

# Speeding Up Construction



## 发展及建筑处的主要职能

## Key Functions of the Development and Construction Division

- 推行和监察房屋建设计划
  - 制定和检讨有关公营房屋土地供应、发展、规划、设计和建设的策略与政策
  - 制定、推行和探讨机构采购、安全和环境管理策略
  - 就全港／区域／地区规划研究及规划标准与准则提供意见
  - 监察房屋资讯系统
- Implementing and monitoring the Housing Construction Programme
  - Formulating and reviewing strategies and policies with regard to public housing land supply, and the development, planning, design and construction of public housing
  - Formulating, implementing and reviewing corporate procurement, safety and environmental management strategies
  - Contributing to territorial/district/local planning studies and planning standards and guidelines
  - Monitoring the Housing Information System

「拥抱创科和环保措施，为居民构建可持续、优质和健康的居住环境。」  
“To embrace innovation, technology and green initiatives with a view to building sustainable, high quality and healthy living environment for our residents”

善用创科 提速建屋

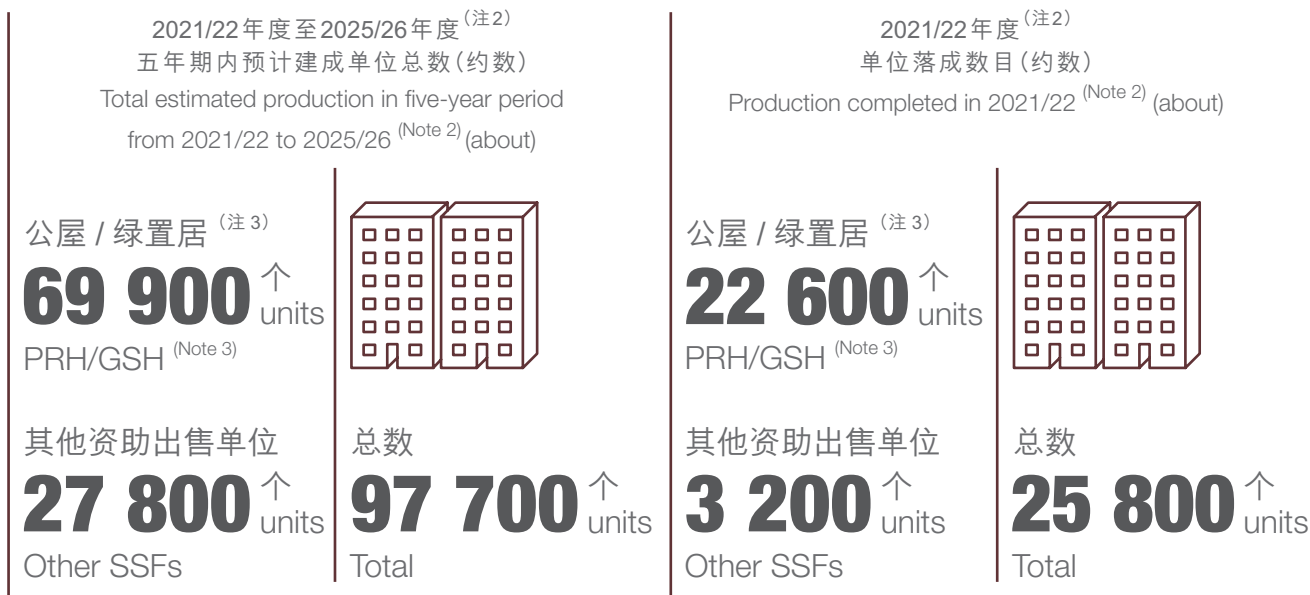
Faster Public Housing Construction with Innovative Technology

加  
快  
建  
设



公共租住房屋(公屋)/绿表置居计划(绿置居)和其他资助出售单位的建屋量<sup>(注1)</sup>

Production of Public Rental Housing / Green Form Subsidised Home Ownership Scheme (PRH/GSH) and other subsidised sale flats (SSFs)<sup>(Note 1)</sup>



注 Notes :

1 数字乃根据2022年3月房委会的预测及计至最近的百位整数。由于进位原因,数字相加结果可能不等于所列总数。数字会因应房屋建设计划而修订。

Figures are based on the forecasts as at March 2022. Figures are rounded to the nearest hundred and may not add up to the total due to rounding. Figures are subject to changes of the programme.

2 财政年度由每年的4月1日起至翌年的3月31日止。 The financial year starts on 1 April of a year and ends on 31 March of the following year.

3 数字指房委会预计于每个财政年度中落成的新单位数目。除新建单位外,从现有屋邨回收的单位,亦是编配予公屋申请者的主要单位来源。

Figures refer to the estimated number of new units to be completed by the HA in each financial year. In addition to new units, units recovered from existing estates are also a major source of units for allocation to PRH applicants.

零售设施、私家车与货车泊车位

Retail facilities, private car and lorry parking spaces



2021/22年度完成的公屋/绿置居发展项目(按时序排列):  
PRH/GSH projects completed in 2021/22 (in chronological order):

|   |   |   |
|---|---|---|
| 颂雅路东 Chung Nga Road East  | 富蝶邨(斑蝶楼) Fu Tip Estate (Ban Tip House)  | 1 |
| 钻石山第一期<br>Diamond Hill Phase 1                                  | 启钻苑(启宏阁、启隽阁)<br>Kai Chuen Court (Kai Wang House, Kai Chun House)  | 2 |
| 白田第十一期<br>Pak Tin Phase 11                                      | 白田邨(朗田楼、清田楼)<br>Pak Tin Estate (Long Tin House, Ching Tin House)  | 3 |
| 皇后山第一期<br>Queen's Hill Phase 1                                  | 皇后山邨(皇颐楼、皇汇楼、皇乐楼)<br>Queens Hill Estate (Wong Yi House, Wong Wui House, Wong Lok House)                       | 4 |
| 近荔景山路 Near Lai King Hill Road                                   | 荔景邨(恒景楼) Lai King Estate (Heng King House)  | 4 |
| 西北九龙填海区第6号地盘第三期<br>Northwest Kowloon Reclamation Site 6 Phase 3 | 海达邨(海盛楼)<br>Hoi Tat Estate (Hoi Shing House)  | 5 |
| 皇后山第五期 Queen's Hill Phase 5                                     | 皇后山邨(皇盛楼) Queens Hill Estate (Wong Sheng House)   |   |
| 皇后山第二期 Queen's Hill Phase 2                                     | 皇后山邨(皇顺楼) Queens Hill Estate (Wong Shun House)  |   |
| 皇后山第一期<br>Queen's Hill Phase 1                                  | 皇后山邨(皇溢楼、皇澄楼)<br>Queens Hill Estate (Wong Yet House, Wong Ching House)  |   |
| 柴湾道 Chai Wan Road   | 蝶翠苑 Dip Tsui Court  |   |
| 屯门第54区第1及1A号地盘<br>Tuen Mun Area 54 Sites 1 & 1A                 | 和田邨(和喜楼、和善楼、和彩楼、和丽楼)<br>Wo Tin Estate (Wo Hei House, Wo Sin House, Wo Choi House, Wo Lai House)               |   |
| 屯门第54区第3及4号(东)地盘<br>Tuen Mun Area 54 Sites 3 & 4 (East)         | 菁田邨(菁心楼、菁乐楼、菁喜楼、菁善楼)<br>Ching Tin Estate (Ching Sum House, Ching Lok House, Ching Hay House, Ching Sin House) | 6 |

2021/22年度完成的其他资助出售单位发展项目:  
Other SSFs project completed in 2021/22:

|                             |  |   |
|-----------------------------|--|---|
| 皇后山第三期 Queen's Hill Phase 3 | 山丽苑(松山阁、榕山阁、杏山阁、梨山阁、榿山阁、桥山阁)<br>Shan Lai Court (Chung Shan House, Yung Shan House, Hang Shan House, Lei Shan House, Ying Shan House, Kiu Shan House) | 7 |
|-----------------------------|--|---|



5



6



7

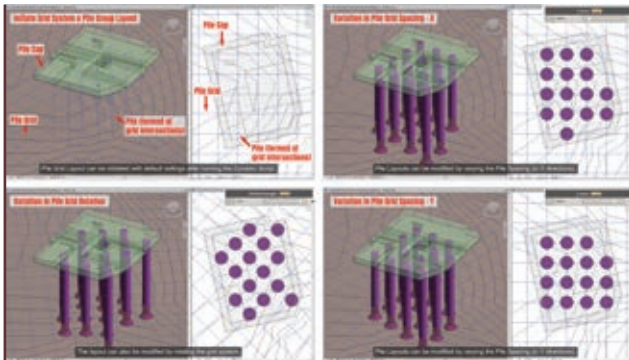


用创新科技是加快设计和建屋程序的一个重要方法。近年，我们积极探索和应用各种创新科技，以提升设计与建造工作的速度、效率和精准度。

### 采用衍生式设计以提升效率

在规划、设计和建造阶段，我们把衍生式设计技术与建筑信息模拟技术结合使用。此举证实对提升工作效率十分奏效，例子之一是为大厦地基自动制作桩柱布局图则，以便工程师从多款经优化的桩柱布局图则中选择。这个做法对我们为地基设计作最后定稿时，在质素保证和效率提升方面确实是向前跨进了一大步。

园境师在设计和建造阶段也运用衍生式设计技术。举例来说，他们依据预定的规则，以达到最合适重量、刚度和最合乎成本效益为目的，利用衍生式设计技术为发展项目自动制作设计独特的蝴蝶式指示牌。在同一个发展项目中，又在建造阶段利用衍生式设计技术自动制作多种铺砖布局选项，以期把需要切割的砖块数目减至最少，并减省人手和减少浪费物料。



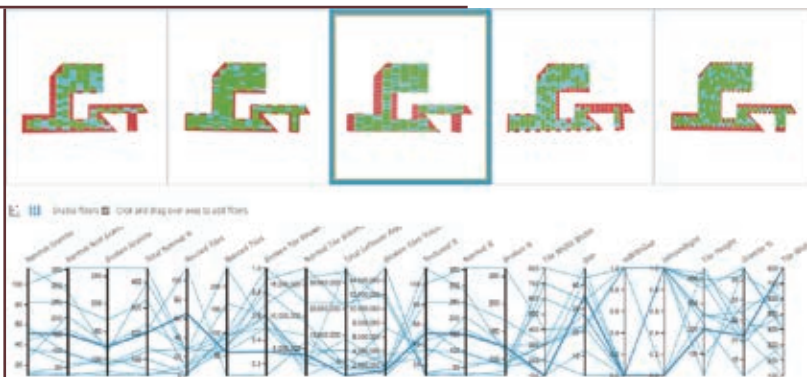
衍生式设计技术为桩柱地基的布局自动制作多个方案  
GD technology can automatically generate pile-supported foundation layout options

New and innovative technology is an important way to speed up the processes of design and construction. In recent years, we have actively explored and applied a range of innovative technology to enhance the speed, efficiency and accuracy of design and construction work.

### Generative Design (GD) enhancing efficiencies

Integrating GD with Building Information Modelling (BIM) at the planning, design and construction stages has proved to be very effective in enhancing our work efficiency. An example is the automatic generation of pile-supported foundation layout plans. This allows our engineers to choose from multiple options of optimised pile layout plans. This is a big step forward in terms of guaranteeing the quality and efficiency of our final foundation designs.

GD is also being used by our landscape architects at the design and construction stages. In one project, for example, special butterfly-themed signage design was automatically generated by GD based on a set of pre-defined rules which aimed at achieving optimum weight, rigidity and cost efficiency. In the same project, GD was also used at the construction stage to automatically generate tile paving layout options, minimising the number of tiles needing cutting, and reducing labour resources and wastage of materials.



利用衍生式设计技术制作铺砖布局，减少需要切割砖块的数量  
Using GD to generate a paving layout to minimise the number of cut tiles

## 发展及建筑工地流动系统

我们驻工地人员和承建商利用「发展及建筑工地流动系统」以加强管理工地的活动，例如建筑工程、屋宇装备工程、结构工程，以及进行最后逐户验收的检查。现时，该流动系统备有11个不同的应用程序处理上述不同工作。



2021年，我们在该系统内新增「地基工程检查应用程序」，以便人员利用流动电话协助检查三种最常用的桩柱。其后，我们推出「参考文件应用程序」，让驻工地人员利用流动电话下载所需文件，以便进行日常的督导工作。

我们现正开发该系统第四阶段的「物料测试申请应用程序」，以支援驻工地人员与承建商提交物料测试要求；房委会直接聘用的检测承办商收集样本；以及署方辖下的材料试验管理小组检索和贮存物料检查工作的数据与测试结果。过去一年，相关工作进展良好，我们的目标是在2022年推出该应用程序。我们也正研究能否扩大该系统的应用范围，例如与房委会其他资讯科技系统和承建商的资讯科技系统整合，以及利用这系统为工程项目制作建筑信息模型。

## 利用小型无人机检查建筑物

我们在2020年首次试用小型无人机检查两个公营房屋项目（锦晖苑和渔进楼）的建筑物外墙。其后，我们使用和计划使用小型无人机，检查另外四个公营房屋项目（海达邨、蝶翠苑、和田邨、青富苑）的楼宇外墙。



无人机在海达邨检测外墙  
SUAs camera inspects  
external wall in Hoi Tat Estate

## Development and Construction Site Mobile System (DCSMS)

DCSMS is a system used by our site staff and contractors to enhance the management of on-site activities such as architectural works inspections, building services works inspections, structural works inspections, and final flats inspections. DCSMS currently bundles 11 different apps to perform these different functions.

In 2021, we added the Foundation Works Inspection App to DCSMS, allowing for inspections of the three most commonly-used pile types using a mobile phone. Subsequently, we launched the Reference Document App, which facilitates routine supervision work by enabling site staff to download essential documents with their mobile phones.

The latest DCSMS app being developed is Phase 4 of the Materials Testing Request App which supports on-site requests for materials testing by site staff and contractors, sample collection by our Direct Testing contractors, and the retrieval and storage of materials inspection data and test results by our Materials Testing Management Unit. With good progress having been made during the past year, we aim to launch the app in 2022. We are also looking at extending the scope of DCSMS, for instance, by integrating it with other HA and contractor IT systems, and utilising it for project BIM models.

## Small Unmanned Aircraft (SUAs) for building inspections

We first used SUAs in 2020 for inspecting the exterior surface of buildings in two public housing projects (i.e. Kam Fai Court and Yue Chun House) on a pilot basis. Since then, we have used and scheduled to use SUAs to inspect the external walls of four further public housing projects (i.e. Hoi Tat Estate, Dip Tsui Court, Wo Tin Estate, Ching Fu Court).

我们利用小型无人机的摄影机拍摄建筑物外墙的高解像度数码影像，然后透过摄影制图法和数据模型处理这些影像，制作立体实景网格模型，以便利用人工智能技术轻易找出裂纹和其他建筑瑕疵的位置。相比传统的检查方法，利用小型无人机进行检查证实更精准、安全、快捷和有效，大大缩减检查和处理数据的时间。此外，这些航摄影像更可与建筑信息模型结合，有助我们把检查报告制作成可视化立体网格模型，让验楼督察和承建商在充分掌握资讯的情况下更易作出决定，纠正欠妥情况。

### 更广泛应用「组装合成」建筑法

房委会正致力采用「组装合成」建筑法和利用创新建筑科技，以加快建造公营房屋。在建造过程中使用预制组件是「组装合成」建筑法的重要一环。现时，在一些房委会公营房屋项目使用预制组件的比率约为九成，能够在六个工作日内建成一个有20多个公营房屋单位的标准楼层。在发展项目中采用「组装合成」建筑法，我们得考虑多个因素，例如区内运输网络、工地的限制，以及附近有否地方可供储存组件。依据上述因素，房委会先后在东涌、观塘德田街和安达臣道石矿场等用地的公营房屋项目中选出数幢大厦，以「组装合成」建筑法建造约2 000个单位。我们又另外物色了一些适合采用「组装合成」建筑法的项目，而这些项目大多位于新发展区（例如东涌、北部都会新发展区）。根据初步估算，这些采用「组装合成」建筑法的用地可提供约20 000个新单位。



「组装合成」建筑法

With SUA's camera, we capture high-resolution digital images of the building envelope, which can then be processed by photogrammetry and data modelling to produce a 3D reality mesh model that enables cracks and other defects to be easily located and identified with support of artificial intelligence technology. Compared with traditional inspection methods, SUA inspections are more accurate, safe, efficient and productive, and greatly reduce inspection and data processing time. In addition, these aerial images can be integrated into BIM model. This allows inspection reports to be generated as visualised 3D mesh models, making it easier for building inspectors and contractors to make informed decisions about defect management.

### Wider application of Modular Integrated Construction (MiC)

The HA has been making efforts to adopt MiC and utilise innovative construction technology to speed up the construction of public housing. The use of precast components in construction is an important part of MiC. Currently, the HA's precast rate in some public housing projects stands at around 90%, enabling a typical floor with over 20 units to be constructed in six working days. Adopting MiC for projects require us to take into account factors such as the local transportation network, site constraints, and the availability of storage areas nearby. On this basis, the HA has adopted MiC for a few blocks under the public housing projects in Tung Chung, Kwun Tong Tak Tin Street and Anderson Road Quarry Sites, involving a total of about 2 000 units. We have also identified some other projects suitable for MiC, mostly in new development areas such as Tung Chung and the Northern Metropolitan New Development Area. Our preliminary estimate is that around 20 000 new units can be provided at these sites using MiC.



采用「组装合成」建筑法的项目—安达臣道石矿场R2-6及R2-7(左)和东涌第99区  
MiC used in the public housing projects in Anderson Road Quarry Sites R2-6 and R2-7 (left) and Tung Chung Area 99

为使「组装合成」建筑法在公营房屋发展项目更广泛应用，我们拟订工程规格、确保运输网络充足，以及稳定上游供应链。为达致这个目标，我们在2022年1月举办业界参与工作坊，讨论未来如何应用「组装合成」建筑法，逾百名业内人士（包括商会成员、承建商），以及房委会委员和发展局代表出席。

## 「设计及建造」采购模式

我们一直探讨不同方法，以期在2022/23至2031/32年度的十年期内，提供约330 000个公营房屋单位。在众多可行方案中，「设计及建造」采购模式可提升工程项目进度。承建商可运用其专业知识包办设计和建造的工作，让我们可以重新调配资源，应付新发展项目作施工前的规划工作。

该采购模式要求承建商按照指定的规格进行设计，然后就发展项目的设计与建造两部分提交标书。承建商在单一合约内包办设计和建造的工作，从而或会取得多项好处，包括缩减动员时间、资源调配更为得宜、物料采购更具弹性，以及建造工作的流程更为顺畅。

为促使承建商进一步提高生产力，房委会为「设计及建造」标书引入新的评审项目，鼓励承建商在标书中提出广泛采用「组装合成」建筑法、「机电装备合成法」及其他崭新科技，从而提高生产力，并在可行的情况下缩短施工期。

房委会辖下首个采用「设计及建造」采购模式的发展项目是古洞北第19区第二期，共建约4 330个单位，并于2022年6月招标。第二个采用「设计及建造」采购模式的发展项目位于屯门第54区第4A(南)号地盘和第5号地盘，共建约2 350个单位，预计于2022年12月招标。

To apply MiC more widely in our public housing developments, we draw up works specifications, ensure the transportation network is adequate, and secure a stable upstream supply chain. As a first step, we conducted an engagement workshop in January 2022 on the future application of MiC. Over 100 industry participants (including trade associations and contractors), as well as HA Members and representatives from the Development Bureau attended the workshop.

## Design-and-Build (D&B) procurement model

We have been exploring ways to cope with the public housing supply of around 330 000 units for the 10-year period from 2022/23 to 2031/32. Amongst various feasible options, the D&B procurement model can enhance project delivery. This model requires contractors to be responsible for both design and construction work, hence enabling the HA to redirect its resources to pre-construction planning for new projects.

The D&B model requires contractors to develop a design in accordance with a set of specified requirements, and submit a tender for both the design and construction elements of the project. With the contractor bundling design and construction into a single contract, various benefits are likely to follow. These include a reduction in mobilisation time, enhanced coordination of resources, greater flexibility in the procurement of materials, and improved construction workflows.

To encourage contractors to further enhance their productivity, the HA also introduced new tender assessment items for D&B tenders. These will encourage tenderers to submit proposals that involve the wider use of MiC, Multi-trade Integrated Mechanical, Electrical and Plumbing, and other innovations and technologies that boost productivity and where possible, shortening the construction period.

The HA's first D&B project is at Kwu Tung North Area 19 Phase 2, involving around 4 330 flats, and the tender for this project was invited in June 2022. The second D&B project is at Tuen Mun Area 54 Site 4A (South) and Site 5 with about 2 350 flats, and the tender is scheduled to be invited in December 2022.