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HM WHITE SITE ARCHITECTS

紐約時報新總部大樓位于紐約市最繁華的社區。一個頗具哈德遜山毅風格的中央景觀庭院被稱作總部大樓的“心髒與靈魂”。14萬平方米的垂直玻璃幕墙限定了這個以樺樹和青苔爲特色植物的樓內露天庭院。透明與并置的主題滲透到整體設計，彰顯出自然之美在這一人工景致中的核心地位。

無論是白晝或是夜間，人們在樓內的視綫都可穿過玻璃幕墙，欣賞到那顯露無限美好憧憬的庭院的各個側面和頂面。在這僅455平方米面積局限的設計中，設計師巧妙地提取了視覺的精華。尊重自然的强烈態度與建築元素之間的關系不是衝突，而是融洽。

然而乍看之下，人們可能會産生錯覺，以爲這個微妙的設計僅僅是一個簡單的花園。其實它是智慧與基礎設施和科學研究與先進技術的結合體。然而，完全用人工配置來營造這個混凝土森林中“桃花源”的過程并不如想像中那么簡單。正是這個邏輯推理的過程定義了歷史性的創造。

項目背景

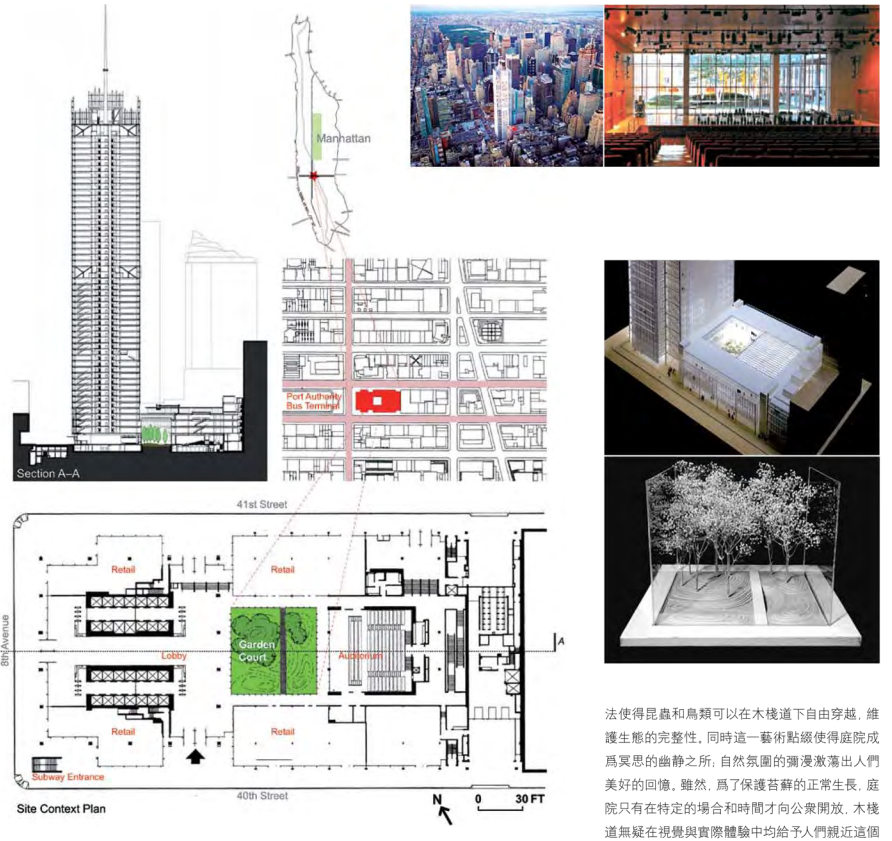
紐約時報創辦至今已有一個多世紀之久，報社大樓原址位于曼哈頓區中心的時代廣場。由于大樓原址周邊人口密集，擴建受到限制，報社總部遷往第8大道與41街的交匯處。52層高的大樓内，建築結構錯綜復雜。而要在這樣的建築中建造一個露天庭院，無疑提出了對園藝的挑戰和對微氣候分析的要求。

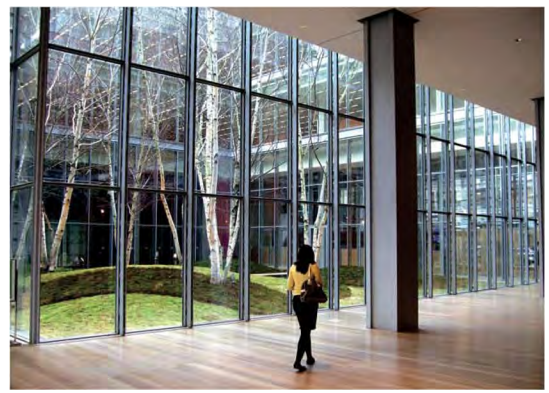
項目設計概況

由于關系到整個微氣候的因素以及基地本身的獨特條件，設計的細節不僅反映出人體舒適度的温度，并考慮到日照時長以及風速對植物的影響，呈現出對尺度的謹慎與精准校正的效果。

庭院中，一群約15米高的美洲樺（紙樺），在丘陵起伏如綠色地毯般的苔原的映襯之下顯得生機無限。整個地景如雕塑般浮脱于建築大廳的白橡木地板之上；隨四季變换的自然色調對比出時報大樓主廳與禮堂鮮紅與金黄等大膽的現代色彩。兩種苔蘚則來自北美本土：細枝羽蘚和金發蘚。一深一淺，一高一矮，這嫩綠與墨綠如彩帶蜿蜒交織的天然地毯，在地景中提供了高度上、彩度上、以及質感上的多重視覺衝擊。苔丘以大廳的地平綫爲基准上下起伏約1米，在簡潔的建築幾何中營造了自然的動感。

唯一建築元素的嵌入是一座懸浮于蘚丘之上的木棧道（由環保認證的南美熱帶重蠟硬木建造而成）。它以黄金分割的比例横貫整個庭院。騰空的處理手法使得昆蟲和鳥類可以在木棧道下自由穿越，維護生態的完整性。同時這一藝術點綴使得庭院成爲冥思的幽静之所；自然氛圍的彌漫激蕩出人們美好的回憶。雖然，爲了保護苔蘚的正常生長，庭院只有在特定的場合和時間才向公衆開放，木棧道無疑在視覺與實際體驗中均給予人們親近這個“世外桃源”的機會。





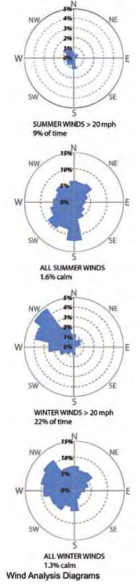
设计挑战

起初，建築師構想在大樓中央建立一座小樹林。但這個看似簡單的想法却面臨重重的挑戰。景觀建築師如何憑空創造一個尚未存在的環境？如何確保新種的植物都能適應將來的生長環境？在大多數景觀項目設計之初，設計方案的敲定往往取决于當地植物的生長環境。然而在這個項目中，整個庭院是個純人造的全新空間，并非自然存在的。因此，擺在設計師面前的首要任務是：通過設計模式的創新，種植技術的准確把握以及對微氣候的研究來滿足植物的生長需求。

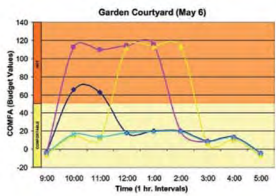
设计解析

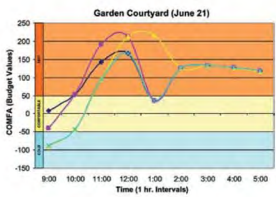
模型與微氣候分析

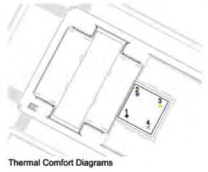
景觀設計師們通過計算機模型來預測微氣候因素對這一城市庭院設計的影響程度。報社大樓以及周邊城市環境的計算機三維立體模擬，加之太陽軌迹模擬器，判斷出陽光照射到的區域範圍。這



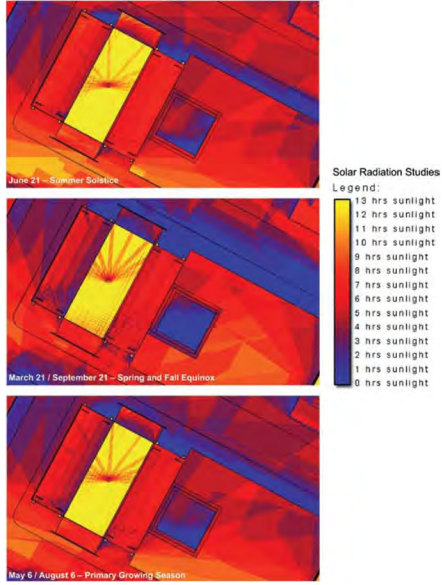
Wind Analysis Diagrams

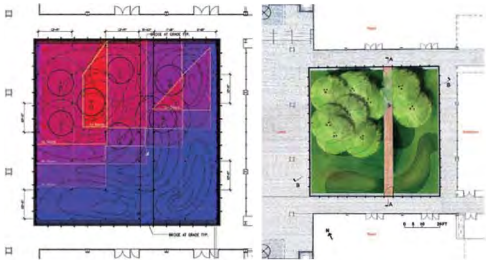






Thermal Comfort Diagrams





一預測結果加上風洞模擬器的預測數據，用來判斷合適的植物物種和種植准備工作，以確保植物長期可持續地健康成長。太陽模擬器還用于測算太陽和地球在春分、夏至、秋分這三個特殊節氣日中每小時的輻射量。這些測算結果連同每小時的温度、風力和空氣濕度的估算結果，一起被載入人體舒適度模擬區內。這一科學驗證的精確結論，對庭院內植物的生長和人們的活動提供了空間上以及温度上的合理依據。

分析結果與植物選擇

現場光綫的不均勻衝突到景觀建築師原本的設想:矩陣排列的小樹林無法長期自我維持。景觀建築師決定發展一個不規則的地景配置,讓喜好陽光的樺樹集中在庭院的西北角，以獲得足够的自然光綫，而本地全年常綠的苔蘚則如地毯般覆于整個地面，剛好展現耐陰適應性。這樣的地景設計是景觀建築師、建築師、工程師和科學家們合作的成果；實現建築師建造大樓時的最初設想：一個置于建築核心裏寧静的自然景象。

這一景觀庭院的成功證明了計算機三維模型不再只是用來作視覺呈現，也可以在設計户外環境過程中扮演重要的角色。尤其是在微氣候與人體舒適度建模過程中，替景觀建築師揭示了未來潜在的環境問題，避免了施工和維護中的隱患；預見了最科學的設計方案。

土壤成分和植物灌溉

從某種程度上分析，青苔和樺樹代表了并行的生態圈。因此，設計用兩種不同的土壤成分來調適植物的區域差别。同樣，兩種植物也有着不同的濕度需求。爲此，庭院包含了一個由計算機控制的灌溉系統（結合了去氯化物技術，因爲自來水中的氯會傷害苔蘚的生長），灌溉功能包括對樹木土壤的地下滴流灌溉以及對地面青苔的噴霧式灌溉，同時也在夏日提供降温的功能。苔蘚生長季節的時候，每天上午8點45分噴霧器定時作業，給人們一種蒙朧世界的視覺享受。

施工過程

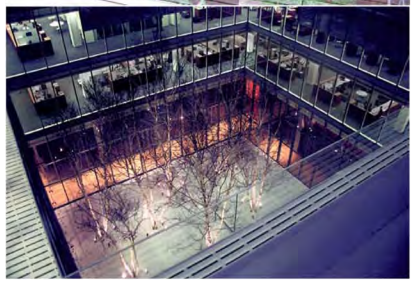
當建築中庭立面所有的搬運起重系統通通被移走之后，景觀庭院的施工才開始。新的排水填方以及兩種培養土針對各處樺樹及苔蘚不同的需求安裝到基地上，爲植栽移入前作准備。六年前就挑選購買好的25年樹齡的樺樹在苗圃被精心培養，直到一個潮濕、寒冷的早晨，它們被平板車運至一個對它們而言全新的大都市——紐約。緊接着，一個規模龐大的施工團隊在嚴格程序的指導下通宵作業，一個接一個地將這些每棵重約14515公斤的巨型樺樹，用美國東部唯一一架有56米長伸縮吊杆的起重機移到約21米高的玻璃墻包圍着的庭院中。最后，裝置照明系統來照亮步道和樺樹，同時安裝自動滴流與噴水灌溉系統以及去氯化物設備。

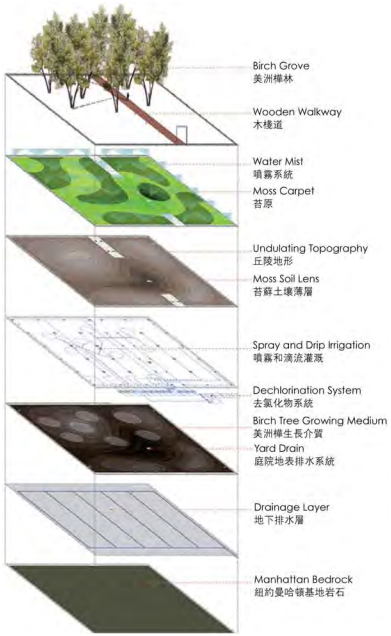
景觀管理

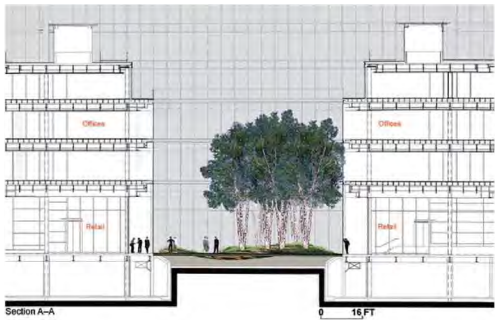
爲了能讓這個别致的景觀庭院能長期地自我維持生態平衡，設計團隊制訂了一項景觀管理説明，以便大樓工作人員能在不同的季節中對園中的土壤、植物以及灌溉系統進行更好地培植、維護和管理。文件内容包括：利用有機的方法來維護土壤的健康,使它的有益真菌、細菌和其它微生物能維持良好的平衡比例。此外，設計團隊還針對銅樺木蜈制定了一個蟲害有機控制計劃：春季，在園中放養一些益蟲，并且運用寄生蟲和寄生真菌來控制；而在秋季，則注射適量的當地葉菌液，并加上長期的養料來源，以及益菌、真菌、原生物和綫蟲等輔助養料來刺激植物的根部生長，同時也提了高樺木土壤結構的質量。

总述

這座雅致大方的生態景觀庭院充滿了藝術氣息；它是在建築師、景觀建築師以及專業環境研究團隊反復磨合協作下的結晶；它創造了一個有彈性的生態環境，同時兼顧了創意美學的設計理念。在人口擁擠、建築密集的都市環境中，設計團隊更需要重視實地考察研究和微氣候的分析，從而找到更有價值的可持續解决方案。







At the heart of The New York Times's new headquarters, in one of New York City's densest neighborhoods, lives a symbolic fragment of the Hudson Valley landscape. The 1.5 million-square-foot glass and steel complex showcases a unique open-air birch and moss garden. Themes of transparency and juxtaposition permeate the design and reveal Nature at the core of this man-made construct.

Day and night, aspects of the garden court are visible through the layers of glass walls enclosing it, exposing myriad contextual perspectives. The minimalist design of the 70-foot-square courtyard creates a restrained visual abstraction, yet strong natural statement that harmonizes rather than competes with the design elements of the building.

At first glance, however, one could mistake the subtle design for that of a simple garden. The intelligence and infrastructure supporting it incorporate scientific research and technological advancements critical to realizing and sustaining this urban courtyard. However invisible, the complexity in "setting the stage" for this living sanctuary, within an entirely manufactured setting, defined its creation in Time.

Site Context

The New York Times has been published on Manhattan's center of gravity - Times Square - for more than a century.

Lack of expansion, overcrowding and general congestion necessitated both a new site and building at Eighth Avenue and Forty-First Street. The 52-story high-rise office building, set in among a variety of all structures, posed significant horticultural challenges and required microclimatic analysis.

Design

A full-scale microclimatic study led to a carefully calibrated site deign, reflective of small-scale environmental needs and unique design opportunities, and described in great detail human thermal comfort zones, sun hours and wind velocities.

A grove of 50-foot-tall multi-stem paper birch trees (Betula papyrifera) and a rolling carpet of green mosses offer sculptural relief to the level plane of the building lobby's white oak floor and seasonal color contrast to the bold shades of red and marigold yellow in the building's lobby and auditorium. Two native species of moss offer varying height, color and texture - Fern moss (Thuidium delicatum) and Hair Cap moss (Polytrichum commune). This moss underplanting modulates three feet above and below the lobby plane.

One architectural insertion - a wooden footbridge (of certified tropical IPE hardwood) - transects the garden and provides controlled access, thus reinforcing the sense of a serene, delicate and sensitive woodland space and, paradoxically, suggesting that one can occupy, experience and understand it. While the courtyard garden will only be accessible at specific times, the footbridge gives the viewer the impression of being able to wander in at will and the visual sense of physical connection.

Design Evolution

From the beginning, the architect envisioned a bosquet at the building's heart. This seemingly simple request begged the question: How does the landscape architect design a space that does not yet exist and specify plant material for future growing conditions that cannot yet be assessed? In most projects, existing growing conditions inform design decisions, but here, the courtyard garden is entirely new, manufactured, man-made space. The accurate simulation of cultural needs with microclimatic studies and meeting these needs through technological innovation became paramount to fulfilling the architect's vision.

Intelligence

Modeling and Microclimate Analysis

Computer models were developed to predict the effects of design on microclimates in the urban courtyard. A three-dimensional computer model of the building and its urban environment was integrated with a solar simulator to identify solar radiation zones within the space. This information, along with the results of a wind tunnel simulation, was used to determine species selection, arrangement and planting preparations to ensure long-term sustainability. The solar simulator was also used to generate hourly solar and terrestrial radiation data for typical spring, summer and fall days. These results, along with hourly air temperature, wind and air humidity estimates were input to a human thermal comfort model. This assessment gave both a spatial and temporal estimation of comfort for the courtyard space.

Analysis Results and Vegetative Selection

Light levels indicated that the architect's original aspiration for a uniform stand of trees would not perform evenly and be sustainable. We developed an irregular planting pattern for the birch trees in the northwestern portion of the garden, matched to the available light, and an evergreen carpet of native mosses across the entire space, which addressed the horticultural limitations of adaptability and a shaded understory. This landscape design, a product of collaboration among landscape architects, architects, engineers and scientists, fulfilled the architect's original vision of a serene natural environment at the heart of his building.

This study demonstrated that three-dimensional computer modeling, which has been traditionally used solely for visualization purpose, can play a significant role in deterministic modeling of outdoor environments. In particular, it can play a significant role in microclimate modeling and human thermal comfort modeling, providing the foresight to find the best design solution for spaces in response to future environmental conditions.

Soil Profiles and Irrigation

The moss and paper birch trees represent somewhat juxtaposed ecologies, and consequently, two separate soil profiles were developed to support endemic growing conditions. Similarly, both species have differing moisture requirements as well, and consequently, the garden contains a computer-controlled irrigation system (with an integrated water de-chlorination system) that includes subsurface irrigation for the trees and surface mist irrigation for the moss, which also assists in cooling the garden during hot summer periods. Each morning at 8:45 a.m. throughout the growing season, the misting sprinklers articulate a design element that transforms the garden into a recurring, daily misting event for employees and fellow commuters.

Construction

Garden construction began after the external hoist from the construction site had been dismantled and removed. New drainage fill and growing medium, engineered to the specific needs for birches and moss, were placed in layers in the garden area in preparation for the plantings.

The 25-year-old birch trees, which had been pre-purchased six years earlier, were tagged at the nursery and maintained until their transport by flatbed to the site, arriving on a cold, rainy New York winter morning. An extensive crew worked through the night under strict schedule demands to lift each 32,000-pound tree, one by one, with a 184-foot boom over the 70-foot high glass walls of the building and into its final position in the garden.

Finally, lighting to illuminate the walkway and trees were installed, as well as sprinkler and de-chlorination systems.

Landscape Management

For the long-term sustainability of the garden, a management protocol has been developed to educate staff on the range of seasonal maintenance needs and the preferred methods of care for soils, plants and the irrigation system. The protocol includes organic methods for building and maintaining healthy soil biology with a balance of beneficial fungi, bacteria and microorganisms. Additionally, an organic pest-control program to combat susceptibility to the Bronze Birch Borer has been developed: in the spring, both the release of beneficial insects and the application of insect parasite nematodes and a parasitic fungus and, in the fall, applications to stimulate root growth and enhance the birch soil structure with injections of indigenous leaf mold, a blend of long-term food sources and beneficial bacteria, fungi, protozoa and nematodes.

Conclusion

The collaboration among architect, landscape architect and an experienced landscape research team set the stage for an ecologically resilient and aesthetically creative landscape solution. Dense and intensive urban site conditions demand microclimatic analysis and substantive local research to achieve sustainable solutions for significant and productive outdoor space.

Credits:

Project Name: New York Times Headquarters Garden Court
Location: New York, New York, USA
Area: 4900 square feet
Landscape Architect: HM White Site Architects, New York, USA
Acknowledge Guangping Wang's great support

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ASLA New York Chapter 2006 Merit Award for Research and Communication

HM WHITE SITE ARCHITECTS

紐約時報新總部大樓位于紐約市最繁華的社區。一個頗具哈德遜山毅風格的中央景觀庭院被稱作總部大樓的“心髒與靈魂”。14萬平方米的垂直玻璃幕墙限定了這個以樺樹和青苔爲特色植物的樓內露天庭院。透明與并置的主題滲透到整體設計，彰顯出自然之美在這一人工景致中的核心地位。

無論是白晝或是夜間，人們在樓內的視綫都可穿過玻璃幕墙，欣賞到那顯露無限美好憧憬的庭院的各個側面和頂面。在這僅455平方米面積局限的設計中，設計師巧妙地提取了視覺的精華。尊重自然的强烈態度與建築元素之間的關系不是衝突，而是融洽。

然而乍看之下，人們可能會産生錯覺，以爲這個微妙的設計僅僅是一個簡單的花園。其實它是智慧與基礎設施和科學研究與先進技術的結合體。然而，完全用人工配置來營造這個混凝土森林中“桃花源”的過程并不如想像中那么簡單。正是這個邏輯推理的過程定義了歷史性的創造。

項目背景

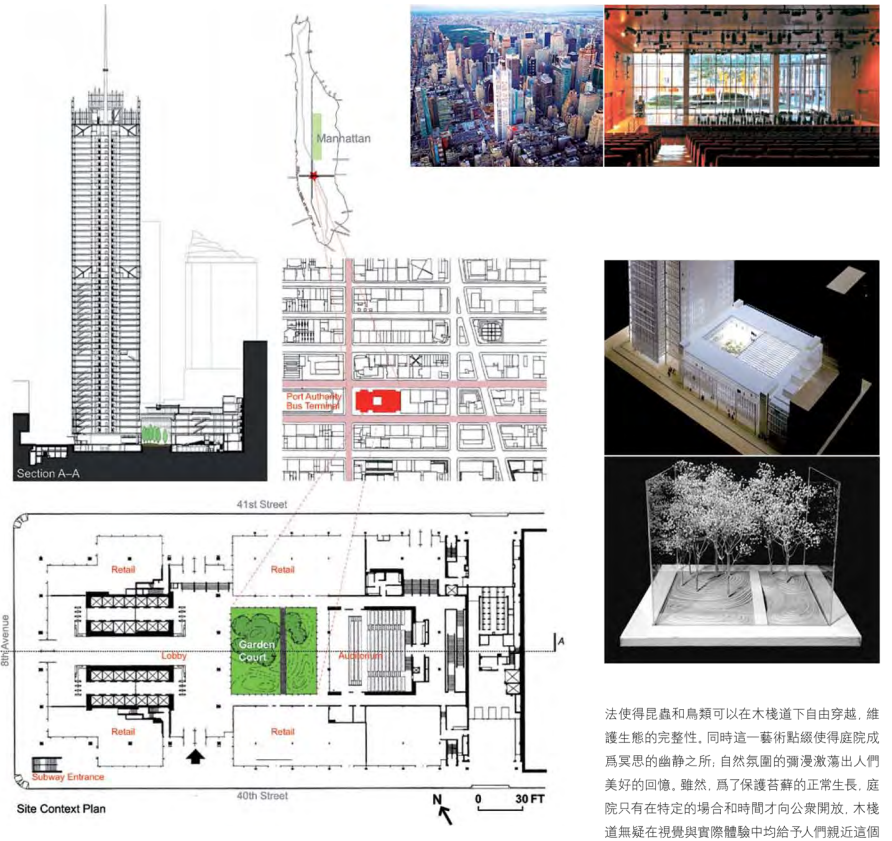
紐約時報創辦至今已有一個多世紀之久，報社大樓原址位于曼哈頓區中心的時代廣場。由于大樓原址周邊人口密集，擴建受到限制，報社總部遷往第8大道與41街的交匯處。52層高的大樓内，建築結構錯綜復雜。而要在這樣的建築中建造一個露天庭院，無疑提出了對園藝的挑戰和對微氣候分析的要求。

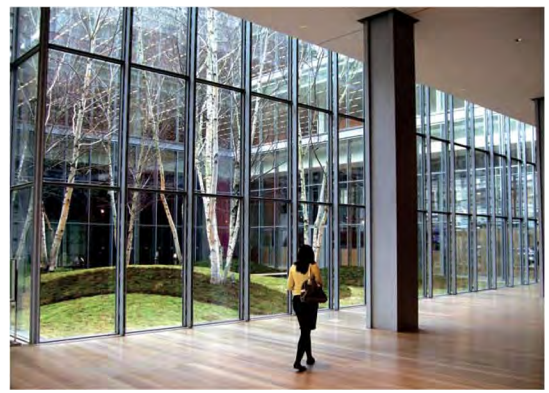
項目設計概況

由于關系到整個微氣候的因素以及基地本身的獨特條件，設計的細節不僅反映出人體舒適度的温度，并考慮到日照時長以及風速對植物的影響，呈現出對尺度的謹慎與精准校正的效果。

庭院中，一群約15米高的美洲樺（紙樺），在丘陵起伏如綠色地毯般的苔原的映襯之下顯得生機無限。整個地景如雕塑般浮脱于建築大廳的白橡木地板之上；隨四季變换的自然色調對比出時報大樓主廳與禮堂鮮紅與金黄等大膽的現代色彩。兩種苔蘚則來自北美本土：細枝羽蘚和金發蘚。一深一淺，一高一矮，這嫩綠與墨綠如彩帶蜿蜒交織的天然地毯，在地景中提供了高度上、彩度上、以及質感上的多重視覺衝擊。苔丘以大廳的地平綫爲基准上下起伏約1米，在簡潔的建築幾何中營造了自然的動感。

唯一建築元素的嵌入是一座懸浮于蘚丘之上的木棧道（由環保認證的南美熱帶重蠟硬木建造而成）。它以黄金分割的比例横貫整個庭院。騰空的處理手法使得昆蟲和鳥類可以在木棧道下自由穿越，維護生態的完整性。同時這一藝術點綴使得庭院成爲冥思的幽静之所；自然氛圍的彌漫激蕩出人們美好的回憶。雖然，爲了保護苔蘚的正常生長，庭院只有在特定的場合和時間才向公衆開放，木棧道無疑在視覺與實際體驗中均給予人們親近這個“世外桃源”的機會。





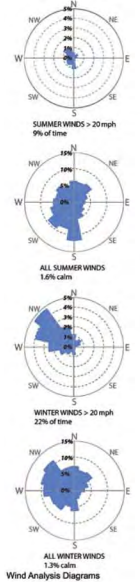
设计挑战

起初，建築師構想在大樓中央建立一座小樹林。但這個看似簡單的想法却面臨重重的挑戰。景觀建築師如何憑空創造一個尚未存在的環境？如何確保新種的植物都能適應將來的生長環境？在大多數景觀項目設計之初，設計方案的敲定往往取决于當地植物的生長環境。然而在這個項目中，整個庭院是個純人造的全新空間，并非自然存在的。因此，擺在設計師面前的首要任務是：通過設計模式的創新，種植技術的准確把握以及對微氣候的研究來滿足植物的生長需求。

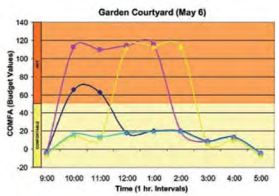
设计解析

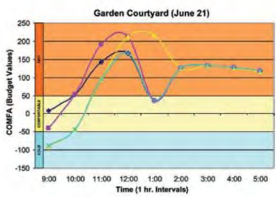
模型與微氣候分析

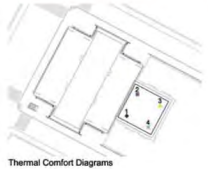
景觀設計師們通過計算機模型來預測微氣候因素對這一城市庭院設計的影響程度。報社大樓以及周邊城市環境的計算機三維立體模擬，加之太陽軌迹模擬器，判斷出陽光照射到的區域範圍。這



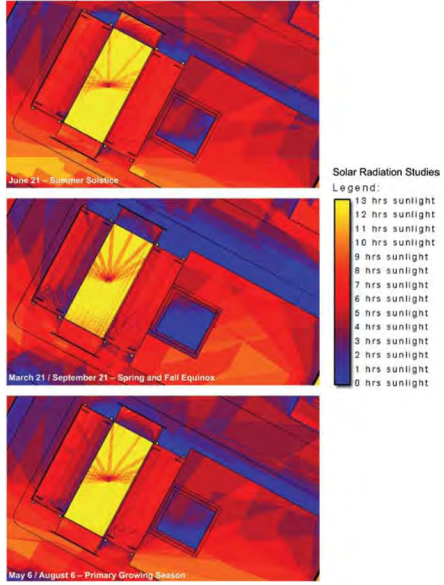
Wind Analysis Diagrams

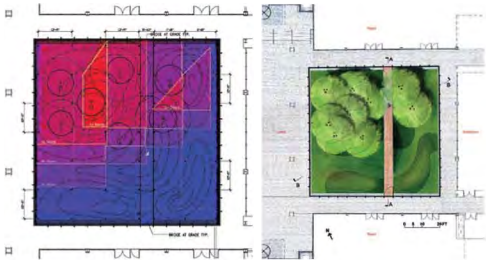






Thermal Comfort Diagrams





一預測結果加上風洞模擬器的預測數據，用來判斷合適的植物物種和種植准備工作，以確保植物長期可持續地健康成長。太陽模擬器還用于測算太陽和地球在春分、夏至、秋分這三個特殊節氣日中每小時的輻射量。這些測算結果連同每小時的温度、風力和空氣濕度的估算結果，一起被載入人體舒適度模擬區內。這一科學驗證的精確結論，對庭院內植物的生長和人們的活動提供了空間上以及温度上的合理依據。

分析結果與植物選擇

現場光綫的不均勻衝突到景觀建築師原本的設想:矩陣排列的小樹林無法長期自我維持。景觀建築師決定發展一個不規則的地景配置,讓喜好陽光的樺樹集中在庭院的西北角，以獲得足够的自然光綫，而本地全年常綠的苔蘚則如地毯般覆于整個地面，剛好展現耐陰適應性。這樣的地景設計是景觀建築師、建築師、工程師和科學家們合作的成果；實現建築師建造大樓時的最初設想：一個置于建築核心裏寧静的自然景象。

這一景觀庭院的成功證明了計算機三維模型不再只是用來作視覺呈現，也可以在設計户外環境過程中扮演重要的角色。尤其是在微氣候與人體舒適度建模過程中，替景觀建築師揭示了未來潜在的環境問題，避免了施工和維護中的隱患；預見了最科學的設計方案。

土壤成分和植物灌溉

從某種程度上分析，青苔和樺樹代表了并行的生態圈。因此，設計用兩種不同的土壤成分來調適植物的區域差别。同樣，兩種植物也有着不同的濕度需求。爲此，庭院包含了一個由計算機控制的灌溉系統（結合了去氯化物技術，因爲自來水中的氯會傷害苔蘚的生長），灌溉功能包括對樹木土壤的地下滴流灌溉以及對地面青苔的噴霧式灌溉，同時也在夏日提供降温的功能。苔蘚生長季節的時候，每天上午8點45分噴霧器定時作業，給人們一種蒙朧世界的視覺享受。

施工過程

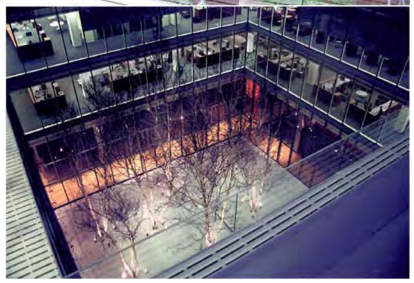
當建築中庭立面所有的搬運起重系統通通被移走之后，景觀庭院的施工才開始。新的排水填方以及兩種培養土針對各處樺樹及苔蘚不同的需求安裝到基地上，爲植栽移入前作准備。六年前就挑選購買好的25年樹齡的樺樹在苗圃被精心培養，直到一個潮濕、寒冷的早晨，它們被平板車運至一個對它們而言全新的大都市——紐約。緊接着，一個規模龐大的施工團隊在嚴格程序的指導下通宵作業，一個接一個地將這些每棵重約14515公斤的巨型樺樹，用美國東部唯一一架有56米長伸縮吊杆的起重機移到約21米高的玻璃墻包圍着的庭院中。最后，裝置照明系統來照亮步道和樺樹，同時安裝自動滴流與噴水灌溉系統以及去氯化物設備。

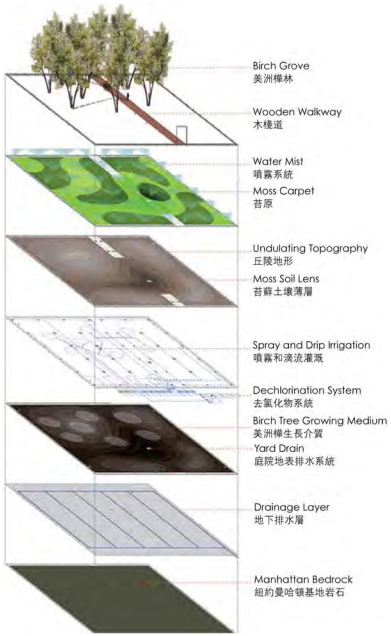
景觀管理

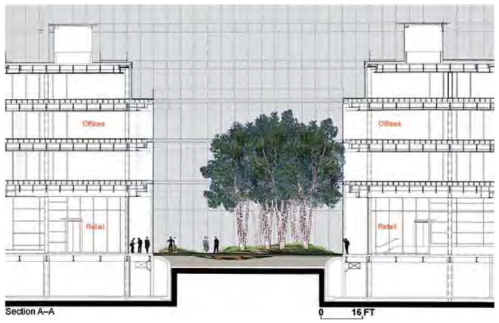
爲了能讓這個别致的景觀庭院能長期地自我維持生態平衡，設計團隊制訂了一項景觀管理説明，以便大樓工作人員能在不同的季節中對園中的土壤、植物以及灌溉系統進行更好地培植、維護和管理。文件内容包括：利用有機的方法來維護土壤的健康,使它的有益真菌、細菌和其它微生物能維持良好的平衡比例。此外，設計團隊還針對銅樺木蜈制定了一個蟲害有機控制計劃：春季，在園中放養一些益蟲，并且運用寄生蟲和寄生真菌來控制；而在秋季，則注射適量的當地葉菌液，并加上長期的養料來源，以及益菌、真菌、原生物和綫蟲等輔助養料來刺激植物的根部生長，同時也提了高樺木土壤結構的質量。

总述

這座雅致大方的生態景觀庭院充滿了藝術氣息；它是在建築師、景觀建築師以及專業環境研究團隊反復磨合協作下的結晶；它創造了一個有彈性的生態環境，同時兼顧了創意美學的設計理念。在人口擁擠、建築密集的都市環境中，設計團隊更需要重視實地考察研究和微氣候的分析，從而找到更有價值的可持續解决方案。







At the heart of The New York Times's new headquarters, in one of New York City's densest neighborhoods, lives a symbolic fragment of the Hudson Valley landscape. The 1.5 million-square-foot glass and steel complex showcases a unique open-air birch and moss garden. Themes of transparency and juxtaposition permeate the design and reveal Nature at the core of this man-made construct.

Day and night, aspects of the garden court are visible through the layers of glass walls enclosing it, exposing myriad contextual perspectives. The minimalist design of the 70-foot-square courtyard creates a restrained visual abstraction, yet strong natural statement that harmonizes rather than competes with the design elements of the building.

At first glance, however, one could mistake the subtle design for that of a simple garden. The intelligence and infrastructure supporting it incorporate scientific research and technological advancements critical to realizing and sustaining this urban courtyard. However invisible, the complexity in "setting the stage" for this living sanctuary, within an entirely manufactured setting, defined its creation in Time.

Site Context

The New York Times has been published on Manhattan's center of gravity - Times Square - for more than a century.

Lack of expansion, overcrowding and general congestion necessitated both a new site and building at Eighth Avenue and Forty-First Street. The 52-story high-rise office building, set in among a variety of all structures, posed significant horticultural challenges and required microclimatic analysis.

Design

A full-scale microclimatic study led to a carefully calibrated site deign, reflective of small-scale environmental needs and unique design opportunities, and described in great detail human thermal comfort zones, sun hours and wind velocities.

A grove of 50-foot-tall multi-stem paper birch trees (Betula papyrifera) and a rolling carpet of green mosses offer sculptural relief to the level plane of the building lobby's white oak floor and seasonal color contrast to the bold shades of red and marigold yellow in the building's lobby and auditorium. Two native species of moss offer varying height, color and texture - Fern moss (Thuidium delicatum) and Hair Cap moss (Polytrichum commune). This moss underplanting modulates three feet above and below the lobby plane.

One architectural insertion - a wooden footbridge (of certified tropical IPE hardwood) - transects the garden and provides controlled access, thus reinforcing the sense of a serene, delicate and sensitive woodland space and, paradoxically, suggesting that one can occupy, experience and understand it. While the courtyard garden will only be accessible at specific times, the footbridge gives the viewer the impression of being able to wander in at will and the visual sense of physical connection.

Design Evolution

From the beginning, the architect envisioned a bosquet at the building's heart. This seemingly simple request begged the question: How does the landscape architect design a space that does not yet exist and specify plant material for future growing conditions that cannot yet be assessed? In most projects, existing growing conditions inform design decisions, but here, the courtyard garden is entirely new, manufactured, man-made space. The accurate simulation of cultural needs with microclimatic studies and meeting these needs through technological innovation became paramount to fulfilling the architect's vision.

Intelligence

Modeling and Microclimate Analysis

Computer models were developed to predict the effects of design on microclimates in the urban courtyard. A three-dimensional computer model of the building and its urban environment was integrated with a solar simulator to identify solar radiation zones within the space. This information, along with the results of a wind tunnel simulation, was used to determine species selection, arrangement and planting preparations to ensure long-term sustainability. The solar simulator was also used to generate hourly solar and terrestrial radiation data for typical spring, summer and fall days. These results, along with hourly air temperature, wind and air humidity estimates were input to a human thermal comfort model. This assessment gave both a spatial and temporal estimation of comfort for the courtyard space.

Analysis Results and Vegetative Selection

Light levels indicated that the architect's original aspiration for a uniform stand of trees would not perform evenly and be sustainable. We developed an irregular planting pattern for the birch trees in the northwestern portion of the garden, matched to the available light, and an evergreen carpet of native mosses across the entire space, which addressed the horticultural limitations of adaptability and a shaded understory. This landscape design, a product of collaboration among landscape architects, architects, engineers and scientists, fulfilled the architect's original vision of a serene natural environment at the heart of his building.

This study demonstrated that three-dimensional computer modeling, which has been traditionally used solely for visualization purpose, can play a significant role in deterministic modeling of outdoor environments. In particular, it can play a significant role in microclimate modeling and human thermal comfort modeling, providing the foresight to find the best design solution for spaces in response to future environmental conditions.

Soil Profiles and Irrigation

The moss and paper birch trees represent somewhat juxtaposed ecologies, and consequently, two separate soil profiles were developed to support endemic growing conditions. Similarly, both species have differing moisture requirements as well, and consequently, the garden contains a computer-controlled irrigation system (with an integrated water de-chlorination system) that includes subsurface irrigation for the trees and surface mist irrigation for the moss, which also assists in cooling the garden during hot summer periods. Each morning at 8:45 a.m. throughout the growing season, the misting sprinklers articulate a design element that transforms the garden into a recurring, daily misting event for employees and fellow commuters.

Construction

Garden construction began after the external hoist from the construction site had been dismantled and removed. New drainage fill and growing medium, engineered to the specific needs for birches and moss, were placed in layers in the garden area in preparation for the plantings.

The 25-year-old birch trees, which had been pre-purchased six years earlier, were tagged at the nursery and maintained until their transport by flatbed to the site, arriving on a cold, rainy New York winter morning. An extensive crew worked through the night under strict schedule demands to lift each 32,000-pound tree, one by one, with a 184-foot boom over the 70-foot high glass walls of the building and into its final position in the garden.

Finally, lighting to illuminate the walkway and trees were installed, as well as sprinkler and de-chlorination systems.

Landscape Management

For the long-term sustainability of the garden, a management protocol has been developed to educate staff on the range of seasonal maintenance needs and the preferred methods of care for soils, plants and the irrigation system. The protocol includes organic methods for building and maintaining healthy soil biology with a balance of beneficial fungi, bacteria and microorganisms. Additionally, an organic pest-control program to combat susceptibility to the Bronze Birch Borer has been developed: in the spring, both the release of beneficial insects and the application of insect parasite nematodes and a parasitic fungus and, in the fall, applications to stimulate root growth and enhance the birch soil structure with injections of indigenous leaf mold, a blend of long-term food sources and beneficial bacteria, fungi, protozoa and nematodes.

Conclusion

The collaboration among architect, landscape architect and an experienced landscape research team set the stage for an ecologically resilient and aesthetically creative landscape solution. Dense and intensive urban site conditions demand microclimatic analysis and substantive local research to achieve sustainable solutions for significant and productive outdoor space.

Credits:

Project Name: New York Times Headquarters Garden Court
Location: New York, New York, USA
Area: 4900 square feet
Landscape Architect: HM White Site Architects, New York, USA
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