Singapore Urban Design Studio

Housing for Pearl's and York Hills:

Five Urban Design Proposals

Fall 1999

Massachusetts Institute of Technology
School of Architecture and Planning

Singapore Urban Redevelopment Authority

Singapore Urban Design Studio

Housing for Pearl's and York Hills:

Five Urban Design Proposals

Fall 1999

Massachusetts Institute of Technology
School of Architecture and Planning

Singapore Urban Redevelopment Authority

URBAN REDEVELOPMENT AUTHORITY

MIT

Contents

Foreword

Singapore is a Southeast Asian island-state which, despite its limited land area and its lack of natural resources, has managed to transform itself into a thriving modern metropolis and international business hub. The role of the Urban Redevelopment Authority (URA), as Singapore's national planning authority, is to ensure that Singapore continues to develop into a vibrant and attractive world-class city.

This year, we were delighted to be able to conduct a joint Urban Design Studio with MIT's School of Architecture and Planning. Besides giving MIT students the chance to gain new insights and contribute to the planning of Singapore, the studio has been an excellent platform for an exchange of ideas on planning and urban design.

A particularly challenging site was chosen as the subject of this year's study. Pearl's Hill is one of only two urban hill parks in Singapore's Central Area, and as such it forms a valuable natural and recreational resource. Yet it's proximity to business and shopping districts and to public transportation nodes makes it a prime area for new high-rise high-density residential development. The main task facing the students was, therefore, to balance the optimization of the site's development potential with the need to preserve it's unique character and natural environment.

Under the tutelage of Professors Julian Beinart, Eran Ben-Joseph and John de Monchaux, the students have responded admirably to the challenge and have produced many excellent ideas and proposals for the site. The next step is for the URA to study the schemes in detail and incorporate the best ideas into the development plans for the area.

We are grateful for all the contributions from the MIT professors, the students and the critique panelists in Singapore and Cambridge. We look forward to continuing the warm relationship that has been established between MIT and the URA.

View inside Pearl's Hill Park.

Dr. Tan Kim Siew, Chief Executive Officer and Chief Planner, URA
December 1999

Aerial view of site in Singapore context.

John de Monchaux

Chapter 1: Introduction

(Top) Aerial view of Pearl's Hill Park and reservoir. (Bottom) Aerial view of site.

Background and Brief

In 1999 the Fall Urban Design Studio at MIT's School of Architecture and Planning examined the future of a key site in central Singapore. This report describes the issues to be addressed in the urban design of that site and presents the investigations and urban design proposals for the site that were prepared by student teams.

This studio is the tenth in a series carried out by MIT's City Design and Development group. Each urban design studio has investigated and made propositions about current planning and city design issues in a dynamic urban setting. In recent years, the urban design studios have put forward ideas for strategic areas and sites in Tokyo, Taipei, Miami, Barcelona, Boston and Chandigarh. In each case, these proposals have been based on serious field study followed by systematic exploration of a variety of familiar - and often unfamiliar - propositions about future patterns of place, activity and access.

In this series, the teaching objectives of the studio have been to introduce students from a variety of backgrounds to the issues in cities that can be addressed through good urban design, and to make the students conversant with the bodies of knowledge, techniques and values that must be engaged in that task. Additionally, thanks to the interests of the sponsors of the studio, there has also been a wider public objective attached to the studio task. Typically, this objective has been to stimulate public understanding and debate about a live issue in that city such as a major urban design policy, siting choices for public facilities, or the design and location of a significant transportation investment. The final work of the studios has been published in public brochures and, in many cases, has also been the subject of exhibitions in the various host cities.

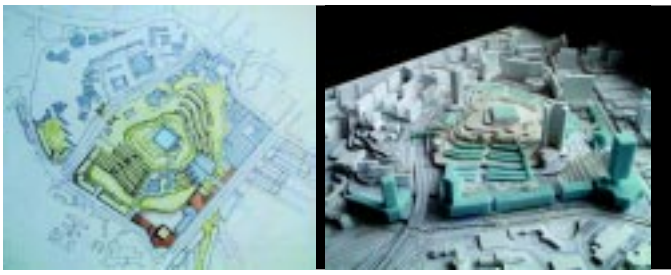
This past fall, with the sponsorship of the Singapore Urban Redevelopment Authority (URA), the studio was set in Singapore and it examined the future of a fifty hectare area in the downtown. The site, known as Pearl's Hill and York Hill, is prominent topographically, rising 40 to 50 meters above the general level of the core of the city. The hill's elevation led to the building of a reservoir on the top of Pearl's Hill in the late nineteenth century. The site is bordered on the north by the Singapore River, on the south by Outram Road and the east by New Bridge Road and the Chinatown Conservation area. The Central Expressway crosses the middle of the site. The MRT interchange at Outram Road and New Bridge Road occupies the southeast corner of the site.

Over the next twenty years or so, half or more of the site will be redeveloped at much higher densities and its central feature, the Pearls Hill Park and reservoir, is to be enhanced and perhaps reconfigured as an important open space in the city. A brief for the future of the site was prepared by the URA and it provided a starting point for the studio's work. In essence, the URA's goals for the redevelopment of the site are to considerably intensify its use for residential and recreational purposes, to give the entire area a distinct character, and to greatly improve the visibility and accessibility of that part of the site which might continue to serve as a public park.

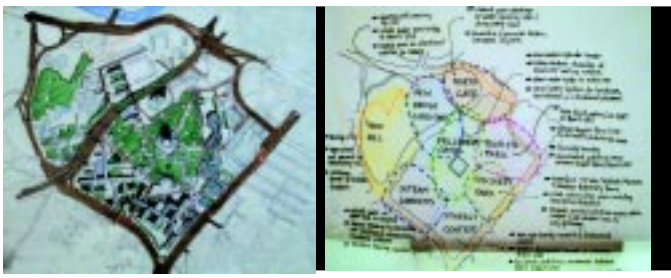
Studio Tasks and Sequence

Following the assembly and study of background material on Singapore and its recent planning and development patterns, the studio began in August 1999 with a one week visit to Singapore by students and faculty. This visit introduced us to the difficulties and potentials of the site and provided an opportunity for the class to prepare five deliberately different sketch concepts for its future. These sketch concepts were reviewed by a panel of key URA staff and local experts. This immediate feedback gave the class a firm basis for continuing their explorations back in Cambridge.

August Sketch Concepts



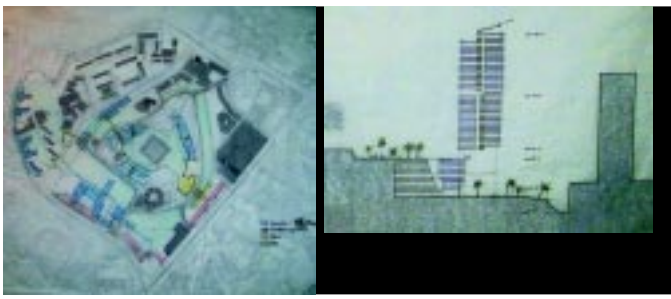
Campus City - This group proposal suggests the possibility of enclosing the site perimeter with a series of high rise housing structures. This allows for an internal park as well as low rise terrace housing sited on Pearl's Hill.



Context City - This group proposal focused on the programming of the site based on contextual conditions. The design ultimately becomes interventions mediating between the park and the surrounding context.

Park City - Exploring the possible relationships between landscape and program, this group proposes a mixure of uses and housing types that are integral to the park.

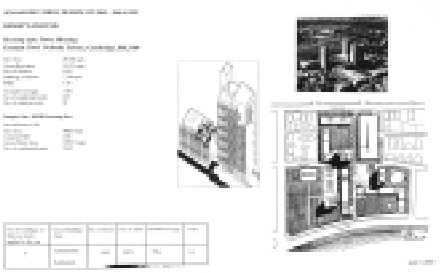
Link City - Using public transit and visual linkages as a basis, this proposal created high density housing at the existing MRT station as well as a scultural water tower atop the reservoir.

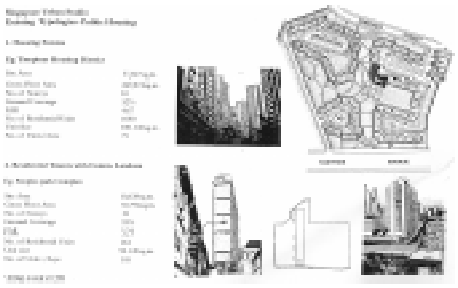


Matrix City - Seeking to establish an overall order to the site, this group proposed a combination of high rise housing structures and landsape forms based on site specific geometries.

Once back in Cambridge for the start of the semester, the class was re-divided into four new teams for a two-week working period. Each team looked at one aspect of development on the site to enable the creation of a database that would be available to the class as a whole. The aspects examined for the class included:

1. Housing typologies: The team studied library references, recent Singapore examples, MIT theses and other sources, and compiled a dossier of high density housing typologies that became a reference for subsequent work in the studio. Site plans and cross sections were presented at consistent scales and were accompanied by a quantitative analysis showing parking ratios, Floor Area Ratios (FAR's), ratio of dwellings per unit of net residential land area, etc. The investigation also commented on the 'fit' of each typology to climatic, market, and other conditions in Singapore.

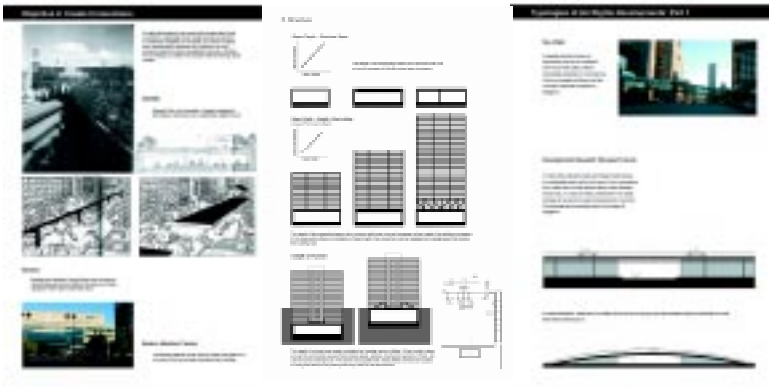




2. Landscape and Open Space Typologies: Climatic and cultural imperatives in Singapore suggest distinct, and possibly innovative, forms of landscaping and public open space use. This team surveyed and presented current landscape approaches to be found in Singapore and other similar climatic settings and analyzed these in terms of how they perform as host to the range of activities that the open space on the studio's site might accommodate. The team also investigated and presented precedents illustrating the range of open space uses and their spatial and landscape implications that are likely to be called for on this site.

3. Site Analysis: The studio work required a thorough understanding of the attributes of the site and its immediate surroundings. Some of the site issues this group looked at were: topography, slope analysis, views, traffic and transit conditions, wind and sun patterns, parcel areas and aggregate area calculations, function and area of existing buildings, the timing of the availability of each site parcel for new uses, etc. The information was documented and presented by this team in a way that these attributes could be read at the variety of scales later used for model building, overall plan formulation and individual zone designs.

4. Air Rights Opportunities: The site affords – and perhaps demands – opportunities for the development of buildings over the Central Expressway. The site also calls for the effective integration of new and existing development with the transit stations, water channels, and other infrastructure elements on the site. This team investigated and presented examples of air rights development and of the integration of new development with transit stations. The team analyzed these examples and suggested an order of magnitude for the costs likely to be incurred to develop air rights. The team also identified some of the key environmental implications of air rights development.



For the next two weeks, the class turned again to the preparation of overall concepts, this time as individuals. These concepts, illustrating proposed uses, densities and access paths, spanned a very wide range of spatial options and they provided the class with the beginning of a sensibility for the key variables that would need to be manipulated to respond to the URA's brief.

For the following two weeks, the class was once more divided into small groups to examine individual zones within the site in more detail. Thus, by the end of the sixth week of the semester, each student had become familiar with the site as a whole, with a particular zone of the site, and with one of the four general aspects of development studied by the class as a whole.

At this point, four broad land use and design approaches to the future of the site had become apparent in the class. Each approach had merits and each would provide a good illustration of the potential of the site. The key variables in identifying these four approaches appeared to be the configuration, function and amount of space to be devoted to the park, the overall site density, and the extent to which the proposed new built form would create a sense of containing – more as a wall – the site as a whole versus the extent to which the new built form would allow views into the whole site. Based on student interest and on a mixing of skills, four new design teams were composed to work together for the remainder of the semester to develop an integrated urban design proposal.

Team A proposed a park configured to create 'outer' and 'inner' bands of new buildings flanking a ring of new park space on the more level portions of the site. Team B proposed a linear park that links New Bridge Road with the Singapore River and five or six clusters of new housing development. Team C proposed a re-distribution of the total park area into smaller dispersed units of park space which, in turn, articulate a system of relatively uniform housing based on the dimensions and geometry of traditional Chinatown block sizes. And Team D, which looked only at Pearl's Hill, retained the existing park configuration, expanded the park area and introduced new housing clusters that add together to bound the site. The highest overall site densities were proposed by Team B and the most extensive park space was proposed by Team D.

An interim review of each team's proposals was held mid-semester and these ideas along with the commentary at the interim review were shared on drawings and video tape with URA staff in Singapore for their comments. Each scheme was then further developed and presented in the form illustrated in this report during the 15th and final week of the semester in the presence of senior URA staff.

The ideas put forward in this report are wholly the result of the activities and thinking of the studio participants, stimulated by others in Singapore and elsewhere who have thought about these same issues. Thus while the financial support of the URA and the comments and input of participants in discussions with the class have been essential to achieve the studio's results, the views and ideas proposed here are exclusively the responsibility of the class, its students and its faculty.

The remaining sections of this report detail the context of this project and the team proposals. In Chapter 2, Bob Cowherd places this round of planning and urban design for Pearl's Hill and York Hill within the history of planning and physical development in Singapore. The attributes of the project site and a summary of the objectives of the URA for the future of this site are outlined in Chapter 3. In Chapter 4, each of the Teams' proposals are described and illustrated. The report concludes with Chapter 5 which reflects on selected aspects of the student proposals including precedents for this scale and form of urban development, the overall form of the core area of Singapore, the texture and character of streets and spaces suggested by the student proposals, and the role of parking as a component of new development in Singapore.

Robert Cowherd

Chapter 2: Pearl's Hill and the Planning of Singapore

View of highrise at the edge of the Chinatown district.

The intent of this chapter is to set the history of the developments on and around Pearl's Hill and York Hill in the context of the larger history of the forces interacting to produce the planning and development of Singapore. The comprehensive approach employed by the modern city-state of Singapore makes the connection between the larger goals of economic growth and the details of building projects more closely linked than elsewhere.

For Sir Thomas Stamford Raffles, the founding of Singapore was first and foremost a means of striking out against the tyrannies of the monopolistic practices of the Dutch control over Southeast Asian trade by establishing a competing port committed to trade that was entirely free and open. On his first trip back to Singapore three years after its founding, Raffles was disturbed by the chaos of the settlement that had grown up around the mouth of the Singapore River and drew up a plan for its more orderly development. This first plan for Singapore included many of the features that were to characterize the later plans of the newly independent nation. A hill was leveled to provide fill for a low spot along the river making the riverfront suitable for building (the present-day Boat Quay) and, simultaneously, clearing an area for the wharf buildings of Commercial Square (the present-day Raffles Place). In the process, several Chinese merchant houses and a village of some 600 native Malays were relocated inland.[1] The Raffles Plan of 1823 dictated the strict segregation of the living quarters in racially specific districts. This "cantonment" followed practices developed by the British in India and gave a favorable position within the city to the community of Europeans. The Chinese were granted a district adjacent to the waterfront to facilitate their role as middlemen in the trade between the Europeans and native populations of the region. The belief that free and open economic relationships are best fostered through spatial planning and development was a part of Singapore's approach to planning for economic growth from its inception.

Remarkably, the outlines of Raffle's plan were largely adhered to for the next century of Singapore's development despite a rapid increase in population. Singapore's Chinatown swelled in population with only minor extensions of its area as the upper floors of its shophouses were subdivided, and subdivided again to accommodate each new wave of immigration.[2] Captain James Pearl sold his house and lands of Pearl's Hill to the colonial administration in 1828. New Bridge Road was built in 1840, extending the town to the foot of Pearl's Hill. In 1858, a fort was constructed at the crown of Pearl's Hill. At the

Aerial view of Pearl's Hill Park and reservoir.

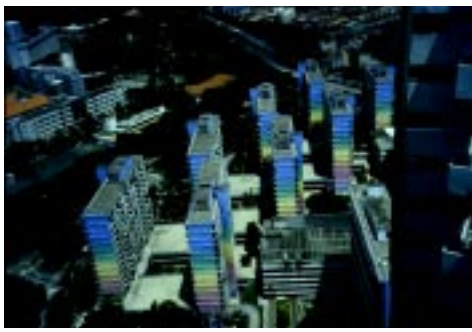
same time, Government Hill, on the other side of the Singapore River, was flattened for the new Fort Canning. The general hospital on Outram Road and the police headquarters on New Bridge Road were built in 1882.[3] The Pearl's Hill Fort was converted to a water tank in 1898.

Singapore's brief boom as the Pacific Rim geared up for World War II came to a crashing halt with the Japanese occupation, the massive influx of refugee populations, and the destruction by allied bombing. By the time the British returned, 70 percent of the Godown space had been destroyed; roads, utilities and other basic services were severely damaged; and the population had risen from 560,000 in 1931 to 941,000 by 1947.[4] Rent control was established to curb landlord exploitation of the desperate densities that had developed as high as 2,500 persons per hectare in some places.[5] Squatter settlements emerged on the fringes of the city. The Singapore Improvement Trust founded in 1924 to solve the housing crisis was largely ineffective against the juggernaut of demographic trends building only 900 units by 1950, many of which were located adjacent to York Hill to the north of the current Central Expressway.[6] The passive Euro-centric guidelines of the 1955 British Master Plan, if implemented, would have filled the island with semi-detached garden houses and cars. It's predictions and provisions fell far short of the drastic measures demanded by the rapid growth in both population and vehicle ownership that were added to the already desperate situation faced by Singapore.[7] By 1959 when Singapore became a self-ruling province of the Federated States of Malaysia with approximately 1.5 million inhabitants, fewer than 300,000 people lived in a decent dwelling, around 250,000 lived in degenerated slums and another 350,000 in crude squatter quarters.[8]

The turning point in the history of Singapore came with the 1959 election of the People's Action Party led by Lee Kuan Yew on a platform in which housing and urban renewal were identified as the keys to turning the tide of Singapore's history of misfortune. The primary means of engineering Singapore's turnaround was the establishment of several state-owned corporations with extensive statutory powers of which the Housing and Development Board (HDB) was one of the most important.[9] Exercising its powers of compulsory land acquisition, the HDB proceeded to relocate slum and squatter populations out of the downtown and demolish vast areas of the city to make way for the commercial redevelopment of the waterfront. Between 1960 and 1965, 54,423 housing units were built, twice as many as in the previous 27 years of Singapore

Improvement Trust activity.[10] The construction of bold high-rise residential towers served the additional purpose of projecting an image of growth and confidence to the population of the fledgling nation.[11]

Two major projects at the foot of York Hill exemplify this process. The first was the redevelopment of the popular People's Park which was actually an informal marketplace set in the heart of one of the residential neighborhoods of the central city. A fire swept through the neighborhood clearing the way for the mixed-use Peoples Park Complex. This was followed in 1968 by the replacement of Outram Prison with the Outram Park Housing Estate which is the largest housing development on Pearl's Hill.



Existing Rainbow Housing on project site.

If the 1959 election was its historic turning point, then Singapore's ejection from the Malay Federation in 1965 was certainly the catapult that launched it into one of history's most dramatic and successful stories of deliberate planning for economic growth. Even with six years of successful programs under its belt, the prospect of sustaining the tiny island of Singapore as an independent state reduced Lee Kuan Yew to tears as he announced to the population of the nascent state its sudden independence.[12] The island nation had been stripped of its economic base of natural resources on the Malay Peninsula. This was the defining moment for Lee Kuan Yew and the generative crisis for the people of Singapore that determined what has followed since.

Lee led the People's Action Party to create a dynamic economy with the goal of becoming the strongest magnet in the region for foreign investment. To do so he demanded the near consensus of the nation to achieve and sustain a competitive advantage for the purpose of economic growth. What is striking about the recent history of planning in Singapore is the degree to which this agenda permeates not only industrial, educational and legal infrastructures but also the provision of housing, environmental quality, cultural institutions and the national ideology — each of which have been the focus of planning initiatives.[13]

The Concept Plan of 1971 grew out of the recommendations of a team of planners commissioned by the United Nations. The planners proposed a ring of housing estates (inspired by Holland's urbanized Randstad) surrounding the preserved water catchment area at the center of the island with the Mass Rapid Transit (MRT) line serving as the spine and primary means of transport for the islands population of workers.[14] The fact that "Singapore can claim one of the most efficient transit-land use connections anywhere today"[15] was

achieved by integrating public housing in high-density clusters with the bus and rail network. In Singapore, 86 percent of the population lives in public housing and 74 percent of working public housing residents commute by mass transit.[16] At the same time, Singapore is well served by high capacity roads built mostly during the 1980s. But the transportation planning of Singapore was pursued conscious of the reality that they would not be able to build their way out of road congestion. Automobile usage in Singapore is subject to perhaps the most extensive controls and disincentives in the world.[17]

View of Central Expressway.

The provisions of the Concept Plan of 1971 are manifest on Pearl's and York Hills most dramatically with the construction of the Central Expressway which was sunk into a trench between the two hills. This was the primary freeway crossing the city and connecting the city to the rest of the island.[18] The construction of the Outram Park MRT station at the already important intersection of Outram and New Bridge Roads contributed to the designation of this area as a Fringe Centre by the URA.[19] But, with the addition of the new North-East MRT line connecting with the existing MRT system at Outram Park Station, the Pearl's Hill area will grow in significance and density.

Existing Housing on York Hill.

During the 1970s and 1980s, public housing was built on York Hill as part of the ongoing drive by the HDB to "house the nation." The provision of housing in Singapore was more of a means to the larger end of promoting economic growth and foreign investment than simply a matter of housing in and of itself. Through provisions such as the Land Acquisition Act, the URA's Sale of Sites program, the Central Provident Fund household savings program and the extensive powers of government corporations like the HDB, the Singapore government wields control over both the supply and demand for a substantial portion of the economy. Housing alone, as the largest single land use and the most significant investment of individual households, is fundamental to the economic policies of the state.[20]

Further revisions of the Concept Plan in 1981 and 1991 built on the previous planning successes and demonstrated a shift in focus from the provision of the basic essentials of housing and infrastructure to enhancing the quality of life, especially for the rapidly emerging middle class. Lee Kuan Yew has proudly characterized the development of Singapore as a succession of increasing refinement of life's opportunities. Having taken care of the basics, Singapore can now pay attention to enhancing the life of its citizens through more sophisticated cultural institutions, recreational activities, and a wider range of material

rewards for the most successful Singaporeans.[21]

The extension of a nighttime entertainment district along the Singapore River led to the construction of luxury hotels that dug into the north slope of York Hill. The fortress-like slopes and retaining walls of the housing developments, roads, shopping complexes and hotels around the base of Pearl's and York Hills were close to completely cutting off the activities occurring on the hills from each other and the rest of the city.

The provision of amenities that became the focus of planning activity in the 1980s and 1990s was strategically linked to the future economic development of the national economy. The family planning programs of the 1970s were suddenly revised in the early 1990s when it was realized that the projected population increase of the nation would leave the economy short-handed. Prime Minister Goh Chok Tong's 1997 National Day speech focused on the need to attract talented foreign personnel to Singapore by creating an attractive, cosmopolitan city.[22] The planning of housing has thus taken a deliberate turn towards providing housing types deemed attractive to an international professional class of high-technology workers that Singapore hopes to attract to its shores in support of the growth of its information economy. The "Technology Corridors" planned for the north and south of the island are designed to emulate Silicon Valley and Boston's Route 128 as Singapore competes with Malaysia's Multimedia Super Corridor and similar initiatives in China and elsewhere. The Punggol 21 plan's emphasis on "executive condominiums," "resort lifestyle" and New Urbanist pedestrian and recreational amenities are a part of this retargeting of housing in support of this sector of the economy.[23]

Another indication of the larger agenda driving recent development is the planned massive Marina South extension of the Central Business District. The emphasis of this project is on integrating housing into the downtown while preserving the quality of the environment and residential amenities. It proposes to achieve this by linking housing closely with an extensively developed waterfront edge, substantial park and recreational areas, and the substitution of state-of-the-art mass transit (complete with continuous air-conditioned linkages from home to work) for the deleterious impacts of over-dependence on private automobiles.[24] Whether or not this vision is eventually realized in full, it exerts an inexorable force on the nature of current development including the redevelopment of Pearl's Hill area. By offering high amenity luxury condominiums close to the Central Business District, the URA hopes to invigorate a downtown that

View of new public housing in Singapore.

is moribund after dark. The URA would like to foster the kind of cosmopolitan environment projected to appeal to the sophisticated tastes of the coming generation of information professionals that Singapore is trying to attract to its shores in support of economic growth.

Footnotes

[1] Ole Johan Dale, Urban Planning in Singapore: The Transformation of a City (Oxford: Oxford University Press, 1998), 1-13; and Chua Beng-Huat, Political Legitimacy and Housing: Stakeholding in Singapore (London: Routledge, 1997), 28-29.

[2] Chua, 29

[3] Dale, 16-20.

[4] Dale, 12

[5] Dale, 22; and Chua, 29-31.

[6] L.H. Wang, "Residential New Town Development in Singapore: Background, Planning, and Design," in New Towns in East and South-east Asia: Planning and Development, ed. David R. Phillips and Anthony G.O. Yeh (New York: Oxford University Press, 1987), 23-25.

[7] Chua Beng-Huat, Political Legitimacy and Housing: Stakeholding in Singapore (London: Routledge, 1997), 32; Living the Next Lap: Towards a Tropical City of Excellence (Singapore: Urban Redevelopment Authority, 1991), 8; and C. Abrams, S. Kobe and O. Koeningsberger, "Growth and Urban Renewal in Singapore," in Habitat International 5 (1987), 98.

[8] Wang, 25.

[9] Wang, 24-25.

[10] Dale, 35.

[11] Wang, 26.

[12] Rem Koolhaas, "Singapore Songlines: Portrait of a Potemkin Metropolis or Thirty Years of Tabula Rasa," in Small, Medium, Large, Extra-Large: Office for Metropolitan Architecture, ed. Jennifer Sigler (New York: Monacelli Press, 1995): 1011.

[13] Joseph B. Tamney, The Struggle Over Singapore's Soul: Western Modernization and Asian Culture, (Berlin: Walter de Gruyter, 1996): 7-19.

[14] Chua, Political Legitimacy and Housing, 33-36.

[15] Robert Cervero, The Transit Metropolis: A Global Inquiry (Washington, D.C.: Island Press, in press), 156.

[16] Cervero, 166.

[17] Cervero, 155-80; "Living With the Car: No Room, No Room," in The Economist 6-12 December 1997, 21-23;

[18] Chin Hoong Chor, "Urban Transport Planning in Singapore," in Planning Singapore: From Plan to Implementation, ed. Belinda Yuen (Singapore: Singapore Institute of Planners, 19980, 81-132.

[19] Fringe Centres are expected to support a certain degree of economic activity removing congestion from the Central Business District and Regional Centres. Living the Next Lap, 20.

[20] Manuel Castells analyzes this role of housing as the key to the economic success stories of Hong Kong and Singapore in The Sek Kip Mei Syndrome: Public Housing and Economic Development in Hong Kong (Hong Kong: University of Hong Kong, Centre of Urban Studies and Urban Planning, 1986).

[21] Tamney, 18.

[22] Dale, 64.

[23] "Punggol 21: A Waterfront Town of the 21st Century," brochure produced by the Urban Redevelopment Authority and the Housing and Development Board advertising the exhibition of the Punggol town Development Guide Plan, 1996; and Punggol Planning Area: Planning Report 1998 (Singapore: Urban Redevelopment Authority, 1998).

[24] New Downtown: Ideas for the City of Tomorrow (Singapore: Urban Redevelopment Authority, 1996).

Robert Brown
Thayer Donham

Chapter 3: Programmatic and Site Constraints

Although the four student teams had different design responses, the teams were given the same site and programmatic considerations. Each team created a hierarchy of values that ultimately determined the form of their design proposal. The following list outlines the major programmatic elements that each team was given to address in their proposal.

- Maintain existing overall park area
- Double the amount of housing that currently exists on the site
- Achieve a minimum residential FAR of 5.0 across the site
- Define street edges especially along the major roadways
- Relate design to topography of site
- Integrate new development into the fabric of the city
- Capitalize on strategic commercial and residential development opportunities
- Subdivide the site into 1 to 1.5 hectare plots for release to private developers
- Create a link between Pearl's Hill and York Hill
- Respond to the hot humid tropical climate of Singapore through site design and building form
- Evaluate the existing buildings within the context of the urban design scheme

Additionally, the student teams had to consider local cultural values and norms, like the existing building typologies, attitudes toward landscaping, and transportation demands. The following sections discuss these issues in more detail.

Building Typologies

The need for high-density housing in Singapore has created various housing typologies based on land ownership, population growth, efficiency of dwelling units, and symbolic meaning. The three housing typologies that emerge most commonly are the slab block, the point tower and the dense low-rise typology of the traditional shop-house that is still evident throughout Singapore. While it can be argued that various versions of each housing type can create similar densities, the individual typologies are specific in their contextual usage. For example, small sites are more conducive to point towers and the new housing estates, centered on rapid transit stations, are tall slab block villages organized around pedestrian parks.

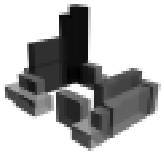
In response to the tropical climate, outdoor spaces require shade and open walls to capture breezes. In Singapore, the architectural response to the climate is evident in building forms such as the enclosed podium and the

Chapter 4: Team Proposals

Team A - The team that created a lower level park

Team B - The team that connected the site to the Singapore River with a new park

Team C - The team that developed a shape grammar to inform future development



Team D - The team that preserved the hill and redesigned Pearl's Hill Park

Team E - An exploration of high density residential development

Mark Bailey
La Tonya Green
Kiran Mathema
Jeff Tsui

Team A

The team that created a lower level park

- *Creates links to the existing parks and open spaces in the Central City region*
- *Creates a new lower level park that links Chinatown and the Singapore River and develops air rights over the Central Expressway*
- *Maximizes the development potential provided by the new Outram MRT interchange*
- *Creates housing typologies that respond to the topography of the site*

Introduction to Proposal

Team A has created a new linear park at a lower elevation on the site that becomes the green space connection between the Central Business District, New Bridge Road, the Singapore River, Fort Canning Park, and Orchard Road. The linear park provides attractive open space as well as extensive pedestrian pathways through the Pearl's Hill and York Hill precincts. The new park is both a greenway system and an urban oasis that complements the high density and urban energy of the Pearl's Hill neighborhood. New active and passive recreational opportunities for the district and the broader city are possible through the redistribution of the existing park space.

Section through Pearl's Hill

The Pearl's Hill and York Hill precincts are an important part of the urban structure of Singapore due to their central location within the city. Team A's design for new residential and commercial development takes advantage of the site's proximity to the new downtown and Orchard Road by doubling residential density in this prime urban location. The design aims to strengthen the commercial corridor of New Bridge Road and create a major commercial node at the Outram Road MRT Interchange through intensifying commercial development along New Bridge Road.

Lower level park plan

Design Intent

The main structuring element of this scheme is the seven hectare linear park that is created on the lower levels of Pearl's Hill making access to the park more manageable for the average pedestrian. The steep slope of the existing Pearl's Hill Park is developed for housing and the park area is reallocated in a new configuration that allows for maximum accessibility by area residents. Because the park is flat rather than steeply sloping, there are opportunities for sports and games within the neighborhoods. Vegetation and open space would be structured to sustain natural systems through a combination of green patches and corridors that would enhance the ability of native fauna to move through the region despite the increased density of development around the park.

Site plan

Landscape intent

Model view from south

The linear park increases the livability and attractiveness of this precinct of the city by balancing the high residential densities proposed by the URA with the provision of high quality public open spaces adjacent to the new housing. A new community identity will be created by the unique integration of open space with high-density housing.

The linear park gives organization to the built environment through the creation of a hierarchy of public and private space. A more private, secluded place is created along the edge of the park so that it remains an urban oasis while becoming more attractive for living and working. The residential buildings on the upper level are raised one level off the ground thus allowing views from the upper park to the lower park and out to the city beyond. The two parks are connected physically through stairs that act as "fingers" linking the upper level and the lower level. The link from the upper park to the linear park directly ties into the Garden Bridge which spans New Bridge Road and links People's Park to the Pagoda Mall in Chinatown.

The development of the air rights over the CTE creates a green linkage between York Hill and Pearl's Hill and also enhances the value of the buildings that face the CTE. By shortening the travel time between one side of York Hill and the other side of Pearl's Hill, there is better access from York Hill to New Bridge Road and the MRT interchange.

By constructing a new building in front of the historic CID building, the street edge along New Bridge Road becomes a continuous band of commercial development. The new building would have a commercial podium at street level fronting New Bridge Road that would allow pedestrian access to the CID building and the linear park beyond. Residential towers are proposed above the commercial podium to achieve the housing density required by the URA.

A major asset of Team A's scheme is the creation of an architecturally distinct precinct determined by the variety of housing typologies offered on the site. In the park-side housing typology, the buildings serve as a buffer between the traffic of Outram Road and the recreational space created by the linear park. These buildings are constructed on relatively flat parcels of land, which allows for two-story commercial podiums along the ground level with housing above. The park-side housing focuses on views into the park, and, hence, along the Outram Road facade, the housing blocks have a vertical profile, while on the side that faces the park they have a stepped profile. The park-side buildings reach a total height of 60m, and have a residential floor area ratio of 4.5 to 6.0.

Commercial and residential development on Outram Road

In the hillside typology, the buildings are partially built into the side of the hill. The stepped building massing is responsive to their location on the steep hillside. The residential buildings of the tower typology are located at pivotal points in each bend of the linear park. The tower buildings provide the most intensive floor area ratios on the site.

In contrast to the active linear park, the upper park has a contained and reflective character. The upper park is a private space designed around the existing nineteenth century reservoir at the center. In response, the landscaping of

Green Pedestrian Network

Relation to Orchard and New Bridge Roads

Proximity of site to the Singapore River and Fort Canning Park

Relation to Little India and Kampong Glam Historic Districts

Pedestrian Networks Along Riverside

Axial Link to Marina Bay and the new Downtown

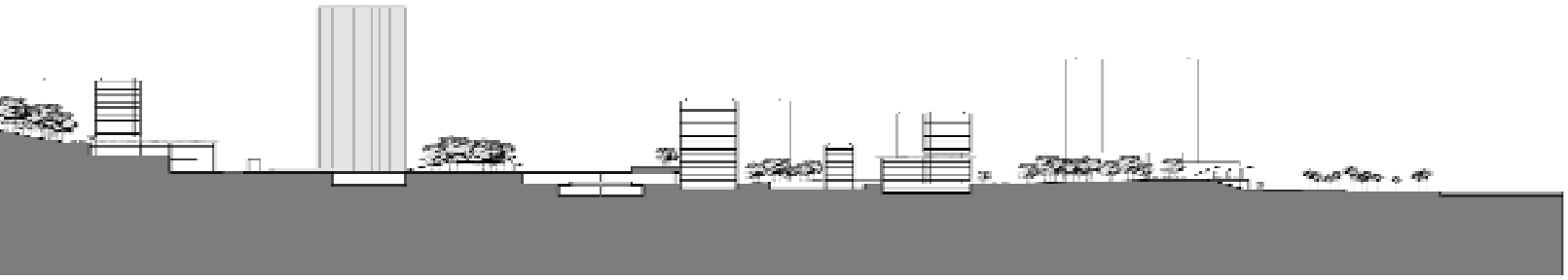
View to York Hill from Singapore River

View of Hillside Typology

the upper park is more formal than that of the lower park: trees are planted in a grid and the park contains water features made of short channels leading to and around the water tank.

Transparent building elements such as atriums would help to create transitional zones between the built environment and open spaces. Buildings fronting major roads should have arcades of at least one story high along the street level to provide protection from the sun and tropical storms. Buildings should have a minimal lot line setback in order to engage the street and the edge of the park. Team A envisions using a similar palette of materials and architectural details throughout the site to reinforce a sense of unity within the district.

The block pattern within the new precincts has been established to allow for a greater variety of ways to circulate through the site. Pedestrians will have access to the public park and streets at all times. In inclement weather, passages through the ground level of the commercial podiums will provide alternate circulation routes for pedestrians. These circulation routes combined with the proximity of the site to both the Outram Road MRT interchange and the bus stops along New Bridge Road will facilitate transit-related travel.

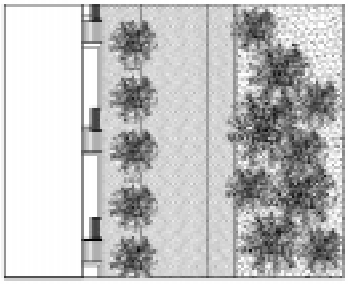


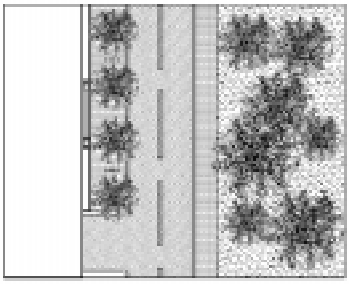
Section through Pearl's Hill

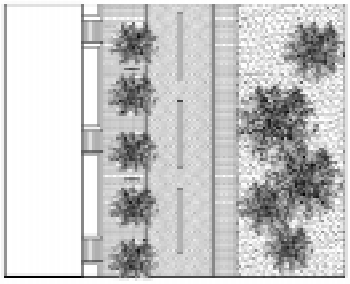
Implementation

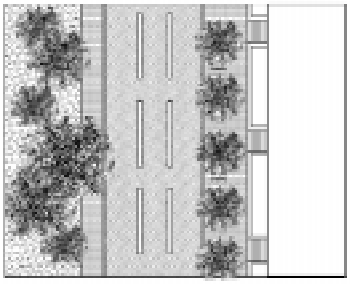
The development parcels are subdivided by Team A in a manner that insures that the urban design scheme remains intact regardless of the development schedule set out by the URA. The Pearl's Hill precinct should be in very high demand over the next ten to twenty years due to the new Outram MRT interchange and the precinct's proximity to the Central Business District, the new Downtown, China Town, and the Singapore River. The URA should release the land to private developers based on the time in the real estate market when they can capitalize on the development potential of the land.

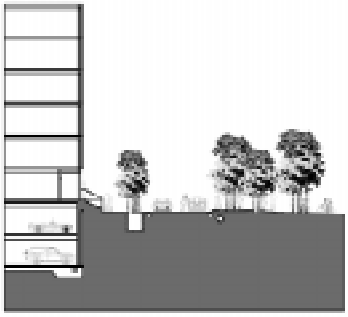
The corner of New Bridge Road and Outram Road, above the Outram MRT Station, should be developed to serve as a catalyst for new construction in the Pearl's Hill precinct. Simultaneously, the parcels closest to the Singapore River should be opened for private development as well. Developing these parcels first will create the type of density needed to support the development of the housing on the top of Pearl's Hill and possibly help to finance new housing on York's Hill.



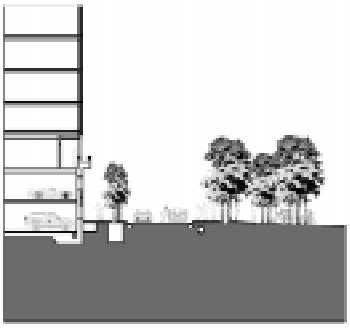




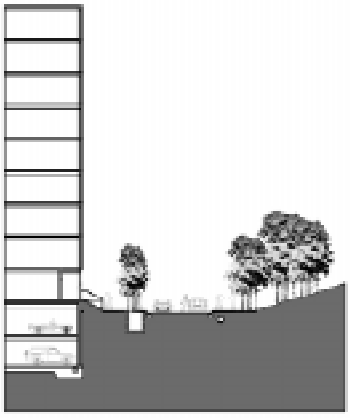




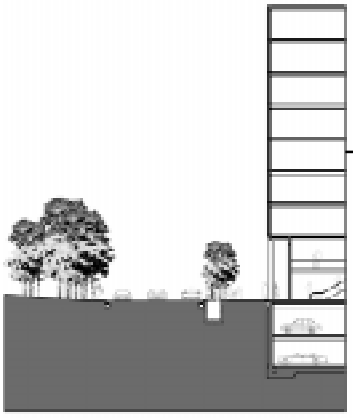
Residential park street details



Alternative residential park street details



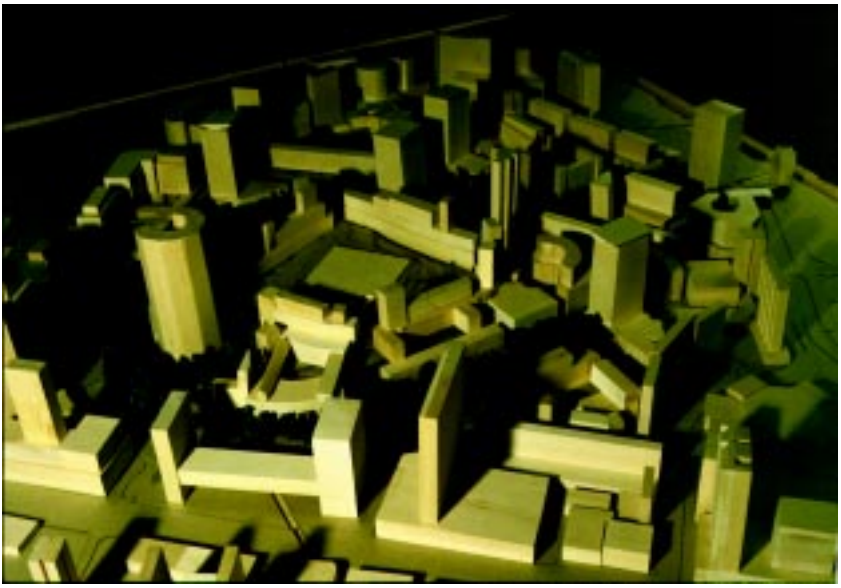
Residential hill street details



Internal commercial street details

View of CID development

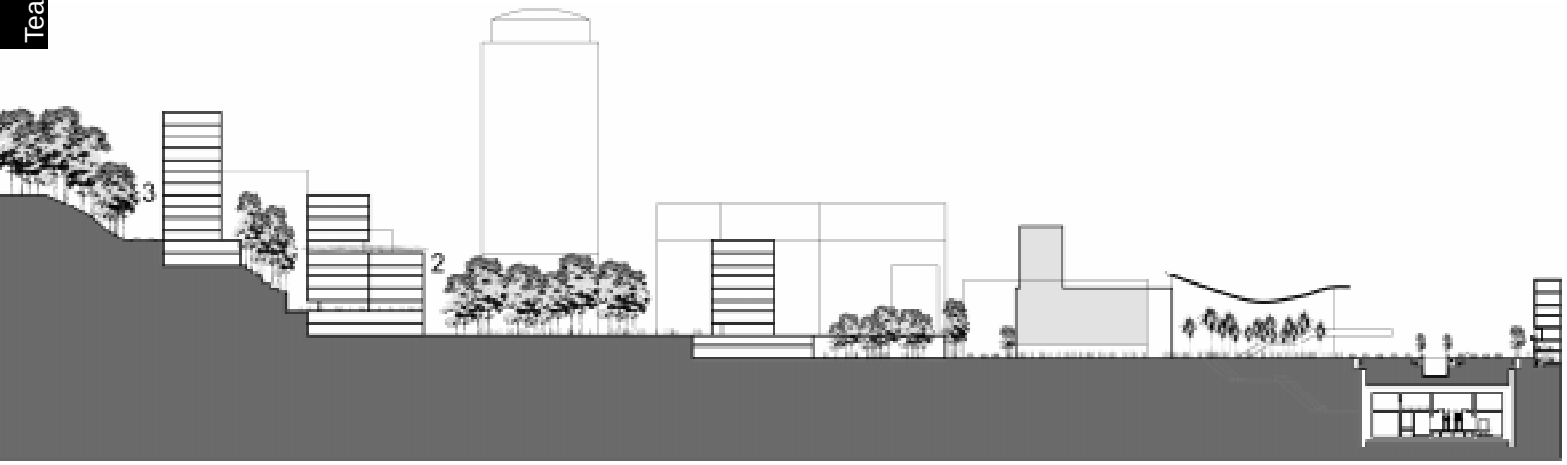
Model view from south-east



View of linear park

The next area to be developed would be the air rights over the CTE. Partial decking over the CTE is necessary in order to make a strong connection between Pearl's Hill and York Hill. Decking over the CTE could be costly depending on the structural requirements of spanning the CTE and supporting a park on the newly created deck. This scheme calls for the development of approximately 13,000 square meters of air rights above the CTE. The cost for air rights construction and the specialized landscaping is approximately $128 (US) per square meter. Recovery for the costs of the air rights development could come from the sale of the parcels for two proposed buildings that abut the new air-rights development.

Transfer of property ownership from the public sector to the private sector is a major step in the implementation of the plan. In order for this design to be effective, the responsibility for developing the site must be divided between the public sector and the private sector. The public sector would be

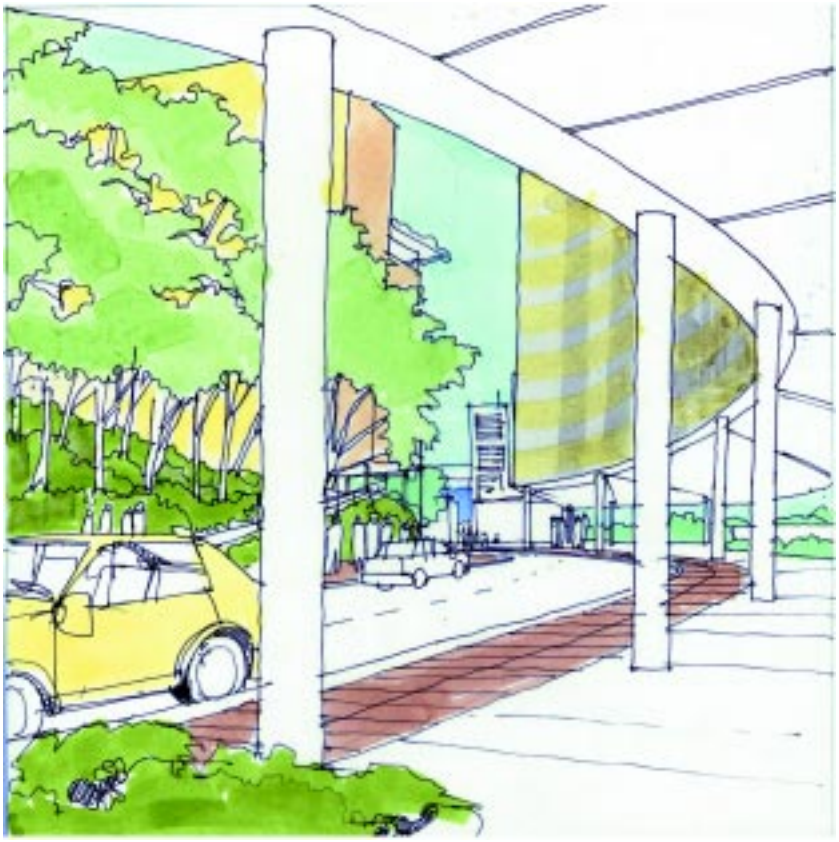


Section through People's Park MRT station

responsible for the maintenance of the lower linear park on Pearl's Hill and over the CTE. Although the upper park is intended for use mostly by the residents of the top of Pearl's Hill, it is a public space and should be maintained by the public sector.

The private developer's main responsibility would be to maintain the landscaping immediately surrounding their development. It is extremely important that the areas surrounding the private development sites are heavily landscaped in order to provide continuity between the public and private realms. Enforcing landscape requirements will keep the site attractive and therefore the overall land value of the site will remain high.

View of residential interface with linear park



View of development on top of Pearl's Hill

Block Diagram

Buildings

Private Spaces
Institutional Spaces
Public Spaces

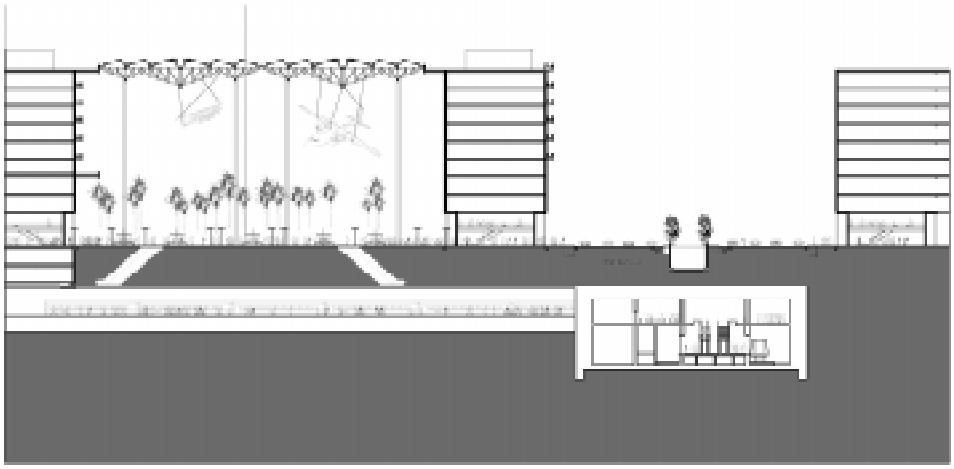
Open Space

HDB
Private Ownership
Institutional Ownership
Public Ownership

Ownership

The Master Plan

- Creates link between Chinatown and the Singapore River
- Maximizes residential and commercial development potential provided by the new Outram MRT Interchange
- Housing typologies respond to the topography of the site and the desire to increase residential densities
- Air rights development over CTE completes a pedestrian accessible link between Pearl's Hill and York Hill



Section through Outram MRT interchange

- *Develop strong link to Singapore River from MRT interchange at Outram Road across Pearl's Hill and York Hill*
- *Facilitate private development through the parcelization plan*
- *Retain existing overall park area*
- *Relate design to site conditions and surrounding context*

Timothy Jones
Yong Joo Kim
Sunitha Raju
Francisca Rojas

Team B

The team that connected the site to the Singapore River with a new park

Section through Pearl's Hill

Introduction to Proposal

At first, a proposal to develop private housing units within a public park seems unreasonable, but given the context of Singapore it is a quite viable proposition. Because the population of Singapore is growing and the island of Singapore has a limited amount of developable land, it is critical to the Urban Redevelopment Authority (URA) that Pearl's Hill and York Hill become more than underutilized public park. This project is an opportunity to create new housing for Singapore's dense population that is integrated with a public park and semi-public open space. The new design for the park has points of destination that anchor the park within the pedestrian pathway system of the city.

Furthermore, this project's unique opportunity gives way to a process of development that can generate financial subsidies from adjacent private developments. By merging public and private investment and providing new development opportunities, financing for this urban design scheme is attainable.

Team Proposal

The primary intent of Team B's urban design scheme for this project site was to develop a strong link to the Singapore River by creating a linear park that runs from the Outram MRT interchange across Pearl's Hill and York Hill to the Singapore River. This scheme creates a new typology of public riverfront space for Singapore that differs from the highly commercialized riverfront quays that have recently been renovated along the Singapore River. The scheme also increases the overall park area from 8.2 hectares to nearly 10 hectares of combined semi-public and public space. While increasing the park area, the scheme capitalizes on strategic commercial/ institutional development at the Outram MRT interchange, the CID site and along the Singapore riverfront.

The proposed plan adopts the adjacent Chinatown grid to the edge of the Pearl's Hill site. The building design relates to site conditions by orienting

Transportation Network

Site plan

Model view from south

Conceptual Design Process

the interior shell of the site's built form towards the hill while still maintaining a basic grid structure. This proposal facilitates the internal vehicular circulation of the project site through development-specific looped roads that connect to the surrounding network of roads.

This plan achieves a site FAR of 7.4 on Pearl's Hill, a FAR of 3.5 on York Hill and nearly doubles the housing units per hectare from an existing site average of 524 units per hectare to 997 units per hectare. In order to facilitate new development by private investors, the entire site is divided into parcels with a maximum size of 1.5 hectares.

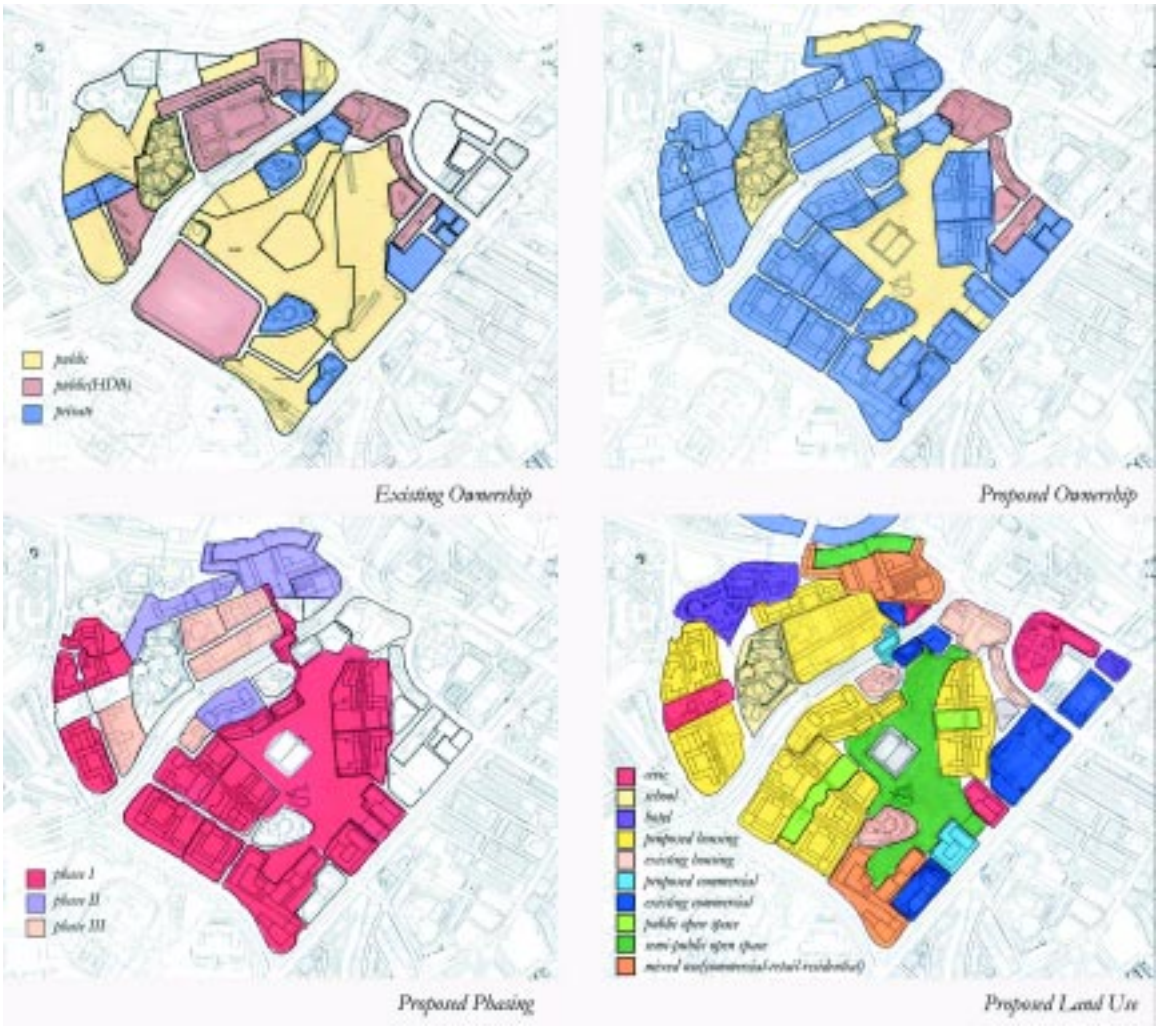
Implementation-Public Actions

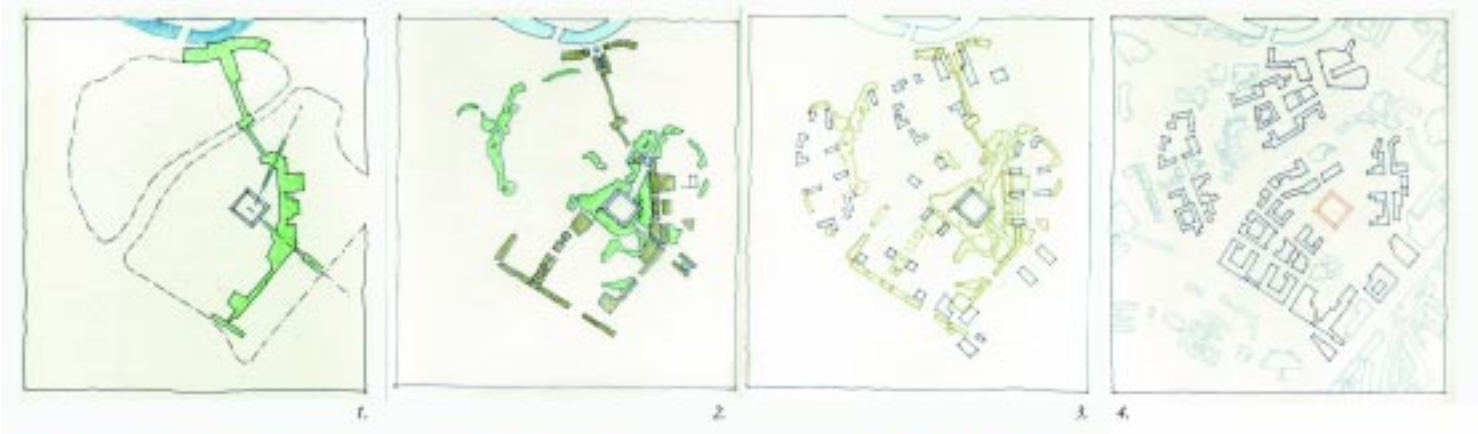
This proposal reconfigures the CID site into two private development parcels that are bisected by a publicly owned parcel that provides public access from Chinatown to Pearl's Hill Park. The plan replaces the CID building with two structures that contain institutional/civic space on the lower levels in conjunction with mixed commercial and retail uses. The institutional/civic spaces serve to substitute for the obsolete CID building while the commercial and retail uses on the privately owned parcels ensure continuity along the New Bridge Road commercial corridor. Though the CID site is surrounded by private development, the central parcel remains public thus ensuring a powerful view corridor and gateway to Pearl's Hill. Due to its status as the gateway to Pearl's Hill Park linking through to the Singapore River, these publicly owned parcels should be developed by the URA and should be the first step in the new linear design of Pearl's Hill Park.

Currently, the steep topography of Pearl's Hill renders the site's park nearly unusable in Singapore's hot and humid climate. In order to facilitate the public's use of Pearl's Hill, Team B proposes creating a formal landscaped park along the hill's east side, which is flatter than the rest of the hill, to minimize climbing up the steep slope and to maximize access to a shady, cool place to walk. The new linear Pearl's Hill Park is anchored at the new Outram MRT interchange, the reconfigured CID site, and the Riverside Park. The gap between Pearl's Hill and York Hill is bridged by a modest commercial development over the CTE. Immediately behind the CID commercial/institutional development, on Pearl's Hill, is a landscaped platform area that provides a place for public activities, fairs and festivals. All of this landscaped land is public and should be developed as public open space by the URA. The west side of the existing park should be returned to native tropical vegetation that will provide an organic landscape for surrounding private housing developments.

For the connection between Pearl's Hill, York Hill and Singapore River to succeed, it is necessary to establish a physical link between the two hills that will ease movement back and forth between the Outram MRT area and the Riverside Park development, and thus connect the site's residential neighborhoods. The CTE

Model view from Chinatown District





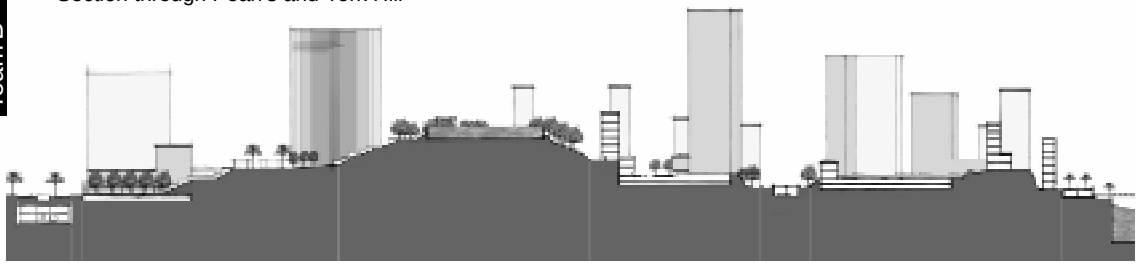
1. Pattern of green spaces
2. Existing and proposed landscape
3. Location of tower blocks
4. Proposed building footprint
5. Street network
6. Edges
7. Nodes

Model view from north

presently acts as a physical barrier between Pearl's Hill and York Hill and the proposal to link the hills will require the development of the air rights over the CTE. Considering the high cost and difficulty of air rights development, Team B proposes a small commercial building (such as a market) to be developed by the public sector, which could initially begin as a simple bridge across the two hills. The public sector could lease the commercial space (i.e. market stalls) for a period of time and once the investment solidifies financially, the government could sell the development to a private developer. A private investor may find it profitable to expand the development of the air rights over a larger portion of the CTE.

Facilitating access to and through Pearl's Hill and York Hill, and linking these to the Singapore River activity corridor and the rest of the city, presents an incomparable opportunity for providing riverfront public open space and creating a mixed-use development (commercial / hotel / residential) along the river's edge. Creating a strong pedestrian link to the edge of Singapore River requires either decking over Havelock Road or rerouting traffic across to Mohamad Sultan Road or Clemenceau Avenue. Though surrounded by private development, the proposed Riverside Park may have to be developed publicly due to the high cost incurredby constructing a park spanning a roadway. Relegating development of the Riverside Park to the public sector ensures public access to the open space and would result in a publicly accessible park that would benefit all citizens of Singapore.

Section through Pearl's and York Hill



Team B

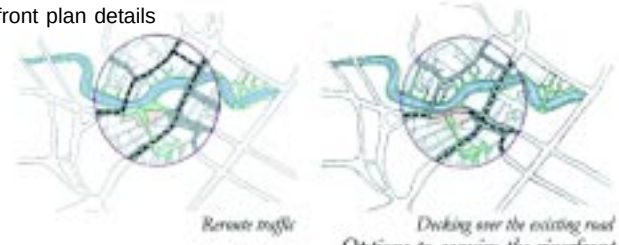
Detail plan of urban park

Proposal Implementation-Private Actions

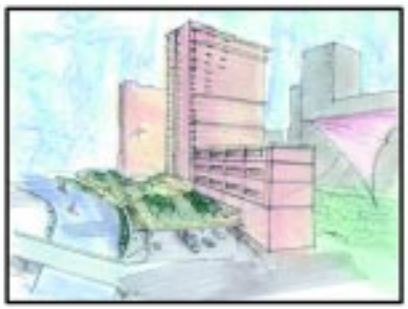
Team B felt that it was imperative to intensify commercial activity at the junction of Outram Road and New Bridge Road. This is the location of the newly developed Outram MRT interchange and it is also the terminus of the linear commercial corridor along New Bridge Road. Given the site's important location within the city, the MRT parcel should be developed for combined commercial / retail / residential use by the private sector. Due to this parcel's incomparable accessibility to two MRT lines, the mixed-use development on this site will act as one of the two principal portals to activities in the project area.

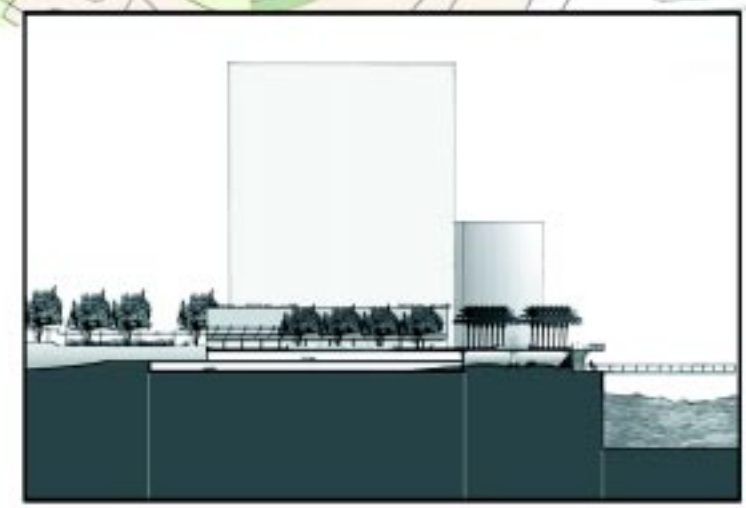
As the second portal to activities on Pearl's Hill and York Hill, the Riverside mixed-use development should be privately developed, owned and operated. A hotel (to continue the cluster of hotels presently existing along Havelock Road), office space, housing and a public park are proposed on the site to create an activity node along the edge of the Singapore River. As a public good, the park should be managed and maintained by the public sector and remain accessible to the public. But as an open space development along a valuable riverfront property, the private sector has an incentive to develop the park on its own and even incur the cost of the public park development over Havelock Road.

Riverfront plan details



Options to acquire the riverfront





Cross Section through Riverfront

Model view from east

As previously mentioned, this plan proposes the removal of the CID building and the division of the CID site into three parcels. The central publicly owned parcel will act as a gateway to Chinatown and will open a view corridor to Pearl's Hill, while the other two privately owned parcels will be developed with a mix of commercial, retail and institutional uses. Ideally, the two privately owned parcels would be owned and developed by the same party so as to create a unified and coherent space around the public park parcel. However, design guidelines could be crafted for both sites thus establishing similar building requirements for each site.

The housing proposed for the rest of the project site would be privately developed as parcels of land become available for redevelopment. The main concern with the implementation of the private housing on Pearl's Hill and York Hill is ensuring the creation of the semi-public open space that is interwoven with the housing and feeds into the larger, site-wide network of public open space. As in the case of the proposed Riverside Park, the URA could sell the parcels and require the provision of semi-public open space on each site. If the real estate market is strong, this maybe seen by the developers as a liability thus lowering the market price of the parcel. If the real estate market is weak at the desired time of parcel development, the URA could introduce development incentives for the provision of semi-public open space.

June 21, 10:00AM *12:00PM* *2:00PM*

Shadow Study

Residential block plan details

Cross Section from Linear Park to Cross Street

View from beginning of the A Street

- *Uses shape grammar to determine modules of development creating blocks, neighborhoods and regions*
- *Disaggregates the park and disperses the park area throughout the project site*
- *Completes a link between Pearl's Hill and York Hill through the development of the air-rights over the CTE*

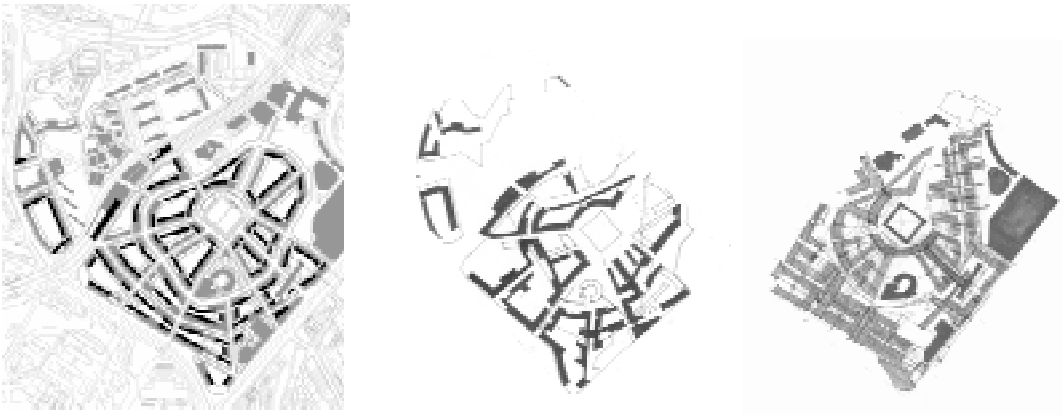
Design Intent

Team C offers a design tool to guide the future development of this site. Embedded within the design tool is the generation of a development module, or block, that responds to and comes out of the existing site conditions. The growth and expansion of development on the Pearl's Hill and York Hill sites is determined by the physical assets of the site, societal values, and available financing to fund future development. The other parameters of the design tool are the URA's desire for both high-density residential use of the site and the preservation of public open space.

Robert Brown
Marianne Deklerk
Meegan Massagli

Team C

The team that developed a shape grammar to inform future development



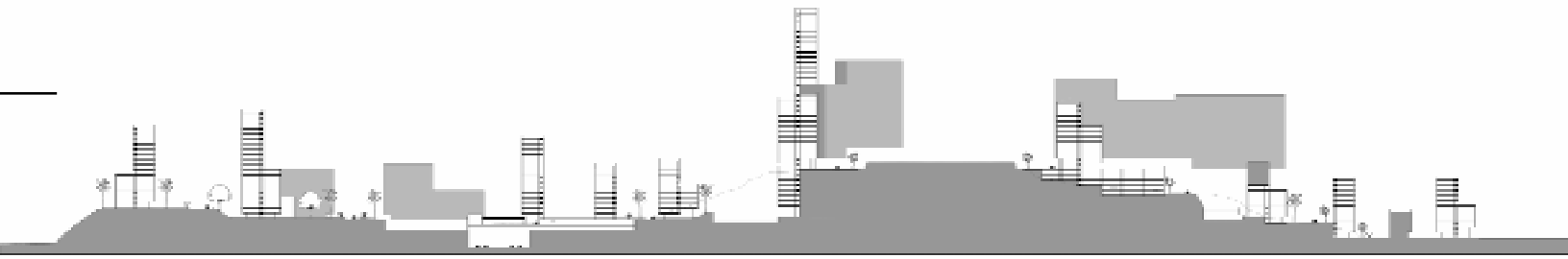
Plan Iterations

Team C reconfigured the underutilized Pearl's Hill Park and dispersed the park area throughout the site to create multiple parks that are easily accessible to the new blocks of housing. The team considered the reservoir as a historic object that should have its' walls preserved and offered to the public as a potential recreational resource. The team assumed that the use of the reservoir for water storage is not a function that will continue into the distant future; therefore, the open space immediately adjacent to the reservoir walls could be opened to the public as a civic or historical park. This scheme proposes creating a public pathway system to link the park at the reservoir to other public spaces and activities throughout the city.

Proposal Descriptions and Link to Intentions

Team C believes that the combined factors of the rapid rate of development and the large size of the project sites promote the need for a systematic design tool that allows for flexibility at multiple scales. A flexible design system

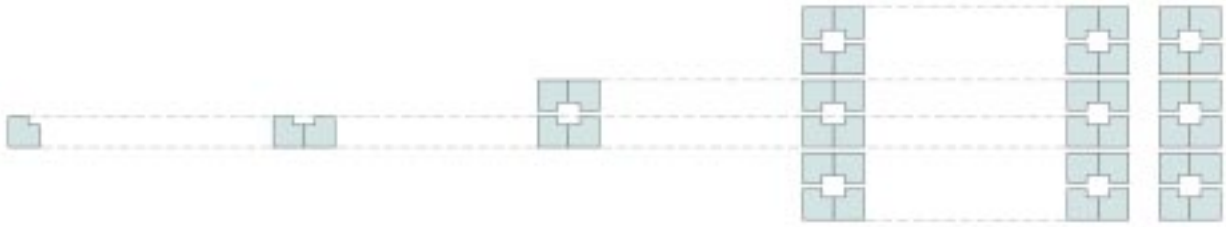
Section through Pearl's and York Hill



Site plan

Model view from south

Typical Chinatown block



Unit to block analysis

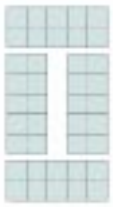
allows for changing uses as well as additions or deletions to the total development scheme. Team C's system of development starts at the individual unit and grows outward to the block, then to the neighborhood scale, and, ultimately, to the regional scale.

The Chinatown Block system is used as the basis for the patterning of the units to form blocks. Architecturally, this system of design utilizes the slab block form in combination with vertical point towers. These combined forms have setbacks that allow for a pedestrian-scaled environment and unconstrained views over the site. As the height of each block increases, a larger block size becomes necessary. A maximum height of five stories along street edges defines the individual blocks and street forms. Ten story buildings are set back from the street edge and define a larger area that encompasses two blocks. The tallest buildings have forty-five stories and mark communities or regions that contain multiple blocks.

Concept collage

By establishing a system for the design of this site, an open-ended condition is created where growth can occur as desired by the URA. Furthermore, such a system allows for a constant evolution of development beyond the site edges based on the immediate adjacencies. Internally, this system can also evolve based on the development of its immediate neighbors. Therefore, new development does not occur independently, but is constrained by relational adjacencies to the structures that currently exist on the site, the steeply sloping hillsides and the flat parcels at the base of the hill.

Rather than create a constant system over the entire site, Team C proposes variation based on topography and the built context. The blocks developed on the flatter parts of the site are able to be denser with pocket parks and private courtyards. The blocks built on the steeply sloping portions of Pearl's Hill and York Hill have fewer direct connections to the ground. These contextual variations can create regional communities differentiated by their own formal rules. These regions can be linked together by a network of continuous public green space of varying sizes.

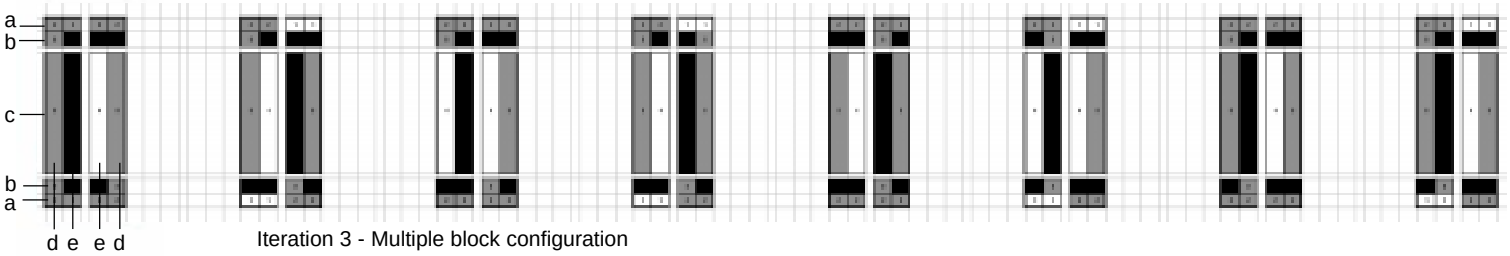


①

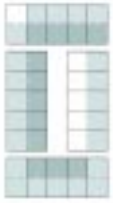
Block iterations

②

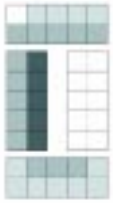
Model view from west



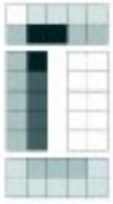
Iteration 3 - Multiple block configuration



④



⑤



⑥

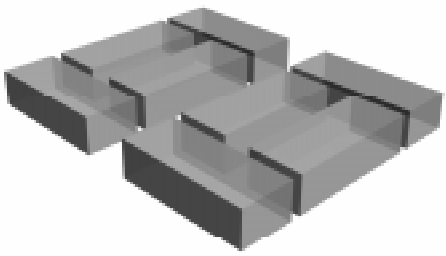
Zone a - Maximum height of 15 meters. No more than 6 solid cells across before two must remain open.

Zone b - Maximum height 30 meters. No more than 3 cells at maximum before 1 cell at 15 meters. No more than 3 sets of 3 full cells at 30 meter heights before 3 sets of 2 full cells at 30 meters.

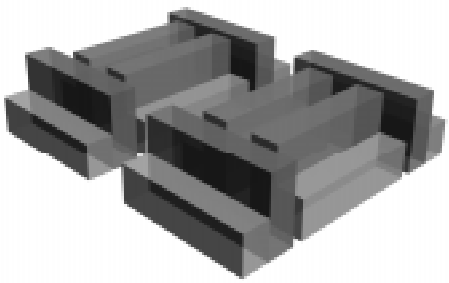
Zone c - No more than three strips may be solid before one must remain open.

Zone d - Maximum height of 15 meters. Every third block must have an open street edge.

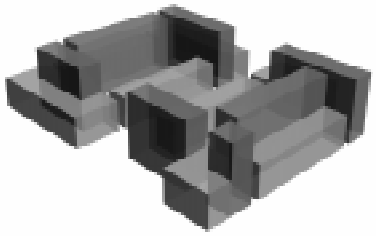
Zone e - Maximum height of 30 meters. Maximum of one full strip per block.



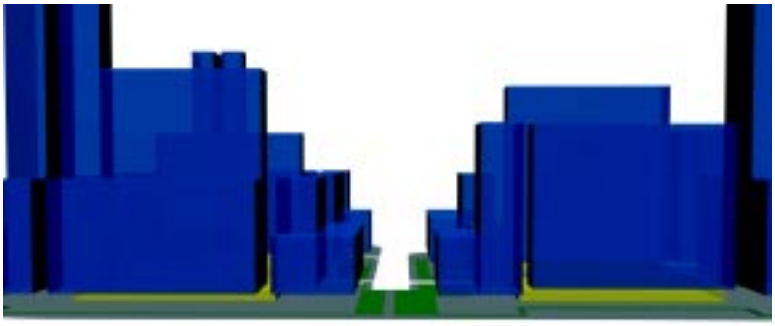
Block iteration 1



Block iteration 2

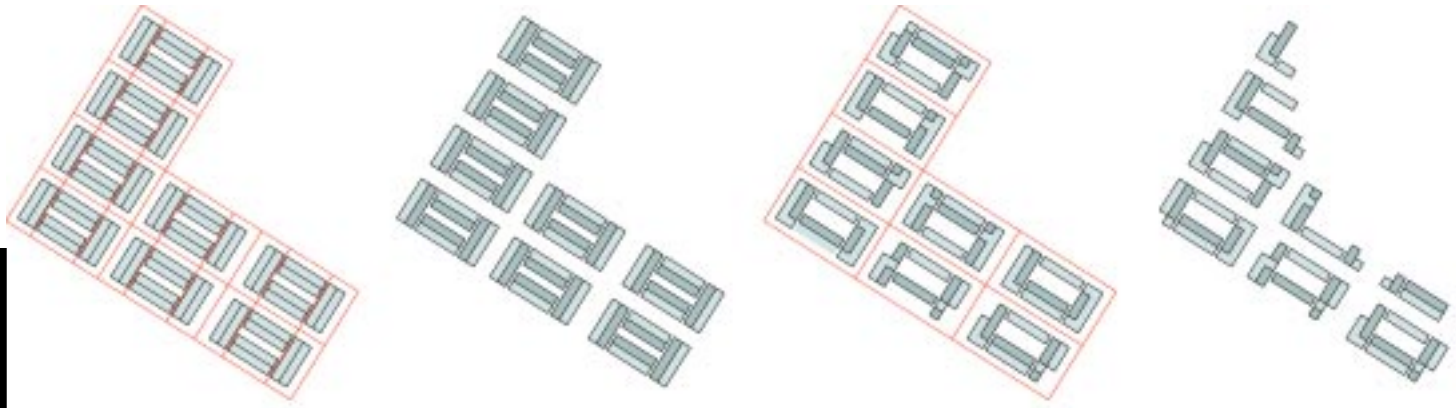


Block iteration 3



Digital model view from southwest

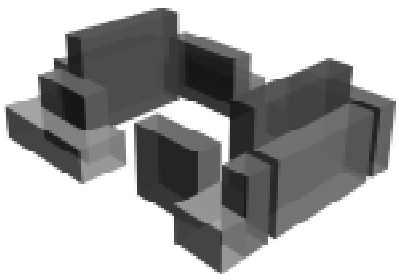
Although each of these separate communities have similar FAR requirements, each community can potentially create distinctive high-rise typologies that differentiate one community from another. These high rises then become symbols not only of each community, but also symbols for the city. Both the natural and the historical elements of the site influence the visual form of the city by determining how the towers mark the communities into which they are placed.



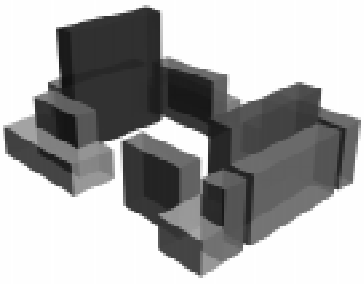
Plan iterations of region

This proposal incorporates development of the air rights over the CTE. The new structure over the CTE acts to make a seamless connection between Pearl's Hill and York Hill, and also increases the quantity of developable land on the site.

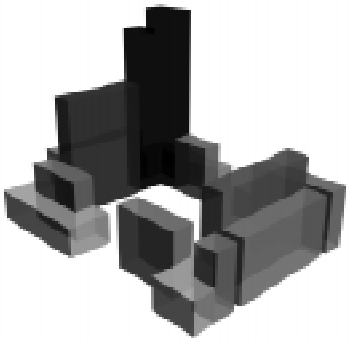
In its existing state, the Pearl's Hill Park is underutilized. While the park is intended for use of residents of the city, accessibility up the steeply sloping topography is limited. Team C proposes to keep the same relative area of park land on the project site, but plans to disperse it throughout the site as public, semi-private, and private open spaces. Within the rule grammars that create the block units on the site, setback requirements will allow for a continuous



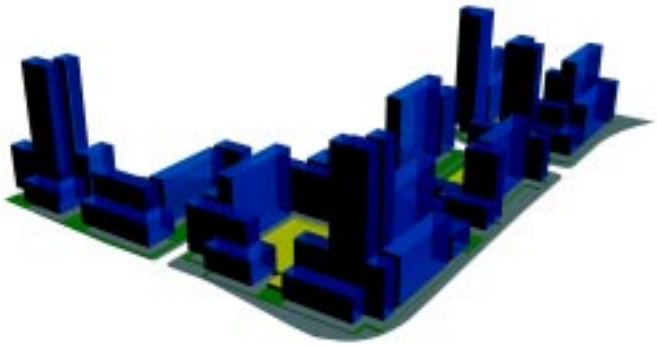
Block Iteration 4



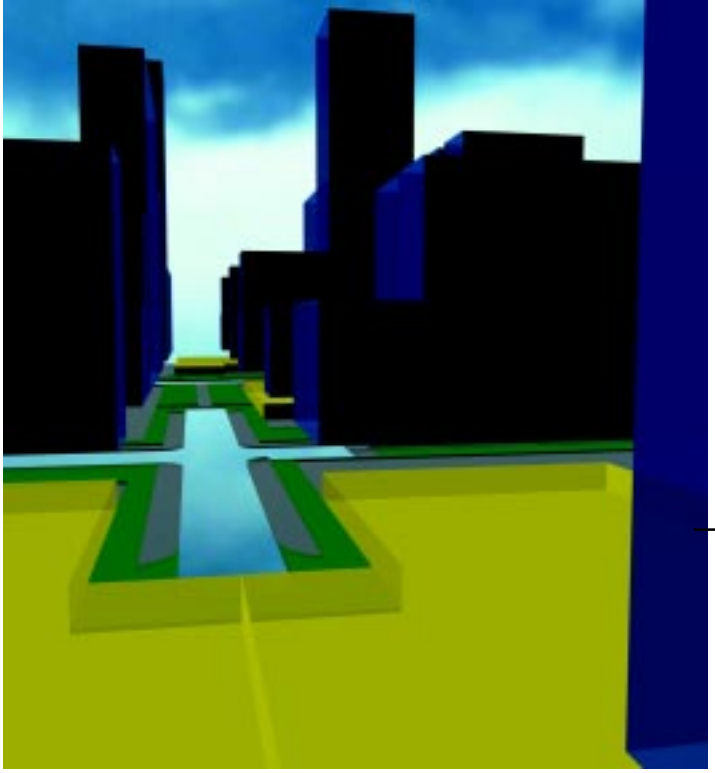
Block Iteration 5



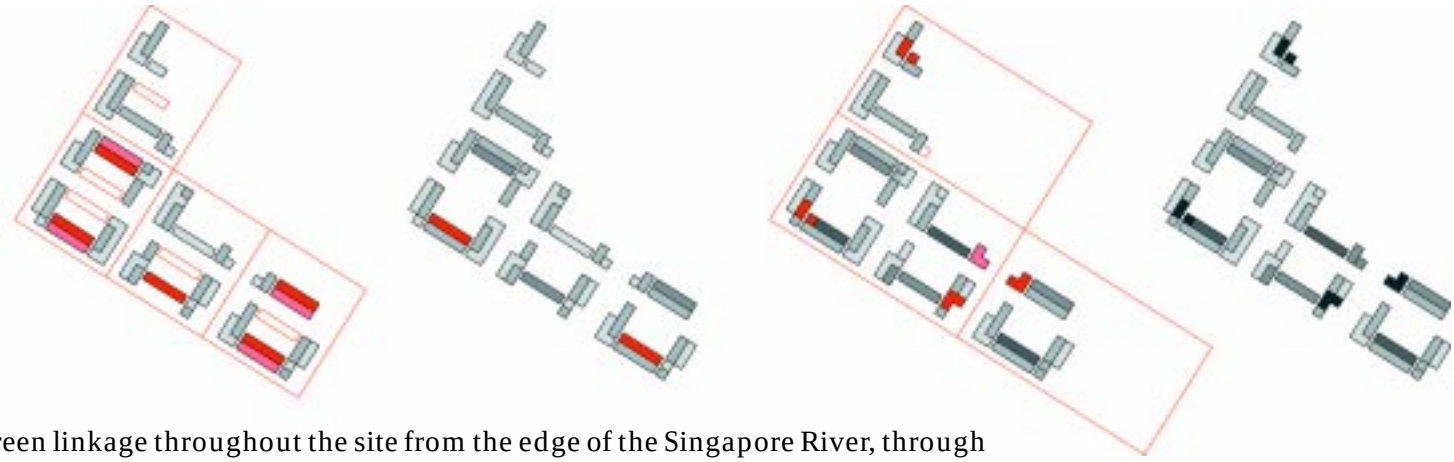
Block Iteration 6



Digital model view of region

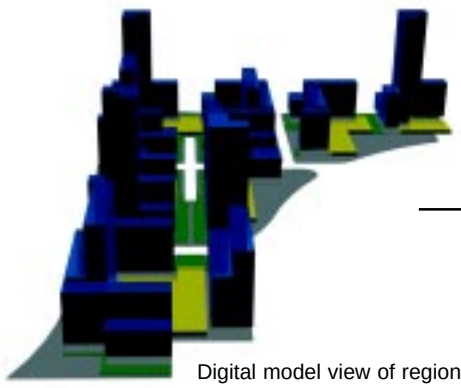


View of internal street



green linkage throughout the site from the edge of the Singapore River, through York Hill, over the CTE, and terminating around the base of Pearl's Hill in large public open spaces. Each block and neighborhood will have easily accessible public green space integrated into the development.

While automobile accessibility and parking is required for all dwelling units, the proximity between the dwelling unit and its parking space can be varied. Since there is a MRT interchange on the site, those dwelling units within walking distance of the MRT can have their automobiles stored in parking banks on more remote parts of the site. This allows for more dwelling units to be placed immediately adjacent to the transit stop. Additionally, each block on the site will have a two level parking structure in the base. On top of the garage will be a private park designed for the use of the residents of the block. Along the green linkage throughout the site, it is possible to incorporate a personal transit system that connects the residential and commercial development with the more remote parking banks. The top of these parking banks will be primarily public open space which is possible since the parking banks are located in areas where rooftop access can be provided by existing topography (such as underneath the air rights development and at the northeast corner of the site).



Digital model view of region

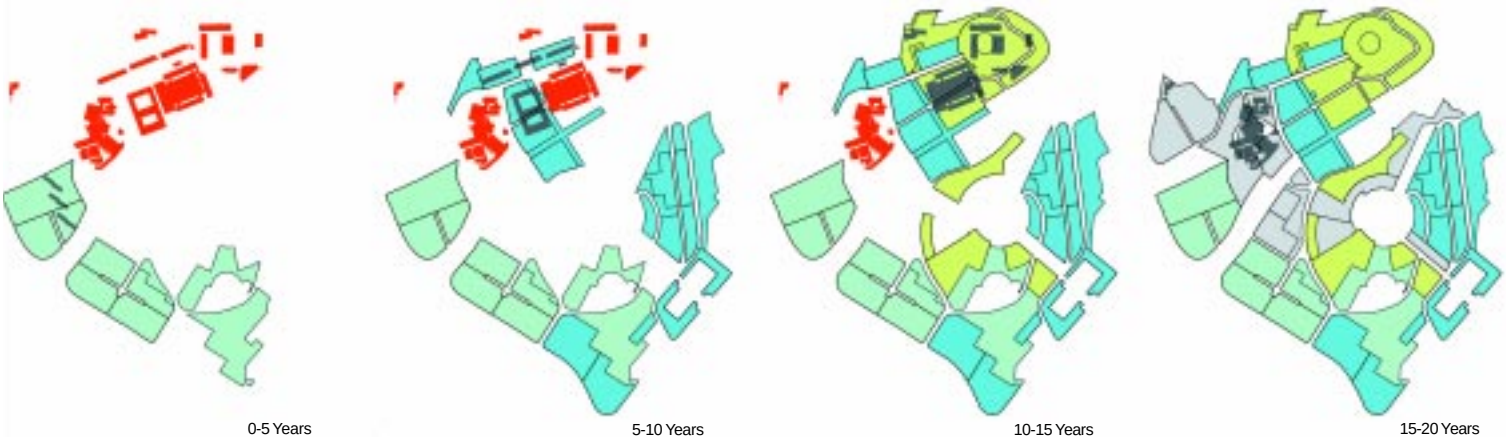
Phasing of Development

The shape grammars applied to the site have created a systematic tool that allows for flexible phasing and ownership. Team C recommends that the first phase of development is the edge of the site, primarily, along Outram Road and New Bridge Road. Building along the edge of the site allows for the site interior to be preserved as open space until further development occurs. This edge development is discontinuous at the existing CID building to ensure public access into the park. Additionally, the development is intended to occur according to the community regions embedded in the site based shape grammars. The further stages of the development allow for the removal of the existing school on York Hill and the reuse of the Pearl's Hill reservoir when it becomes obsolete. These sites will become the cores of the separate regions, and become community symbols with views outward to the city.

The design tool suggested by this proposal can be applied to the development parcels immediately adjacent to the project site. The constraints of the design tool will change as the context in which it works is differentiated, although adjacent, from our given site. This flexibility of design module and form allows for a finer grain of development at larger scales. Through the use of shape grammar as the design tool for Pearl's Hill and York Hill, the area will develop with a sense of coherence and a strong identity that distinguishes the area from the rest of Singapore.

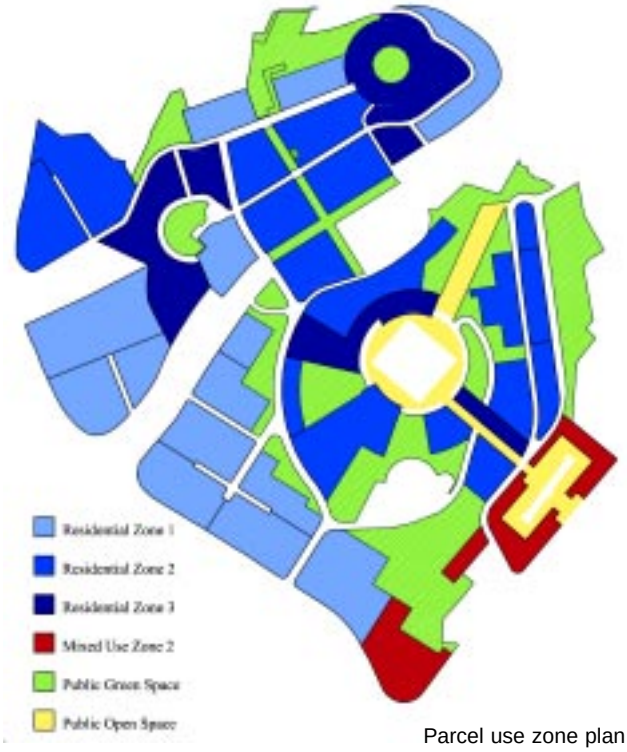
Section through York Hill

The rapid redevelopment of Singapore's urban core is creating a need to distinguish between existing development that is significant and must be preserved, and, existing development that is ripe for demolition. This applies to individual buildings (the CID Building), entire neighborhoods (Chinatown), and green open spaces (Pearl's Hill Park). How to integrate preservation and conservation into a quickly changing context is a design issue that must be based upon the community context that evolves around them.



Parcelization sequence

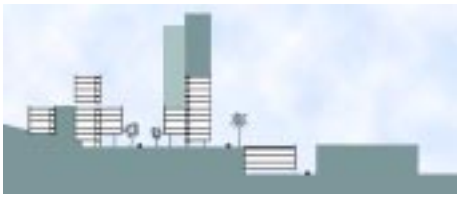
Sidewalks and green space



Parcel use zone plan

Housing structures

Section through parking bank



Private green

Parking

Sidewalks

Public Green

Public Open

Parcel

Parcel ownership plan

- *Preserves, expands and redesigns the existing Pearl's Hill Park*
- *Creates three new distinct residential neighborhoods*
- *Places high-density commercial and residential development in a ring around the perimeter of the park*

Thayer Donham
Jeffrey Shumaker
Sabina Suri

Team D

The team that preserved the hill and redesigned Pearl's Hill Park

Introduction to Proposal

Pearl's Hill occupies a prominent location in the central city of Singapore. It is one of only two hills in the city center and it is adjacent to the Central Business District, the Chinatown Conservation District, the Singapore Medical Center, the Singapore River and New Bridge Road, a major commercial shopping street. At the corner of New Bridge Road and Outram Road two MRT lines intersect and an expanded MRT Station is under construction. In the future, Upper Cross Street will have a light rail line connecting the project site to the proposed new Downtown. A new light rail line will create a strong axis along Upper Cross Street from the new downtown terminating at Pearl's Hill Park and the Courthouse across the street.

North to west Section through Pearl's Hill

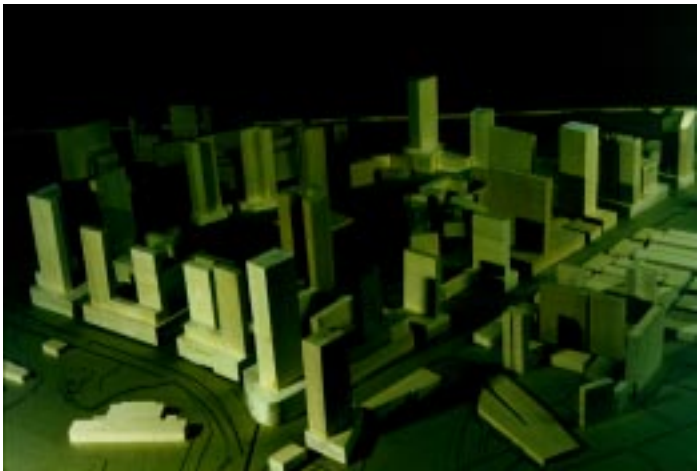
The Pearl's Hill Park is an oasis within the city of Singapore and is one of the few places in the city where one gets the sense of being in a tropical forest. Throughout the park, there are pedestrian paths that meander across the slope of the hill amid dense groves of trees, particularly along the northern slope. Other attractive features include a pond garden and two small exercise areas, randomly placed within the park. Although the park does not have a cohesive design, the dense tree cover and the picturesque reservoir provide a quiet respite from the bustling city of Singapore which is a rare "jewel" and should be preserved.

Pedestrian Access to Park

Intent

Team D's urban design scheme reflects the desire to preserve and enhance Pearl's Hill Park as a resource for the citizens of Singapore. Given the current density of Singapore and the future density expected for the island, it is imperative to the urban life of Singaporeans to have easy access to a large green open space within the city center. Besides maintaining habitat for native wildlife and creating a cool green lung for Singapore, Pearl's Hill Park provides an opportunity for active and passive recreation, a place for children to play and allows for improved pedestrian linkages through the city. Team D felt strongly that to build within the park would violate the unique natural environment of Pearl's Hill, and to allow development to encroach upon the

Site Plan



Model view from south

park would be a substantial loss for the citizens of Singapore.

Team D's urban design scheme is based on the preservation of the park with high-density mixed-use and residential towers along its perimeter. In order to preserve the park and achieve the density required by the URA, proposed development sites have floor area ratios (FAR) of 6.0 or greater. Ideally, the park would be retained and the density requirements eased to a FAR below 6.0 to allow for shorter or fewer towers along the periphery; however, to meet the requirements of the project program, the team pushed the floor area ratios as high as possible without compromising the quality of life within each newly created neighborhood.

This scheme emphasizes the creation of better access to the Pearl's Hill Park from all sides of the study area concentrating on access from Outram Road, New Bridge Road and Upper Cross Street which are important streets within the overall fabric of the city. Team D extended "green fingers" down from the park that reach out to the major streets, thus making the presence of the park more apparent to the public and providing better access to the park itself.

Concept sketch of design proposal

While links to York Hill are important, this team viewed future development on York Hill as independent from their urban design scheme for Pearl's Hill, and, therefore, this project does not include a proposed site plan for York Hill. As part of a future phase of work, Team D envisioned York Hill as a location ripe for high density housing provided that pedestrian linkages to the Singapore River and the Outram Road MRT station are created and maintained. Much of the existing housing on York Hill seems outdated and should be redeveloped in a more cohesive manner similar to that proposed around Pearl's Hill Park, with a stronger focus on creating better pedestrian connections throughout the city.

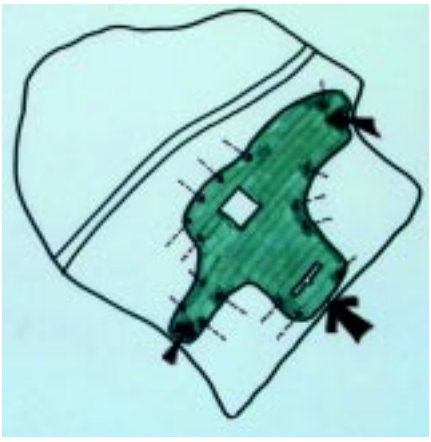
Along the major roads surrounding the site, Team D has placed high-density slab block housing and mixed-use commercial/ residential towers around Pearl's Hill. On an interior ring around the hill, they provided ten story courtyard-housing blocks that have direct pedestrian connections into the park. They have created three distinct residential neighborhoods that can be developed independently. Each neighborhood has a simple road system that connects to the rest of the city.

Team D envisions the CID site as a mixed-use development with a podium design that contains a Science Museum or some other public use. The towers above provide an ideal location for residential units. (For example, in

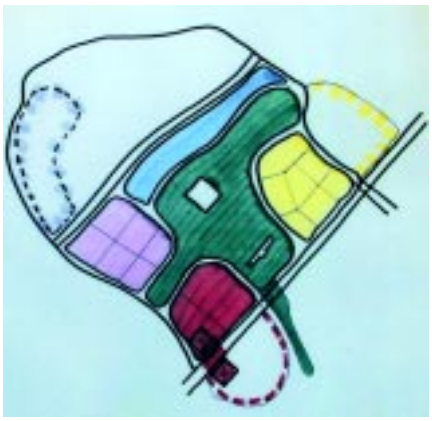
New York City, the Museum of Modern Art has a luxury residential tower above the museum and gift shop.) The public nature of the podium as a museum provides an opportunity for public pedestrian paths through the CID site from New Bridge Road, across a bridge and into the park. By retaining the park in front of the CID Building along New Bridge Road, the hard street edge is softened by the park "finger" extending to the street. Moreover, the CID park provides an easily accessible escape from the intense activities along New Bridge Road.

Proposal

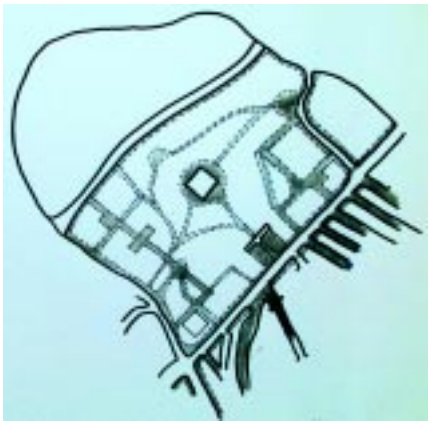
This team's proposal is based on the proposition that Pearl's Hill Park remain undeveloped. The park itself should be redesigned and enhanced with a better system of pedestrian paths, new playgrounds for children, a more distinguished series of garden elements, seating areas for young and old alike and a new observation tower at the top. The reservoir has been transformed into a water feature that would provide an elegant backdrop for evening activities in the park. The castellated walls of the reservoir should remain when, in the future, the reservoir becomes obsolete and is available for redevelopment. The reservoir structure could serve as a base for a restaurant, a swimming pool or some other public recreational activity that would serve as a magnet for area residents.



Pearl's Hill Park access diagram



Parcelization diagram



Pedestrian access diagram

Density and Land Use

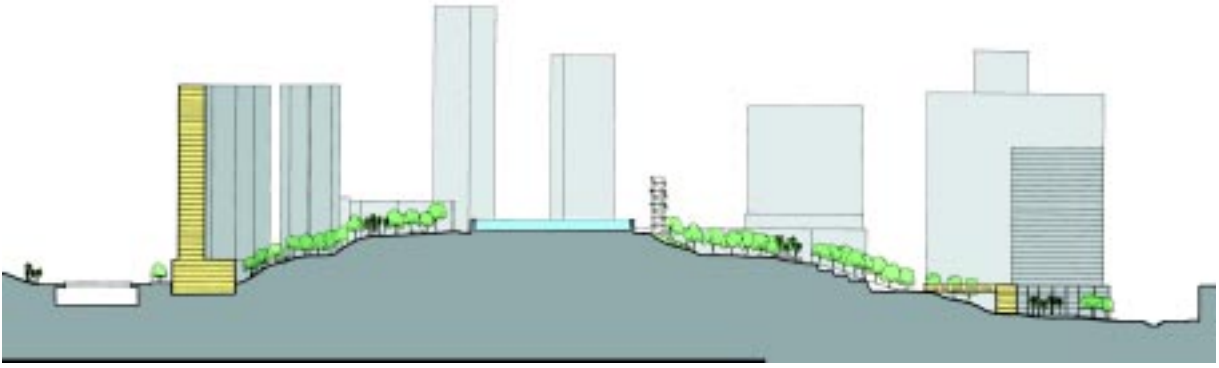
Since Team D was committed to the preservation of the hill and the redesign of Pearl's Hill Park, they did not propose any major development within the park itself. In fact, the team purposely kept the highest density development on the perimeter of the park along the edge of the existing roadways; Outram Road, New Bridge Road, the CTE and Upper Cross Street. They also proposed development on two sites adjacent to the study area that are appropriate for high-density residential development due to their proximity to transit and their availability as underdeveloped sites. One site is located across New Bridge Road from the new MRT station and the other site is located off New Bridge Road on the site of the OG Building.

The highest proposed density occurs around the MRT station at Outram Road. Directly above

the station, the team proposes a podium of commercial space with a large office tower above. Along Outram Road, buildings with commercial podiums are proposed that face the street with residential towers above that are accessed from a new road parallel to Outram Road. The tallest towers have been placed at the corners of site, marking the new and improved Pearl's Hill neighborhood. The towers above the MRT lines that are on either side of New Bridge Road mark the gateway into the neighborhood and establish the intersection as an important urban center within the central city of Singapore.

Implementation

Since the primary theme of this urban design scheme involves preserving the park, the team would first recommend a way to maintain the park. In the United States, there has been the creation of neighborhood groups, like The Friends of the Public Garden in the city of Boston, who raise money and are responsible for the continued maintenance of the park. The creation of such an entity for the redesign and maintenance of the Pearl's Hill Park would ensure that the park continues to be a neighborhood attraction and is



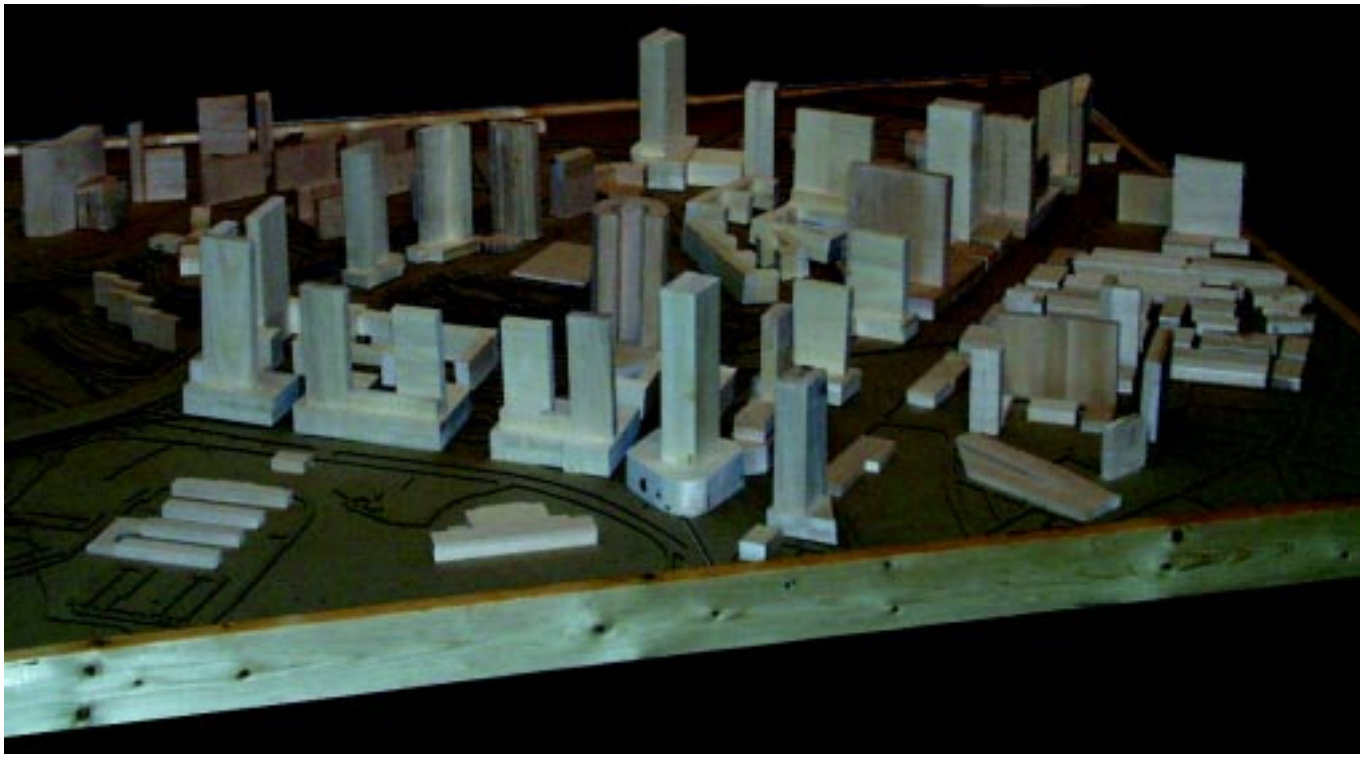
Section through Pearl's Hill

accessible to all the citizens of Singapore.

In terms of development sites, the site above the MRT station is the most critical part of the entire study area and it should be developed first. The MRT site serves as a gateway and a marker for the area and is the place from which most Singaporeans will be entering the area. The Outram Housing site can be parcelized into at least four separate development sites and sold to private developers. The parcels along Outram Road should be developed first and followed by the interior lower density housing.

Next, the CID site is a major part of the urban design for this part of Singapore. While the CID building itself is not architecturally significant, the building has historic significance and could easily be integrated into a design for a museum. The long thin plan of the CID building lends itself to serving as a gallery connecting two more substantial wings flanking the historic building. As a museum, the site would attract both residents and tourists and provide a public amenity for the neighborhood.

The plan for the north side of Pearl's Hill requires the demolition of three architecturally undistinguished buildings: a parking garage and two housing blocks with commercial podiums. Although the housing blocks are not immediately slated for demolition and replacement, the buildings block



Model view from southwest

Initial concept sketch

Pearl's Hill Park edge

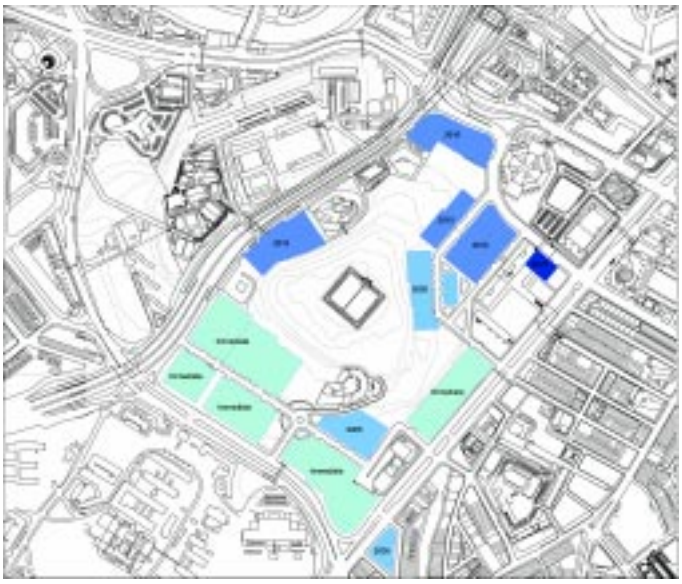
off the major entrance to Pearl's Hill Park. By removing the housing blocks and replacing the housing units on adjacent sites, the city would benefit by a new main entrance to the park fronting Upper Cross Street. Upper Cross Street is the new axis leading from the new downtown to the New Bridge Road/ Chinatown District and the light rail line will terminate in front of our proposed park entrance. The Courthouse across the street also fronts the new park entrance and together the park and the courts would create a public activity center.

The proposal includes two new residential towers on the site of the PH Primary School when the school is deemed to be obsolete. The new residential towers would be of the same typology as Landmark Towers on the adjoining site to the north. Each tower could be developed by a different developer if the URA was inclined to divide the site into two parcels.

Each neighborhood has parcelization that is flexible. The typical development parcel proposed in this scheme is about one hectare. Parcels could be combined to create larger development sites should the URA want to allow developers control over bigger tracts of land.

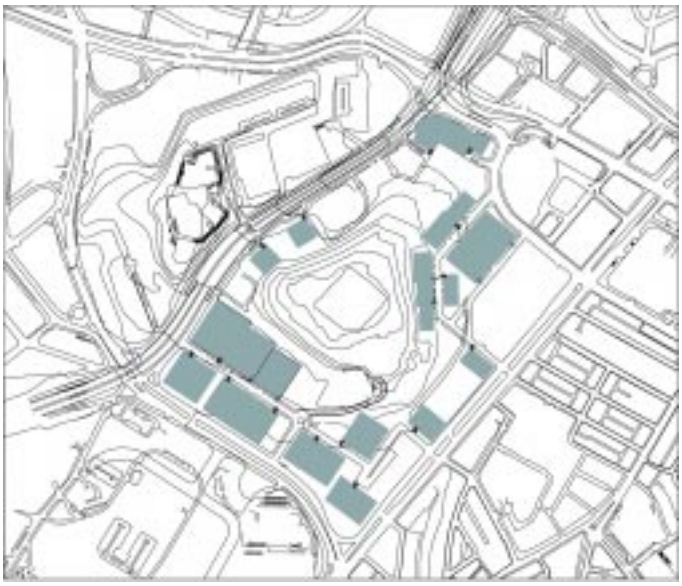
Urban transit and open space diagram

Parcel ownership plan



Parcel phasing plan

Open space plan



Parking structure plan

Road network plan

Junfu Zhu

Team E

An exploration of high density residential development

Working independently from the other four student teams, Junfu Zhu created a design proposal for the Outram Housing site. He divided the site into five parts: four separate courtyard communities and a central park. Each residential court is landscaped with trees and water features which then connect to the central park system forming a continuous chain of gardens at an ascending scale. The courtyards are linked to each other through informal, irregular pedestrian pathways, creating an alternative route throughout the site. The site plan resembles the Chinese character Xi which represents happiness and good fortune. All the buildings are designed with good Feng Shui which Junfu Zhu believes would be an added selling point for the developer.

The buildings that face the central park have two-story colonnades that are five meters in depth. These colonnades echo a traditional Singapore architectural style that provides protection from the tropical sun as well as from the heavy rain during the monsoon season. The residential towers would contain three different apartment types: a luxury tower apartment, a double-story apartment and a large apartment. The tower buildings are spaced apart to allow light and air to flow into the central park. All of the buildings are arranged to minimize western exposure which is undesirable in the hot humid tropical climate of Singapore.

This proposal creates 3000 new housing units with a floor area ratio of 6.0 for the Outram housing site. The open space covers 55% of the site area. Each residential tower contains parking in the base of the building to easily accommodate the residents of the new neighborhood.

Aerial view of proposal from the west

Site plan iteration 1

Site plan iteration 2

Aerial view from the southwest

Site plan iteration 3

Julian Beinart
Eran Ben-Joseph
John de Monchaux



Chapter 5: Reflections on Studio Proposals

While visiting Singapore, working with our students and discussing ideas with the URA staff, we reflected on a number of ideas about the future of Singapore's city core. These ideas are put forth here to provoke discussion and thought about the design of the city. They have not been tested in a rigorous and functional way, but they do emerge for us as clear implications of the work illustrated earlier in this report.

Singapore's goals for its future, its physical setting and climate, and its remarkable resources all suggest that each increment of change in the city's form, however small, should be carried out in a way that enhances the public realm of the city. The desired attributes of these increments of change need to be anticipated and incorporated in urban design plans for every zone of the city core. Singapore has a clear tradition of consistent plan preparation and implementation in the central city. The current cycle of strategic planning provides an excellent opportunity to examine the implications – and we believe desirable implications - of redeveloping the core areas of the city at double the current density.

Team A Urban Connections

Having studied a future for the Pearl's Hill and York Hill sites at a Floor Area Ratio (FAR) of 5, we are confident that such densities can be properly accommodated on these sites. In order for such densities to be applied more widely throughout the city, individual sites need to be studied in terms of their own special characteristics. These individual studies should then be the basis of an overall plan for the intensification of the central area of Singapore. Such an urban design plan is urgently needed in the light of population growth and land limitation in Singapore. We do believe that there will need to be an explicit shift in emphasis towards the needs of pedestrians in such a plan. Such a plan could also seek to build a clearer pattern of major streets and to create connections between the new core areas on the reclaimed land and the existing foci of development such as Pearl's Hill and the Courts district on the east edge of the project site.

Changes in site intensity will have implications for the street system which connects and articulates major sites throughout the city. The streets of

Singapore have the potential for integrating non-contiguous sites, for creating intense public pathways, for impressive landscaping and climate control, and for consolidating and creating an overall image of the center of Singapore as a vibrant community. Too many isolated and introverted places now dominate Singapore's central city pattern. New Bridge Road/Eu Tong Sen Street along the southern edge of our project site, is an instance of a thoroughfare that offers an immediate opportunity for a comprehensive redesign. A new urban design scheme will enhance the pedestrian experience at the same time ensuring that it affords easy access to elements of the public transportation system. The high-density redevelopment along the western edge of the Pearl's Hill and York Hill sites and the attraction of the new MRT interchange at Outram Road will increase pedestrian movement along Outram Road. There will be an opportunity to redesign the street level environment to be engaging and inviting for pedestrians.

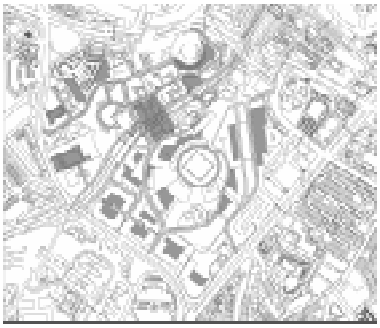
A further implication of the new densities that are proposed for sites in the city center, such as Pearl's Hill and York Hill, is that the road and service vehicle access system will need to be carefully considered. It was clear from the student proposals that residential development at high density calls for a carefully detailed local access system that will allow passenger vehicle access to residential buildings, service vehicle access to loading areas, and safe pedestrian paths within the same right of way as the vehicle traffic. These street designs will need a new emphasis on the priority of pedestrian comfort, convenience and safety if higher densities are to be adopted. The rights-of-way will have to be carefully designed so as not to squander space by incorporating unnecessary right-of-way and lane width, or excessive building setbacks.

Team B pedestrian park

At densities such as those projected in this study, the amount of space devoted to automobiles on the site, especially with the presence of severe slopes, needs careful attention. When one parking space is required per dwelling unit, a large volume of adjacent parking is necessary for a residential tower. Required on-site parking uses a substantial portion of any development site. If, in addition to the provision of a major park to serve city residents, local open space is to be provided for site residents, then on-site parking has to be primarily underground. This, in turn, significantly raises the cost of the development particularly since land prices in Singapore have risen to a point where land purchasing expenses compose about two-thirds of the development's total cost.

Since Singapore is moving to an 80/20 modal split and cars are mainly used for social trips, the possibility of warehousing parking was investigated by a few of the student teams. In some instances, parking structures located at the periphery of the site or within commercial buildings allows the removal of parking from residential parcels. These parking sites were either within a comfortable walking distance, or were serviced by a shuttle system. In other instances, the parking structures themselves were designed to minimize space. Since cars are accessed infrequently, space saving devices such as stacked parking can be utilized. By concentrating parking and warehousing at least part of the required parking spaces, many of the difficulties associated with the high residential density and the steep topography of the site will be mitigated.

Team C parking configuration



The students' work illustrated a number of options for taking advantage of the 'air-rights' over streets and expressways passing through or adja-

cent to the site. There are at least two good reasons to investigate air-rights development on this site and more widely throughout the city core where topography and the cross-section of adjoining development may readily accommodate it. The first reason is the opportunity to recover usable land at the same time as providing for vehicle access on major roads. The proposed density of a FAR of 5 to 6 for sites in the central city begins to allow for financially viable air-rights development. The second reason is to make the pedestrian setting more attractive by removing the noise and visual impact of high volumes of traffic. Given Singapore's need to use its land more intensively, building housing or other types of development over roadways will better utilize the scarce land resource.

Team D hilltop access

Pearl's Hill is not readily seen and revealed as a special resource or natural feature within the city's landscape. Over the long term, every effort should be made to encourage unrestricted public access to the top of Pearl's Hill, perhaps adding a tower structure that would allow for both its identification from elsewhere in the city and its use as a public viewing point. The site's severe topography and the proposed high-density buildout will leave little of the original land and native vegetative cover. Thus, the reshaping of the new landscape should be seen as an opportunity to create a new vocabulary of integration between open, semi-open and built spaces. The landscape can be seen as a respite from the bustle of the surrounding streets and intense commercial development by providing internal, semi-secluded gardens in some areas and in other areas providing opportunities to traverse the site to get to other parts of the city such as the river.

The benefits of extensive landscaping on the site can not be overlooked. The careful structuring of vegetation and open spaces can support the functioning of natural systems. A combination of connected 'patches' and 'corridors' throughout the city provides habitat for wildlife, enhances bio-mass flow, and allows better control of storm-water runoff.

Beyond the environmental, recreational, and aesthetic benefits of an extensive landscape design, plant material and landscape features should be seen as the binding theme between the different land uses on the Pearl's Hill / York Hill site. The severe topography provides a unique opportunity to incorporate easily accessible roof gardens and terraces, which in turn creates a dynamic relationship between private, semi-private and private open spaces. Creating connections between these different spaces through stairs, ramps, and landings increases the utility of the site while maintaining the memory of the original hill. Better connectivity also creates a zone where public and semi-private realms overlap, creating defined physical edges, yet allowing visual continuity between spaces.

As Singapore continues to intensify the use of its downtown core both by rebuilding on key sites such as Pearl's Hill and by expanding onto newly reclaimed lands at its southern edge, the government has the opportunity to create one of the world's most engaging and successful new city centers. To meet this challenge, Singapore must subject every part of the core area to new design efforts that will take into account these aspirations and will bring a fresh appraisal – and reconsideration – of previous expectations about the form to be given to buildings, landscaping and circulation paths. We feel privileged to have had the chance to be part of Singapore's planning process and look forward with interest to the outcome of the next round of thinking about city design and development in Singapore.

Acknowledgments

Urban Redevelopment Authority- Singapore
Dr. Tan Kim Siew, Chief Executive Officer and Chief Planner
Mrs. Koh Wen Gin, Deputy Chief Planner (Development Strategies)
Mrs. Cheong Koon Hean, Director, Conservation and Urban Design
Andrew David Fassum, Head, Urban Planning
Looi Miin Chiat, Executive Architect

Housing Development Board-Singapore
Patrick Lee, Executive Architect

Massachusetts Institute of Technology
William Mitchell, Dean
Stanford Anderson, Head, Department of Architecture
Bishwapriya Sanyal, Head, Department of Urban Studies and Planning

Studio Faculty
Julian Beinart, Professor of Architecture
Eran Ben-Joseph, Assistant Professor of Landscape Architecture and Planning
John de Monchaux, Professor of Architecture and Planning

Teaching Assistants
Robert Cowherd
Brent Ryan

Students
Mark Bailey
Robert Brown
Marianne de Klerk
Thayer Donham
La Tonya Green
Timothy Jones
Yong Joo Kim
Meegan Massagli
Kiran Mathema
Sunitha Raju
Francisca Rojas
Jeffrey Shumaker
Sabina Suri
Jeff Tsui
Junfu Zhu

Studio Critics
Michael Dennis
Shun Kanda
Ann Pendleton-Jullian
J. Mark Schuster
Antonio Di Mambro

Other Colleagues at MIT
Rolf Engler
Launa Johnson
Duncan Kincaid
Phil Thompson

Publication Team
John de Monchaux
Robert Brown
Thayer Donham

MIT

URBAN REDEVELOPMENT AUTHORITY

covered environment at grade that is a public/private semi-enclosed space. In commercial buildings, this base condition becomes an enclosed podium that is air-conditioned and yet still functions as an indoor/outdoor public space. In residential towers, the raised first floor creates a progression of space from public to private that offers protection from the climate and allows social interaction within the covered common space for building residents.

Manufactured Nature

The land upon which these building typologies sit is another condition unique to Singapore. The limited amount of vacant land on the island and the projected population creates a situation where every inch of Singapore eventually becomes a candidate for redevelopment and "nature" can be placed in the most opportune location. As such, the natural environment is manufactured in the location where nature is planned to be and overall planning goals supercede the goal of environmental preservation. This approach toward the natural environment presented an opportunity for student teams to disaggregate the large Pearl's Hill Park and re-distribute the park area around the housing blocks on the Pearl's Hill and York Hill sites.

Transportation

Weaving throughout the island of Singapore is an extensive transportation network. From high-speed regional trains to local connector bus lines, Singapore's mass transit system operates as a model of efficiency to the rest of the world. Contrasted with the extensive mass transit system is the automobile with its pollution, space requirements, and costs. Although Singapore has one of the most restrictive automobile ownership policies in the world, automobile ownership is prevalent. Due to peak pricing strategies, automobiles are mostly used for leisure activities rather than for commuting to work; therefore, parking areas become automobile storage and can be less directly linked to the building function. Some of the student groups used the concept of automobile storage to design parking banks on the site which allow for aggregate parking with public open space on top of the garage.

In conjunction with the mass transit system, Singapore has an extensive pedestrian network; however, the hot humid tropical climate of Singapore discourages pedestrians from walking extended distances and promotes a need for protection from the sun and rain. The Pearl's Hill site offered an additional challenge to pedestrians since the hill has extremely steep slopes that discourage pedestrian activity. The student teams developed alternative pathways and approaches to the topography to increase access to the MRT and to provide clear pedestrian pathways connecting throughout the city of Singapore.

Conclusion

Given the fact that each student team had the same issues to consider, the individual team proposals have many similarities and yet are unique. Team A organized their scheme around a lower level linear park, Team B created a strong link from the Outram MRT interchange to the Singapore River, Team C developed a design tool to be applied across the site, and Team D preserved the hill as a park and concentrated new development at the base of the hill.