



KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI



Construction Survey

Civil Engineering Department

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Construction Survey

Volume 1



Construction Survey
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SYNOPSIS

This e-book is written to help students understand about basic of construction survey.

Hopefully, students will know about the definition, element about construction survey and can differentiate step in urban development flow also know about role of construction team.



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Construction surveying.

(known as "staking", "stake-out", "lay-out" or "setting-out"):

- is to stake out reference points and markers that will guide the construction of new structures such as roads or buildings.
- These markers are usually staked out according to a suitable coordinate system selected for the project.

Wikipedia

It is carried out to layout engineering and construction works.

Measurements are done for reference points which determine the location of the planned structure or improvements, vertical and horizontal positioning, dimensions, configuration, and to control the elevation of the new structures.



1

Survey existing conditions of the future work site, including topography, existing buildings and infrastructure, and underground infrastructure whenever possible (for example, measuring invert elevations and diameters of sewers at manholes).

2

Stake out lot corners, stake limit of work and stake location of construction trailer (clear of all excavation and construction).

3

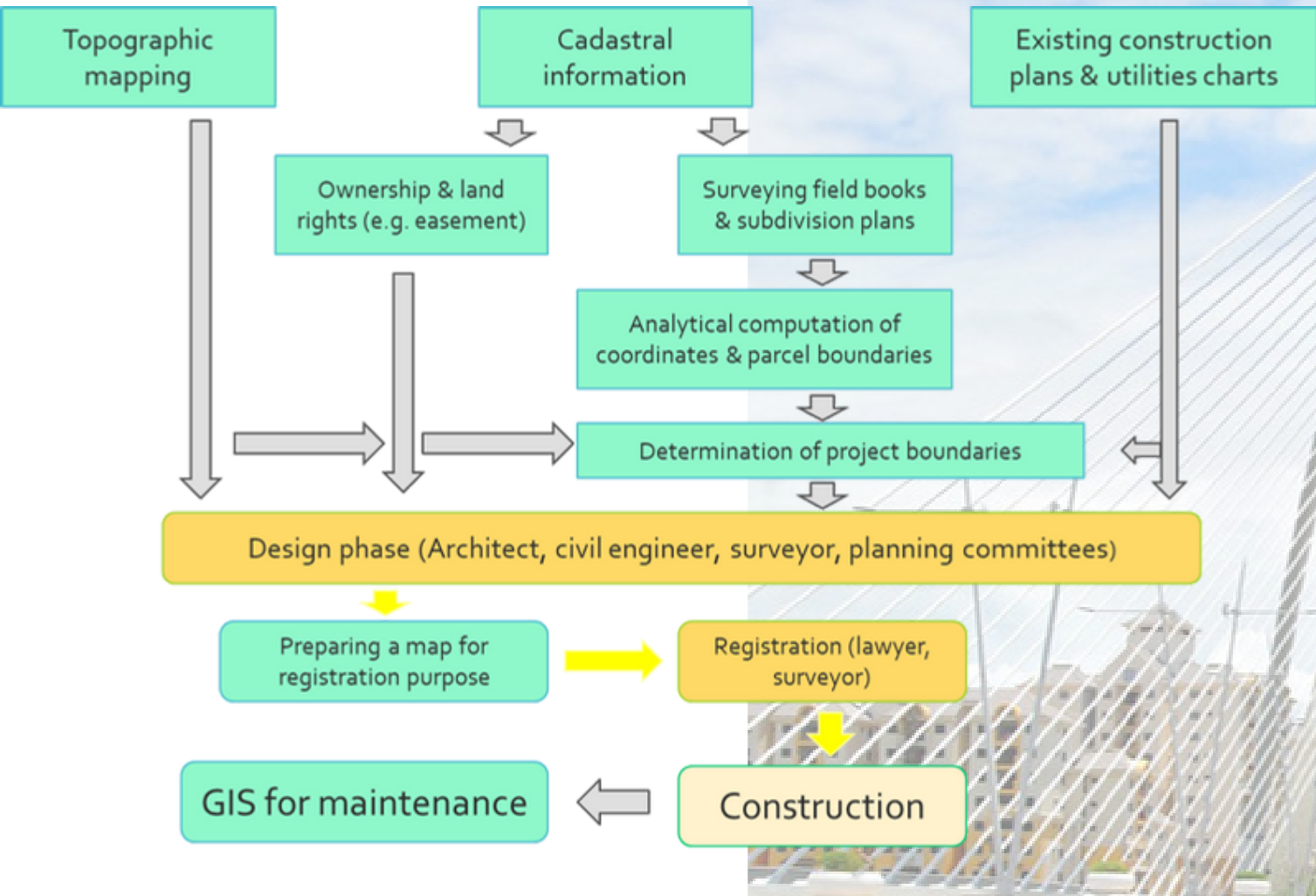
Stake out reference points and markers that will guide the construction of new structures



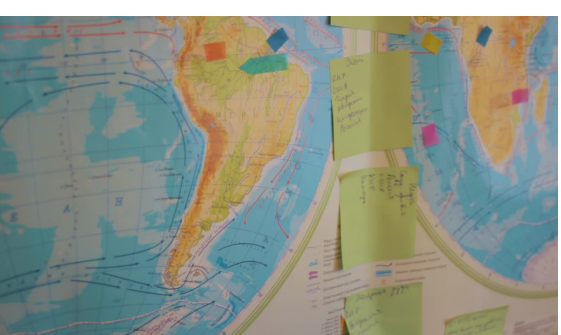
- 4 Verify the location of structures during construction
- 5 Provide horizontal control on multiple floors
- 6 Conduct an As-Built survey: a survey conducted at the end of the construction project to verify that the work authorized was completed to the specifications set on plans



DIFFERENT STEP IN URBAN DEVELOPMENT WORKFLOW



WHICH COLOUR RELATED TO SURVEYOR JOB SCOPE?





TOPOGRAPHIC MAPPING?



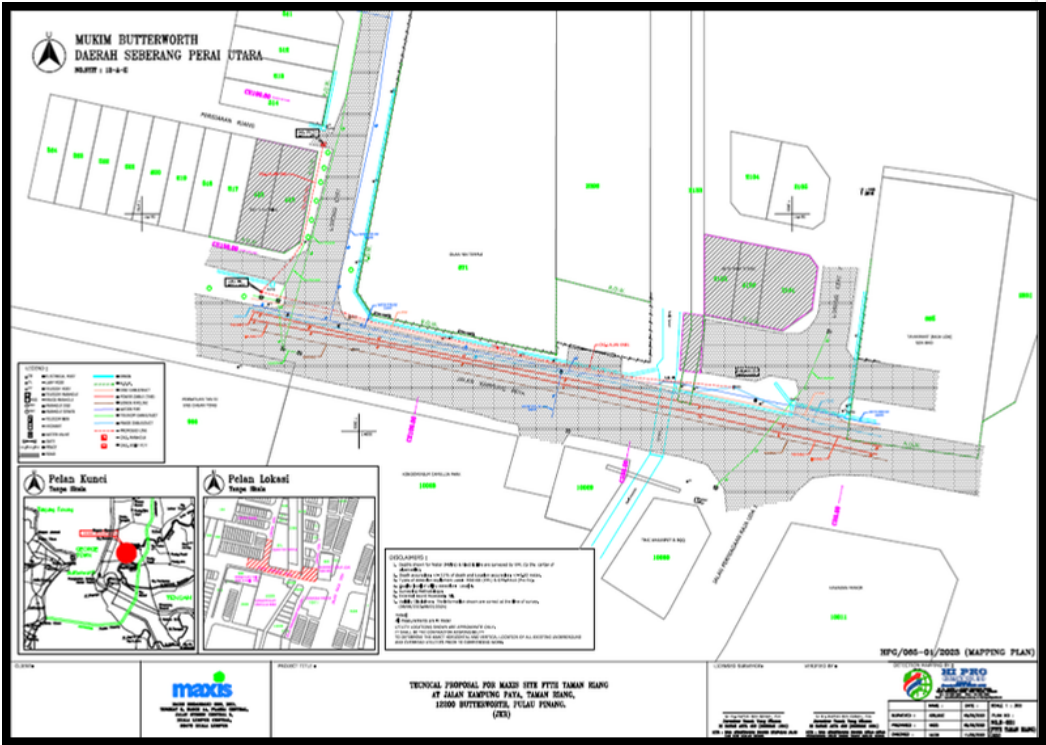
Topographical plans and maps are drawings which show the main physical features on the ground, such as buildings, fences, roads, rivers, lakes and forests, as well as the changes in elevation between land forms such as valleys and hills (called vertical relief). You base these plans and maps on the information you collect from topographical surveys.



Plans are usually large-scale drawings; maps are usually small-scale drawings. Depending on the scale you use to make the drawing.

DIFFERENT STEP IN URBAN DEVELOPMENT WORKFLOW

UTILITY PLAN



Underground utility mapping is a process of measurement and detection work to obtain utility installation data from the aspect of position, depth, type, and size of utility installation found/planted underground.



PROJECT TITLE :

TECHNICAL PROPOSAL FOR M
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UTILITY PLAN



JUPEM in collaboration with the Ministry of Housing and Local Government on 24 December 2014 issued Circular Number 7 of 2014 which is about 'Guidelines for the Implementation of Measurements on Underground Utility Lines During Installation' to all Local Authorities and State Authorities.














This circular requires that:

- (i) All new underground utilities installed through open drilling or directional drilling (horizontal directional drilling; HDD) must be measured by JTB during installation; and
- (ii) the requirements in (i) above are made one of the approval conditions in the application for planning permission. *(Kebenaran Merancang)*

1. THE DRAWING IS TO BE SUBMITTED TO THE LOCAL AUTHORITY FOR APPROVAL AND TO BE USED FOR THE PURPOSE OF THE PROJECT. THE DRAWING IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN PERMISSION OF THE LOCAL AUTHORITY.

2. THE DRAWING IS TO BE USED FOR THE PURPOSE OF THE PROJECT ONLY. IT IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN PERMISSION OF THE LOCAL AUTHORITY.

3. THE DRAWING IS TO BE USED FOR THE PURPOSE OF THE PROJECT ONLY. IT IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN PERMISSION OF THE LOCAL AUTHORITY.

| LEGEND : | |
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ROLE OF CONSTRUCTION TEAM



DEVELOPER



- 1 **Project owners or both the owner and contractor of a development project.**
- 2 **usually considered to be a person who develops land through construction and who, to this end, becomes an owner of the developed land.**
- 3 **seeks a profit from development of the land, either by selling a development, such as a tract of residential homes, a shopping mall, or an office building, or by holding the developed property to reap a return on the investment.**
- 4 **The developer as owner has the responsibility to provide access to the site and pay the contractor according to the agreement and conditions of the contract.**
- 5 **Developers can operate in many different economic arrangements. Some developers form construction companies to do their own work, and to pick up any other work they can obtain at a good price**



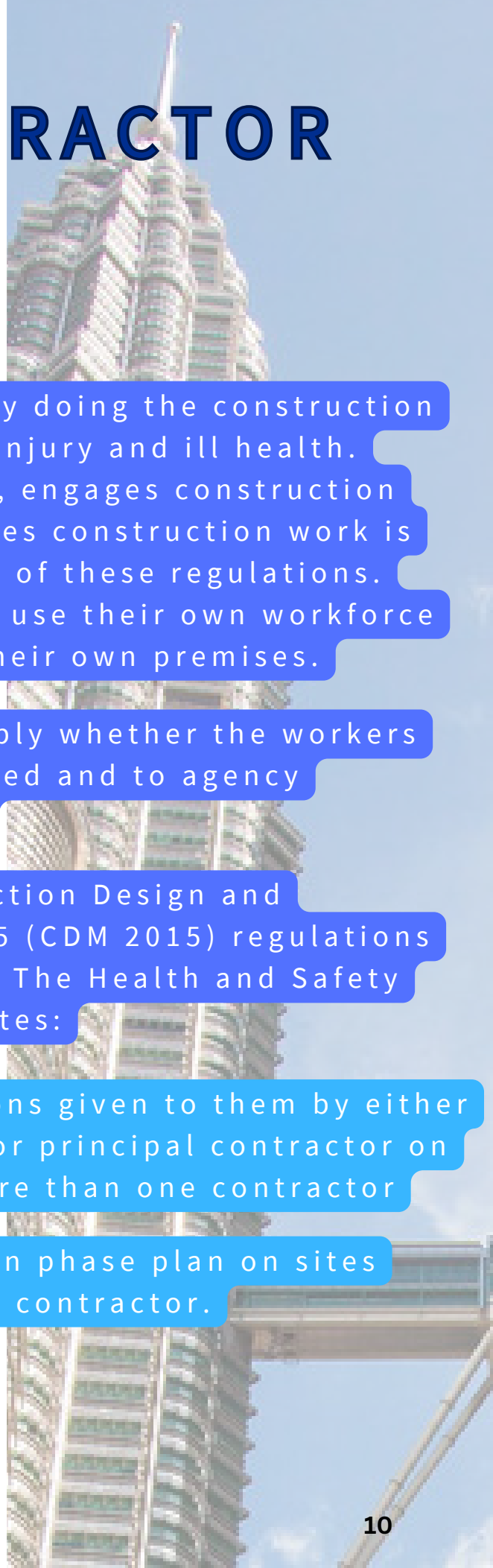
DEVELOPER



Identify SIX(6) roles of developer for Construction Surveying



CONTRACTOR



➡ 1 Contractors are those actually doing the construction work and are most at risk of injury and ill health. Anyone who directly employs, engages construction workers or controls or manages construction work is a contractor for the purposes of these regulations. This includes companies that use their own workforce to do construction work on their own premises.

➡ 2 The duties on contractors apply whether the workers are employees or self-employed and to agency workers without distinction.

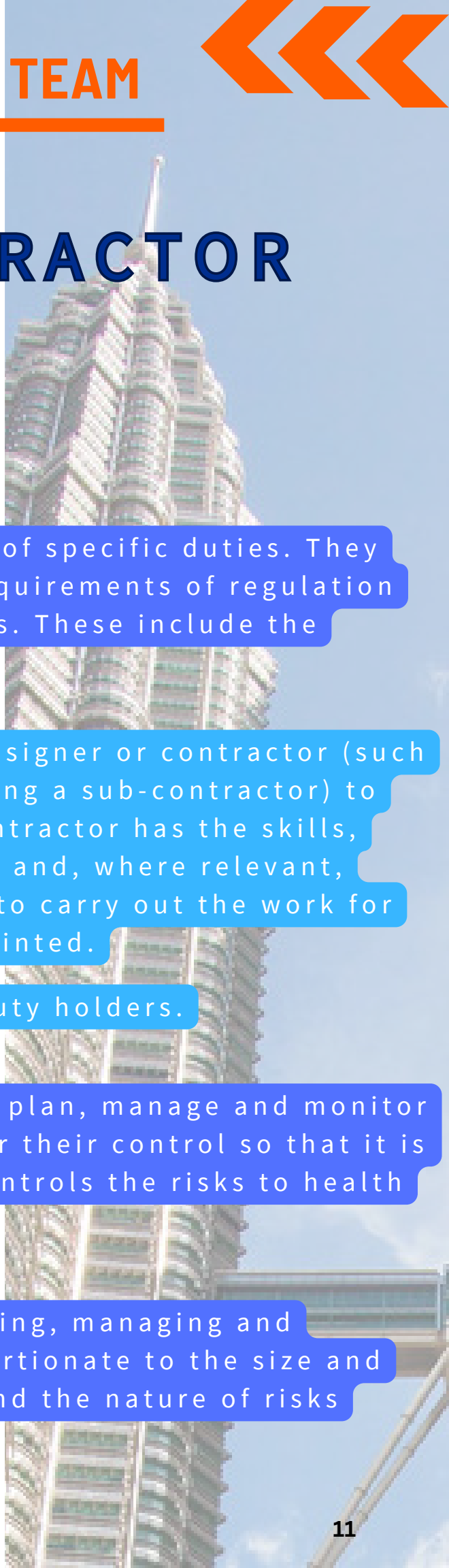
➡ 3 Regulation 15 of the Construction Design and Management Regulations 2015 (CDM 2015) regulations places duties on contractors. The Health and Safety Executive (HSE) Guidance states:

➡ i complying with directions given to them by either the principal designer or principal contractor on sites where there is more than one contractor

➡ ii preparing a construction phase plan on sites where they are the only contractor.



CONTRACTOR



4. Contractors have a number of specific duties. They must also comply with the requirements of regulation 8 as they apply to contractors. These include the requirements:

a on anyone appointing a designer or contractor (such as the contractor appointing a sub-contractor) to ensure the designer or contractor has the skills, knowledge and experience and, where relevant, organisational capability to carry out the work for which they are being appointed.

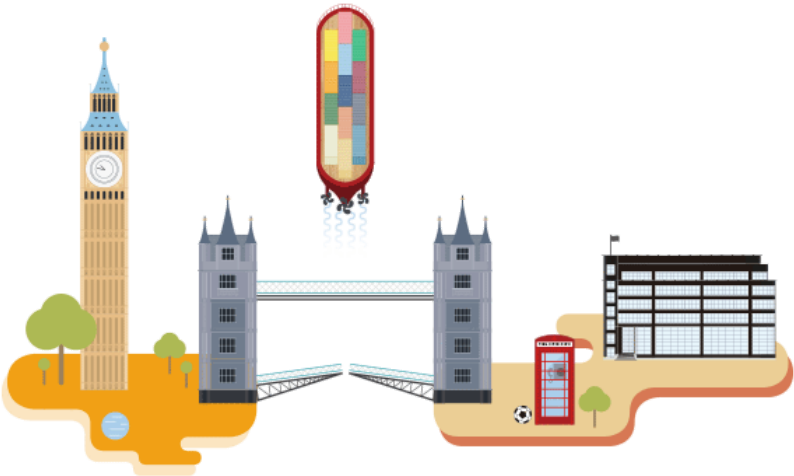
b to cooperate with other duty holders.

5. Contractors are required to plan, manage and monitor the construction work under their control so that it is carried out in a way that controls the risks to health and safety.

6. The effort devoted to planning, managing and monitoring should be proportionate to the size and complexity of the project and the nature of risks involved.



CONTRACTOR

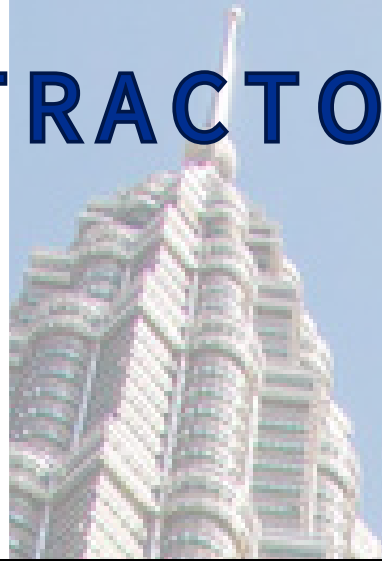


Identify FOUR (4) roles of contractor for construction surveying

**Discuss with your lecturer



CONTRACTOR



PLANNING

- must take into account the risks to those who may be affected e.g. members of the public, and those carrying out the construction work.
- cover the same considerations as those for the principal, including considering the risks and ensuring the measures needed to protect those affected are in place.
- responsible for planning the construction phase and for drawing up the construction phase plan before setting up the construction site.

MANAGING

- must take into account the same issues that principal contractors must consider.

MONITORING

- to ensure that the health and safety precautions are appropriate, remain in place and are followed in practice.
- Effective monitoring by the contractor must address the same issues that principal contractors must consider. This includes using a mix of measures to check performance and taking prompt action when issues arise.

QUANTITY SURVEYOR




➤ In ensuring the project cost not exceeding the budget set by the employer, the Quantity Surveyor is responsible for ensuring this.

➤ The Quantity Surveyor will be involved from the beginning to a stage of the final accounts.


➤ Therefore, accurate and objective information about the project is important to ensure that the cost estimated by the Quantity Surveyors are in the areas of budget set by the employer.

➤ Without objective and accurate information, the estimated costs to be incurred by the Quantity Surveyors may not be as accurate as desired.



ROLE OF CONSTRUCTION TEAM

QUANTITY SURVEYOR



Sample of BQ.

| Web Sample 2 - Housing Tender | | | | | |
|-------------------------------|--|----------|-------|-------|----------|
| 4 - 3 BED 5 PERSON HOUSE | | | | | |
| 2E - EXTERNAL WALLS | | | | | |
| Ref | Description | Quantity | Units | Rate | Value |
| | <u>EXTERNAL WALLS</u> | | | | |
| | <u>GENERALLY</u> | | | | |
| | <u>F10: BRICK AND BLOCK WALLING</u> | | | | |
| | Cavity walls | | | | |
| | Facing bricks , PC 300:00 per 1000, in gauged mortar (1:1:6); flush pointing one side: | | | | |
| A | half brick skins; stretcher bond | 114 | m2 | 47.23 | 5,384.22 |
| | Durox Supablocs in gauged mortar (1:1:6): | | | | |
| B | 100 mm skins 7 N/mm2 blocks | 114 | m2 | 22.45 | 2,559.30 |
| | Features | | | | |
| | Contrasting brick panels; facing bricks, PC 300:00 per 1000, in gauged mortar (1:1:6); flush pointing all exposed edges: | | | | |
| C | extra over facings for contrasting brick Quoins | 5 | m | 12.77 | 63.85 |
| | Sills and copings; facing bricks, PC 300.00 per 1000, in gauged mortar (1:1:6); flush pointing all exposed edges: | | | | |
| D | brick on edge sills; 50 mm projection weathered; half brick wide (snapped headers) | 14 | m | 15.47 | 216.58 |
| E | extra over for soldier course above windows curved | 18 | m | 16.77 | 301.86 |

What is BQ??

A Bill of Quantities (commonly known as BOQ or BQ) is a document prepared by a quantity surveyor or cost consultant to define the quality and quantity of works required to be carried out by the main contractor to complete a project. A bill of quantities also provides the main contractor with measured quantities of works as identified on the project drawings and specification.



ROLE OF CONSTRUCTION TEAM

QUANTITY SURVEYOR



PURPOSE OF A BQ

- Standardise the process for tendering contractors to prepare a firm cost to carry out the works.
- Provide a fair and accurate method for tendering contractors to price the project using the same information.
- Allow the employer's consultants to carry out a tender analysis whereby they can compare both the overall cost received and individual priced items with other tender offers.
- Enable either the quantity surveyor or contract administrator to confirm that individual contractors have submitted bona fide tenders compliant with the tender information, that represent value for money to the client.



ROLE OF CONSTRUCTION TEAM

QUANTITY SURVEYOR



During the construction period the BQ can assist the design team by:

- Helping to determine the agreement of the contract sum with the successful tender
- Identifying a schedule of rates for individual work items to assist with costing variations
- Providing the basis of identifying works completed for interim valuations
- Providing the basis for the preparation of the final account
- It is important that a BQ is prepared to a standard methodology recognised by everyone involved in the project to avoid any misunderstandings or ambiguities.
- A BQ is also a valuable document during the process and settlement of any dispute resolution.



LAND SURVEYOR

- 1 Prepare and maintain sketches, maps, reports, and legal descriptions of surveys in order to describe, certify, and assume liability for work performed.
- 2 Verify the accuracy of survey data, including measurements and calculations conducted at survey sites.
- 3 Direct or conduct surveys in order to establish legal boundaries for properties, based on legal deeds and titles.
- 4 Record the results of surveys, including the shape, contour, location, elevation, and dimensions of land or land features.
- 5 Calculate heights, depths, relative positions, property lines, and other characteristics of terrain.
- 6 Plan and conduct ground surveys designed to establish baselines, elevations, and other geodetic measurements



LAND SURVEYOR

Identify FIVE(5) roles LAND SURVEYOR for construction surveying

7

8

9

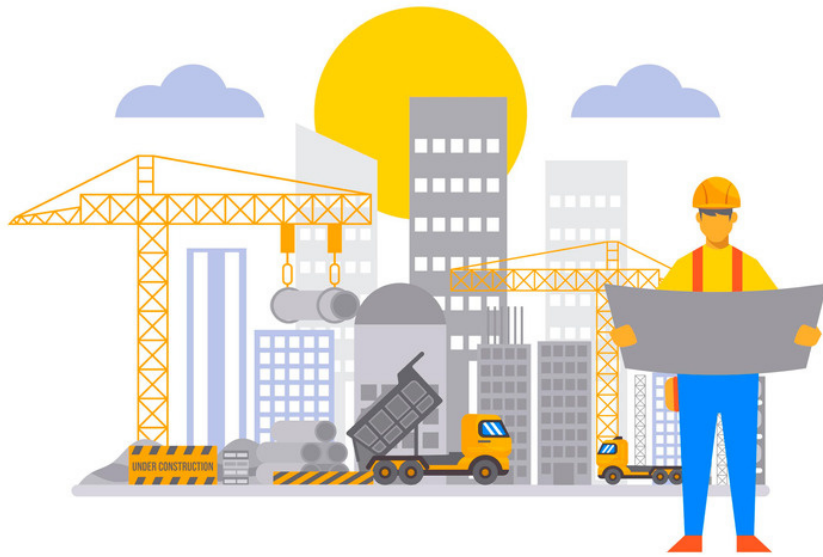
10

11

12

**Discuss with your lecturer

ROLE OF CONSTRUCTION TEAM



ENGINEER

- 1 Acting as the main technical adviser on a construction site for subcontractors, crafts people and operatives
- 2 Setting out, levelling and surveying the site
- 3 Checking plans, drawings and quantities for accuracy of calculations
- 4 Ensuring that all materials used and work performed are as per specifications
- 5 Overseeing the selection and requisition of materials and plant
- 6 Agreeing a price for materials and making cost-effective solutions and proposals for the intended project



ENGINEER

7

Managing, monitoring and interpreting the contract design documents supplied by the client or architect

8

Liaising with any consultants, subcontractors, supervisors, planners, quantity surveyors and the general workforce involved in the project

9

Liaising with the local authority (where appropriate to the project) to ensure compliance with local construction regulations and by-laws

10

Communicating with clients and their representatives (architects, engineers and surveyors), including attending regular meetings to keep them informed of progress

11

Day-to-day management of the site, including supervising and monitoring the site labour force and the work of any subcontractors



ENGINEER



12

13

**IDENTIFY FIVE (5)
JOB SCOPE FOR
ENGINEER**

14

16

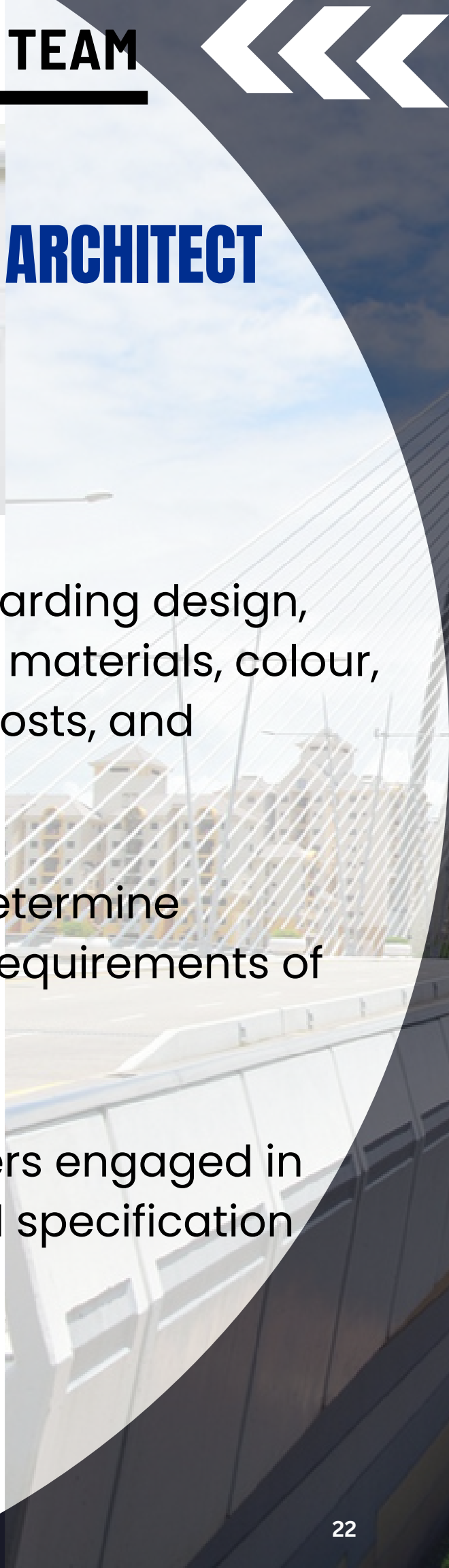
15

**Discuss with your lecturer



ARCHITECT

- ③ Prepare information regarding design, structure specifications, materials, colour, equipment, estimated costs, and construction time
- ③ Consult with client to determine functional and spatial requirements of structure
- ③ Direct activities of workers engaged in preparing drawings and specification documents





ARCHITECT

- ① Plan layout of project
- ① Prepare contract documents for building contractors
- ① Conduct periodic on-site observation of work during construction to monitor compliance with plans
- ① Integrate engineering element into unified design.
- ① Prepare scale drawings





ARCHITECT

- ④ Administer construction contracts
- ④ Represent client in obtaining bids and awarding construction contracts
- ④ Prepare operating and maintenance manuals, studies, and reports

④ _____

④ _____

SPECIFICATION
&
STANDARD

PENGLIBATAN JABATAN/AGENSI TEKNIKAL DALAM MENYEMAK
PERMOHONAN TERUTAMANYA DALAM PEMBANGUNAN SKIM PERUMAHAN

| BIL | AGENSI TEKNIKAL | JENIS DOKUMEN PERMOHONAN | | | | | | | | |
|-----|---------------------------------------|---|--------------------------------|-------------------------------|--------------------|-----------------------|----------------|---------------------|---------------|---------------|
| | | HAL-HAL TANAH (124A dan 204D KTN) | KEBENARAN MERANCANG (KM) | PELAN BANGUNAN (PB) | PELAN KEJURUTERAAN | | | PELAN SUBSIDIARI KM | | |
| | | | | | KERJA TANAH | JALAN DAN PARIT | LAMPU JALAN | LANSKAP | NAMA TAMAN | NAMA JALAN |
| 1 | Jabatan Mineral dan Geosains Malaysia | ✓ | ✓ | | ✓ | | | | | |
| 2 | Jabatan Bomba dan Penyelamat Malaysia | | | ✓ | | | | | | |
| 3 | Jabatan Alam Sekitar | | ✓ | | | | | | | |
| 4 | Tenaga Nasional Berhad | ✓ | ✓ | | | | | | | |
| 5 | Suruhanjaya Komunikasi dan Multimedia | | ✓ | ✓ | | | ✓ | | | |
| 6 | Jabatan Pengairan dan Saliran | ✓ | ✓ | ✓ Tambahan (lihat nota) | ✓ | ✓ | | | | |
| 7 | Pentadbiran Tanah Negeri | ✓ | ✓ | | | | | | | |
| 8 | Indah Water Konsortium | | ✓ | ✓ | | | | | | |
| 9 | Jabatan Kerja Raya | ✓ (124 A) | ✓ | | ✓ | ✓ | | | | |
| 10 | Jabatan Perancangan Bandar dan Desa | | ✓ | | | | | | | |
| 11 | Pihak Berkuasa Air Negeri | | ✓ | | | | | | | |
| 12 | Jabatan Perancangan PBT | ✓ | ✓ | | ✓ | | | | ✓ | |
| 13 | Jabatan Bangunan PBT | | ✓ | ✓ | | | | | | |
| 14 | Jabatan Kejuruteraan PBT | | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ |
| 15 | Jabatan Lanskap PBT | | | | | | | ✓ | | |

Nota :
1. Jika OSD dan/atau SPAH direkabentuk di dalam dan di halaman bangunan.

SPECIFICATION & STANDARD

- ◆ All the specification of construction are fixed by several agencies.
- ◆ Basically it refers to “*Undang Undang Kecil Bangunan Seragam*” and “*Akta Jalan, Parit dan Bangunan 1974*”
- ◆ In development of place/area, JKT through PBT are responsible to ; Building Layout and Density of population
- ◆ Building layout covers several items:
 - Layout : PBT
 - Building Design : PBT/ Architect
 - Access & Road networking : JKR/PBT
 - Path : JKR/PBT
 - Utility : JKR / TNB / JPS /BOMBA / etc

**IDENTIFY THE AGENCIES WHICH RELATED
TO UTILITY NEED HOUSE SCHEME
DEVELOPMENT**

◆ WATER RETICULATION SYSTEM:

◆ SEWERAGE:

◆ GARBAGE SITE:

◆ TELECOMMUNICATION:

◆ DRAINAGE:

◆ ELECTRICITY:

SPECIFICATION & STANDARD

RELATED AGENCIES



JABATAN KERAJAAN TEMPATAN
KEMENTERIAN PEMBANGUNAN KERAJAAN TEMPATAN



**JABATAN PENGAIRAN
DAN SALIRAN MALAYSIA**



IndahWater



**TENAGA
NASIONAL**

Better. Brighter.



E-IDAMAN



1. <https://www.jonesmelling.co.uk/newsroom/insights/what-is-a-bill-of-quantities/>
2. https://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6707e/x6707e09.html
3. <https://www.google.com/search?q=topographic+plan+sample>
4. <https://jkt.kpkt.gov.my/sites/default/files/2022-02/dalaman.pdf>
5. [https://www.malaysia.gov.my/portal/content/31218?language=my_\(utility\)](https://www.malaysia.gov.my/portal/content/31218?language=my_(utility))
6. <https://www.kkr.gov.my/ms/mengenai-kkr/agensi-dalam-kkr/jabatan-kerja-raya>
7. <https://www.iwk.com.my/my/>
8. <https://e-idaman.com/>
9. <https://www.sada.com.my/syarikat>
10. <https://www.bomba.gov.my/legacy/Bomba/www.bomba.gov.my/index.php/pages/view/38.html>

1. Architect , Civil Engineering and The Land Surveyor
<https://youtu.be/rtABpWbtJqQ?si=nPy7lHoQ-dGrXCqk>
2. Topographic Map
<https://youtu.be/zqPMYGDxCr0>
3. What is Construction Survey
https://youtu.be/hcik8U-tjAo?si=_DiQLKlrdGvsb-Rf
4. Construction Engineering
<https://youtu.be/1ZY6O7zZDUE?si=FBtqWkOy-rd3vM20>
5. Occupational - Land Surveyor
<https://youtu.be/D0lq0dNc76k?si=u9OZIEG0RXlzNpIR>
6. *Fungsi dan peranan Jabatan Pengairan dan Saliran*
<https://youtu.be/rItGuajevO0?si=QGxxJizNA-m0tLB4>
7. Local Authority
<https://youtu.be/LRCTrGQ0DDM?si=31ROLYpBtq5ybl5q>

JKT : JABATAN KERAJAAN TEMPATAN

PBT : PIHAK BERKUASA TEMPATAN

JKR : JABATAN KERJA RAYA

TNB : TENAGA NASIONAL BERHAD

JPS : JABATAN PENGAIRAN DAN SALIRAN

JUPEM : JABATAN UKUR DAN PEMETAAN MALAYSIA

JTB : JURUKUR TANAH BERLESEN



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