity. Value creation stems from intelligent ideas and strategic thinking and life-long learning is required to stay abreast of rapidly changing technology. Empathy is an attribute necessary for team collaboration and building personal relationships that lead to new opportunities. Personal well-being is cultivated to improve overall performance.

Other factors are changing the workplace, too. Wireless technology allows people to work from anywhere and the boundary between work and life has become more fluid. Ron Bakker, Co-Founding Partner, PLP Architecture, acting for Deloitte and OVG, led the design of The Edge, where data collection helps the employee increase control and choice,

and helps the facility manager reduce energy consumption. Increased occupation density has arisen from occupiers wanting to make more efficient use of their space, and from activity-based working relying on a greater concentration of people. In the City, this change from one person per twelve square meters to one person per eight square meters, requires more elevators, more stairs, more restrooms, and more fresh air.

To learn about the new workplace, the project team visited top-performing banks in Melbourne and Sydney, whose human resource and facility managers extolled the virtues of activity-based working. Not hot-desking, but a wide variety of unassigned workstations from communal to private, fostering collaborative exchange as well as quiet, focused work. Amenities, from bike parking to yoga, promote physical fitness, learning and meeting others, while simultaneously supporting individual needs. The result was individual self-reporting of increased productivity. Subsequently, there is a recognized need for greater support for regular periods of more focused work, requiring less distraction for greater mental concentration, in addition to collaborative work.

Well-Being From Street to Sky

The client had a vision to build the tallest building among a close group of emerging tall buildings at the heart of the City of London. A team of experts were gathered to re-explore The Pinnacle site, setting targets to re-use existing deep Pinnacle foundation piles and build a skeleton of repetitive components for a building 40 percent larger but using 15 percent less steel. WSP proposed to activate the existing raft with a stiffer, concrete core, with outriggers adding lateral stiffness. Numerous iterations were provided for vertical transportation, which was trickier when serving multiple destinations of the "vertical village."

The tower is designed to respect the Mayor's views of St. Paul's Cathedral, and as a backdrop to the historic Bank of England and Royal Exchange. The architectural response is a multi-faceted glass form, faced with low-iron glass, to join together the non-geometrical relationships of the other tall buildings into a single cluster, and to take on different colors in the sky, softening the form. The top of the tower steps, formally to create the apex of the cluster of towers and functionally to provide space for the United Kingdom's highest public viewing gallery.

Well-Being at Work: Improved Satisfaction and Performance

The skyline morphology has been addressed, but 22 Bishopsgate contributes to the City's public realm and introduces a new typology of workplace. Stuart Lipton had a vision to create a place designed for people's well-being at work. The new design would be distinct as the United Kingdom's first WELL-registered shell and core building, for a



Figure 3. 22 Bishopsgate forms the center of the cluster of tall buildings in the City of London, viewed from the Thames. © Riverfilm Martin Richardson



Figure 4. 22 Bishopsgate links the open space network. © PLP Architecture

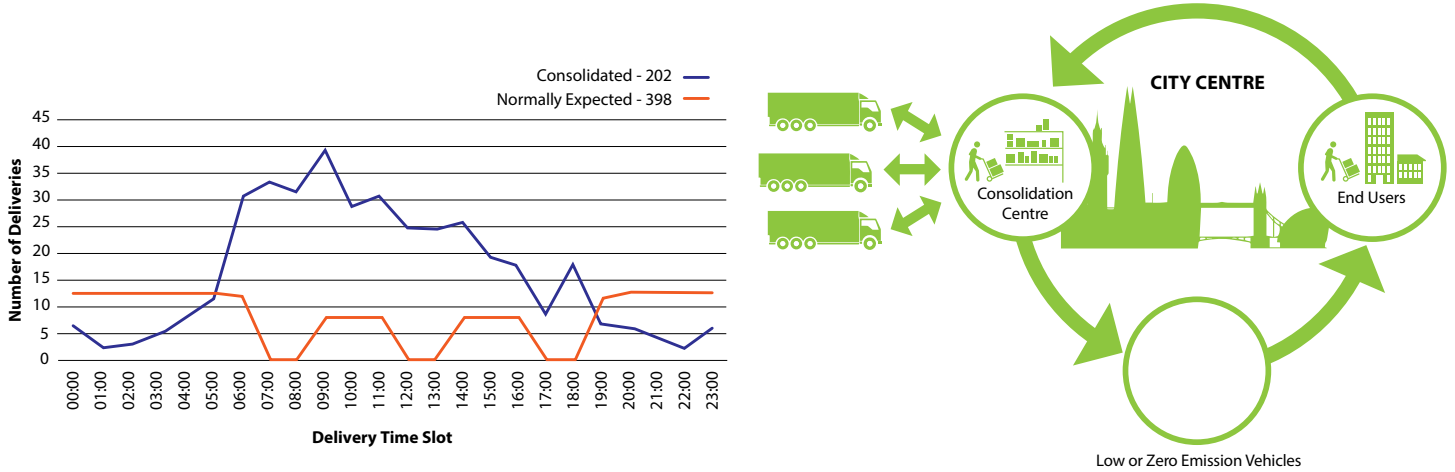


Figure 5. Delivery profile comparing number of trips to 22 Bishopsgate over a twenty-four-hour cycle, with and without Consolidated Delivery Management System. © Miller Hare

higher occupation density, with more generous office space, better fresh air, better daylight, art, and a vertical village to meet others, learn, relax.

WELL is a standard that supports the health, well-being and performance of people by proposing to enhance the quality of indoor environments. The Well Living Lab was established in collaboration with the Mayo Clinic to study the impact of indoor environments on health and well-being. WELL classification rates criteria as a tool for designers and clients, covering a wide range of decisions.

A Walkable City

As the largest building in the cluster, 22 Bishopsgate fulfills a civic role to elevate the pedestrian experience, starting with the daily commute. The City has over half a million commuters daily, a hundred thousand more people than a decade ago, and anticipates another hundred thousand by 2030. Car parking is no longer permitted in new developments and over ninety percent of commuters arrive on public transport or cycle. Consequently, during pre-application discussions with the City of London planners, several new urban pressures needed addressing: sufficient flow on pavements, wind mitigation, reduced vehicle numbers and a walkable open space network.

Space Syntax gathered pedestrian flow data, and on the basis of the analysis made a number of recommendations which

were adopted, including reopening a Roman route across the site. A new open-air pedestrian passage, lined with large-scale glass artwork, increases pedestrian permeability, connecting Bank Junction to St. Mary Axe (see Figure 4).

Toward a Vehicle-Free Public Realm

Vehicle delivery requirements to the building almost stopped the new proposal: the combination of increased surface area with increased population density led to a number of vehicle trips forecast significantly higher than the original Pinnacle permission. A logistics engineer at Wilson James proposed a concept to reduce the number of vehicles. First introduced to the City during the construction of Broadgate, 22 Bishopsgate is the first commercial multi-occupier building to apply Consolidated Delivery Management during operation.

This system means that instead of trucks entering the building to unload a single item, all goods first go to a remote dispatch center, where they are off-loaded, scanned for security and stored until the tenant requires the item. Fresh fish and cheese are exceptions, delivered directly to the chef. A fleet of private, small, low-emission vehicles shuttle between the dispatch center and 22 Bishopsgate, upon return removing dry waste.

The benefits are numerous with this scheme. The number of vehicle trips to the building is forecast to reduce by at least half (see Figure 5) and vehicle trips can be omitted entirely

during peak pedestrian rush hour, morning, noon and evening. A safer pedestrian and cyclist experience, less noise and air pollution, and greater security in the building and on the street have led the City of London to adopt this delivery strategy into planning policy.

Toward a Less Windy Public Realm

City planning required wind testing to maintain pedestrian comfort. RWDI conducted wind tunnel tests, analyzed in collaboration with Formula 1 advising engineers Wirth Research, whose powerful computer fluid dynamic analysis and alternative approach increased solution options. A large canopy 17 meters above street level was introduced to mitigate wind effects. To resist both down draft and up draft, caused by negative pressures from prevailing wind circumnavigating the cluster, and to handle the various geometric shapes, it was

decided to build the canopies from ultra-high-strength-fiber-reinforced-concrete (UHPFRC), which relate to the mineral character of the Bank Conservation Area opposite Bishopsgate. 22 Bishopsgate has the United Kingdom's largest application of UHPFRC used simultaneously as self-structural and fair-faced panels (see Figure 6).

The canopy acts as a cornice line separating the glass office tower above and giving the base permission to have its own character. A powerful visual element, the cornice holds the tower and unifies the many aspects of the base. A four-level main foyer has four entrances, facing pedestrian approaches from Bishopsgate and Crosby Square. A symmetrical escalator promenade serves the upper deck of the double-deck elevators and the Urban Market. The pedestrian route links Bishopsgate to Crosby Square and serves a dedicated public entrance to the top (see Figure 7).



Figure 6. 22 Bishopsgate, Wind testing and analysis for mitigation and pedestrian comfort. Wind tunnel test at RWDI (top left). Downdraft analysis by Wirth Research (top right). Bishopsgate main foyer elevation (bottom left). Perspective diagram of the UHPFRC canopy in the context of the Bank Conservation Area (bottom right). © RWDI (top left, top right); Martin Richardson (bottom left); PLP Architecture (bottom right)

Artwork in the Public Realm

Art and craft contribute to a unique and singular identity unlike other corporate architecture in the City. Technological processes make large scale public artwork possible within a commercially driven time frame. Artwork and craft add color, texture, delight and surprise to the design of the base, in the historic tradition of the City Guilds, whose colors and motifs inspired Alexander Beleschenko's glass artwork. Beleschenko's artwork is integrated with wind mitigation devices, including a large glass canopy and several glass screens (see Figure 8). Stuart wanted this canopy, required to meet wind mitigation requirements, in glass covering the street into the Norman Parish Church of Great St. Helen. The canopy was designed by PLP Architecture, incorporating Beleschenko's original artwork which he made digitally in Wales, and which Sedak printed at high-resolution on large glass panels in Germany, finally to be installed by Gartner. Beleschenko has continued the same theme on the glass walls lining the new pedestrian passage. Artwork is integrated into the architecture around the entire base, with a free-standing large sculpture at the southwest corner, marking the public passage and entrance to the top.

Well-Being at the Threshold

The main foyer is large but welcoming, with familiar materials and changing curated art exhibits (see Figure 9). Art and hand craft using natural materials are evident in the Library, tucked under the escalator promenade. 22 Bishopsgate's opt-in facial recognition omits the hassle of badges and makes the reception desk queue obsolete. Visitors receive QR codes with a meeting invitation. Greeters with iPads rove to assist visitors arriving. Philip Ross of Unwork advised how technology could facilitate the operation of innovations, such as facial recognition entry, goods delivery, food delivery directly to desks, locating colleagues or meeting new people, adjusting window blinds and setting the lighting and temperature.

Vertical Village: The Office as a Social Place

Outside the office spaces, 9,290 square meters are distributed vertically along the tower and are dedicated to amenities and well-being: a vertical village connecting people, providing choice and convenience. The selection of amenities is carefully curated to nurture mind, body and spirit, and to provide what people need to support their daily lives (see Figure 10).

The City of London is well-served by public transport, and planning policy permits no new car parking spaces but does require cycle parking, which was satisfied with the inclusion of the cycle park (see Figure 11). 22 Bishopsgate has approximately 1,700 cycle parking spaces, for regular and electric bicycles and tricycles. Folding cycles are available for hire. To promote cycle use, the cycle park is operated as if it were a gym, including showers, lockers, dry cleaning, clothes drying, cycle cleaning, cycle repair, and safety classes.



Figure 7.22 Bishopsgate, London—main foyer facing Bishopsgate. © MIR



Figure 8. North Entrance Canopy, artwork by Alexander Beleschenko. © PLP Architecture



Figure 9. The library and reception area at 22 Bishopsgate contains leatherwork by Bill Amberg and Black Walnut furniture by Pierre Renart with a rug by Sandy and Chester Jones © MIR

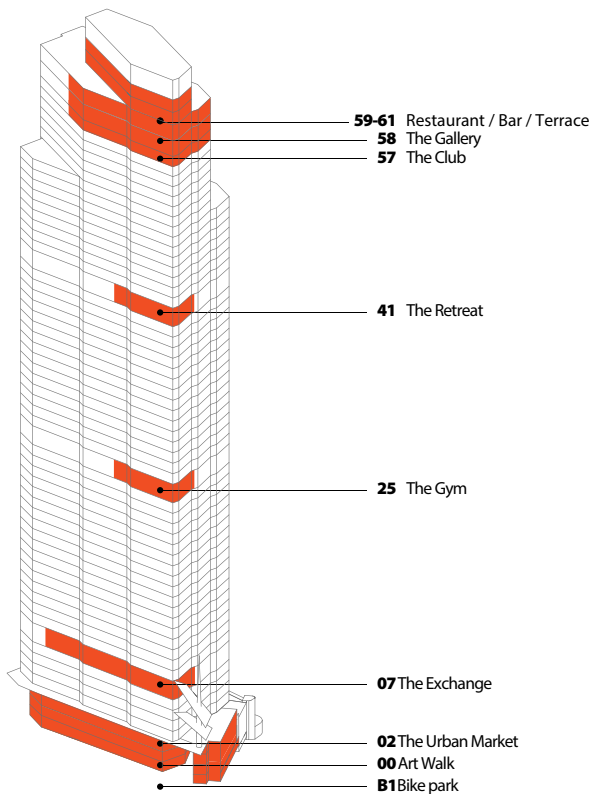


Figure 10. The “vertical village” concept at 22 Bishopsgate is meant to address multiple aspects of wellness with diverse amenities. © PLP Architecture

years old and fewer than ten employees, was implemented. A double-height space on level seven offers seminars and broadcast quality recording booths.

Various other wellness, fitness and multi-purpose spaces are offered as well. The fitness center at Level 25 offers London’s highest climbing wall, as well as inspirational talks by visiting Olympic medalists, dance or immersive spin classes. The retreat at Level 41 is a spa attentive to emotional and physical health, including doctor and dentist appointments. At Level 57, the club allows members to book a private dining room for client meetings or conferences. The vertical village concept permits small businesses to compete with big companies to attract and retain top talent. It permits individuals to mix life and work in a multi-occupier tower with a choice of varied settings for work, for learning, for relaxing and for fun.

The office space is arranged around a central core and delineated by a twenty-three faceted façade, creating different core to glass dimensions, offering views in more directions, and fitting the tower into the cluster, dematerializing its form by reflecting the light in multiple directions. Floor plates, averaging 2,322 square meters remain large at the top in contrast to the diminishing floor plates of earlier cluster towers (see Figure 12).



Figure 11. The cycle park at 22 Bishopsgate contains parking for multiple types of bicycles, as well as cycle repair and other services. © PLP Architecture

With access from the main foyer, the urban market with restaurants and independent food purveyors bring the originality of street market discoveries onto the building’s second level. Choosing meals from the menu a day in advance reduces food waste, and tenants can take advantage of an external terrace that overlooks Crosby Square. Open to tenants and their visitors, the highly visible promenade of escalators facilitates public access.

A planning committee request to offer fifty desks at discounted rents to qualifying start-ups, i.e., companies less than five

The Façade Concept and Design

Better daylight and solar control equal better performance—for both humans and machines. The façade design was conceived in collaborative workshops with the aim of achieving a single type of the highest performance. Lipton Rogers sought façade advice from Corné Zijlmans, at the time running Scheldebouw, and Gartner, who had started work on the original Pinnacle, from Kurt Pfenninger, of independent consultants EPPAG, and from Steve Mudie, of Alinea cost management.

A high-performance closed cavity façade (CCF) was chosen to achieve an optimum controlled balance of solar gain and daylight transmission. The inner layer of glass is a double-glazed unit. A continuously pressurized air feed to each façade unit keeps the cavity free of dust. A single laminated outer skin of low-iron glass with a silvery coating gives the tower an ethereal appearance, changing from reflective, to transparent, to milky in reaction to London’s dynamic North Atlantic island sky.

Operable blinds in the cavity can be fine-tuned, opened or closed, the perforated horizontal louvres rotated to horizontal, 45 degrees or vertical. A building management system controls the blinds, each unit independently addressable and can be overridden by the individual occupier using an app. When in use, the blinds mitigate solar gain and glare, as well as winter nighttime heat loss. When the blinds are not deployed, the CCF build-up transmits 55 percent daylight, up to 60 percent more light than a double-glazed façade that would only transmit 34 percent daylight with comparable solar gain performance to

the CCF when blinds are deployed at 45 degrees (see Figure 13).

The clear height of the office floor is three meters for the typical office floor, higher than the 2.75-meter standard British Council for Offices guidelines. With an overall four-meter floor-to-floor height, it was a challenge for WSP structural and mechanical engineers. An extra 230 millimeters were achieved at the perimeter, for a total clear internal glazing height of 3.2 meters, throwing even more daylight deeper into the space. Studies show that cognitive thinking is greatly enhanced by natural daylight and open views. Choice and control over one's own environment reduces anxiety and stress .

Toward a More Inclusive City

The Corporation of the City of London is taking steps to make the City more inclusive. Children living in boroughs east of the City watch the growing skyline from their windows, and with access to the top of the cluster will consider it their City. Europe's fastest double-deck elevators whisk visitors to the top from a dedicated public entrance. Free-to-access daily, 22 Bishopsgate invites the public to experience the City from London's highest viewing gallery (see Figure 14).

22 Bishopsgate is a new typology of tower for working in a new urban life, the first multi-occupied tower to have a vertical village, with social spaces to meet others and to learn, restaurants, higher ceilings, more daylight, fewer vehicles, more bicycles and public art. Technology improves sustainability performance and enhances the individual experience.



Figure 12. A typical floor with an activity-based working layout. © MIR

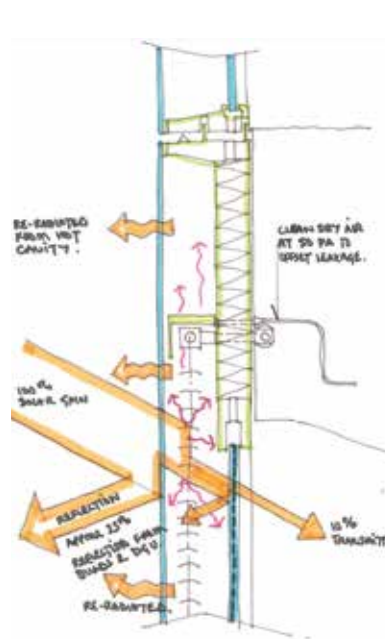


Figure 13. Closed-cavity façade drawings and a photograph of Gartner's visual mock-up unit. © Rob Peebles / PLP Architecture

Figure 14. The view east down the Thames from London's highest viewing gallery at 22 Bishopsgate © Karen Cook / PLP Architecture.

