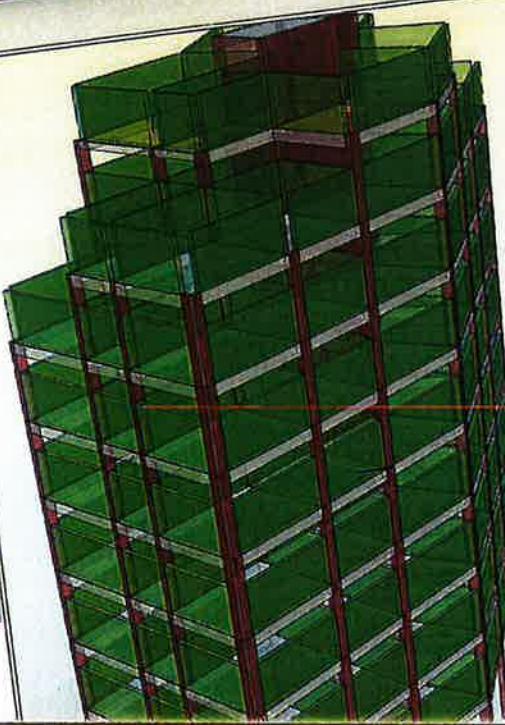
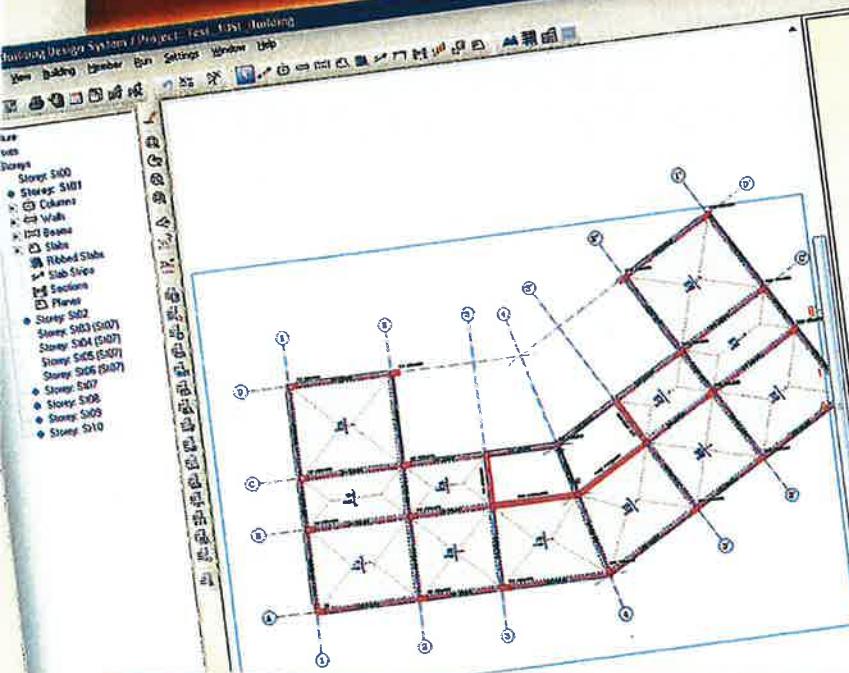




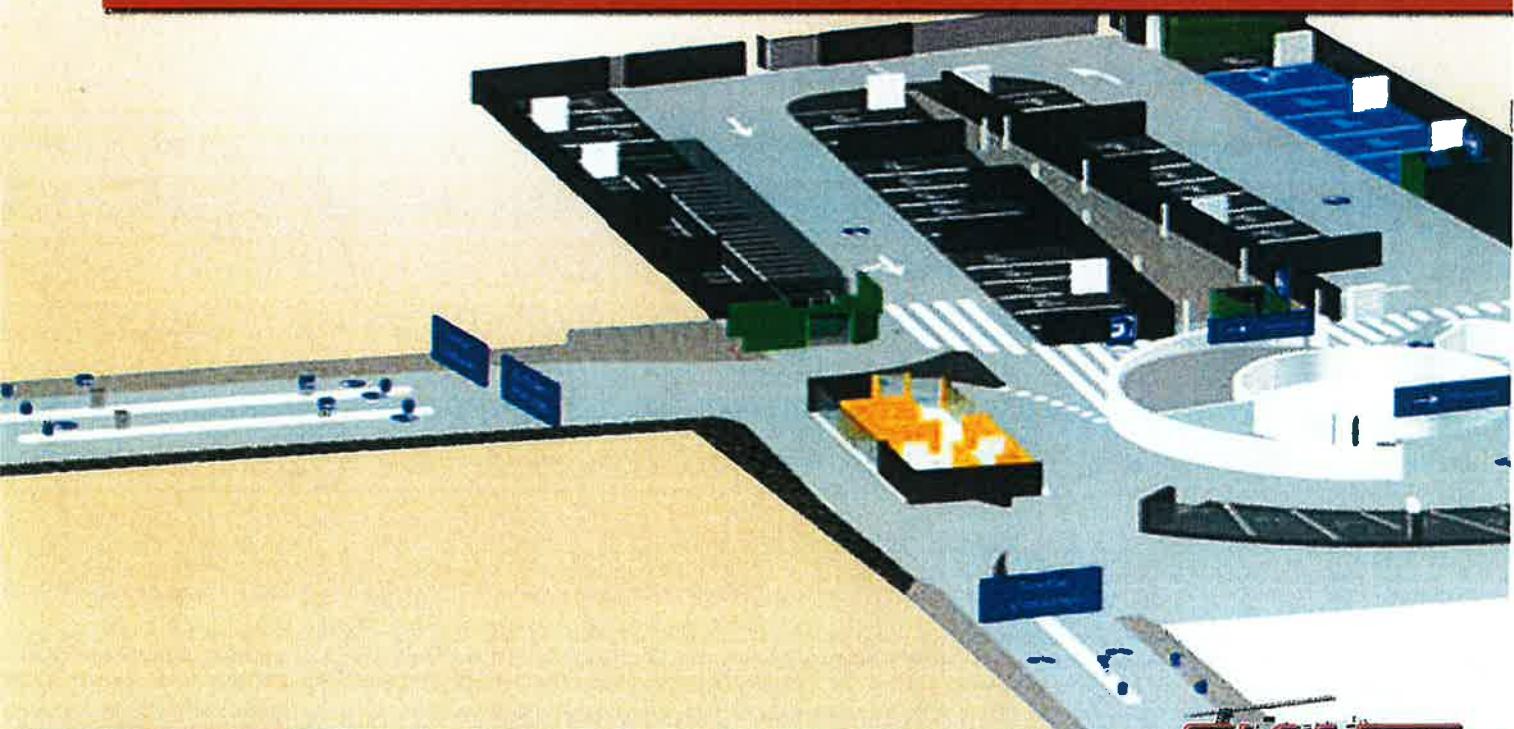
MANUAL REKABENTUK STRUKTUR

Orion



Basic Design Procedure Using Orion

PANDUAN 5





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1.0 PENGENALAN

- 1.1 Panduan 05: Basic Design Procedure Using Orion 17 adalah merupakan diantara siri siri panduan dalam Manual Rekabentuk Struktur yang dihasilkan oleh Cawangan Kejuruteraan Awam, Struktur dan Jambatan (CKASJ). Keseluruhan Manual tersebut mengandungi sebelas (11) panduan yang merangkumi semua peringkat kerja rekabentuk struktur, bermula dari rekabentuk konsep hingga pemeriksaan pembinaan di tapak.
- 1.2 Sebelas panduan yang menjadi teras Manual Rekabentuk Struktur adalah seperti berikut:

Panduan 01	: Kerja Rekabentuk Konsep dan Rekabentuk Awalan
Panduan 02	: Rekabentuk secara In-house (One-off / In-situ)
Panduan 03	: Rekabentuk secara In-house (Piawai)
Panduan 04	: Rekabentuk secara In-house (IBS / Katalog)
Panduan 05	: Basic Design Procedure Using Orion R17
Panduan 06	: Basic Design Procedure Using StaadPro
Panduan 07	: Penyediaan Lukisan Struktur
Panduan 08	: Perolehan dan Perkhidmatan Perunding
Panduan 09	: Pengurusan Rekabentuk Secara Reka dan Bina
Panduan 10	: Penyimpanan Rekod dan Proses Pindaan Rekabentuk
Panduan 11	: Pelaksanaan dan Penyediaan Laporan Pemeriksaan Pembinaan

- 1.3 Kesemua panduan ini memberi pedoman dan penerangan dalam dua cara yang mudah, iaitu secara carta alir dan secara proses kerja.
- 1.4 Kesilapan akibat kenaifan, kecuaian dan kealpaan disepanjang proses rekabentuk struktur dapat dielakkan, dikenalpasti dan diperbaiki sebelum lukisan pembinaan disalurkan untuk pembinaan di tapak.
- 1.5 Manual ini hanya memberi penumpuan kepada aspek prosidur dan proses rekabentuk sahaja. Manual Kualiti, Prosidur Sistem Pengurusan Bersepadu JKR



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dan SKALA hendaklah digunakan secara bersama untuk menjana dan menyimpan rekod kualiti semasa kerja-kerja rekabentuk dijalankan.

- 1.6 Proses pelaksanaan rekabentuk bangunan kadangkala berbeza mengikut kaedah dan ketetapan oleh kerajaan atau kehendak pelbagai pelanggan bagi sesuatu projek tertentu.
- 1.7 Perekabentuk perlu memikirkan kewajaran sendiri untuk meminda mana mana proses yang terkandung dalam Manual ini, sesuai untuk ketetapan tersebut.



2.0 PENDAHULUAN

- 2.1 ORION merupakan perisian komputer yang utama di CKASJ untuk kerja-kerja rekabentuk struktur konkrit tetulang. Ianya mempunyai kelebihan seperti berikut:
- Boleh digunakan untuk merekabentuk struktur bangunan konkrit tetulang yang kecil atau kompleks dengan cepat dan mudah,
 - Pilihan kod piawai antarabangsa, termasuk British Standards dan Eurocodes,
 - Menjimatkan masa dengan fungsi automated FE dan frame analysis,
 - Menghasilkan dokumentasi yang jelas dan tepat, termasuk lukisan dan kuantiti,
 - Menangani perubahan rekabentuk dengan senang dan berkesan,
- 2.2 Perisian yang canggih tidak menjamin penghasilan rekabentuk yang baik dan selamat tanpa input yang tepat. Oleh itu, setiap jurutera perekabentuk mesti melengkapkan diri dengan ilmu pengetahuan teknikal dan kejuruteraan, terutamanya:
- Memahami bagaimana sesuatu struktur bertindakbalas terhadap beban yang dikenakan,
 - Memahami kehendak piawai yang digunakan,
 - Mematuhi ketetapan Jabatan, contohnya kekuatan minima konkrit, saiz minima besi tetulang dan sebagainya,
- 2.3 Perekabentuk perlu memahami perisian ORION dengan mendalam. Pelaksanaan kerja rekabentuk hendaklah mengikuti turutan yang sepatutnya dan tiada langkah ditinggalkan. Meninggalkan langkah analysis, sebaliknya terus kepada rekabentuk adalah tidak digalakkan kerana kemungkinan kesilapan data input tidak dapat dikesan.
- 2.4 Rekabentuk yang baik ialah mengimbangi keselamatan dengan kos keseluruhan struktur. Penggunaan *Factor Of Safety* yang melebihi kadar yang diperlukan akan mengakibatkan kos tidak ekonomik.
- 2.5 Panduan ini hendaklah digunakan secara bersama dengan Panduan Penggunaan ORION Drafting Template (D0s and Don'ts) bagi Jurutera Pereka Struktur Bangunan. Ini adalah bagi menghasilkan lukisan yang mempunyai ciri-ciri seragam dan memudahkan penyediaan lukisan oleh Pelukis Pelan. Template ini juga akan menghasilkan lukisan dengan title blok CKASJ yang terkini.

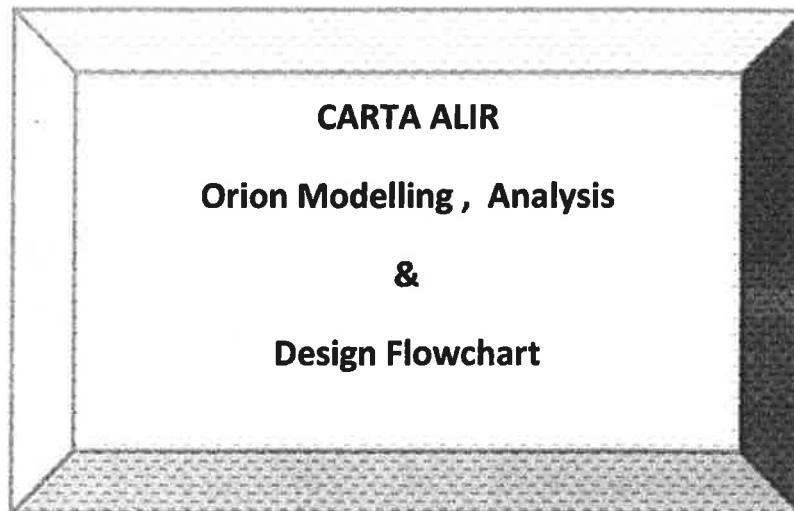


Basic Design Procedure Using Orion 17

- 2.6 Adalah diharap agar Panduan 05: Basic Design Procedure Using Orion 17 ini akan memendekkan tempoh pembelajaran setiap Jurutera Awam yang ditempatkan di

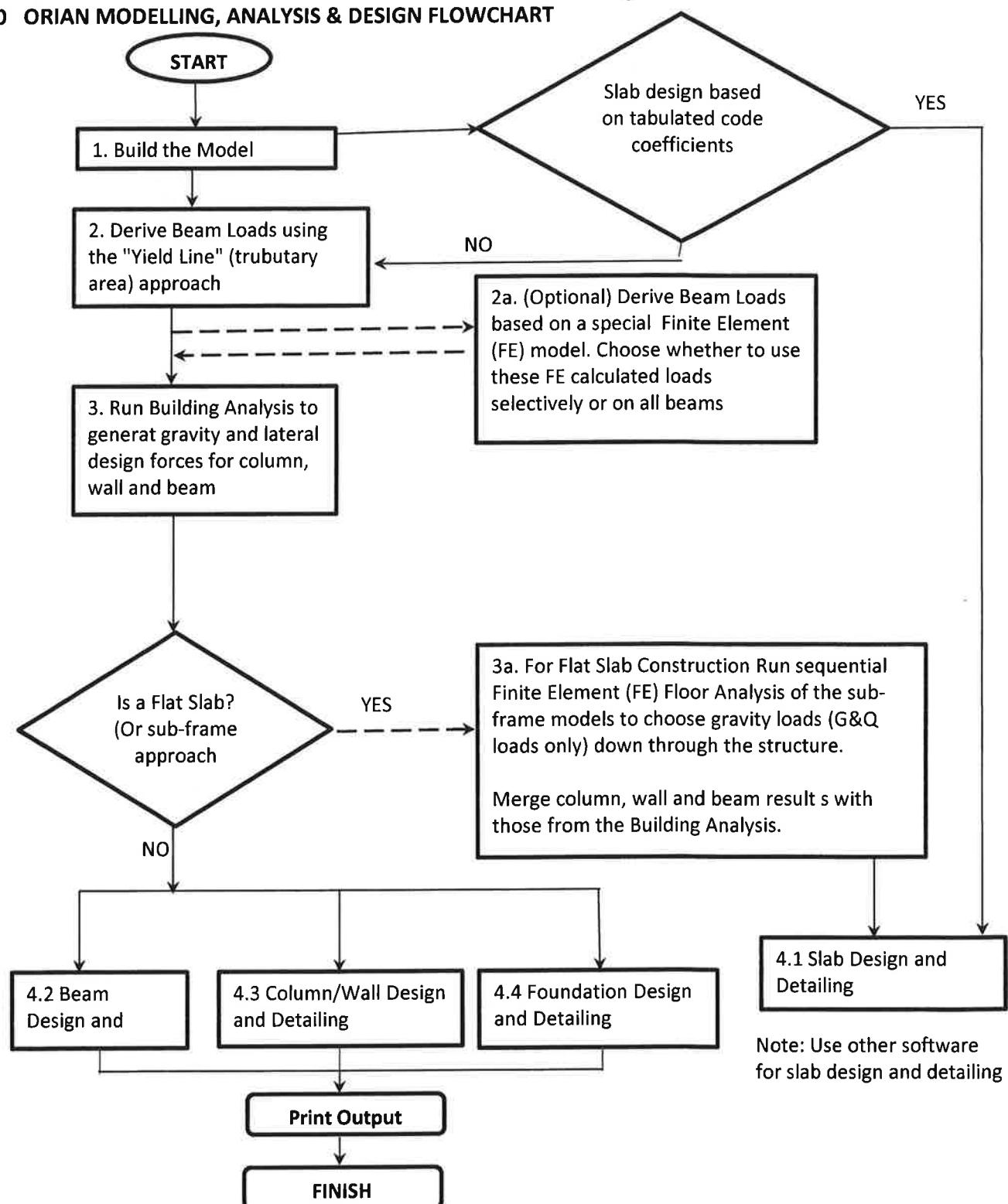
Bahagian Rekabentuk Struktur CKASJ. Dengan aliran kerja yang sistematik, kesalahan rekabentuk akan dielakkan dan penghasilan rekabentuk akan meningkat kerana tiada kerja berulang untuk membaiki kesilapan.

- 2.8 Rujukan panduan ini ialah ORION Standards by CSCWorld.



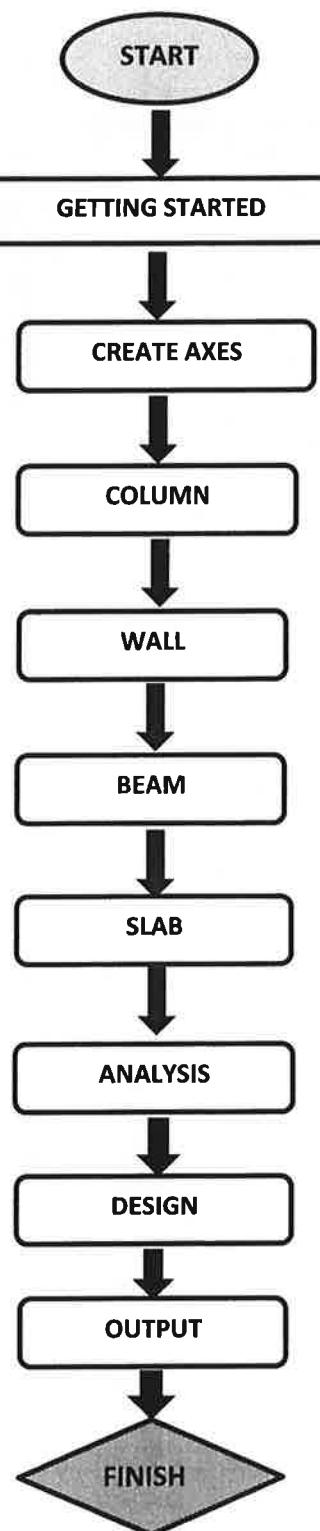
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3.0 ORIAN MODELLING, ANALYSIS & DESIGN FLOWCHART





4.0 Main Flow Chart

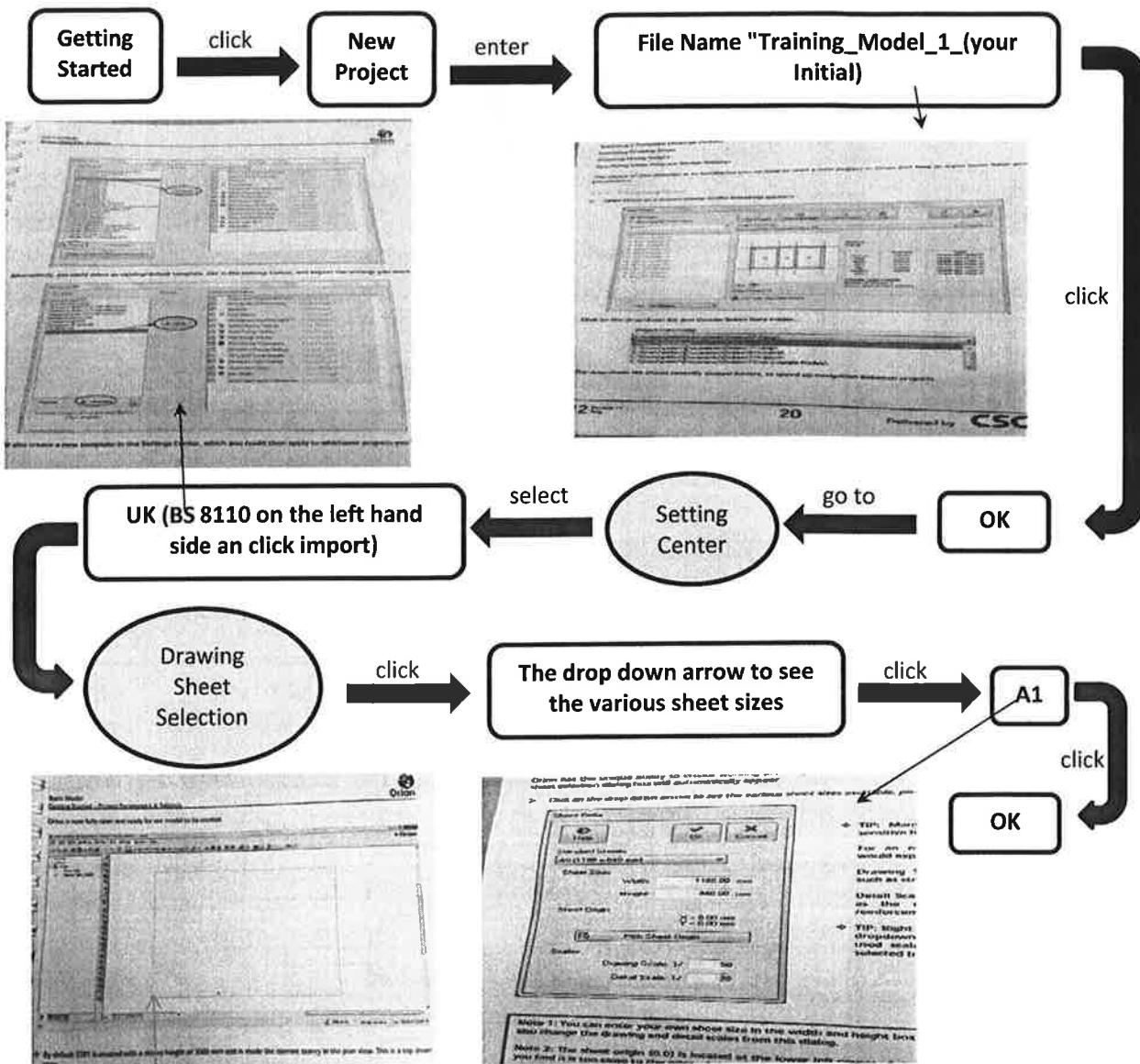




Basic Design Procedure Using Orion

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Date

5.0 Getting Started

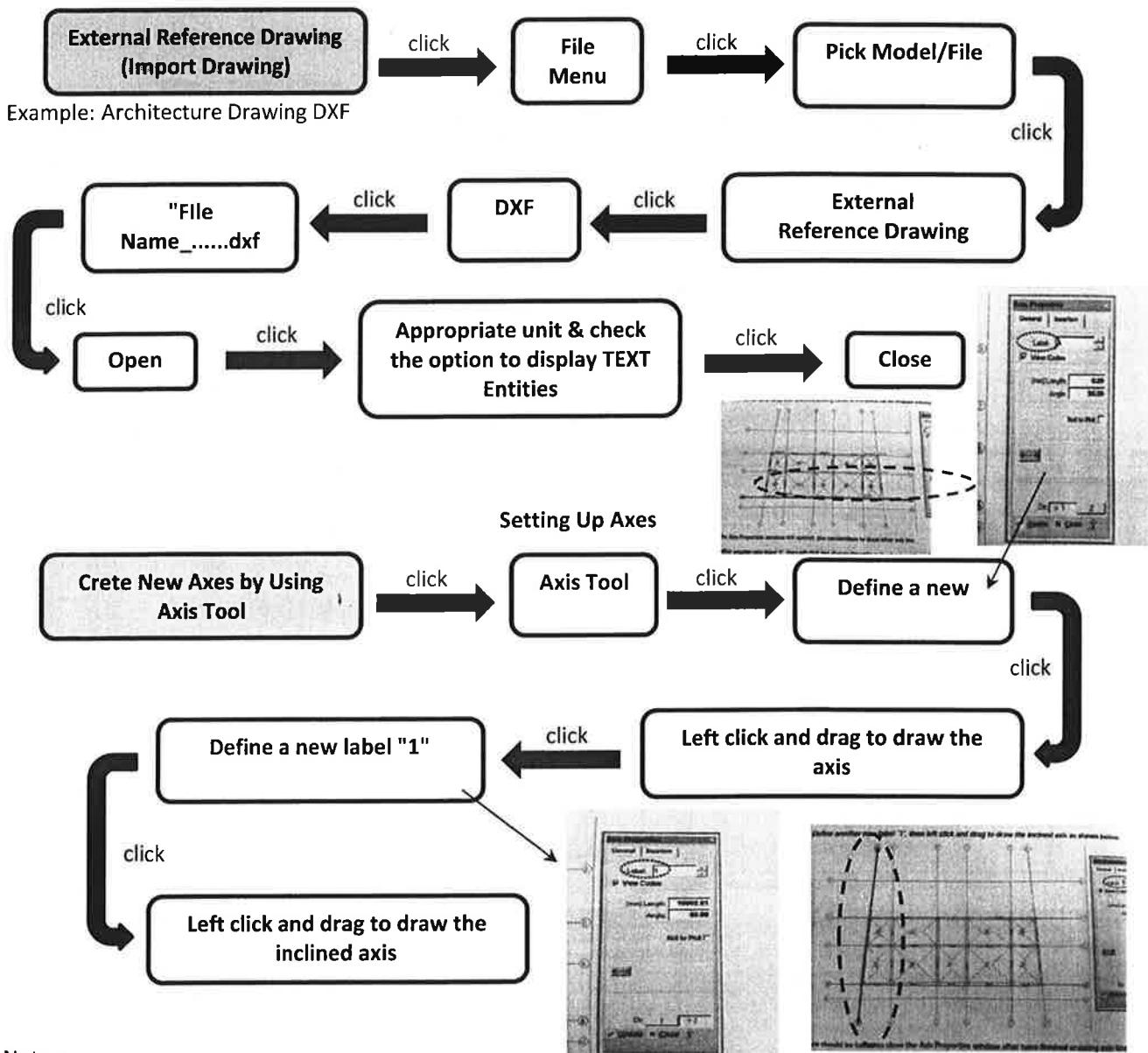


Notes:

1. Orion is now fully open and ready for our model to be created.
2. By default ST01 is created with a storey height of 3000 mm and is made the current storey in the plan view. This is a top down view.
3. All modelling of superstructure members such as beam, column and slab should start in ST01
4. ST00 is the foundation level where foundation elements such as footing & pile caps can be inserted.
5. The first step in modelling in Orion to create axes or grids. The intersection of the grids will then be used as insertion point for members.

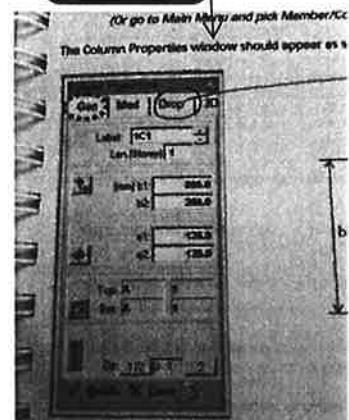
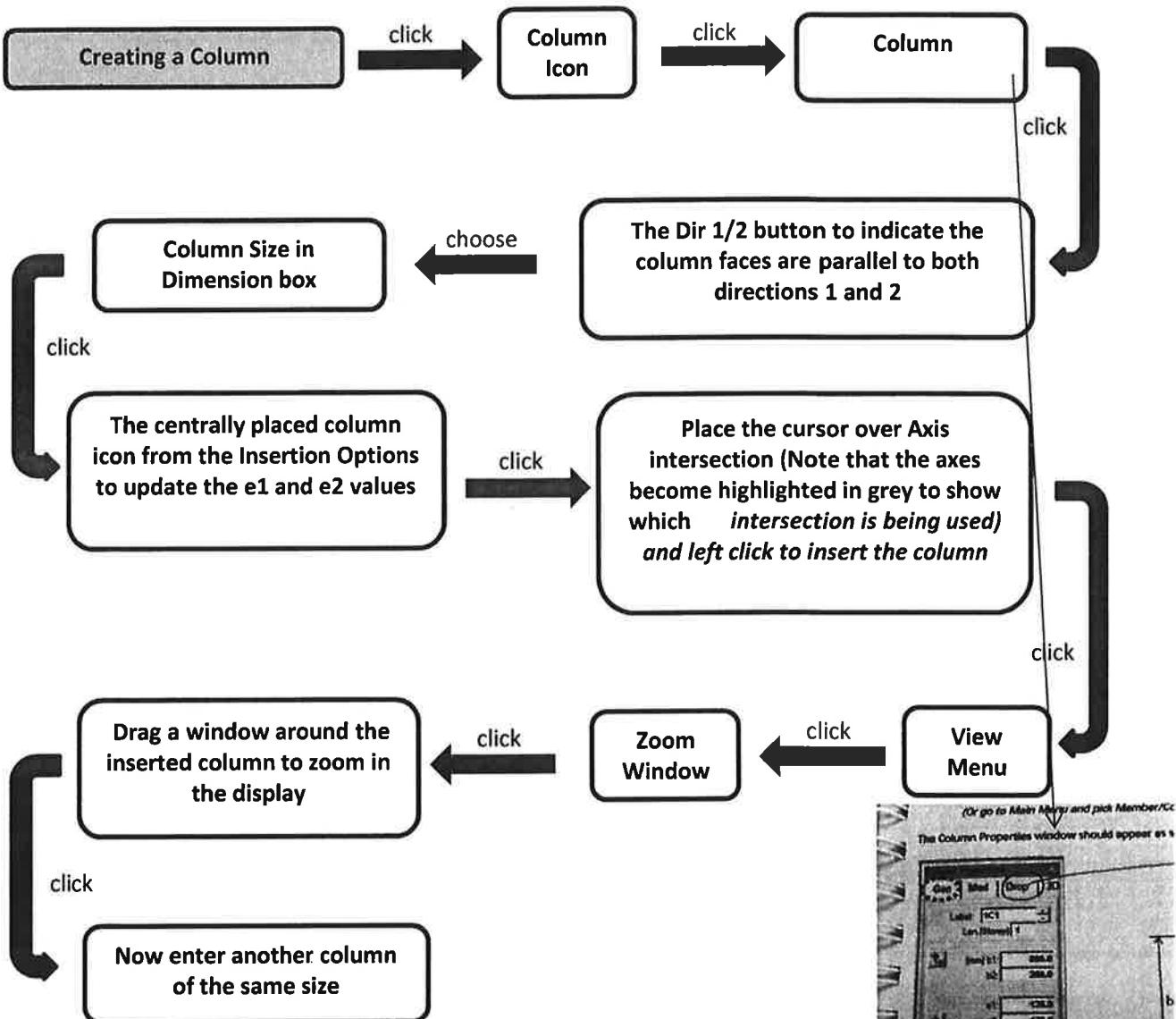


5.1 Setting Up Axes



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6.0 Creating A Column

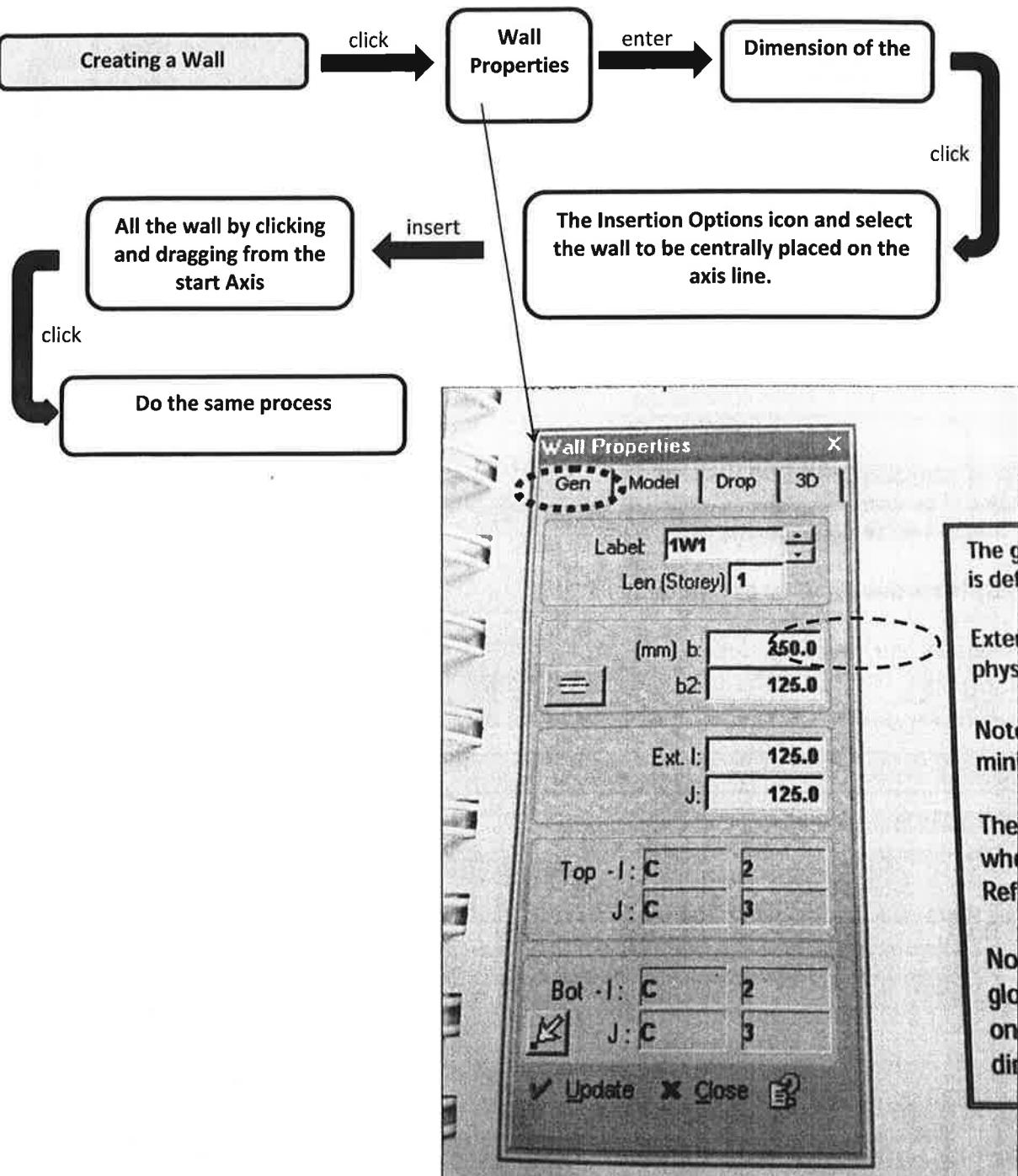


Notes:

- 1) Len (Storey) defines the column is spanning how many storey height.
- 2) b1/b2 define the horizontal and vertical dimension of the column section
- 3) e1/e2 define the horizontal and vertical offset from bottom left corner of column section to column reference point.
- 4) All column must be inserted at axis intersections

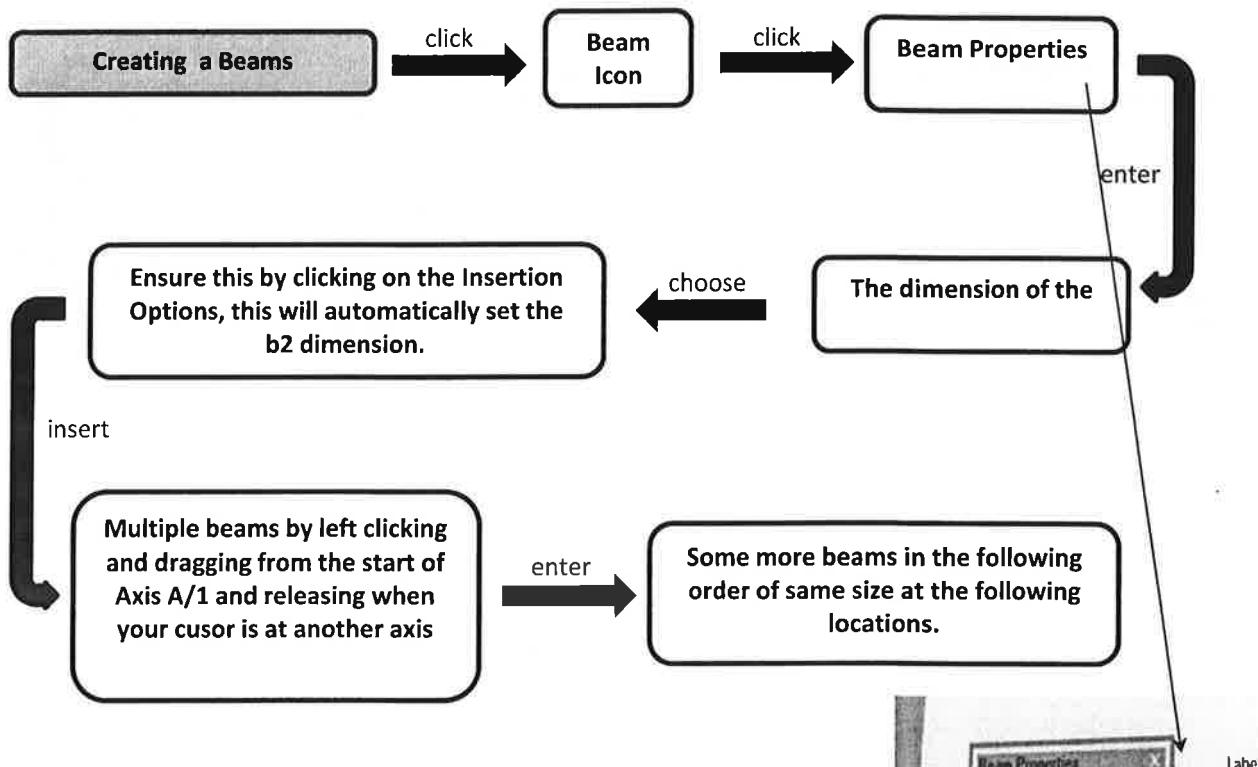


6.1 Creating A Wall



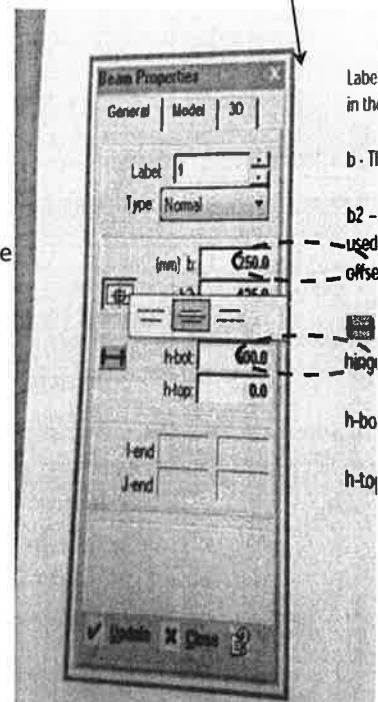


6.2 Creating A Beam

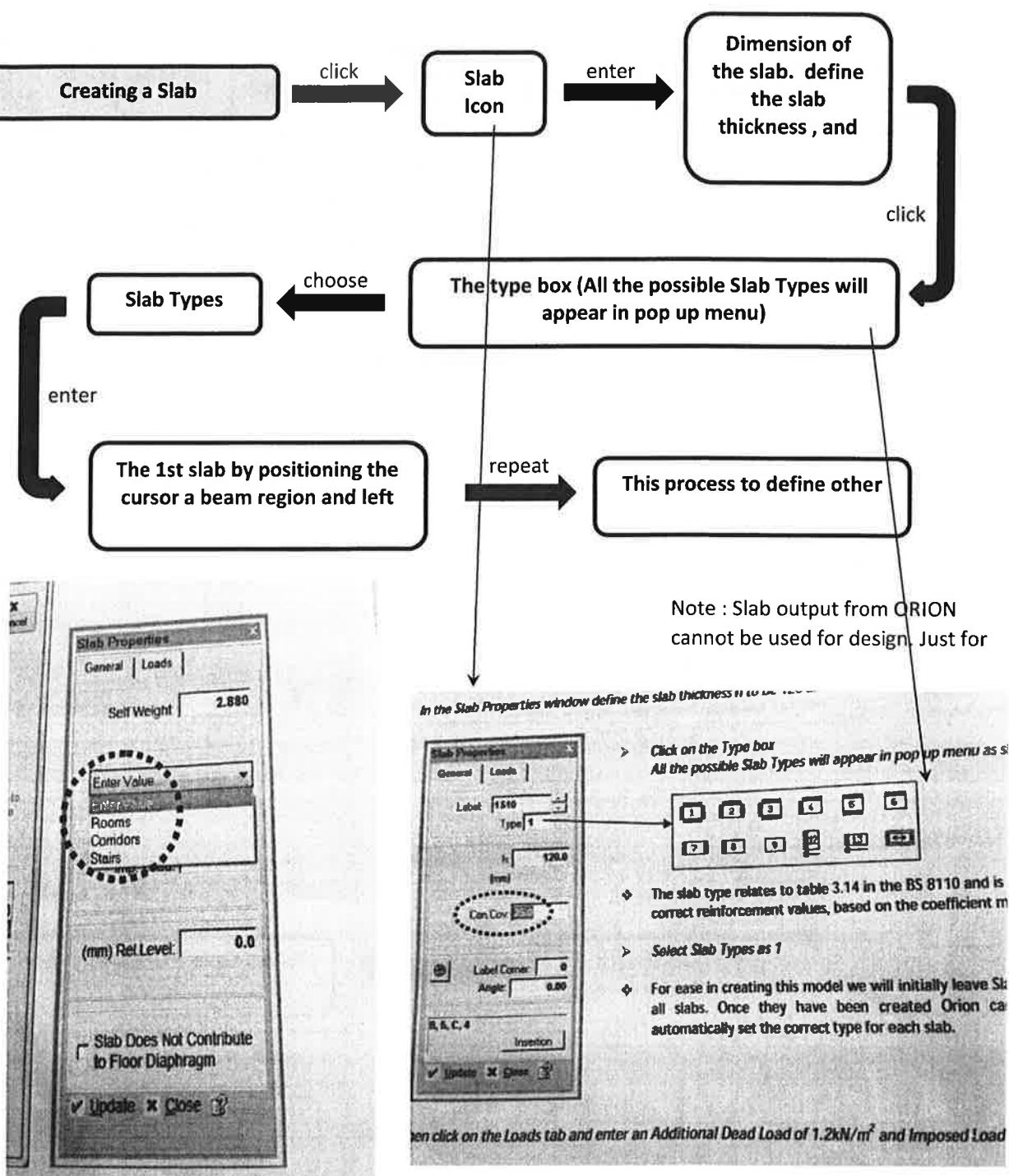


Note

- 1) Label - The labels will automatically generate when creating the beam in the mode
- 2) b - The width of the beam
- 3) b2 - The option determines if the beam is offset in relation to the axis used for its insertion
- 4) Beam End Condition - Click on the icon allows the user to define hinge on either one end or both ends of the beam.
- 5) h-bot - The dimension of the beam to project below the slab
- 6) h-top - The dimension of the beam to project above the slab



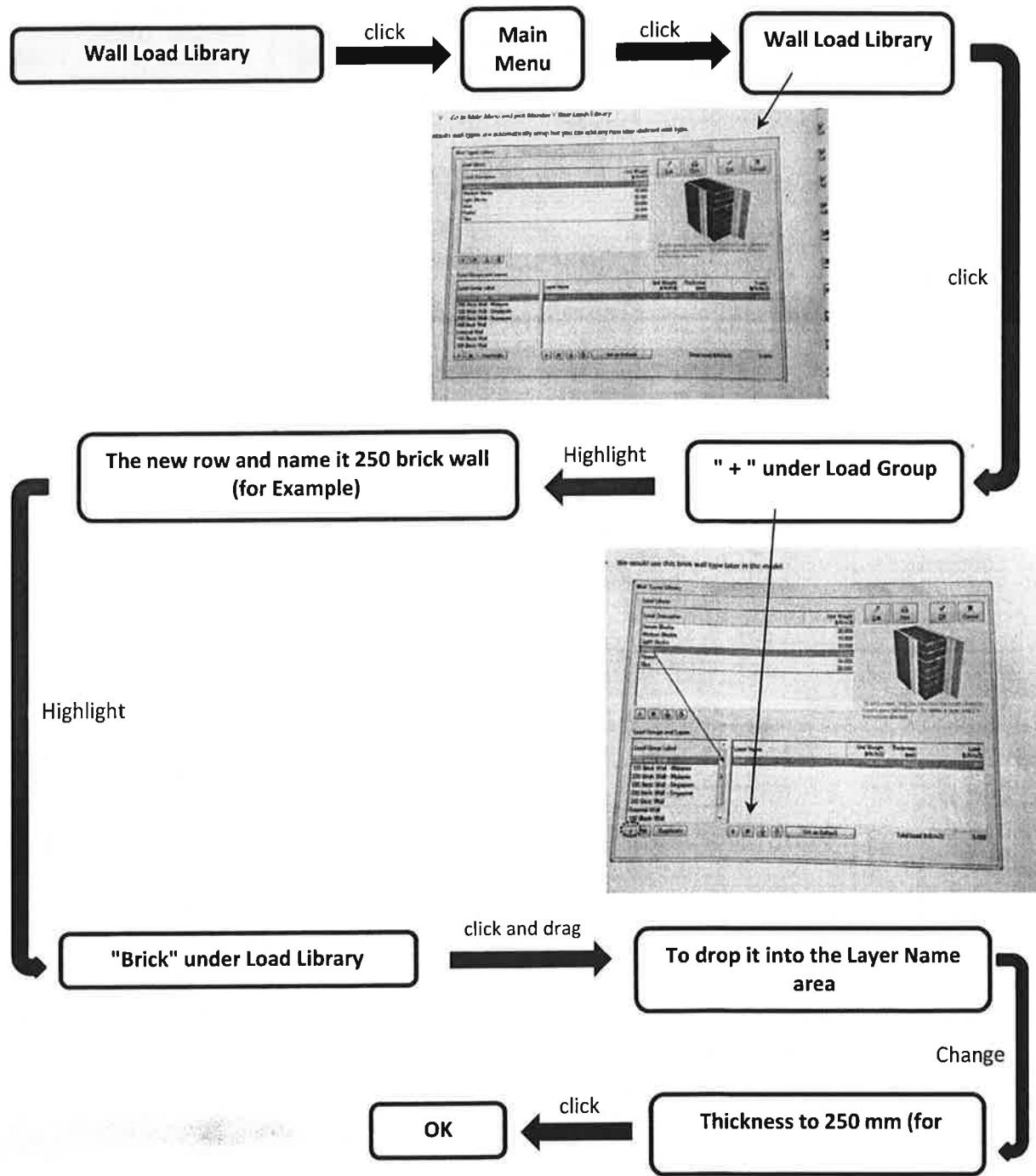
6.3 Creating A Slab





6.4 Wall Load And Additional Beam Loads

6.4.1 Wall Load Library

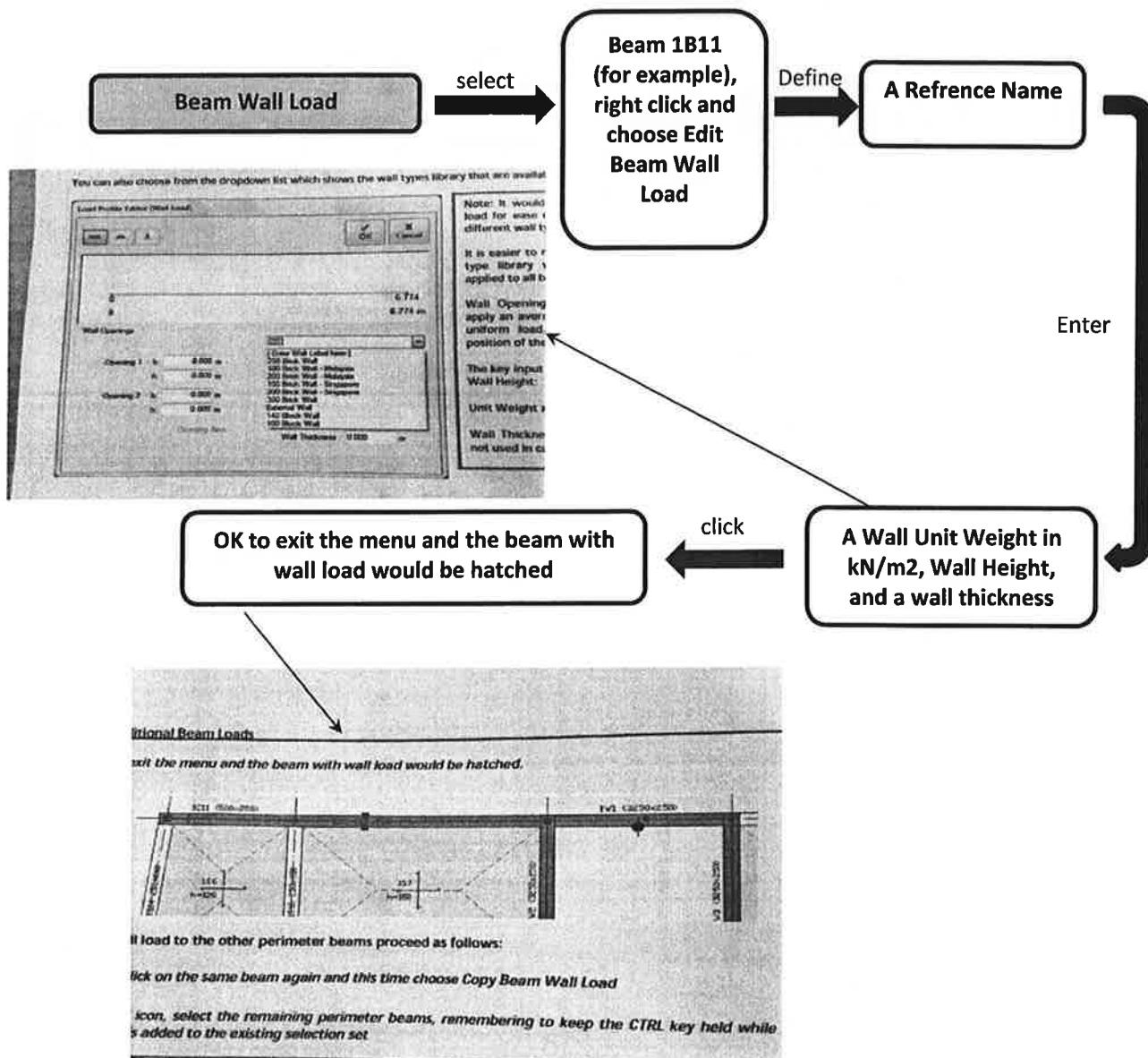




Basic Design Procedure Using Orion

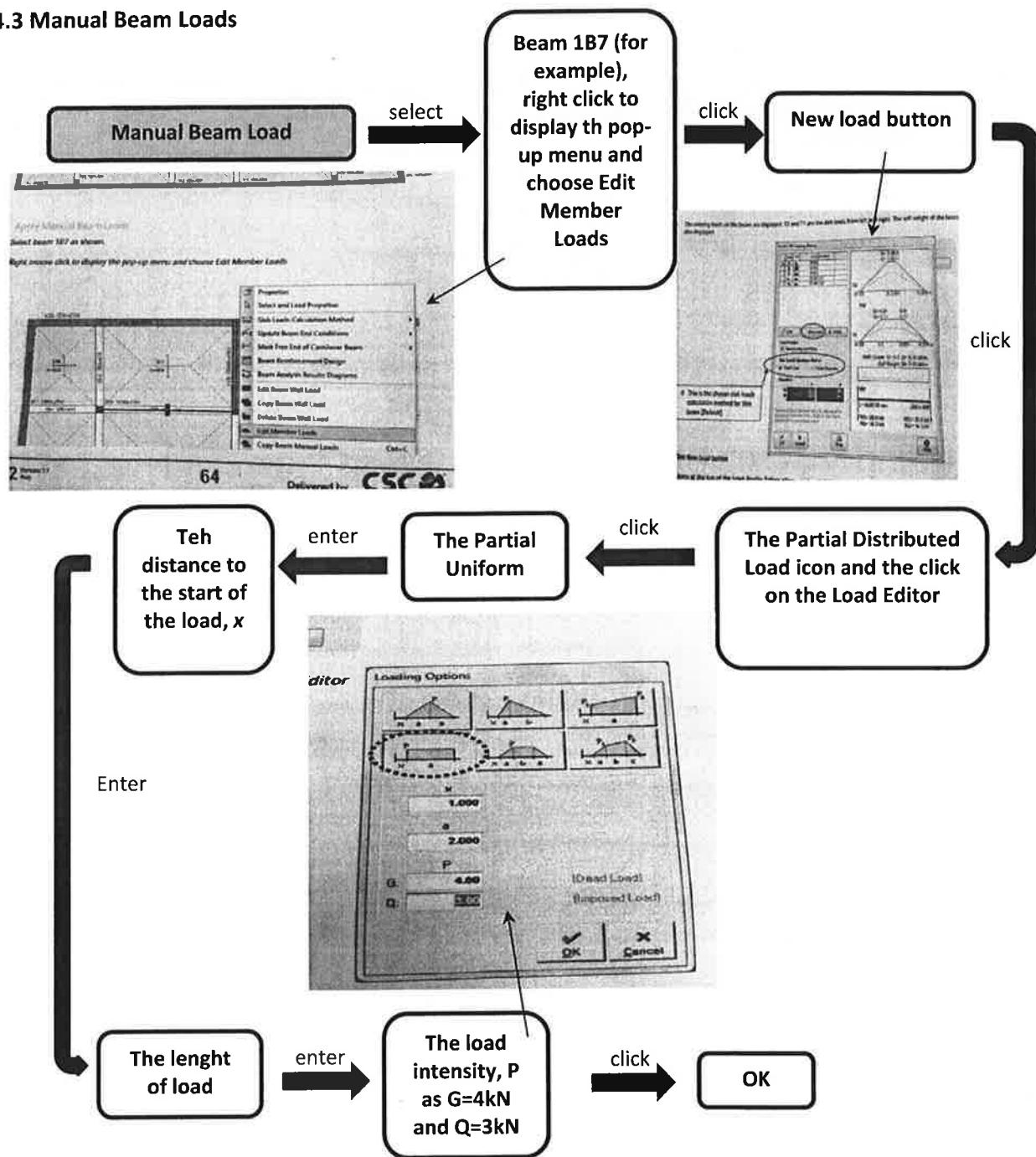
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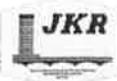
6.4.2 Beam Wall Load





6.4.3 Manual Beam Loads



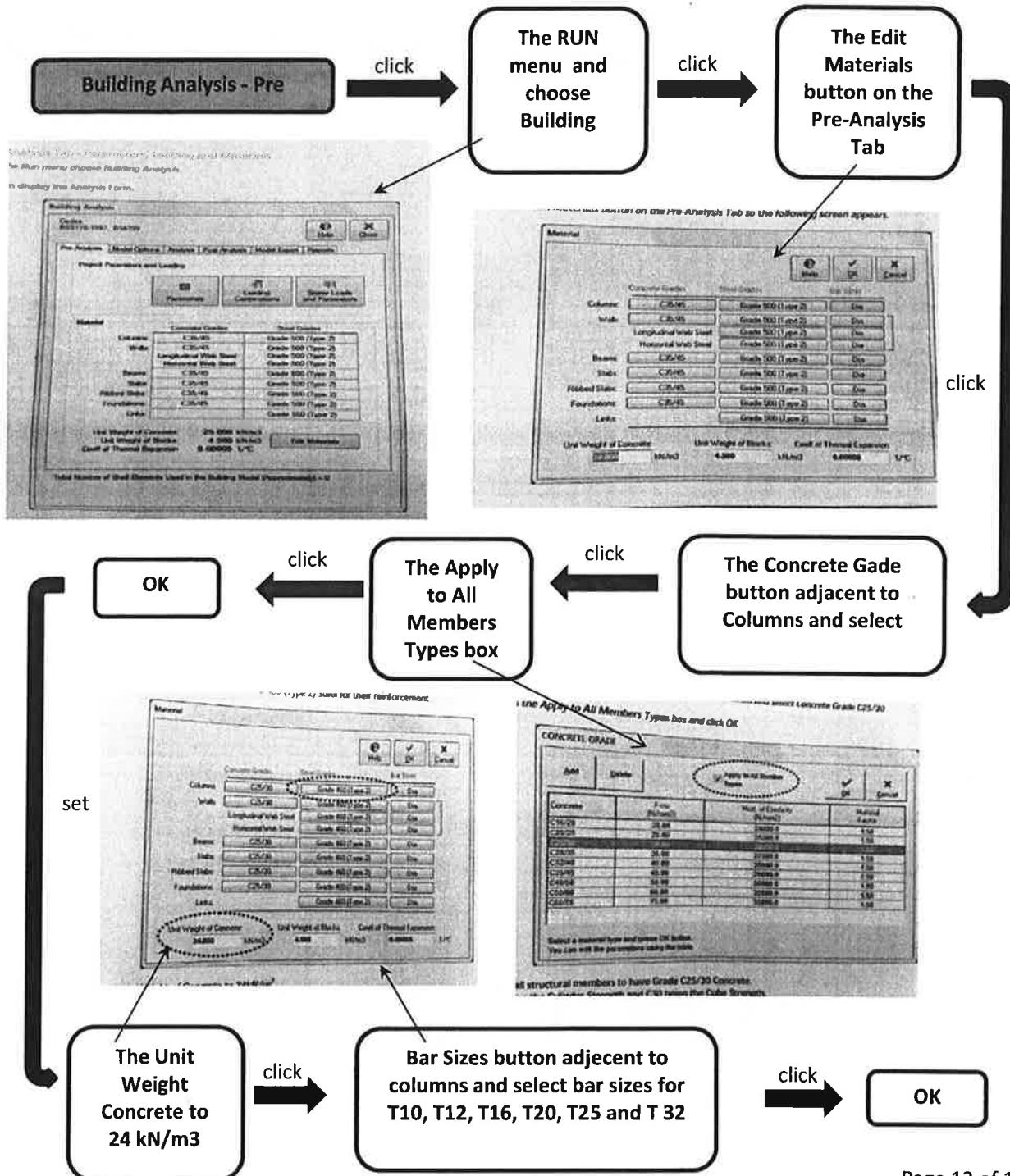


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7.0 Building Analysis

7.1 Pre Analysis Tab - Parameters, Loading and Materials

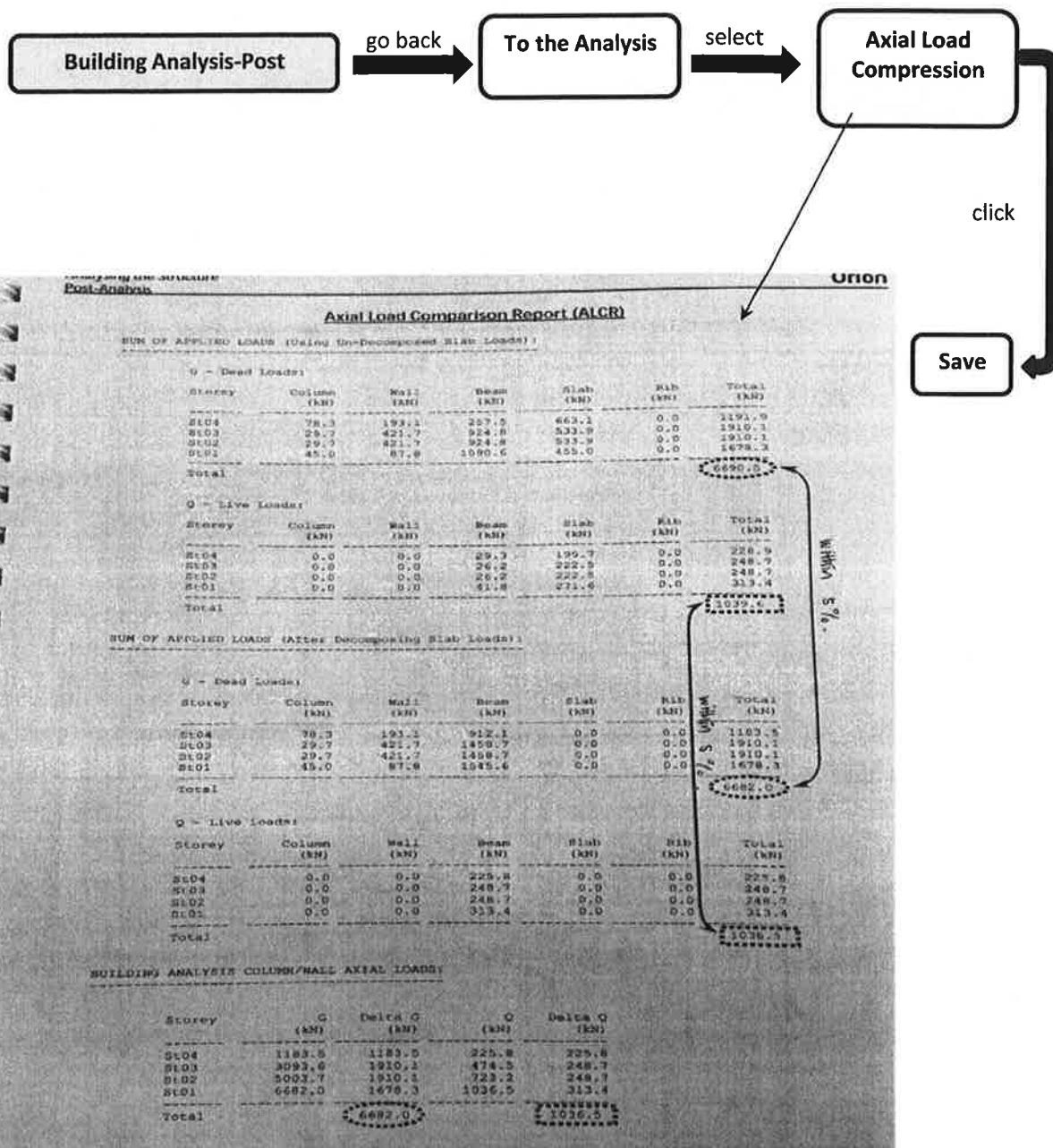




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7.2 Post-Analysis

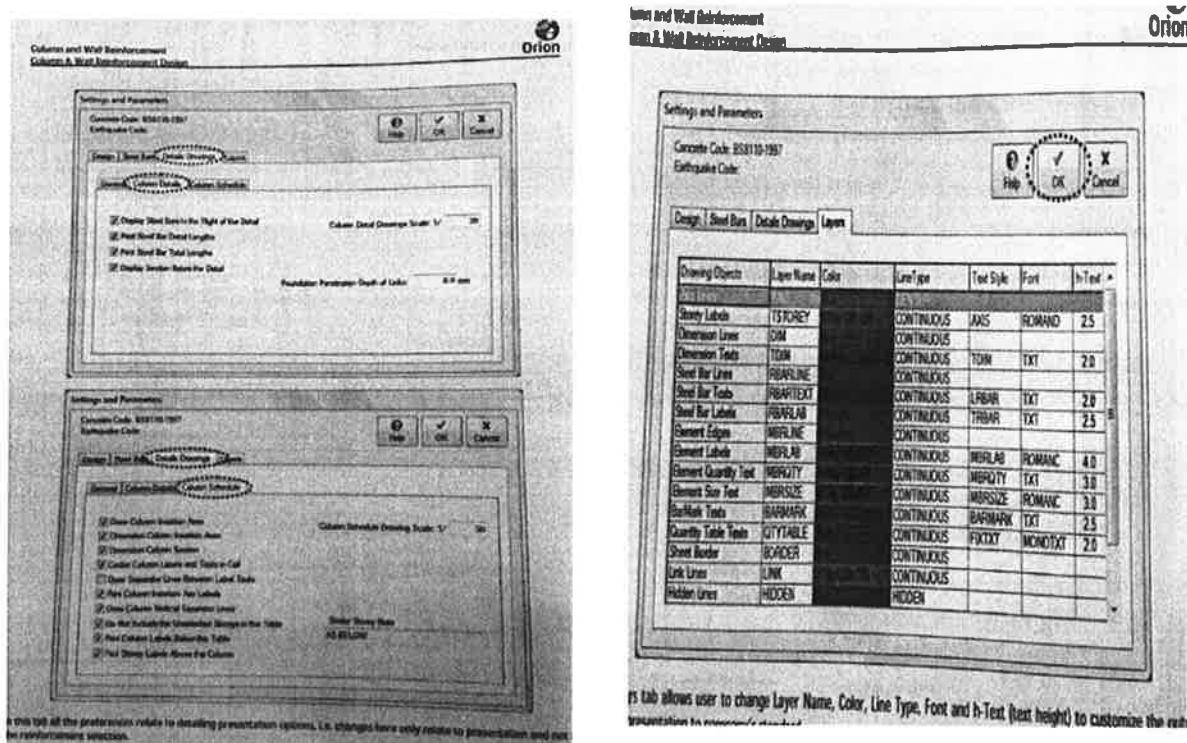
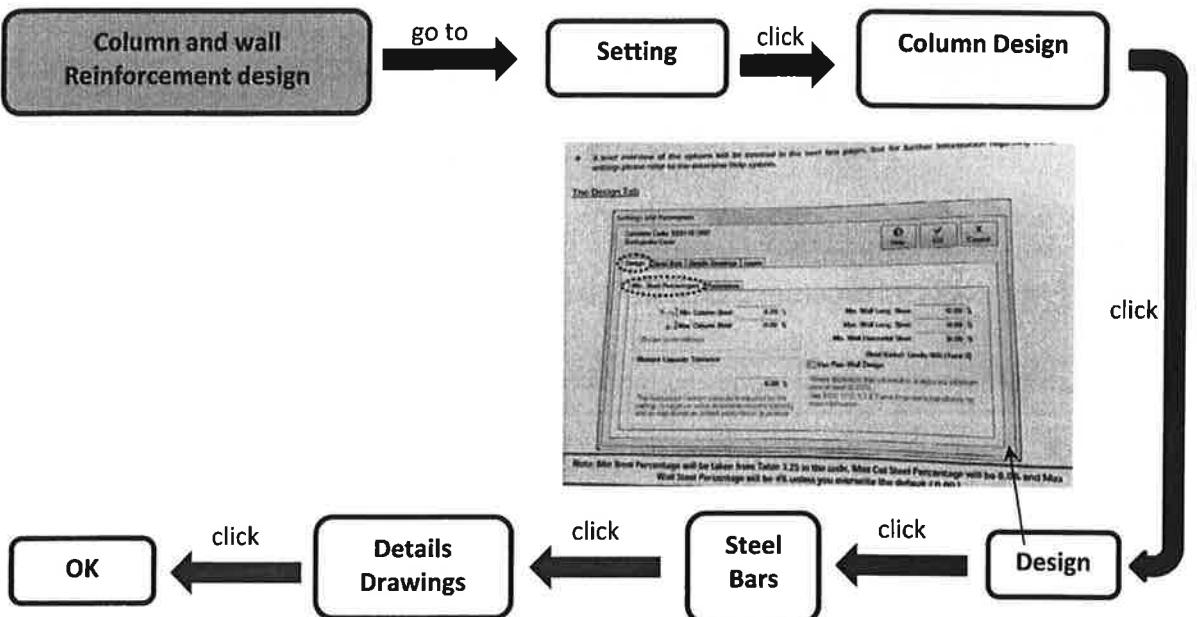




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8.0 Column and Wall Reinforcement Design





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8.1 Designing all Column using Batch Mode

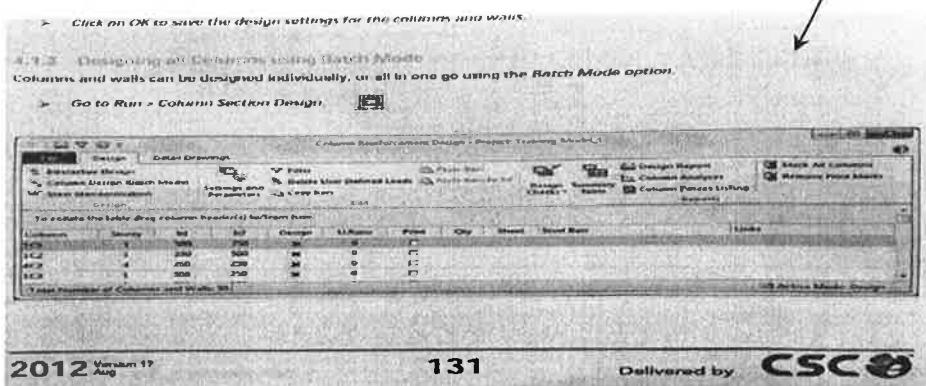
Designing Column using
Batch Mode

go to

Run

click

Column Section



The Messages button to
review the bars selected
for each column for each
combination

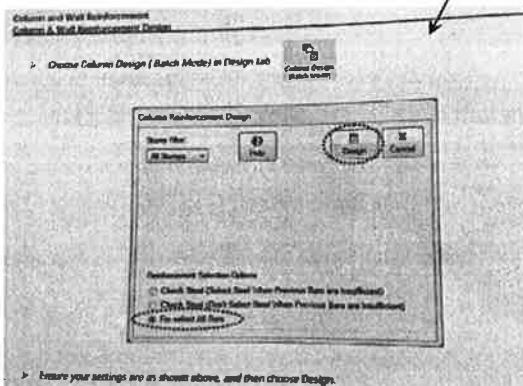
click

Design

choose

Column Design
(Batch Mode)
in Design Tab

choose



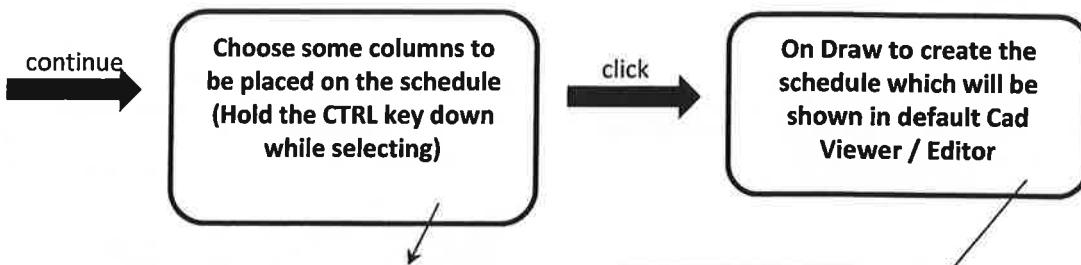
Column	Name	Size	Shape	Area	Spacings	Notes
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C2		250	250	✓	A412-2x12T2	
C3		250	250	✓	A412-2x12T2	
C4		250	250	✓	A412-2x12T2	
C5		250	250	✓	A412-2x12T2	
C6		250	250	✓	A412-2x12T2	
C7		250	250	✓	A412-2x12T2	
C8		250	250	✓	A412-2x12T2	
C9		250	250	✓	A412-2x12T2	
C10		250	250	✓	A412-2x12T2	
C11		250	250	✓	A412-2x12T2	
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C139		250	250	✓	A412-2x12T2	
C140		250	250	✓	A412-2x12T2	
C141		250	250	✓	A412-2x12T2	
C142		250	250	✓	A412-2x12T2	
C143		250	250	✓	A412-2x12T2	
C144		250	250	✓	A412-2x12T2	
C145		250	250	✓	A412-2x12T2	
C146		250	250	✓	A412-2x12T2	
C147		250	250	✓	A412-2x12T2	
C148		250	250	✓	A412-2x12T2	
C149		250	250	✓	A412-2x12T2	
C150		250	250	✓	A412-2x12T2	
C151		250	250	✓	A412-2x12T2	
C152		250	250	✓	A412-2x12T2	
C153		250	250	✓	A412-2x12T2	
C154		250	250	✓	A412-2x12T2	
C155		250	250	✓	A412-2x12T2	
C156		250	250	✓	A412-2x12T2	
C157		250	250	✓	A412-2x12T2	
C158		250	250	✓	A412-2x12T2	
C159		250	250	✓	A412-2x12T2	
C160		250	250	✓	A412-2x12T2	
C161		250	250	✓	A412-2x12T2	
C162		250	250	✓	A412-2x12T2	
C163		250	250	✓	A412-2x12T2	
C164		250	250	✓	A412-2x12T2	
C165		250	250	✓	A412-2x12T2	
C166		250	250	✓	A412-2x12T2	
C167		250	250	✓	A412-2x12T2	
C168		250	250	✓	A412-2x12T2	
C169		250	250	✓	A412-2x12T2	
C170		250	250	✓	A412-2x12T2	
C171		250	250	✓	A412-2x12T2	
C172		250	250	✓	A412-2x12T2	
C173		250	250	✓	A412-2x12T2	
C174		250	250	✓	A412-2x12T2	
C175		250	250	✓	A412-2x12T2	
C176		250	250	✓	A412-2x12T2	
C177		250	250	✓	A412-2x12T2	</td



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8.1 Designing all Column using Batch Mode (continuation)



**Column and Wall Reinforcement
Column & Wall Reinforcement Design**

A. STOREY	B-1	B-2	B-3	B-4	B-5
1. STOREY					
2. STOREY			600x600 452 Lbs= 372-34 Metric 372-34	600x600 452 Lbs= 372-32 Metric 372-32	
3. STOREY			600x600	600x600	
	300x300 452 Lbs= 372-26 Metric 372-26	300x300 452 Lbs= 372-25 Metric 372-25	300x300 452 Lbs= 372-25 Metric 372-25	300x300 452 Lbs= 372-25 Metric 372-25	300x300 452 Lbs= 372-25 Metric 372-25
	IC1	IC2	IC3	IC4	IC5

Note: The DWG's created are opened directly in the 3rd party cad editor or view of your choice, which can be specified via the CAD Editor tab on the General Settings.

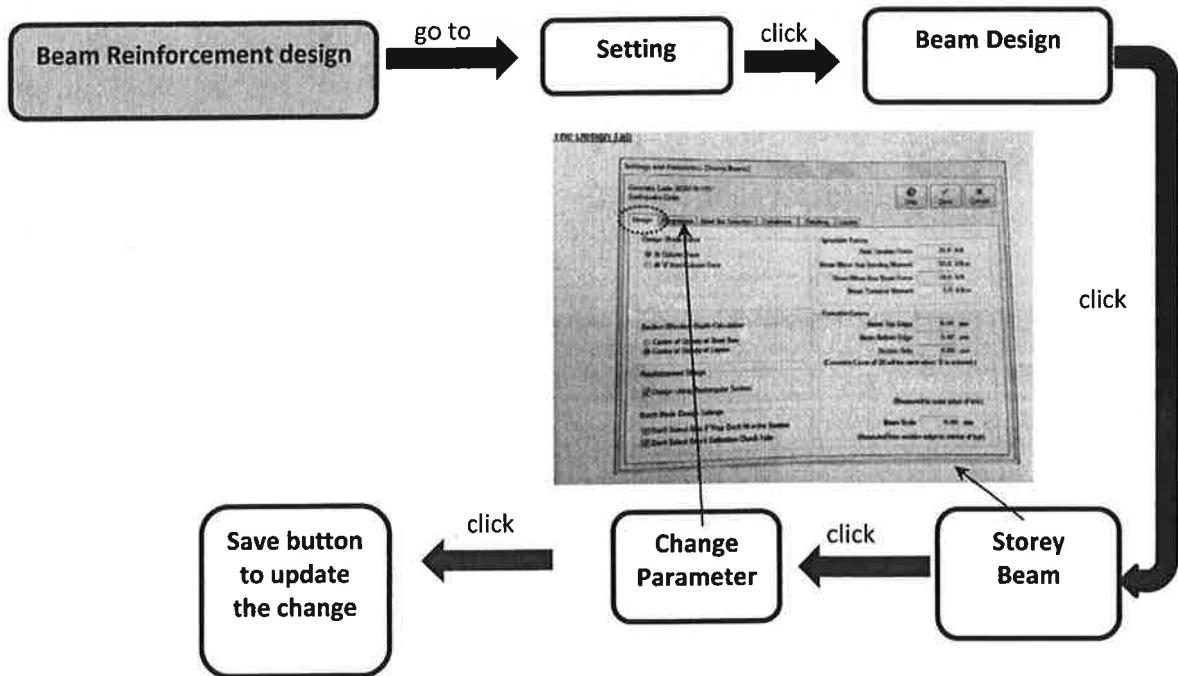
- The time it takes to display the drawing is greatly influenced by the time the system takes to start up the edt editor/ viewer – it is suggested that once opened, you keep this open and close the drawings rather than shutting it down.



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9.0 Beam Reinforcement Design

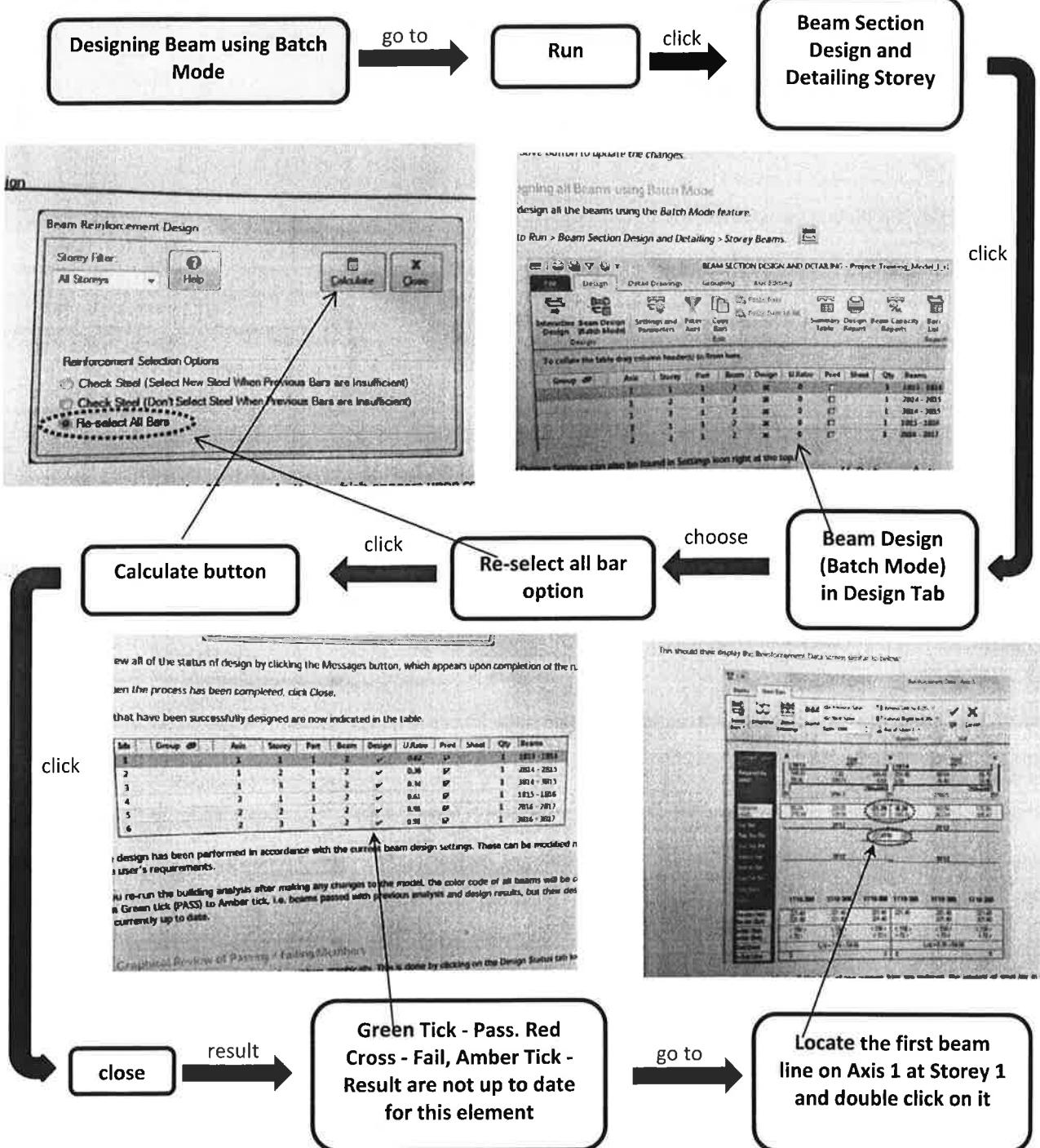




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9.1 Designing Beam Using Batch Mode

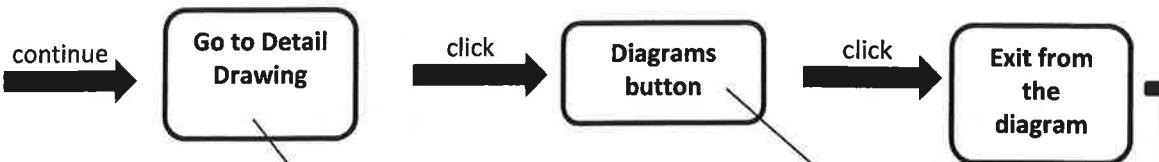




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9.1 Designing Beam Using Batch Mode (continuation)

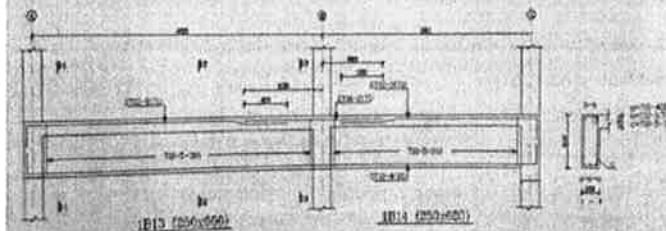


gures in red indicate a problem. If the nos. of top support bars are reduced, the amount of steel bar in the beam will be indicated in red, as shown above.

Beam Deuml Drawings

The pattern above is referred to as Standard Pattern 2.

To preview the beam detail drawing, click on the Detail Drawing button.

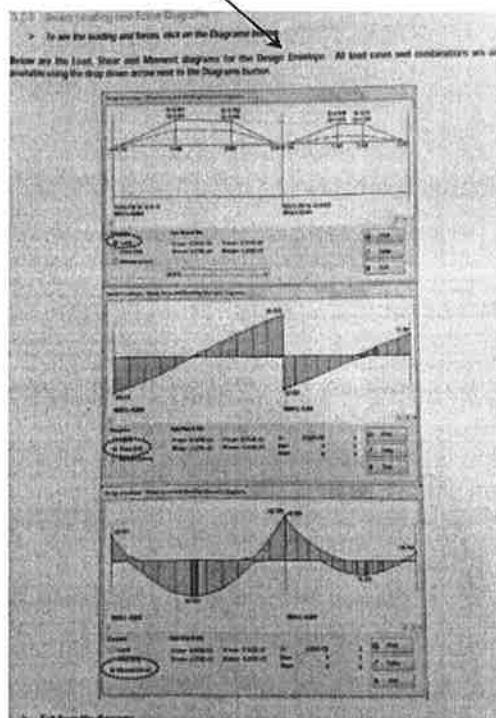


The postfix number "-1, -2" are the bar position marking which is required to read with the steel quantity table. can be switched off in the Beam Design Settings > Detailing > General - 'Show Bar Marks'.

10/10/2011

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10.0 PENGHARGAAN

CKASJ merakamkan setinggi penghargaan dan terima kasih atas segala sumbangan dan kerjasama dari semua Ahli Jawatankuasa Penyediaan Manual Rekabentuk Struktur seperti berikut:

Pengerusi:

Ir. Abd. Halim bin Ibrahim

- Bahagian Struktur (Keselamatan)

Penyedia Panduan 05:

Pn. Noorhayati binti Abd. Hamid

- Bahagian Struktur (Kesihatan)

Ahli Jawatankuasa:

Ir. Fazilah binti Musa

- Bahagian Struktur (Keselamatan)

Ir. Tan Lee Lian

- Bahagian Struktur (Keselamatan)

Ir. Zaleha binti Salehoddin

- Bahagian Struktur (Keselamatan)

Pn. Asrimayanti binti Chi Ani

- Bahagian Struktur (Kesihatan)

Ir. Sarina binti Ismail

- Bahagian Struktur (Pend. dan Peng. Tinggi)

Pn. Nor Iftitah binti Ibrahim

- Bahagian Struktur (Pend. dan Peng. Tinggi)

Ir. Ayu Sazrina binti Sabari

- Bahagian Khidmat Pakar

En. Ahmad Nazmi bin Zaim

- Bahagian Struktur (Bangunan Am 2)

Urusetia:

Puan Noraini Zainol

- Bahagian Struktur (Keselamatan)

Dicetak: Pusat Percetakan, Cawangan Pengurusan Korporat,
Ibu Pejabat JKR Kuala Lumpur 06/2014