

SAP - Etabs²⁰¹⁶

Structural Analysis Program Extended 3D Analysis of Buildings Systems

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Lecturer

Department of Civil Eng..

Fayoum U



*+Safe Introduction
+Etabs Design Introduction*

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Edition 4 - 2016

Brief Introduction to ECL 2012

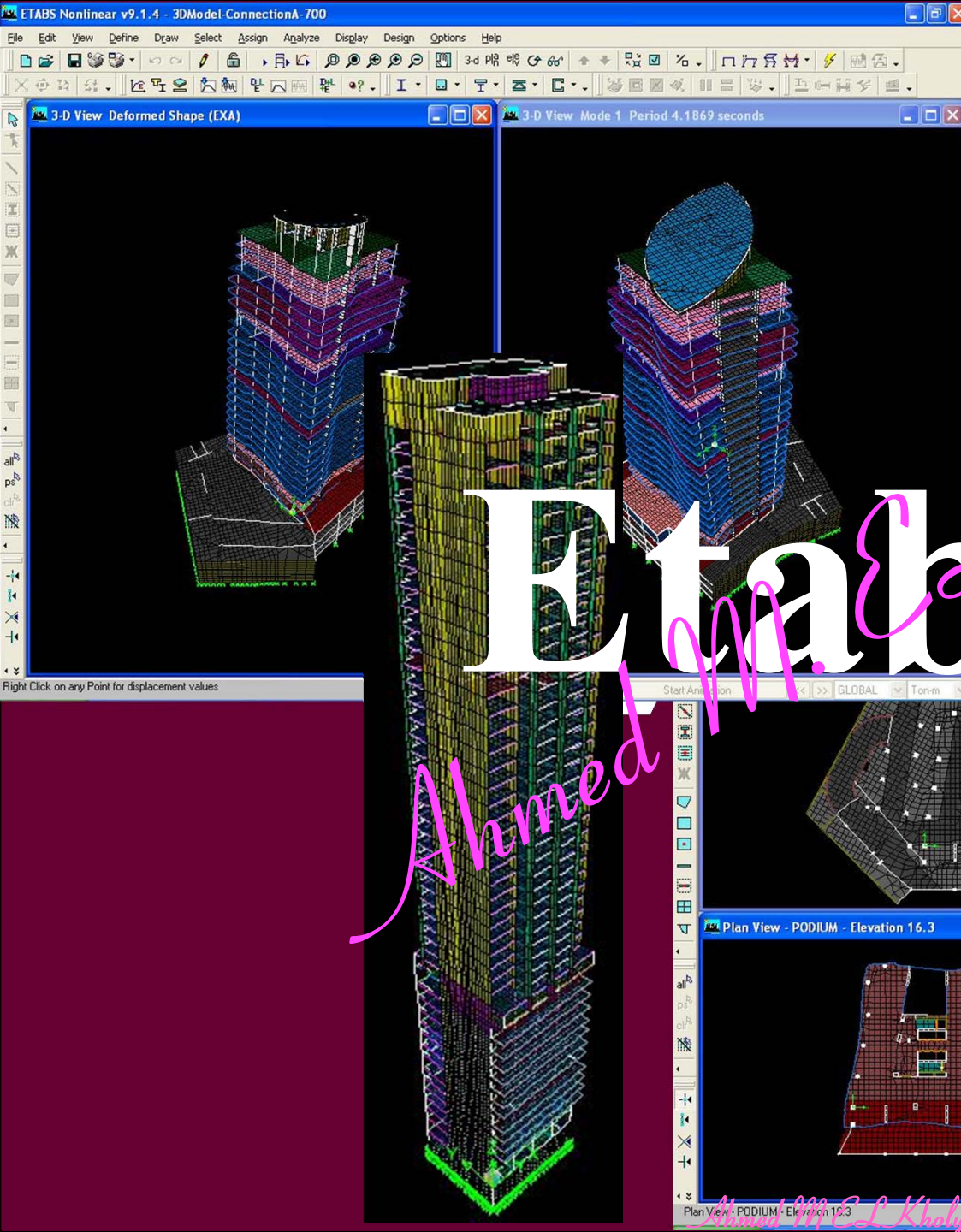
Code ECL 2012

..

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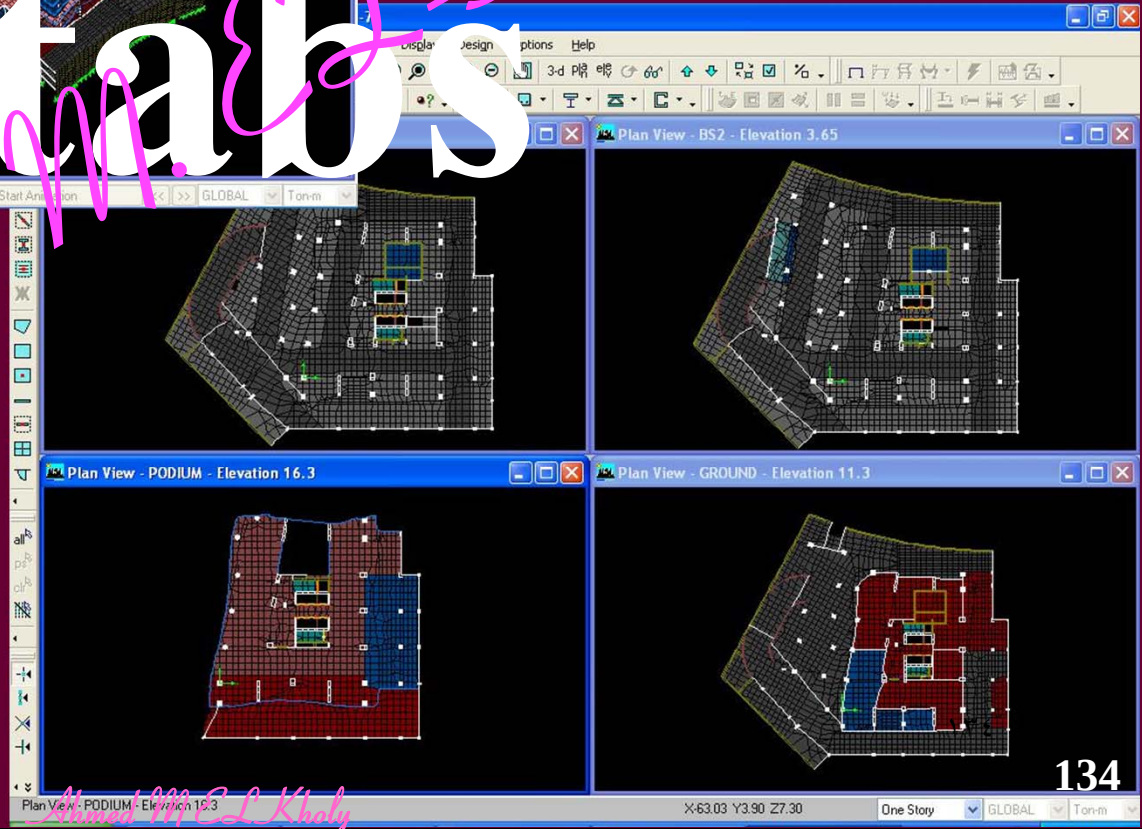
...

.....



ETABS

Ahmed M. S. Kholy



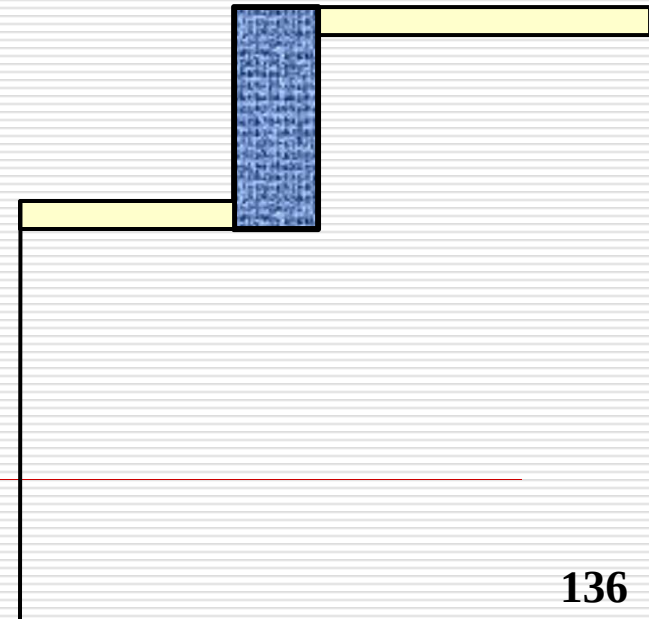
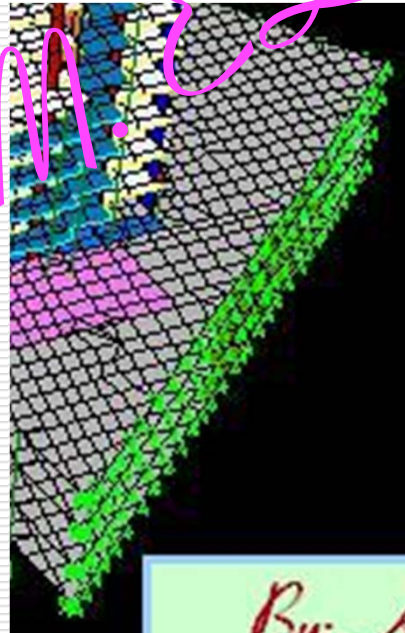
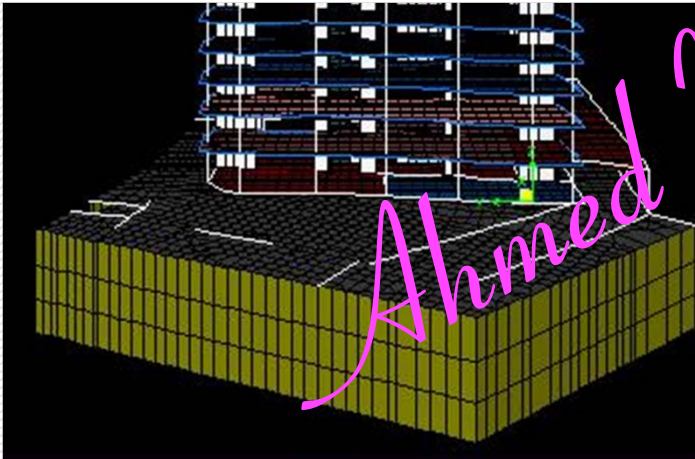
Etabs

DXF

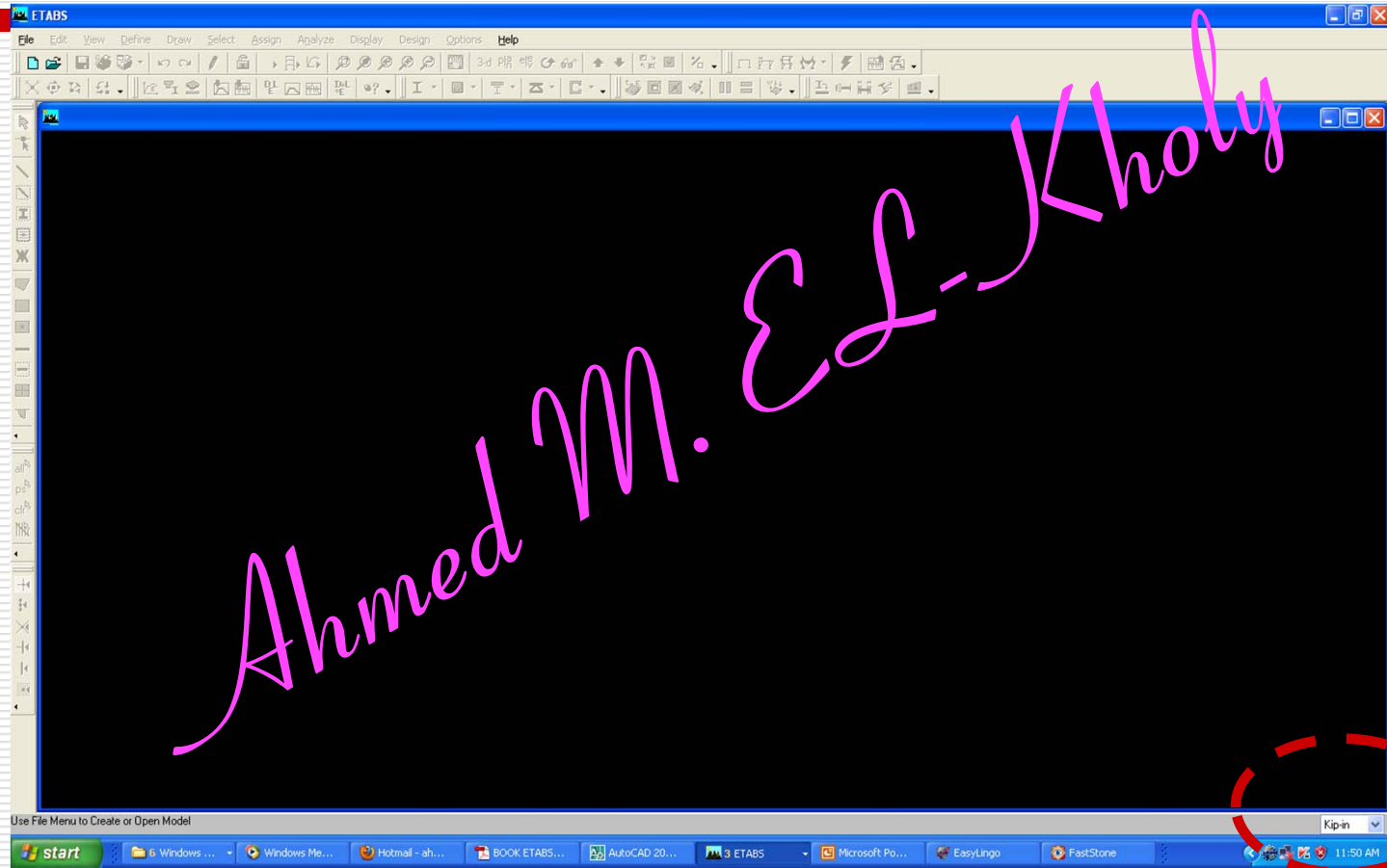
1. Prepare DXF for different floors in Autocad as shown in the given practice in lecture.

1. Try to avoid triangle and irregular elements shapes as much as possible
2. Choose carefully & fix (0,0) point in Cad & Etabs
3. **The mesh should be applicable for continuity of the columns and shear walls in all floors**
4. Check your mesh in Cad many times before working on Etabs
5. Delete any thing on layer 0
6. Draw Slabs in Cad & (Col, beams, SW) in Etabs

7. Large Columns supporting spaced parallel beams may be modeled using area elements.
8. Two alternatives to model the retaining wall.



2-Units



Ton-m

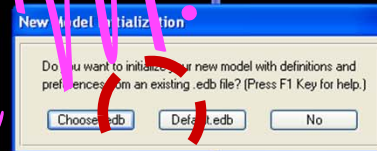
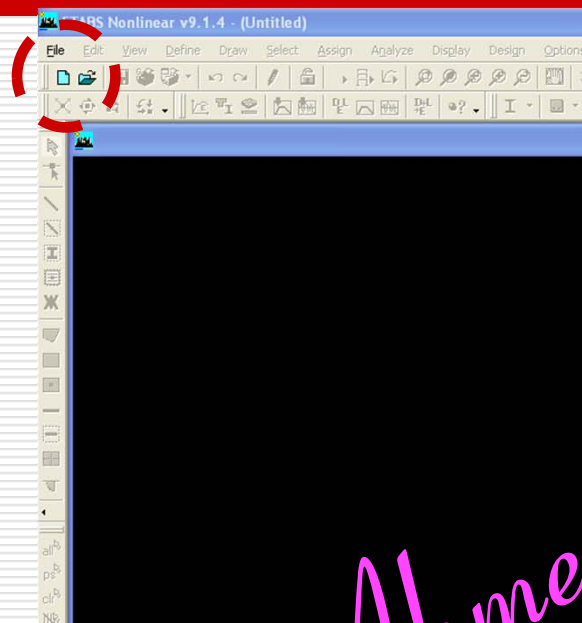
3- New,... edb

X Spacing

1.82,3.87,2.87,1.63,1.63,2.87,3.87,1.82

Y Spacing

3.38,2.74,1.5,1.31,2.25,1.31,1.5,2.68,3.44



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4- Grid, Axes, Story data according your project

Master story & similar stories (F2 is master)

5- Etabs Commands & Icons

ETABS Nonlinear v9.1.4 - Model-01

File Edit View Define Draw Select Assign Analyze Display Design Options Help

Plan View - STORY10 - Elevation 32

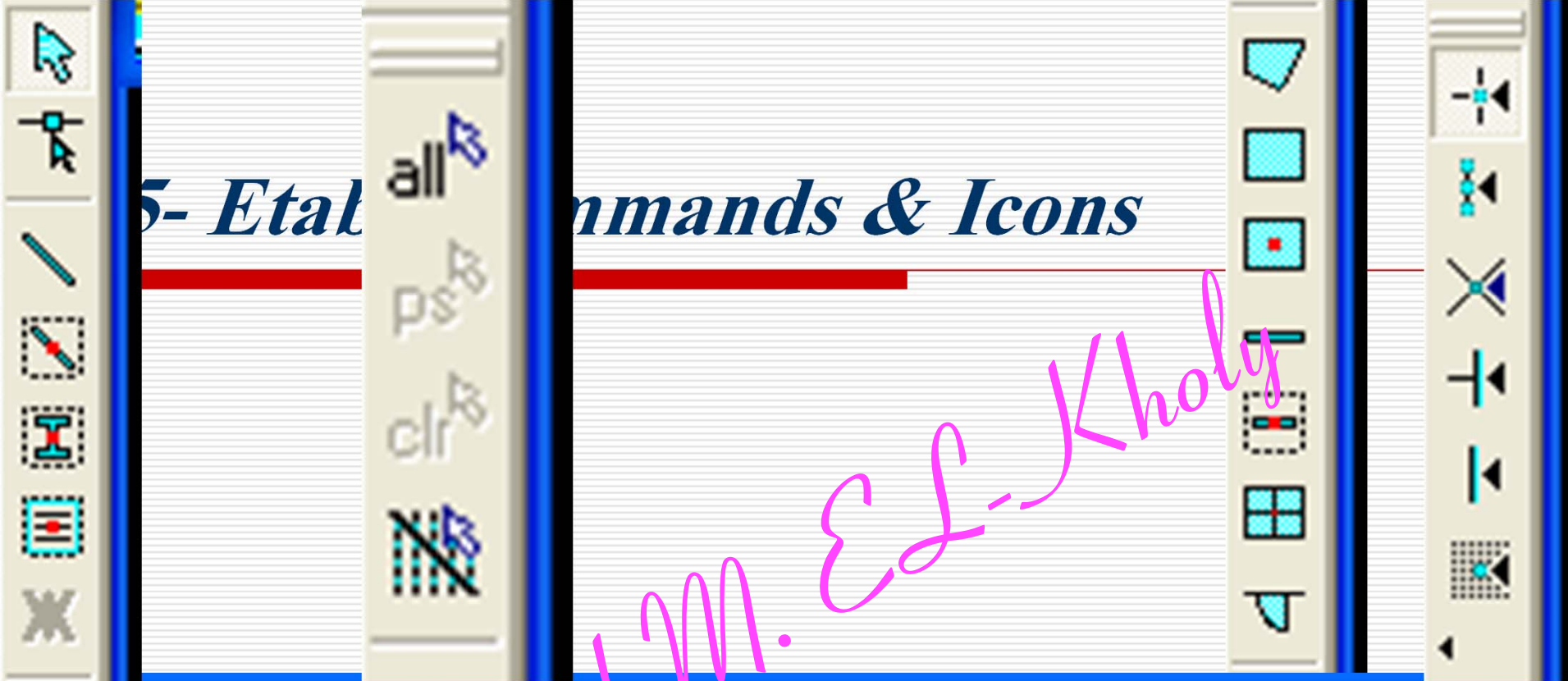
3-D View

5- Options-Window-Change the windows number if you want

One story
Similar stories
All

139

5- *Etat Commands & Icons*



7- Define Design Data and Material (Slab, Columns, Core..)

7- Design data (Options-Preferences-Concrete Frame Design/Shear Wall Design) ACI318-02 – Cm^2 - Cm^2/m

8- Material properties (Define-Material Properties-Concrete 350) according the considered code

The image shows two overlapping software dialog boxes. The 'Material Property Data' dialog is in the foreground, and the 'Wall Pier/Spandrel Design Preferences' dialog is in the background.

Material Property Data

Material Name: 50MPA

Type of Material: ☒ Isotropic ☐ Orthotropic

Analysis Property Data

Mass per unit Volume	0.2448
Weight per unit Volume	2.4026
Modulus of Elasticity	3800699.
Poisson's Ratio	0.2
Coeff of Thermal Expansion	9.900E-06
Shear Modulus	1583624.58

Design Property Data (ACI 318-02)

Specified Conc Comp Strength, f'c	5000.
Bending Reinf. Yield Stress, fy	42000.
Shear Reinf. Yield Stress, fys	42000.
☐ Lightweight Concrete	
Shear Strength Reduc. Factor	

Display Color: Color [Blue]

Type of Design: Design [Concrete]

Buttons: OK, Cancel

Wall Pier/Spandrel Design Preferences

Design Code	ACI 318-02
Rebar Units	cm^2
Rebar/Length Units	cm^2/m
Phi (Tension Controlled)	0.9
Phi (Compression Controlled)	0.65
Phi (Shear and/or Torsion)	0.75
Phi (Shear Seismic)	0.6
Pmax Factor	0.8
Number of Curves	24
Number of Points	11
Edge Design PT-Max	0.06
Edge Design PC-Max	0.04
Section Design IP-Max	0.02
Section Design IP-Min	0.0025
Utilization Factor Limit	0.95

9- Define Wall, Column, Beam, Slab Sections

9- beams.... Define-Frame sections (Add Rectangular) .. Make C30x100, C40x90, B25x60, B12x60

9- slabs.... Define-Wall/Slab/..sections (Add slab, add wall) Make W30, W40, Slb20, Slb22 according the considered code

9- Define Wall, Column, Beam, Slab Sections

Columns Modifier $I_{eff}=0.7I_g$

Shear Walls $I_{eff}=(0.70)$ or $0.50I_g$ (2008) $0.35I_g$ (2012)

Beams $I_{eff}=0.5I_g$ ($0.35I_g$ ACI)

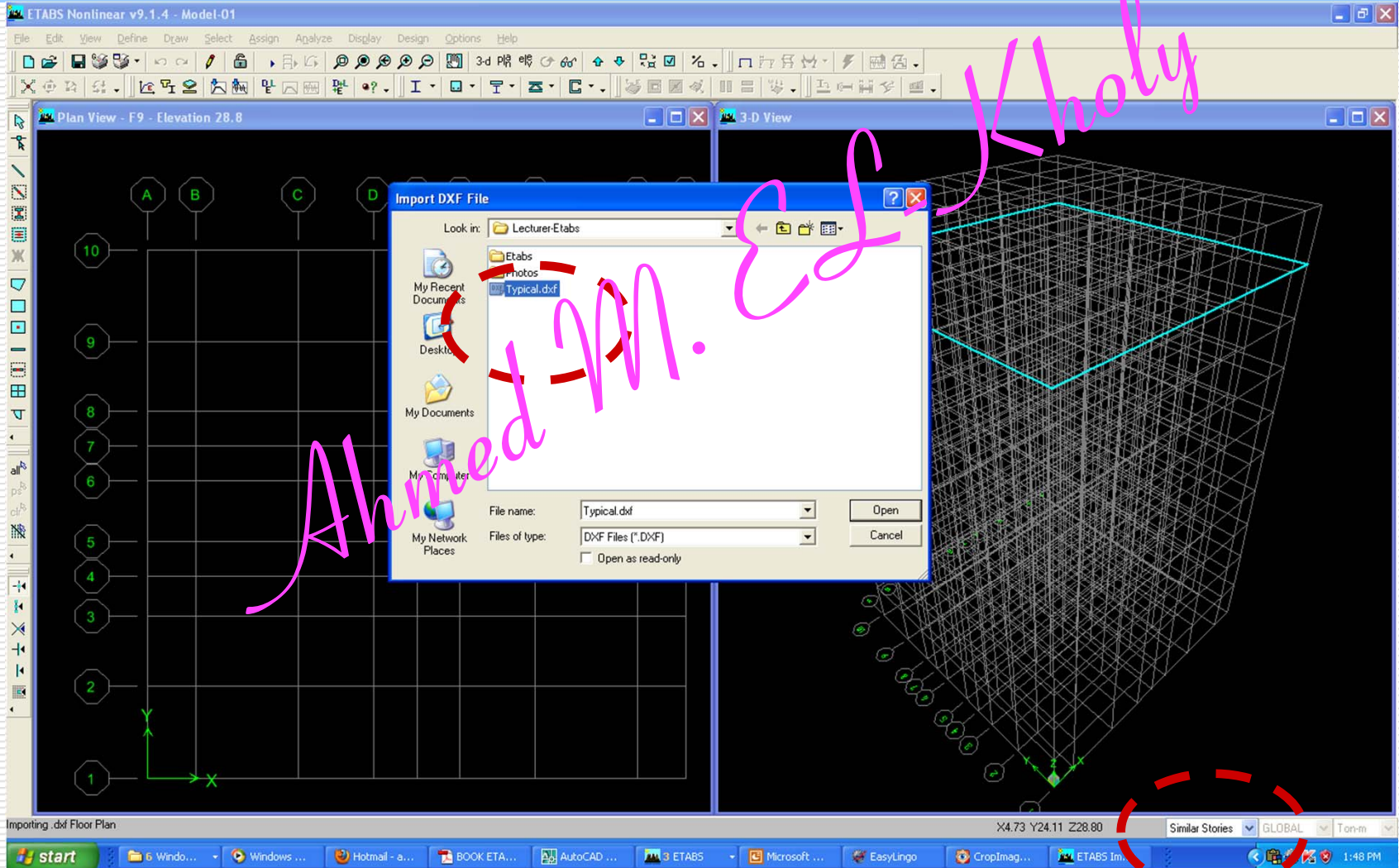
Slabs $I_{eff}=0.25I_g$

Chapter 6 in Egyptian RC Code– Ch 8 Egy Code loads

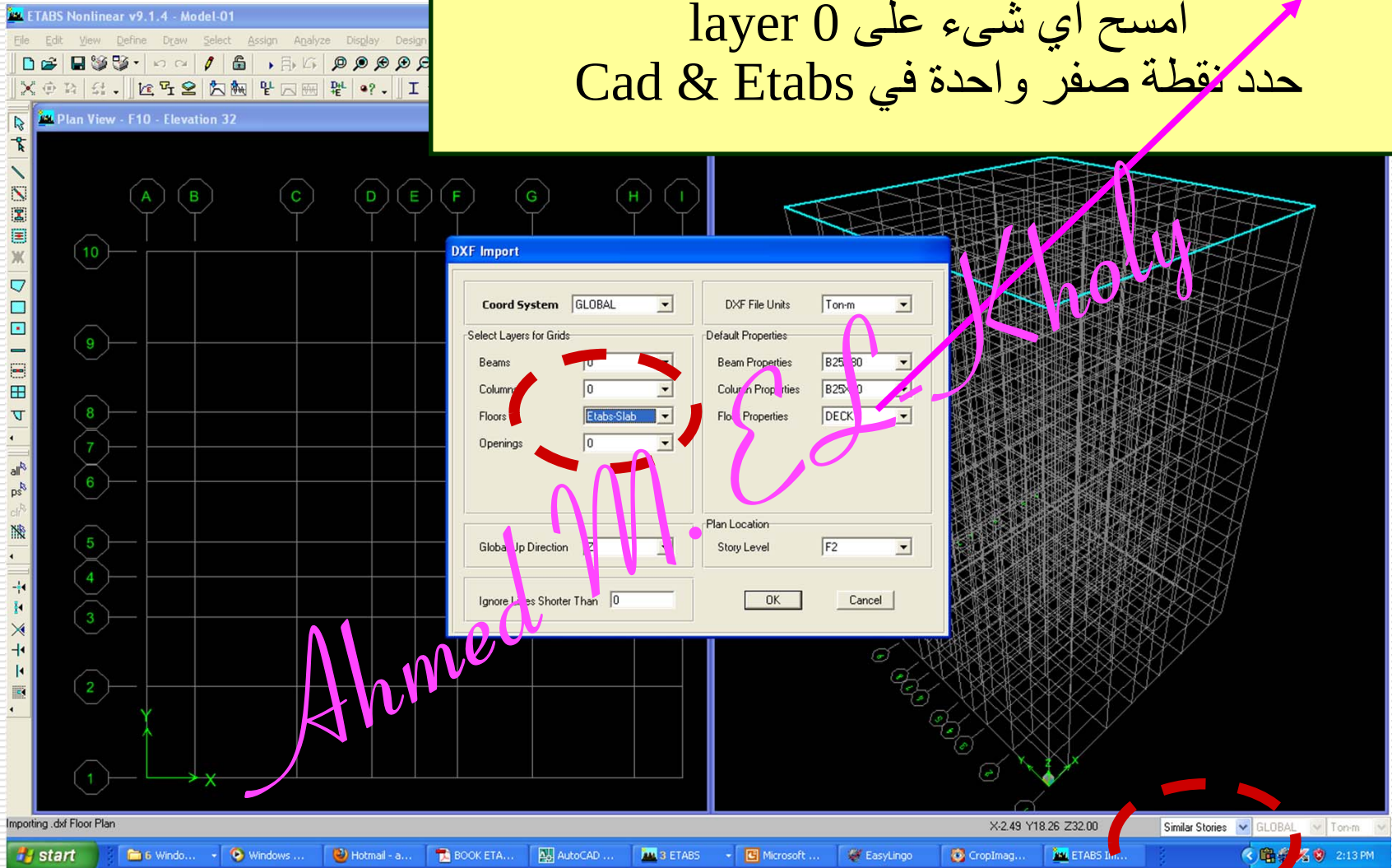
These modifier for M1,M2,M12

10- Import your DXF floors

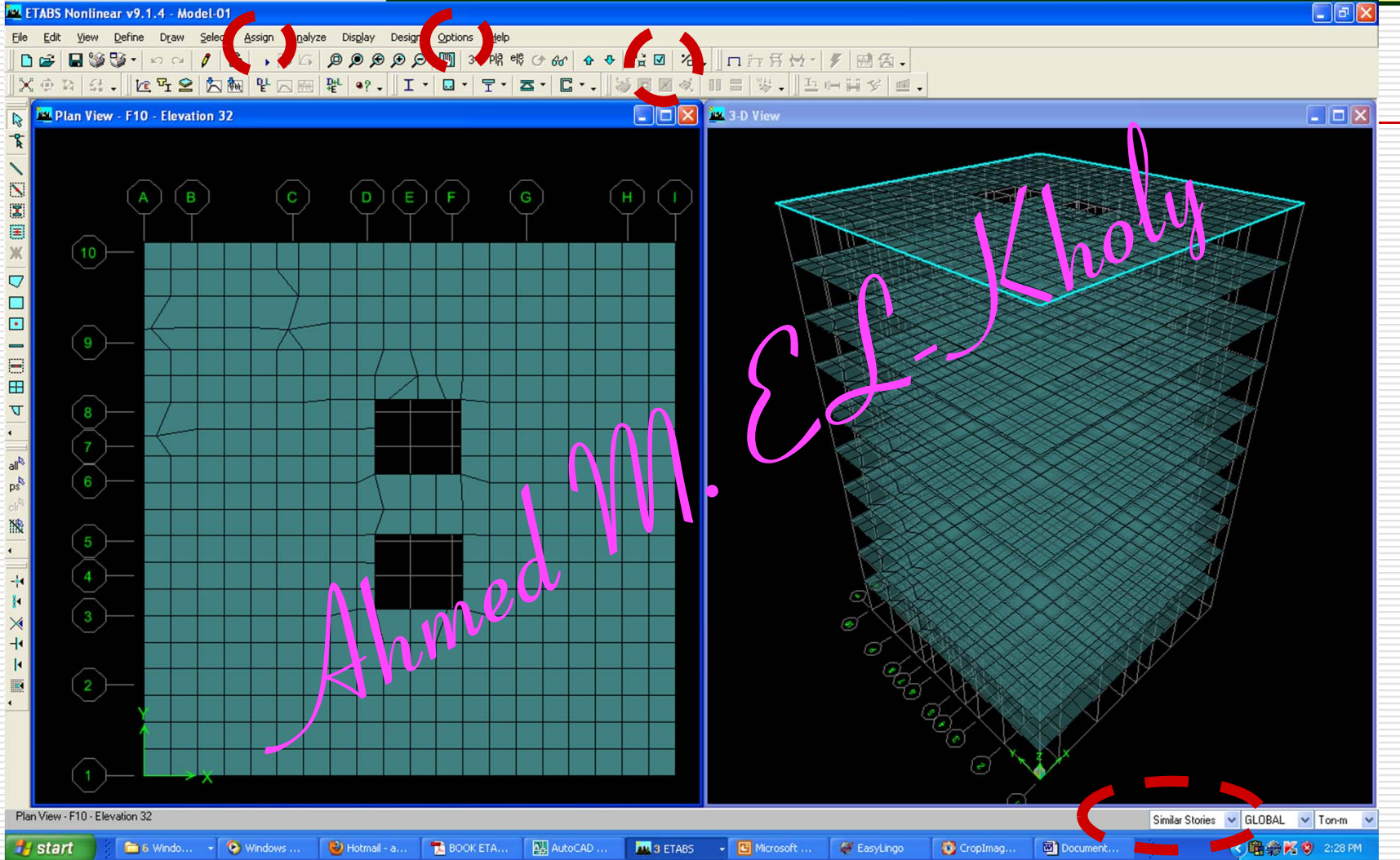
File-Import-DXF floor plan



قطاعات مبدئية غيرها بعد سحب المودل بالقطاعات الفعلية
امسح اي شيء على layer 0
حدد نقطة صفر واحدة في Cad & Etabs



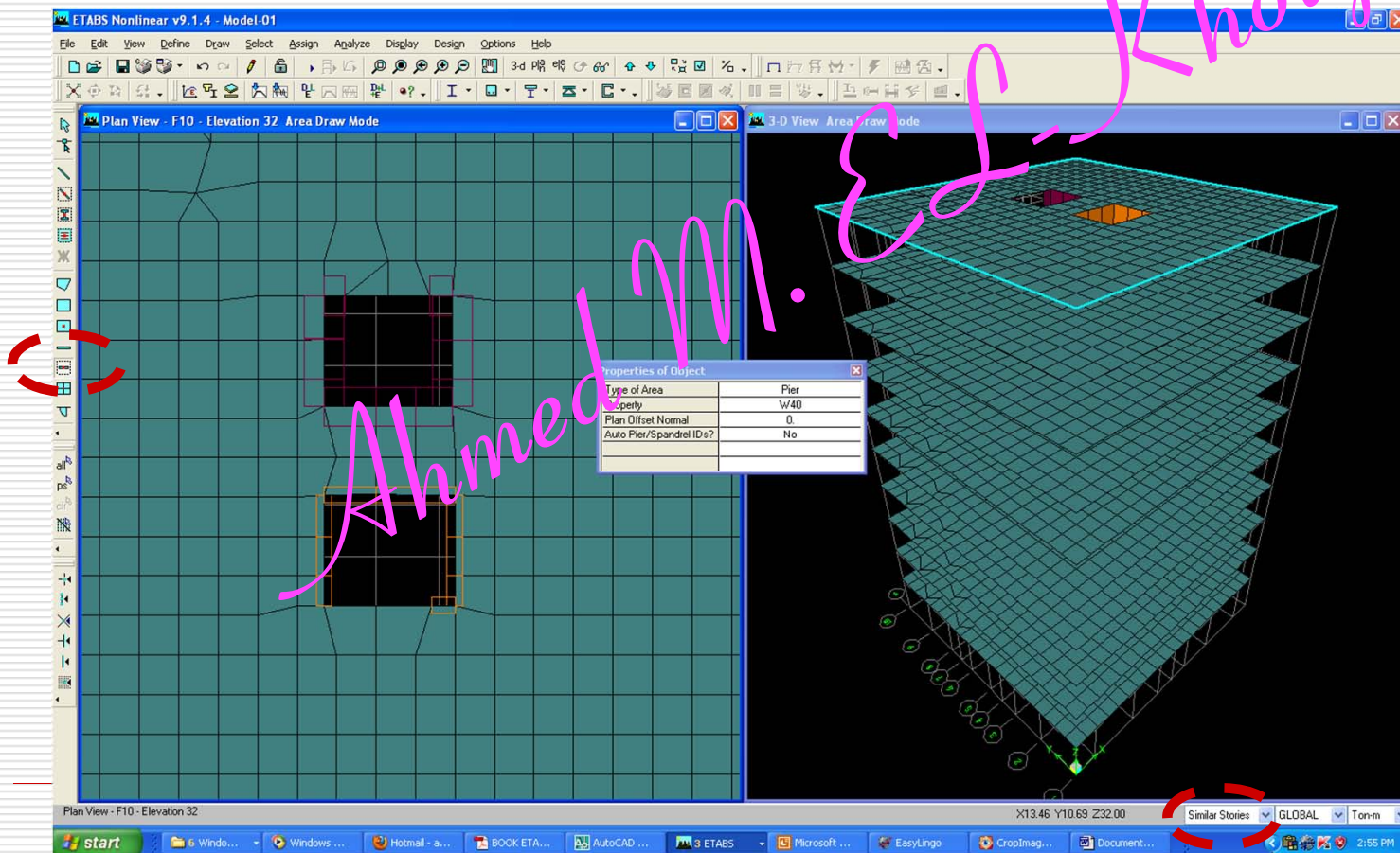
المودل بعد سحبه و تغيير قطاع البلاطة بالقطاع الفعلى



11-Select slabs then, Assign-Shell/Area-Wall/Slab
Section-Slb22

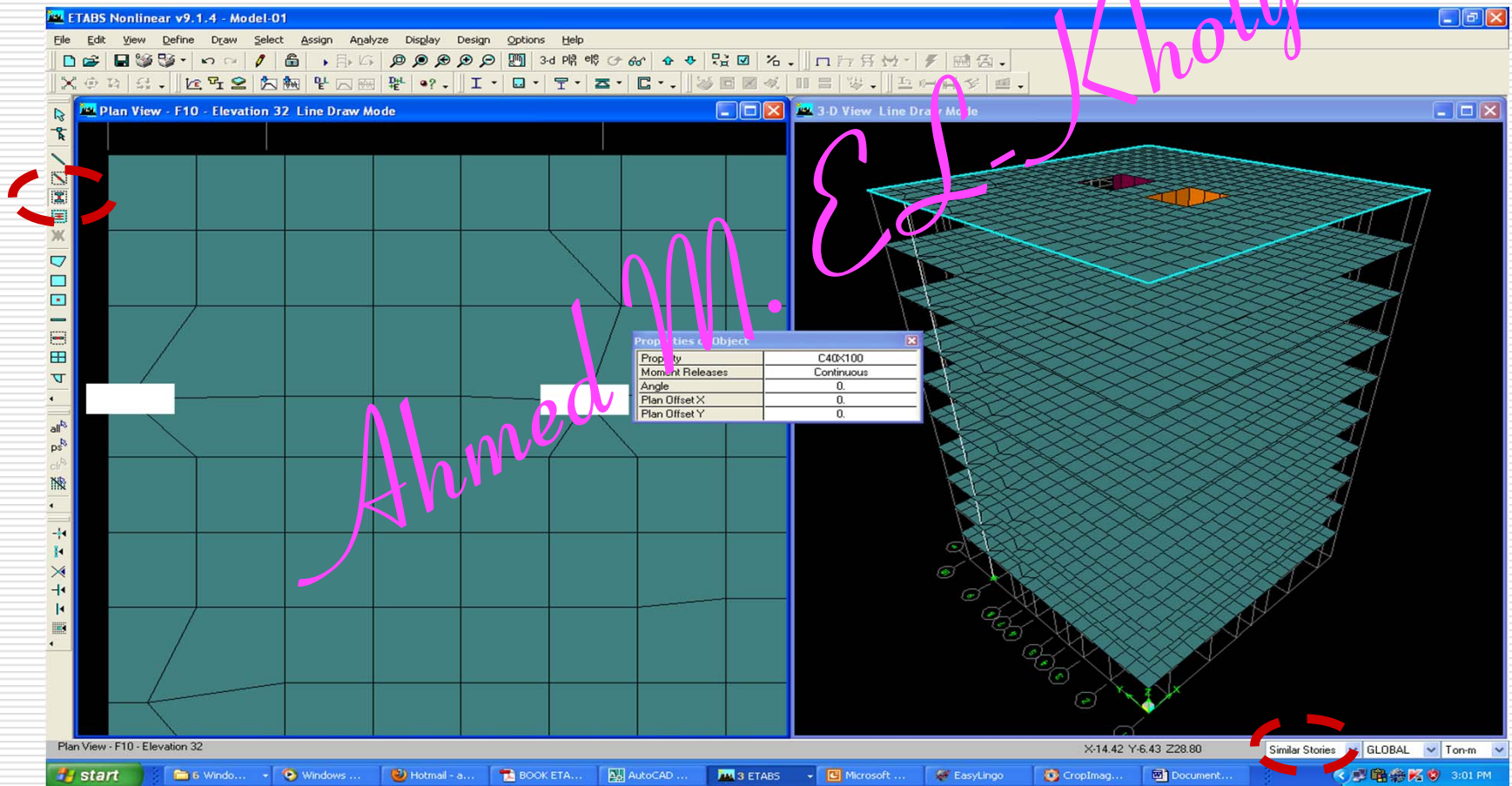
12- Draw Beams, Col, Shear walls

Draw beams, columns, shear walls with exact cross sections in Etabs



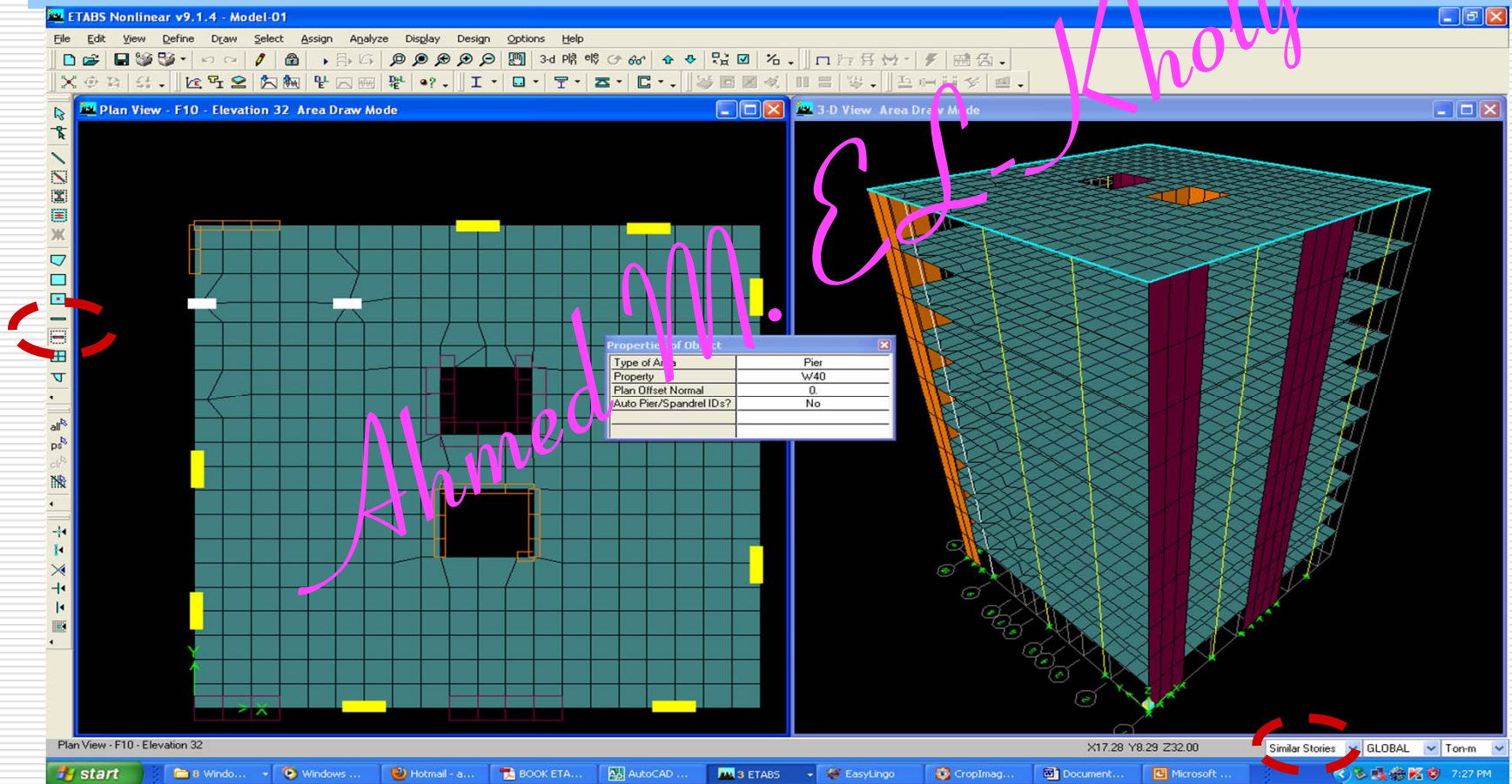
12- Draw Beams, Col, Shear walls

Draw beams, columns, shear walls with exact cross sections in Etabs



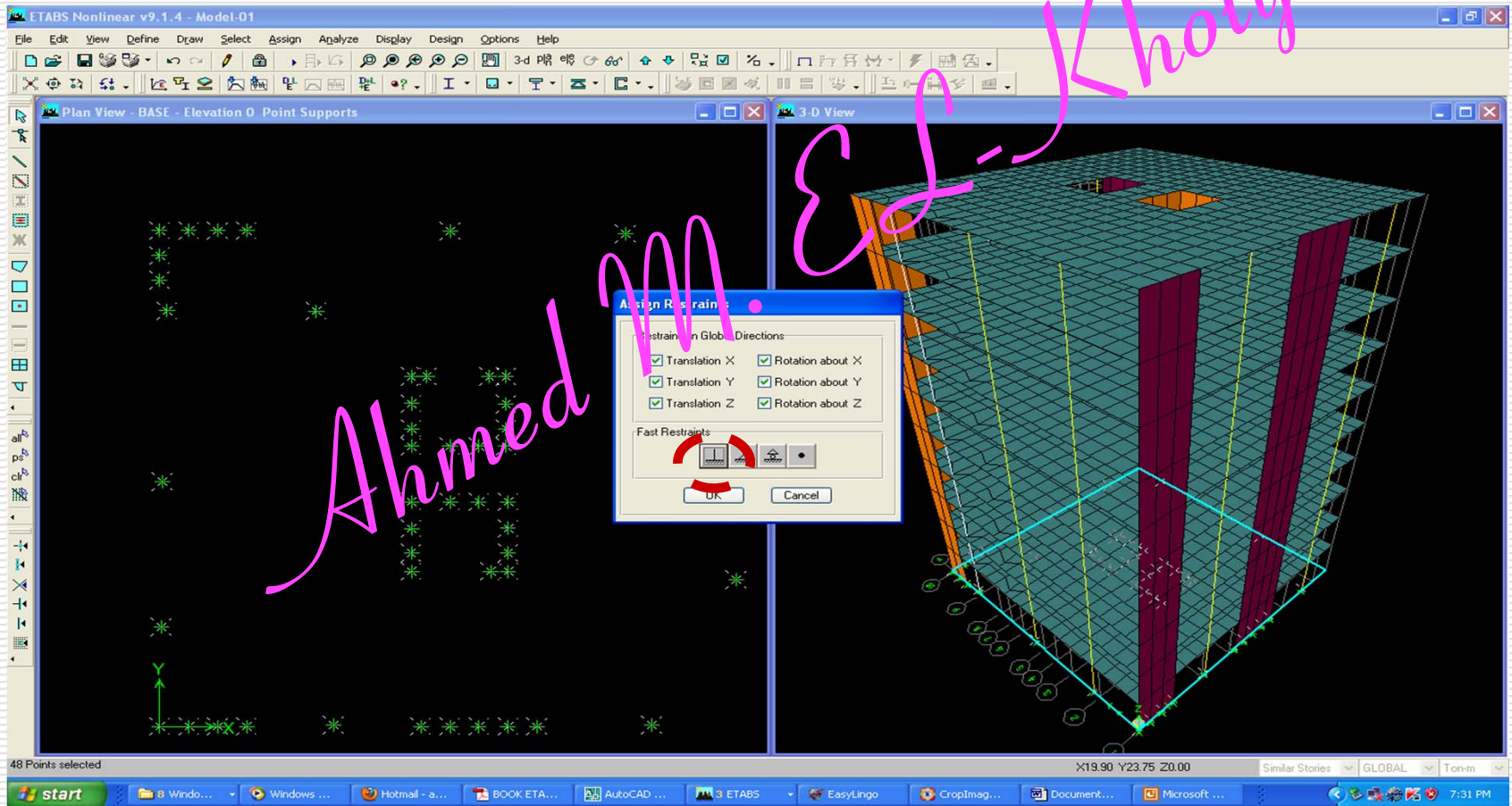
12- Draw Beams, Col, Shear walls

Draw beams, columns, shear walls with exact cross sections in Etabs



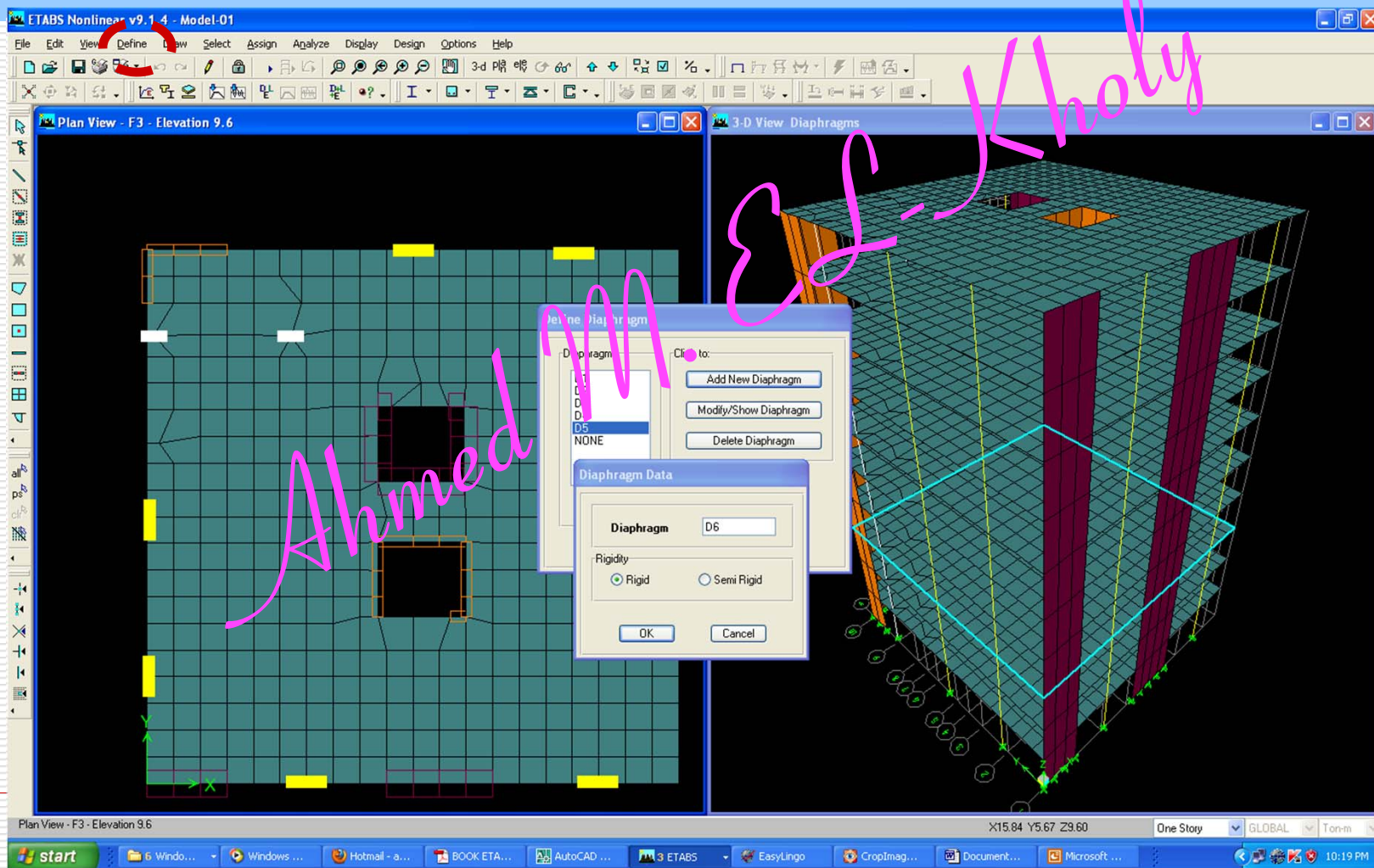
13- Fix the base points

Select the base points and then, Assign-joints-restraints and choose fixed



14- Define Diaphragms for floors

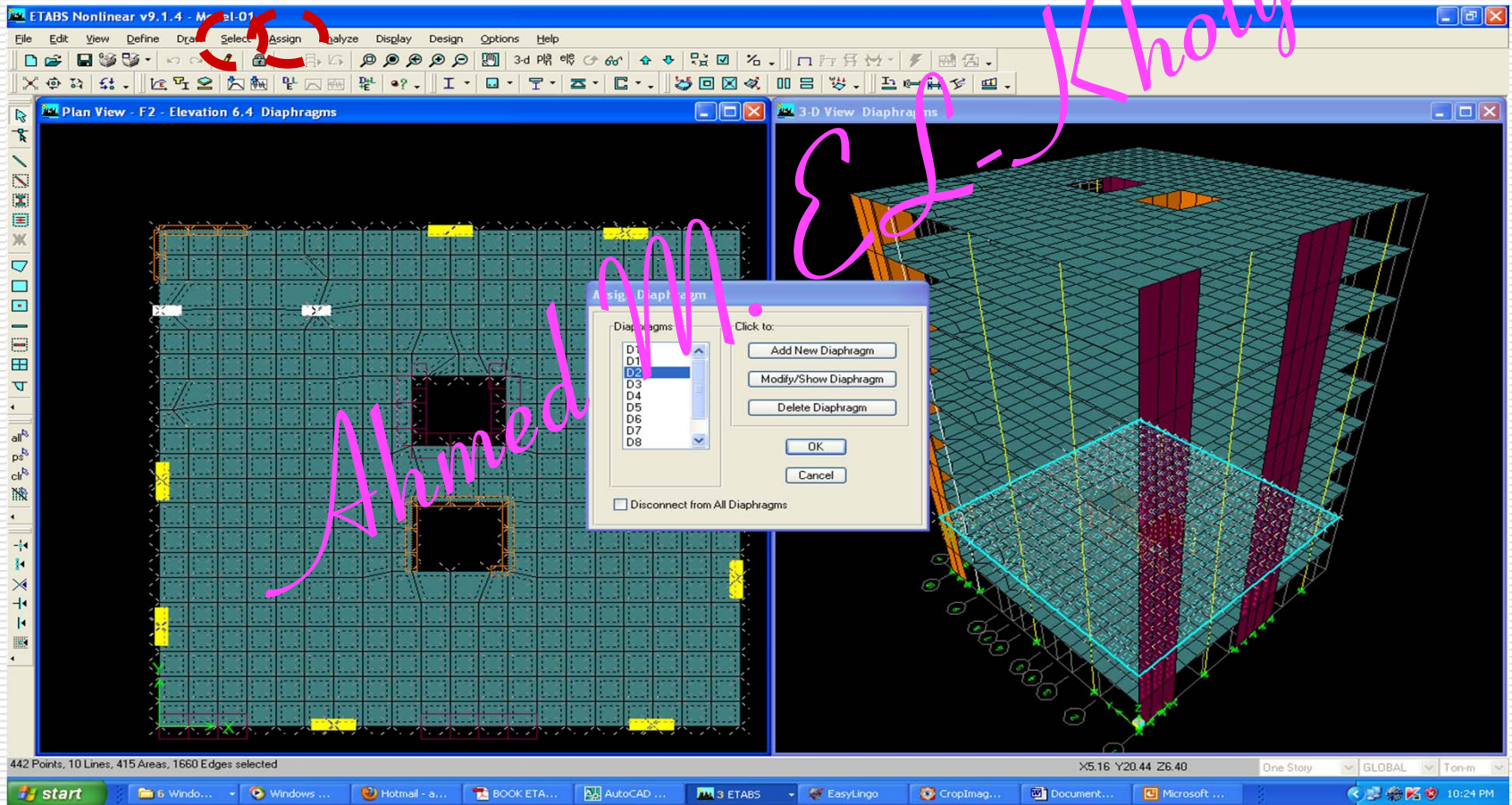
Menu: Define-diaphragm-D1,D2,D3,D4.....D10



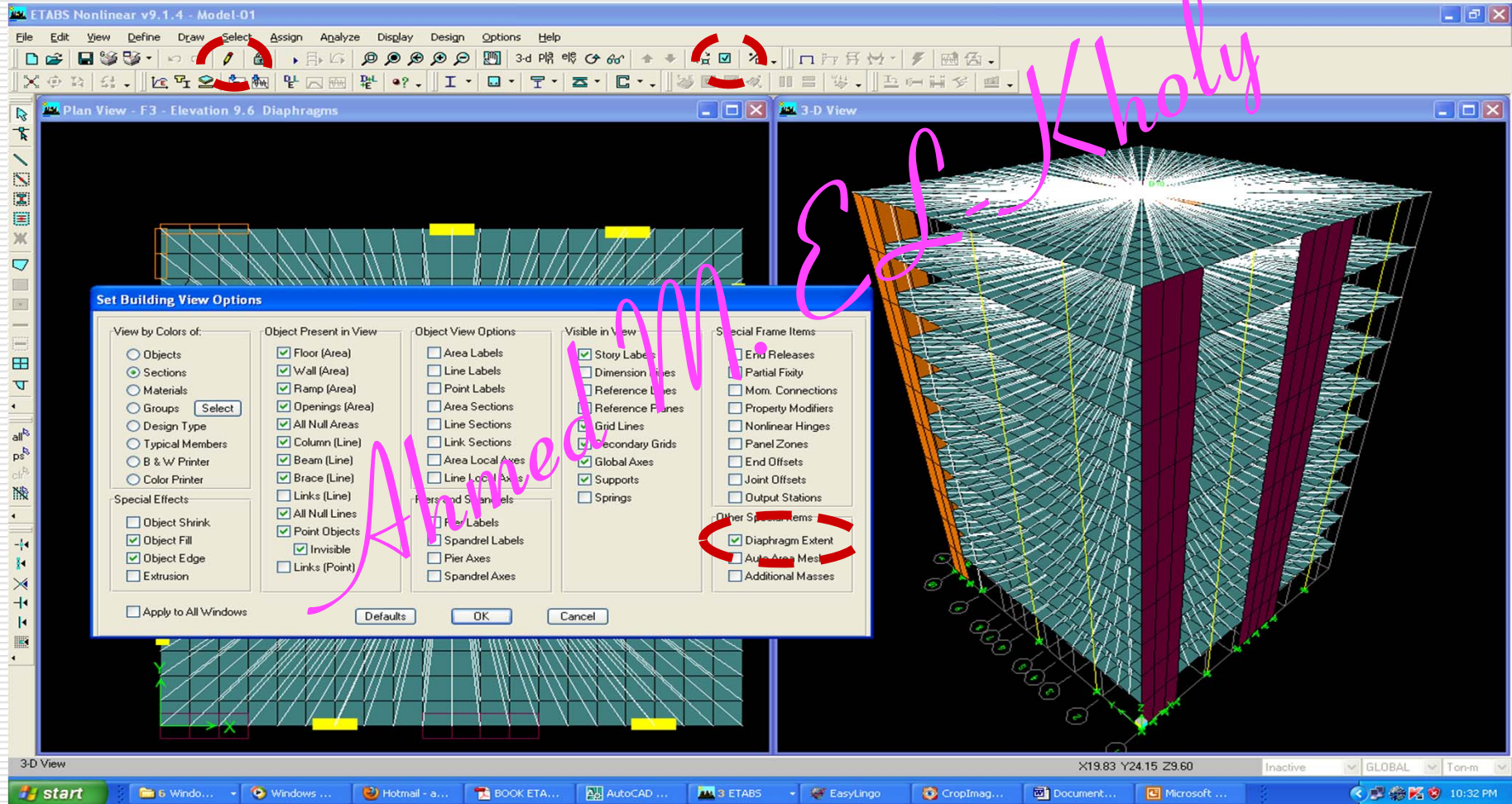
14- Assign Diaphragms for floors

Menu: Select-by story- story2

Assign-Shell-D2



After assigning all diaphragms



- 15- Mesh Shear Wall Areas
- 16- Define Static Load Cases → *D, L, Equivalent Static EQ, ...Temp, H, Wind, Snow*
- 17- Define Response Spectrum Functions } *Only for Spectra Method*
- 18- Define Response Spectrum Cases }
- 19- Define Load Combinations ?? *Spectra or not?*
- 20- Assign Loads ...D, L, ...
- 21- P-delta Effect/Dynamic Analysis
- 22- Define Mass source
- 23- Assign Piers
- 24- Check model
- 25- Run Analysis & Check Log File
- 26- If Spectra Method is utilized, Scale the Base Shear of Spectra Method to the 0.85 Base Shear of Equivalent Static. ...ECL2012 P141
- 27- Re-Run & Check Log File...
- 28- Checks: Mass Ratio, Drift, Overturning & Sliding
- 29- Read Straining Actions
- 30- Design

D, L, Equivalent Static EQ, ...Temp, H, Wind, Snow

Only for Spectra Method

Retaining Wall !!.. Scale level

26- If Spectra Method is utilized, Scale the Base Shear of Spectra Method to the 0.85 Base Shear of Equivalent Static. ...ECL2012 P141

27- Re-Run & Check Log File...

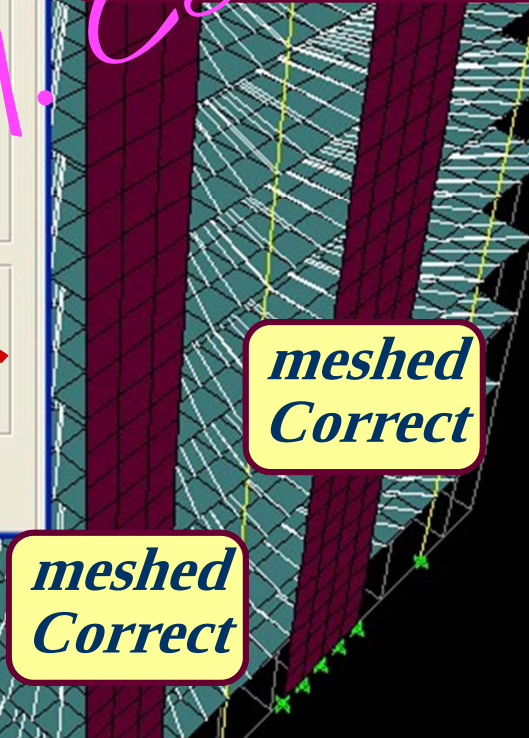
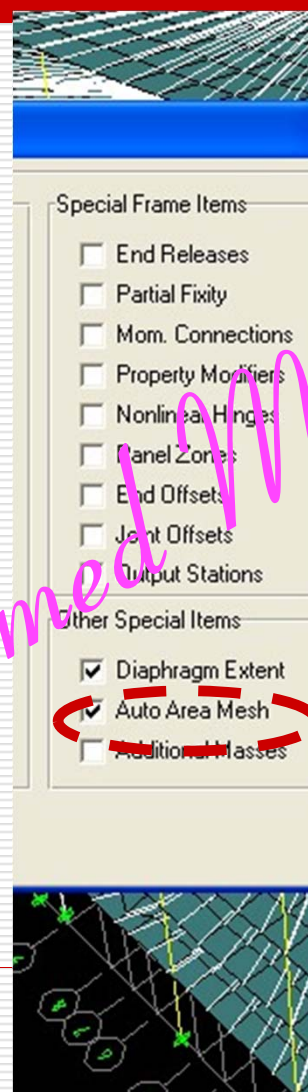
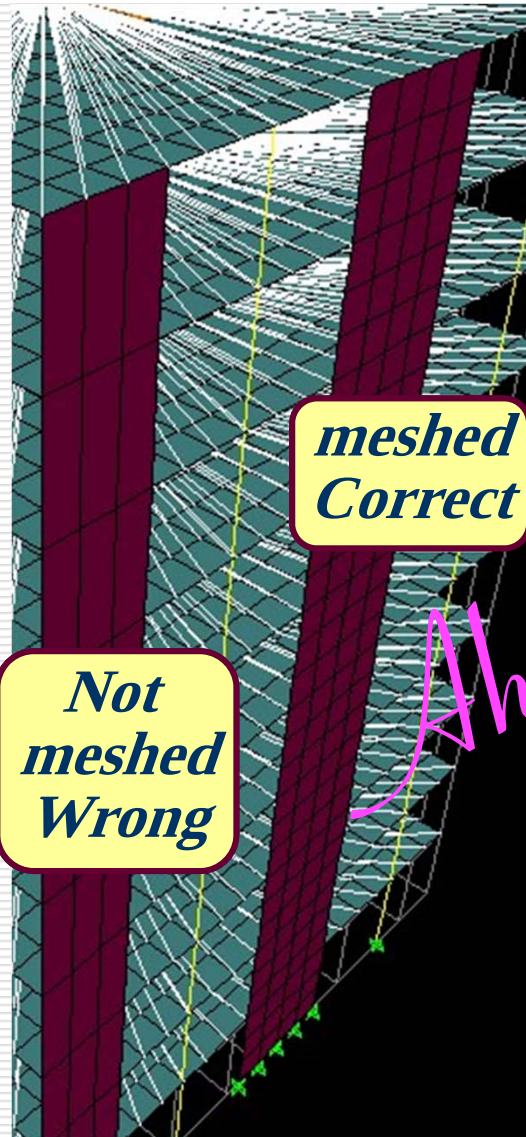
26 26 26 26 26 26 26 26 26 26 26

15-Mesh (Vertically) Shear Wall Areas

..Two Alternatives

1- Bad Alternative
Edit... Mesh Areas

2-Better Alternative
**Assign... Shell/Area...
Area Object Mesh Options**



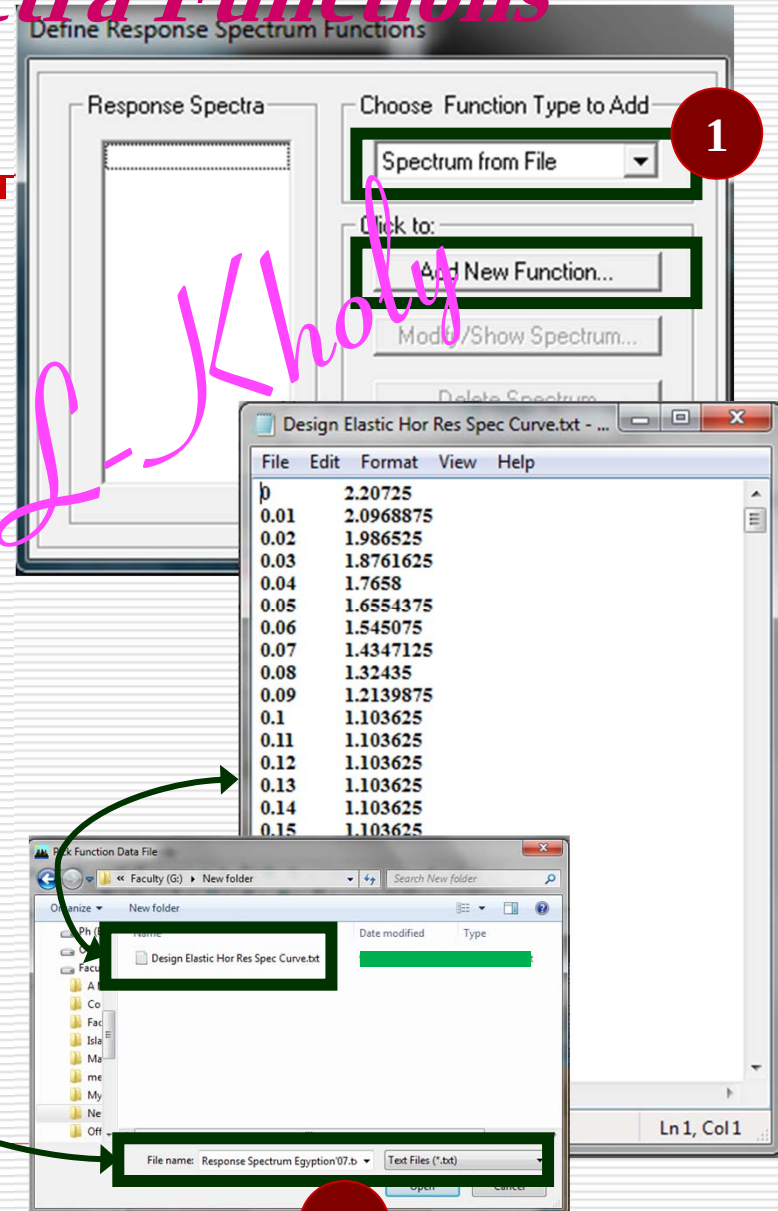
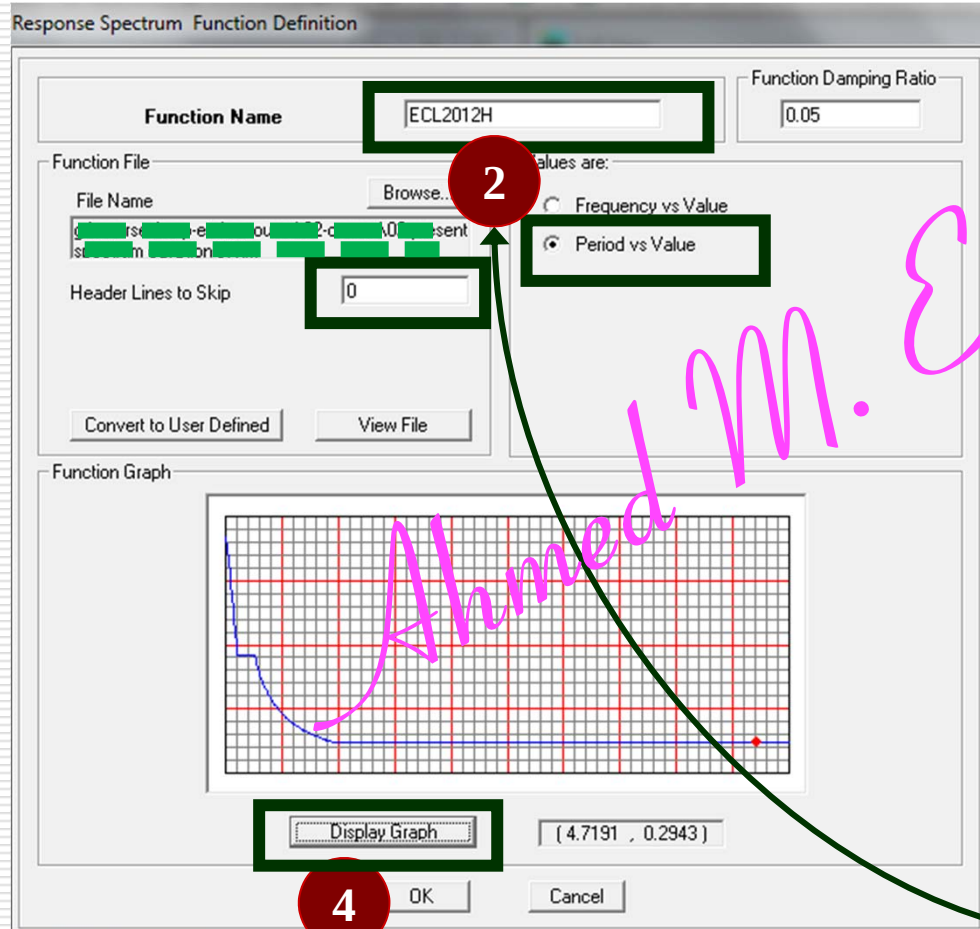
16-Static Load Cases

..Define..Static Load Cases

	Load	Type	SWM	Auto Lateral Loads	Comment
<u>1</u>	OW	Dead	1		Own Wight
<u>2</u>	SID	Dead	0		Flooring+Walls+....
<u>3</u>	LN	Live	0		$\psi=0.25$, Table 8-7
<u>4</u>	LG	Live	0		$\psi=0.5$, Table 8-7
<u>5</u>	LGT	Live	0		$\psi=1.0$, Table 8-7
<u>6</u>	EXA	Quake	0	User Loads	+X dir & Ecc=+0.05
<u>7</u>	EXB	Quake	0	User Loads	+X dir & Ecc=-0.05
<u>8</u>	EYA	Quake	0	User Loads	+Y dir & Ecc=+0.05
<u>9</u>	EYB	Quake	0	User Loads	+Y dir & Ecc=-0.05

17-Response Spectra Functions

..Define..Response Spectra Functions



File	Edit	Format	View	Help
p	2.20725			
0.01	2.0968875			
0.02	1.986525			
0.03	1.8761625			
0.04	1.7658			
0.05	1.6554375			
0.06	1.545075			
0.07	1.4347125			
0.08	1.32435			
0.09	1.2139875			
0.1	1.103625			
0.11	1.103625			
0.12	1.103625			
0.13	1.103625			
0.14	1.103625			
0.15	1.103625			

18-Response Spectra Cases

..Define..Response Spectra Cases

Response Spectrum Case Data

Spectrum Case Name

Structural and Function Damping

Damping

Modal Combination

☒ CQC ☐ SRSS ☐ ABS ☐ GMC

f1 f2

Directional Combination

☒ SRSS

☐ ABS Orthogonal SF

☐ Modified SRSS (Chinese)

Input Response Spectra

Direction	Function	Scale Factor
U1		
U2	ECL2012	1
UZ		

Excitation angle

Eccentricity

Ecc. Ratio (All Diaph.)

Override Diaph. Eccen.

Define Response Spectra

Spectra

Click to:

Response Spectrum Case Data

Spectrum Case Name

Structural and Function Damping

Damping

Modal Combination

☒ CQC ☐ SRSS ☐ ABS ☐ GMC

f1 f2

Directional Combination

☒ SRSS

☐ ABS Orthogonal SF

☐ Modified SRSS (Chinese)

Input Response Spectra

Direction	Function	Scale Factor
U1	ECL2012	1
U2		
UZ		

Excitation angle

Eccentricity

Ecc. Ratio (All Diaph.)

Override Diaph. Eccen.

19-Load Combinations..Define..Load Combinations

	Combination	Equation	Comment	Equ
<u>1</u>	SD	OW+SID	Service Dead (Deflection)	
<u>2</u>	SL	LN+LG+LGT	Service Live (Deflection)	
<u>3</u>	SDL	OW+SID+LN+LG+LGT	Service Dead+Live	
<u>4</u>	UD	0.9OW+0.9SID	Ultimate Dead	
<u>5</u>	UDL	1.4(OW+SID)+1.6(LN+LG+LGT)	Ultimate Dead+Live	
<u>6</u>	UDLEXA	1.12SD+ α SL+EXA	Ultimate Dead+Live+EX+ECC	(3-5)
<u>7</u>	UDLEXAN	1.12SD+ α SL-EXA	Ultimate Dead+Live-EX+ECC	
<u>8</u>	UDLEXB	1.12SD+ α SL+EXB	Ultimate Dead+Live+EX-ECC	
<u>9</u>	UDLEXBN	1.12SD+ α SL-EXB	Ultimate Dead+Live-EX-ECC	
<u>10</u>	UDLEYA	1.12SD+ α SL+EYA	Ultimate Dead+Live+EY+ECC	(3-5)
<u>11</u>	UDLEYAN	1.12SD+ α SL-EYA	Ultimate Dead+Live-EY+ECC	
<u>12</u>	UDLEYB	1.12SD+ α SL+EYB	Ultimate Dead+Live+EY-ECC	
<u>13</u>	UDLEYBN	1.12SD+ α SL-EYB	Ultimate Dead+Live-EY-ECC	
<u>14</u>	UDEXA	0.9SD+EXA	Ultimate Dead+EX+ECC	(3-9)
<u>15</u>	UDEXAN	0.9SD-EXA	Ultimate Dead-EX+ECC	
<u>16</u>	UDEXB	0.9SD+EXB	Ultimate Dead+EX-ECC	
<u>17</u>	UDEXBN	0.9SD-EXB	Ultimate Dead-EX-ECC	
<u>18</u>	UDEYA	0.9SD+EYA	Ultimate Dead+EY+ECC	(3-9)
<u>19</u>	UDEYAN	0.9SD-EYA	Ultimate Dead-EY+ECC	
<u>20</u>	UDEYB	0.9SD+EYB	Ultimate Dead+EY-ECC	
<u>21</u>	UDEYBN	0.9SD-EYB	Ultimate Dead-EY-ECC	

Static Load Combinations

19-Load Combinations

...Define..Load Combinations

	Combination	Equation	Comment	Equ
<u>22</u>	UDLSpecX	$1.12SD + \alpha SL + \text{SpecX}$	Ultimate Dead+Live+SpecX+ECC	(3-5)
<u>23</u>	UDLSpecY	$1.12SD + \alpha SL + \text{SpecY}$	Ultimate Dead+Live+SpecY+ECC	(3-5)
<u>24</u>	UDSpecX	$0.9SD + \text{SpecX}$	Ultimate Dead+SpecX+ECC	(3-9)
<u>25</u>	UDSpecY	$0.9SD + \text{SpecY}$	Ultimate Dead+SpecY+ECC	(3-9)

Dynamic Load Combinations

20-Assign Loads

...Assign..Area Loads... Uniform

*Assign the loads for the slabs in the cases
SID, LN, LG & LGT*

*Be careful and avoid selecting the walls
when assigning loads.*

*Assign the loads to ONLY the slabs.
DO NOT Assign loads to walls.*

21- Dynamic & P-Δ Parameters

...Analyze..Set Analysis Options..

The image displays three software dialog boxes for structural analysis, with handwritten pink annotations. The first dialog, 'Dynamic Analysis Parameters', shows 'Number of Modes' set to 30, 'Type of Analysis' set to 'Ritz Vectors', and 'EigenValue Parameters' including 'Frequency Shift (Center)', 'Cutoff Frequency (Radius)', and 'Relative Tolerance'. The second dialog, 'Analysis Options', shows 'Building Active Degrees of Freedom' with 'Full 3D' selected, and 'Include P-Delta' checked. The third dialog, 'P-Delta Parameters', shows 'Method' set to 'Iterative - Based on Load Combination', 'Iteration Controls' with 'Maximum Iterations' set to 5 and 'Relative Tolerance - Displacements' set to 1.000E-04, and a 'P-Delta Load Combination' table.

Dynamic Analysis Parameters

Number of Modes: 30

Type of Analysis: ☐ Eigenvectors ☒ Ritz Vectors

EigenValue Parameters:

Frequency Shift (Center):

Cutoff Frequency (Radius):

Relative Tolerance:

☐ Include Residual-Mass Modes

Starting Ritz Vectors:

List of Loads: EXA, EXB, EYA, EYB, H, LG, LN, OW

Ritz Load Vectors: ACCEL X, ACCEL Y, ACCEL Z

Buttons: Add ->, <- Remove, OK, Cancel

Analysis Options

Building Active Degrees of Freedom:

Full 3D, XZ Plane, YZ Plane, No Z Rotation

☒ UX ☒ UY ☒ UZ ☒ RX ☒ RY ☒ RZ

☒ Dynamic Analysis

☒ Include P-Delta

☐ Save Access DB File

Buttons: Set Dynamic Parameters..., Set P-Delta Parameters..., File Name..., OK, Cancel

P-Delta Parameters

Method: ☐ Non-iterative - Based on Mass ☒ Iterative - Based on Load Combination

Iteration Controls:

Maximum Iterations: 5

Relative Tolerance - Displacements: 1.000E-04

P-Delta Load Combination:

Load Case	Scale Factor
SIDL	1
LG	.5
LGT	1
LN	.25
OW	1
SIDL	1

Buttons: Add, Modify, Delete, OK, Cancel

Handwritten pink annotations: 'Ahmed', 'SS', 'Lholy'

22- Mass Source

...Define..Mass Source..

Define Mass Source

Mass Definition

☐ From Self and Specified Mass

☒ From Loads

☐ From Self and Specified Mass and Loads

Define Mass Multiplier for Loads

Load	Multiplier
OW	1
OW	1
SID	1
LN	0.25
LG	0.5
LT	1

☐ Include Lateral Mass Only

☐ Lump Lateral Mass at Story Levels

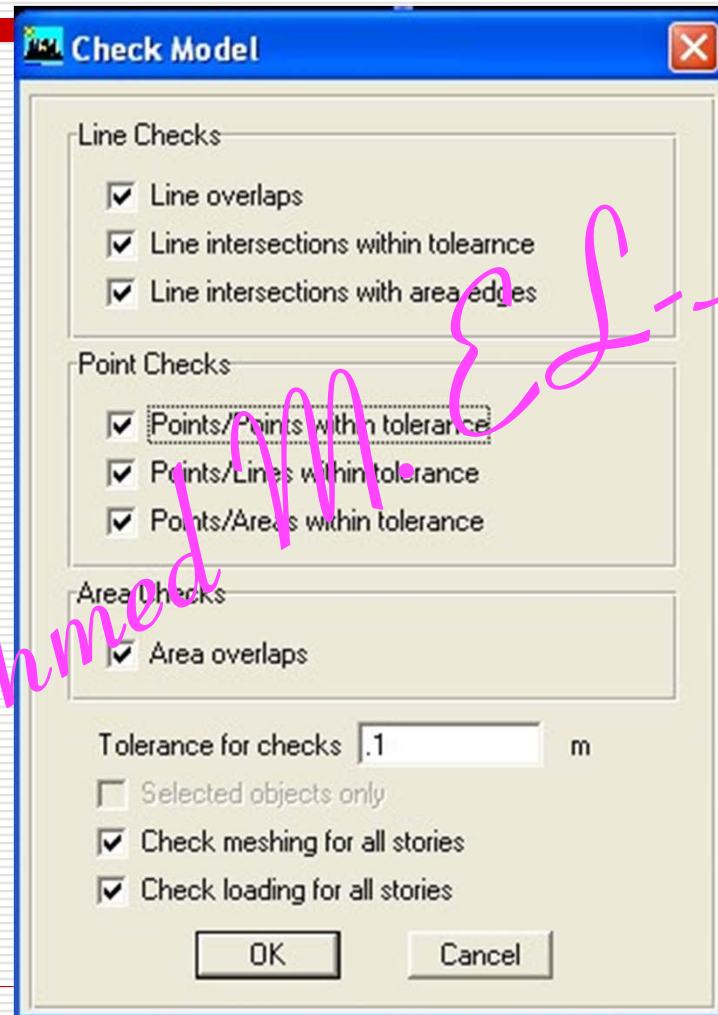
OK Cancel

ES - holy

Ahmed M.

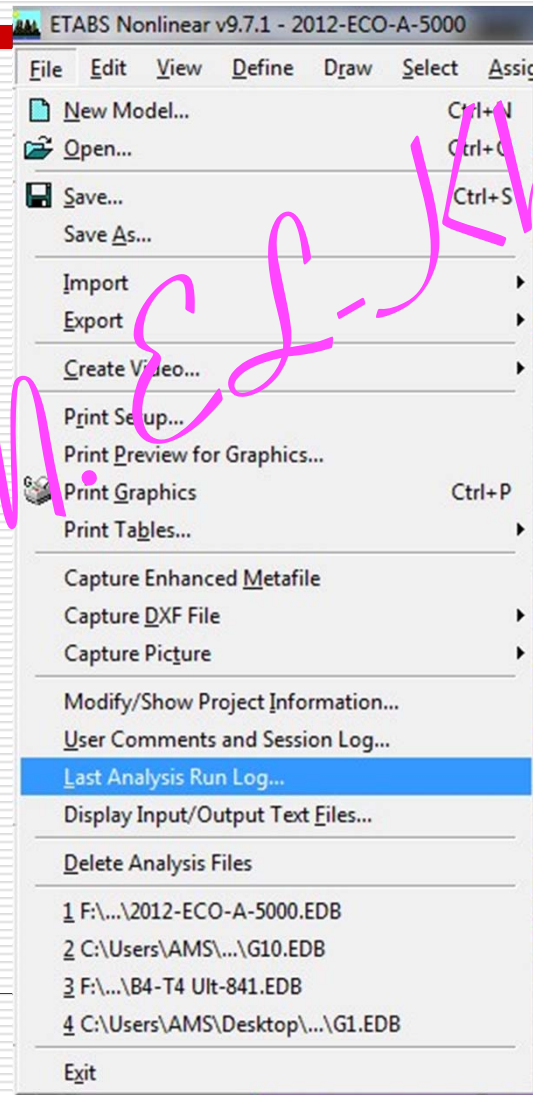
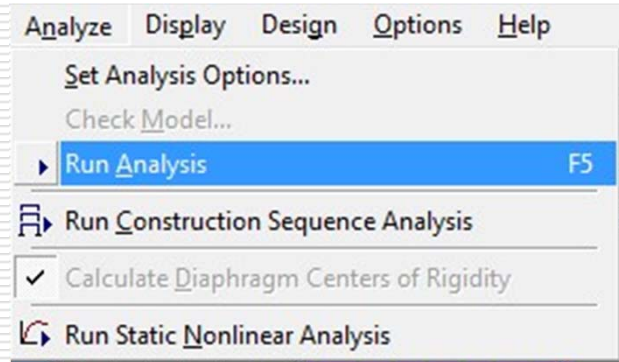
24- Check Model

...Analyze..Check Model..



25- Run ...Check log file

...Analyze.. Run..//// ...File..Last Analysis log File



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26- Scale the Base Shear for Spectra Method

Story	Load	Loc	P	VX	VY	T	MX	MY
ROOF	SPECX	Top	107.15	156.66	45.99	2900.4	2566.3	3776.6
ROOF	SPECY	Bottom	111.60	163.00	49.35	3004.3	2521.2	3512.1
ROOF	SPECY	Top	129.63	73.96	160.78	4434.3	3387.1	3335.7
ROOF	SPECY	Bottom	133.82	77.32	168.13	4616.3	3191.4	3322.6
F02-TP1	SPECX	Top	1000.26	480.77	213.44	10200	18714	23759
F02-TP1	SPECX	Bottom	1001.73	484.26	214.27	10232	19030	24433

ANALYSIS RESULTS (1 of 28 tables selected)

- ☐ Displacements
- ☐ Reactions
- ☐ Modal Information
- ☒ Building Output
 - ☐ Table: Center Mass Rigidity
 - ☒ Table: Story Shears
 - ☐ Table: Tributary Area and RLLF
- ☐ Section Cut Forces
- ☐ Frame Output
- ☐ Area Output
- ☐ Wall Output
- ☐ Objects and Elements

Select Output

Select

SDW7N Combo
 SDW8 Combo
 SDW8N Combo
 SDW9 Combo
 SDW9N Combo
 SDWN Combo
 SIDL Static Load
 SL Combo
 SPECX Spectra
 SPECY Spectra
 T Static Load

OK
 Cancel
 Clear All

BS1	SPECX	Top	1207.96	676.67	248.22	13402	23108	30132
BS1	SPECX	Bottom	1222.49	679.62	250.86	13571	23830	31332
BS1	SPECY	Top	1463.22	325.39	705.29	22258	32078	30615
BS1	SPECY	Bottom	1480.90	327.88	706.75	22391	33568	31119
BS2	SPECX	Top	1302.42	722.48	314.20	16713	25262	31749
BS2	SPECX	Bottom	1325.96	738.81	332.40	17658	26175	33099
BS2	SPECY	Top	1578.37	397.70	734.71	23113	35072	31737
BS2	SPECY	Bottom	1607.10	419.72	756.40	23273	36796	32304

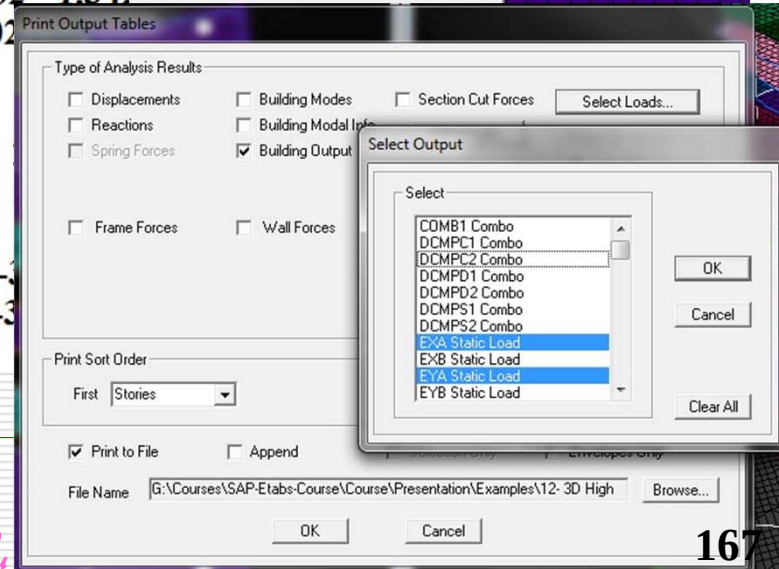
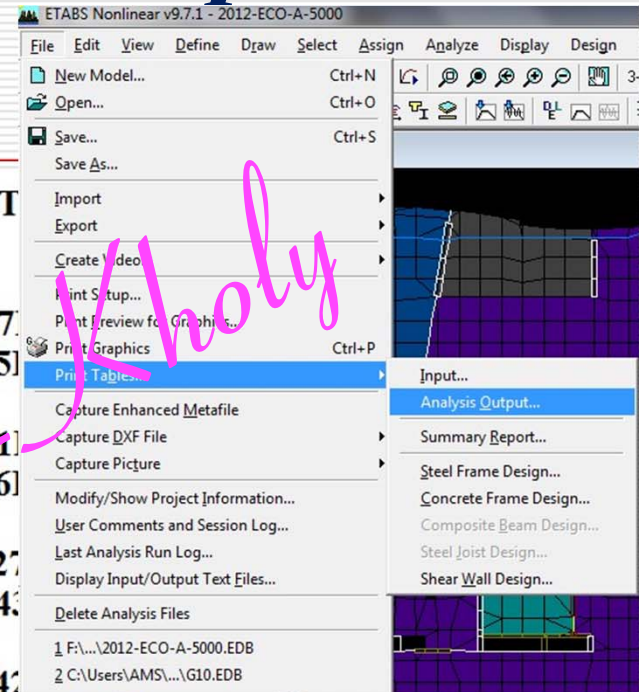
Vdynamic

26- Scale the Base Shear for Spectra Method

STORY	LOAD	LOC	P	VX	VY	T
ROOF	EXA	Top	-3.906E-06	-4.281E+02	4.307E-07	8.097E-06
		Bottom	-3.905E-06	-4.372E+02	4.306E-07	8.255E-06
ROOF	EYA	Top	4.882E-06	2.510E-07	-4.281E+02	8.921E-06
		Bottom	4.881E-06	2.502E-07	-4.372E+02	9.106E-06
F19-TP32	EXA	Top	-3.907E-06	-6.494E+02	2.482E-09	1.227E-05
		Bottom	-3.907E-06	-6.587E+02	8.665E-10	1.243E-05
F19-TP32	EYA	Top	4.900E-06	-4.221E-07	-6.494E+02	-1.344E-05
		Bottom	4.900E-06	-4.227E-07	-6.587E+02	-1.360E-05
BS2	EXA	Top	-3.740E-06	-1.548E+03	-1.778E-05	-3.740E-06
		Bottom	-3.740E-06	-1.549E+03	-1.778E-05	-3.740E-06
BS2	EYA	Top	8.090E-06	8.468E-06	-1.548E+03	-8.090E-06
		Bottom	8.090E-06	8.468E-06	-1.549E+03	-8.090E-06

Static

Must be equal to Base Shear estimated manually



26- Scale the Base Shear for Spectra

Method

Response Spectrum Case Data

Method:

Structural and Function Damping

Damping:

Modal Combination

☒ CQC ☐ SRSS ☐ ABS ☐ GMC

f1: f2:

Directional Combination

☒ CQC

Input Response Spectra

Direction	Function	Scale Factor
U1	ZONE2A	1.78
U2		
UZ		

Excitation angle:

Eccentricity

Ecc. Ratio (All Diaph.):

Override Diaph. Eccen.:

Item 8-7-3-3-1-8
EGL 2012

Scale Factor SpecX = Scale Factor SpecX

0.85 Vstatic X

*

Vdynamic X

26- Scale the Base Shear for Spectra Method

Scale Factor SpecY = Scale Factor SpecY

0.85 Vstatic Y

Vdynamic Y

Item 8-7-3-3-1-8
ECL 2012

Re-Run
!!!
Check Log File
Check Base Shear

Response Spectrum Case Data

Spectrum Case Name: SPECY

Structural and Function Damping

Damping: 0.05

Directional Combination

☒ SRSS ☐ ABS ☐ GMC

Orthogonal SF:

Input Response Spectra

Direction	Function	Scale Factor
U1		
U2	ZONE2A	1.74
UZ		

Excitation angle: 0.

Eccentricity

Ecc. Ratio (All Diaph.): 0.05

Override Diaph. Eccen.:

28- Check Mass Participating Ratios

Mode	Period	UX	UY	UZ	SumUX	SumUY	SumUZ
1	4.07	0.12	7.35	0.00	0.12	7.35	0.00
2	3.33	15.14	32.6	0.00	15.26	40.00	0.00
3	2.88	38.57	11.32	0.00	54.43	55.32	0.00
4	1.07	0.01	0.53	0.00	54.44	55.85	0.00
5	0.77	1.21	9.78	0.00	55.65	65.63	0.00
					67.37	66.72	0.00
					67.37	66.72	0.00
					67.37	66.72	0.00
					67.37	66.92	0.00
					67.45	71.79	0.01
					67.46	71.79	1.36
					67.71	72.26	1.37
					67.82	72.28	24.99
					67.84	72.30	26.03
					71.58	72.52	37.36
					72.91	72.54	40.30
					73.80	72.74	51.87
					73.82	72.83	58.34
19	0.24	0.38	0.09	0.00	74.20	72.92	58.34
20	0.22	0.01	0.01	8.31	74.21	72.93	66.65
21	0.21	0.01	3.85	0.03	74.22	76.78	66.68
22	0.17	5.08	0.12	0.30	79.30	76.90	66.98
23	0.17	0.07	0.03	9.54	79.38	76.93	76.52
24	0.15	0.03	3.04	0.05	79.40	79.97	76.57
25	0.12	0.09	0.05	8.03	79.49	80.03	84.60
26	0.11	7.46	0.11	0.16	86.95	80.14	84.77
27	0.11	0.42	6.94	0.07	87.37	87.08	84.84
28	0.07	7.32	3.57	0.00	94.69	90.65	84.84
29	0.06	2.73	6.99	0.03	97.42	97.64	84.87
30	0.05	0.00	0.04	8.37	97.42	97.67	93.24

Modal Information

☐ Building Modes

☒ Building Modal Information

☐ Table: Modal Participation Factors

☒ Table: Modal Participating Mass Ratios

☐ Table: Modal Load Participation Ratios

☐ Table: Response Spectrum Accelerations

☐ Table: Response Spectrum Modal Amplitudes

☐ Table: Response Spectrum Base Reactions

Item 8-7-3-3-1-5

ECL 2012

$\geq 90\%$

28- Check Drift

UDLSpecX
UDLSpecY

Item 8-8-3-1-a
ECL 2012
 ≤ 0.005

Story	Item	Load	Point	X	Y	Z	DriftX	DriftY				
ROOF	Max Drift X	UDLSPCX	278	2.988	-5.471	86.95	0.00076					
ROOF	Max Drift Y	UDLSPCX	3023	35.988	38.25	86.95		0.00043				
ROOF	Max Drift X	UDLSPCY	3021	34.35	38.25	86.95	0.00069				Max Drift X	Max Drift Y
ROOF	Max Drift Y	UDLSPCY	3023	35.988	38.25	86.95		0.00074			0.00205	0.00215
F21-TP3	Max Drift X	UDLSPCX	3124	36.896	39.459	83.25	0.00090			X 0.7 R	0.00716	0.00752
F21-TP3	Max Drift Y	UDLSPCX	2792	37.585	33.91	83.25		0.00054		X v	0.00358	0.00376
F21-TP3	Max Drift X	UDLSPCY	3124	36.896	39.459	83.25	0.00086				Safe	Safe
F21-TP3	Max Drift Y	UDLSPCY	2792	37.585	33.91	83.25		0.00093		Code	0.00500	0.00500
F20-TP3	Max Drift X	UDLSPCX	3124	36.896	39.459	79.55	0.00099					
F20-TP3	Max Drift Y	UDLSPCX	2792	37.585	33.91	79.55		0.00060				
F20-TP3	Max Drift X	UDLSPCY	3124	36.896	39.459	79.55	0.00097					
F20-TP3	Max Drift Y	UDLSPCY	2792	37.585	33.91	79.55		0.00105				
F19-TP32	Max Drift X	UDLSPCX	3192	37.402	40.139	75.85	0.00111					
F19-TP32	Max Drift Y	UDLSPCX	2775	37.884	33.586	75.85		0.00068				
F19-TP32	Max Drift X	UDLSPCY	3192	37.402	40.139	75.85	0.00111					
F19-TP32	Max Drift Y	UDLSPCY	2775	37.884	33.586	75.85		0.00116				
F18-TP2	Max Drift X	UDLSPCX	3192	37.402	40.139	72.15	0.00123					
F18-TP2	Max Drift Y	UDLSPCX	2775	37.884	33.586	72.15		0.00076				
F18-TP2	Max Drift X	UDLSPCY	3192	37.402	40.139	72.15	0.00125					
F18-TP2	Max Drift Y	UDLSPCY	2775	37.884	33.586	72.15		0.00129				
F17-TP2	Max Drift X	UDLSPCX	3192	37.402	40.139	68.45	0.00132					

Story Load	Loc	P	VX	VY	T	MX	MY	
TOR	SD	Top	0	-56.65	47.42	-426.647	0	0
TOR	SD	Bottom	1648.83	0	0	-4.52	26514.645	86701.675
ROOF	SD	Top	409.65	0	0	-4.32	31.3503	94.452
ROOF	SD	Bottom	409.65	0	0	-4.32	31.3503	94.452
F21-TP3	SD	Top	6526.81	0	0	-5.379	115004.828	-131985.054
F21-TP3	SD	Bottom	7030.2	0	0	-5.822	124244.26	-142028.047
F20-TP3	SD	Top	8587.63	0	0	-5.822	150764.997	-170509.854
F20-TP3	SD	Bottom	9091.91	0	0	-6.307	159341.436	-180571.941
F19-TP32	SD	Top	11205.29	0	0	-6.307	193887.539	-218584.742
F19-TP32	SD	Bottom	11708.67	0	0	-6.886	202483.671	-228851.961
F18-TP2	SD	Top	13677.32	0	0	-6.886	232299.385	-265629.634
F18-TP2	SD	Bottom	14187.38	0	0	-6.886	232299.385	-265629.634
F17-TP2	SD	Top	16156.03	0	0	-6.886	232299.385	-265629.634
F17-TP2	SD	Bottom	16667.87	0	0	-6.886	232299.385	-265629.634
F16-TP2	SD	Top	18636.52	0	0	-6.886	232299.385	-265629.634
F16-TP2	SD	Bottom	19148.35	0	0	-6.886	232299.385	-265629.634
F15-TP3	SD	Top	20705.84	0	0	-6.886	232299.385	-265629.634
F15-TP3	SD	Bottom	21231.64	0	0	-6.886	232299.385	-265629.634
F14-TP31	SD	Top	23138.5	0	0	-6.886	232299.385	-265629.634
F14-TP31	SD	Bottom	23671.49	0	0	-6.886	232299.385	-265629.634
F13-TP1	SD	Top	25488.08	0	0	-6.886	232299.385	-265629.634
F13-TP1	SD	Bottom	26021.64	0	0	-6.886	232299.385	-265629.634
F12-TP1	SD	Top	27838.23	0	0	-6.886	232299.385	-265629.634
F12-TP1	SD	Bottom	28371.22	0	0	-6.886	232299.385	-265629.634
F11-TP1	SD	Top	30187.81	0	0	-6.886	232299.385	-265629.634
F11-TP1	SD	Bottom	30720.81	0	0	-6.886	232299.385	-265629.634
F10-TP1	SD	Top	32537.4	0	0	-6.886	232299.385	-265629.634
F10-TP1	SD	Bottom	33083.63	0	0	-6.886	232299.385	-265629.634
F09-TP2	SD	Top	34917.5	0	0	-6.886	232299.385	-265629.634
F09-TP2	SD	Bottom	35463.73	0	0	-6.886	232299.385	-265629.634
F08-TP1	SD	Top	37280.32	0	0	-6.886	232299.385	-265629.634
F08-TP1	SD	Bottom	37826.54	0	0	-6.886	232299.385	-265629.634
F07-TP1	SD	Top	39643.13	0	0	-6.886	232299.385	-265629.634
F07-TP1	SD	Bottom	40189.35	0	0	-6.886	232299.385	-265629.634
F06-TP1	SD	Top	42005.55	0	0	-6.886	232299.385	-265629.634
F06-TP1	SD	Bottom	42567.23	0	0	-6.886	232299.385	-265629.634
F05-TP1	SD	Top	44383.02	0	0	-12.902	703543.55	-814937.684
F05-TP1	SD	Bottom	44945.11	0	0	-12.902	733155.65	-849021.305
F04-TP1	SD	Top	46761.7	0	0	-12.935	742312.798	-860272.76
F04-TP1	SD	Bottom	47327.98	0	0	-12.935	771924.898	-894356.381
F03-TP1	SD	Top	49139.57	0	0	-12.909	781082.114	-905608.287
F03-TP1	SD	Bottom	49700.85	0	0	-12.909	810694.214	-939691.909
F02-TP1	SD	Top	51517.44	0	0	-12.839	819851.783	-950944.111
F02-TP1	SD	Bottom	52078.73	0	0	-12.839	849463.883	-985027.732
F02-TP1	SD	Bottom	52078.73	0	0	-12.766	858622.302	-996280.637
F01	SD	Top	54375.85	0	0	-12.766	895722.767	-1050533.56
F01	SD	Bottom	55121.7	0	0	-12.685	907778.895	-1066458.405
PODIUM	SD	Top	57896.93	0	0	-12.685	929323.982	-1130610.169
PODIUM	SD	Bottom	58788.65	0	0	-12.667	942701.728	-1149856.485
GROUND	SD	Top	63892.79	0	0	-12.667	1018848.553	-1200110.218
GROUND	SD	Bottom	65651.56	0	0	-12.68	1056718.602	-1212918.137
BS1	SD	Top	69459.71	0	0	-12.68	1117378.052	-1250412.685
BS1	SD	Bottom	70901.17	0	0	-12.674	1148390.569	-1261839.498
BS2	SD	Top	75801.19	0	0	-12.674	1233765.51	-1301045.575
BS2	SD	Bottom	77246	0	0	-13	1264548	-1312539

Options/Preferences Data

☐ Miscellaneous Data

☒ **ANALYSIS RESULTS (1 of 26 tables)**

☐ Displacements

☐ Reactions

☐ Modal Information

☒ **Building Output**

☒ Building Output

☐ Table: Center Mass Rigidity

☒ Table: Story Shears

☐ Table: Tributary Area and PLLF

☐ Section Cut Forces

☐ Frame Output

☐ Area Output

☐ Wall Output

☐ Objects and Elements

Select Output

Select

- H Static Load
- LG Static Load
- LN Static Load
- OW Static Load
- OW1 Static Load
- OWSQ Static Nonlin
- SD Combo**
- SDEXA Combo
- SDEXAN Combo
- SDEXB Combo
- SDEXBN Combo

OK

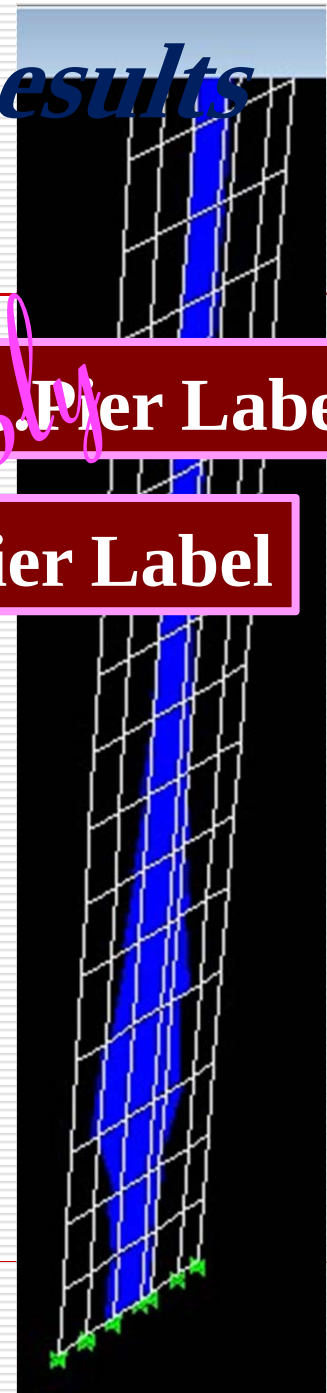
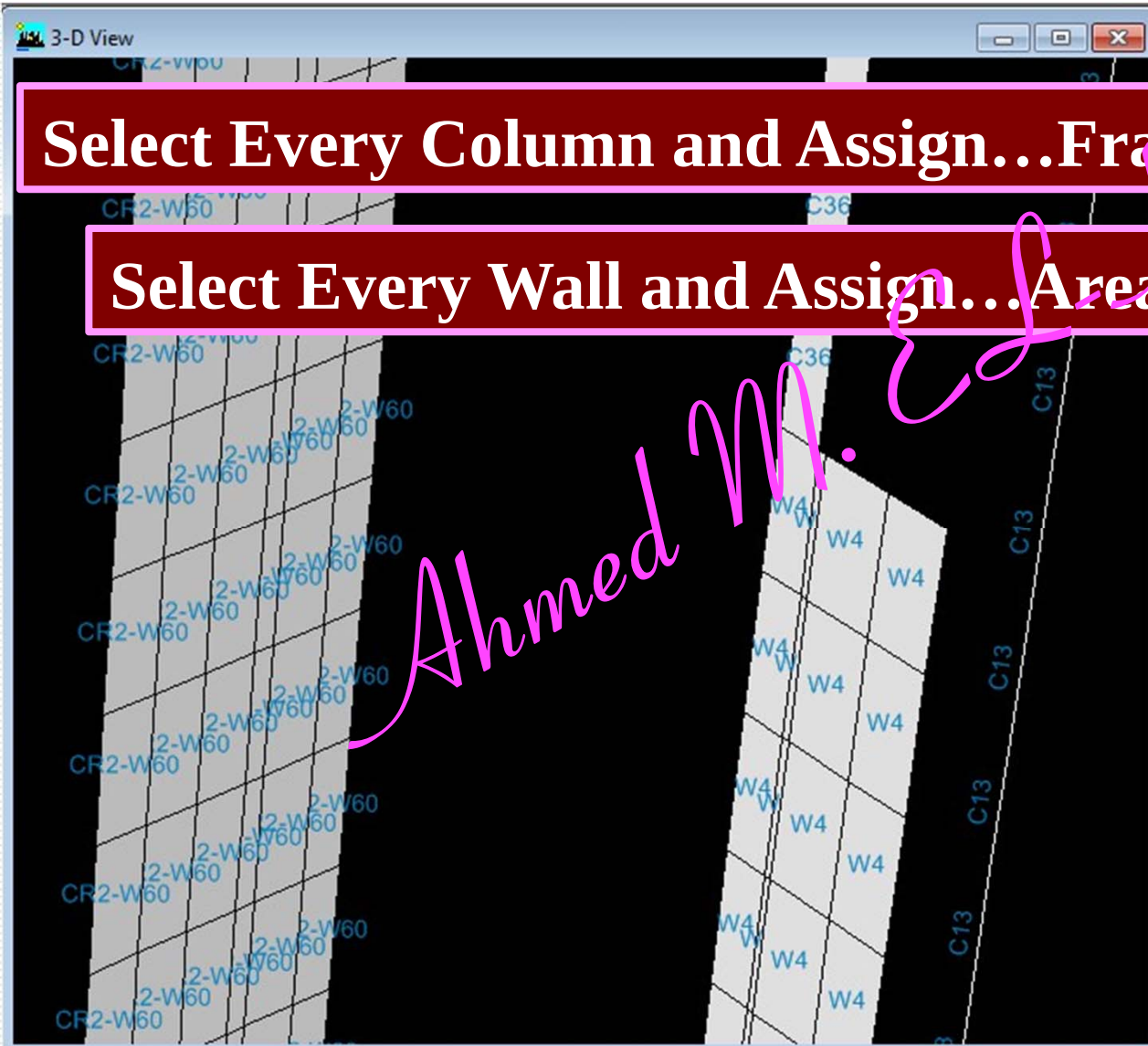
Cancel

Clear All

23 & 29- Assign Piers, Read Results

Select Every Column and Assign...Frame...Pier Label

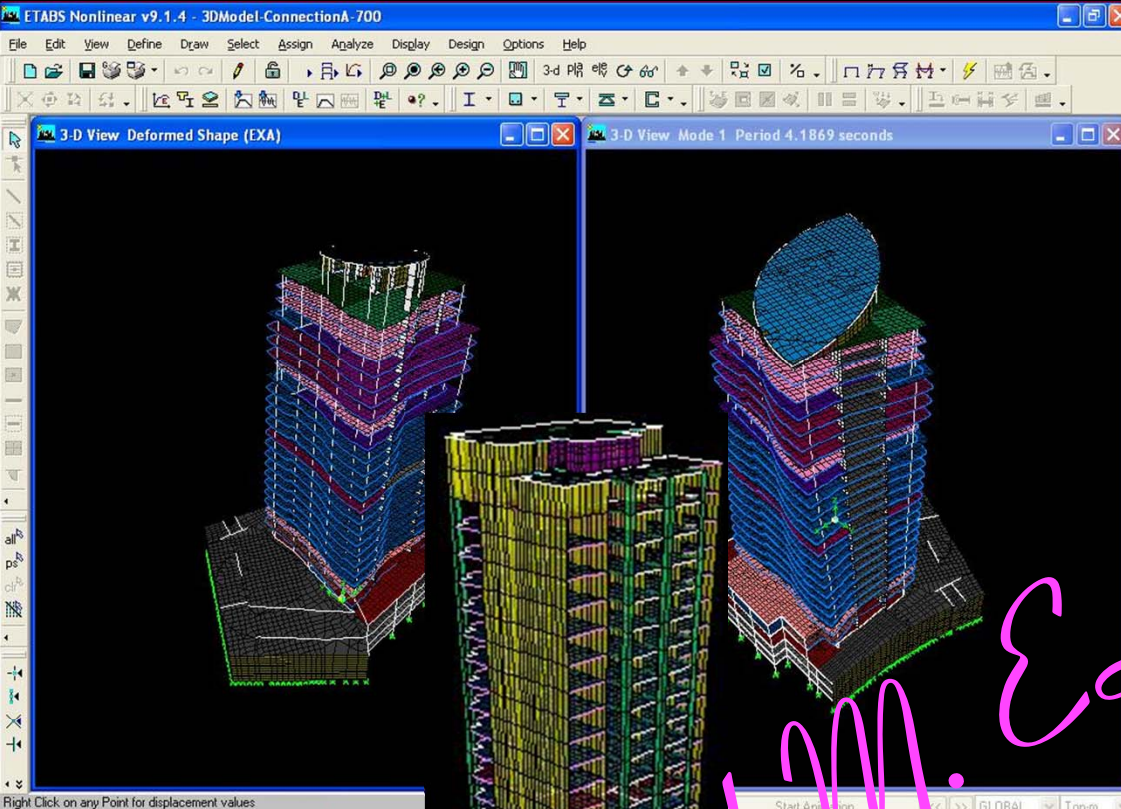
Select Every Wall and Assign...Area....Pier Label



Ahmed M. Elholy

Read Results of Columns
Read Results of Shear Walls
Exporting Results to Excel & CSI
Pier Local Axes

Design of Columns
Design of Shear Walls
Using Etabs (ACI 318)

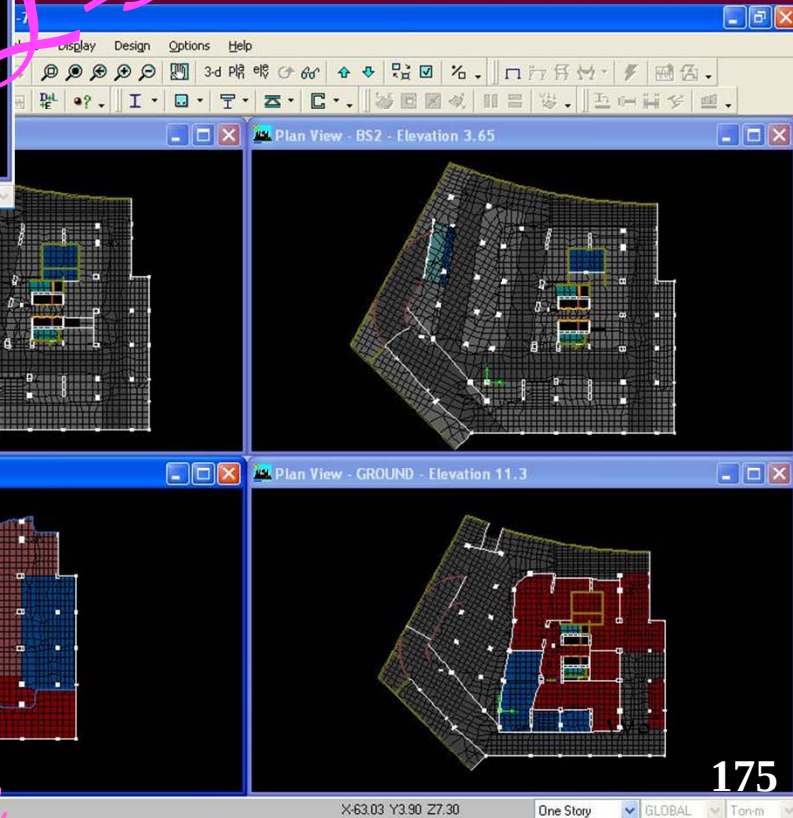


Etabs

2016

Etabs

2016

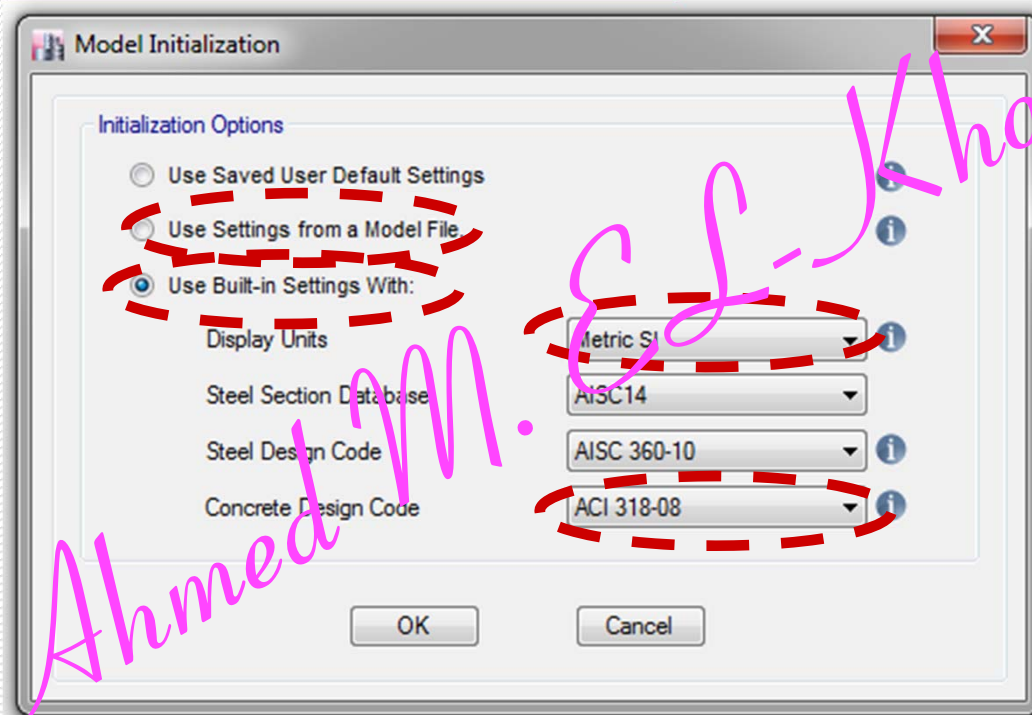


0-DXF

As done in Etabs 9.7

Ahmed M. Elkholy

1-New Model



2- New,... edb

X Spacing

1.82,3.87,2.87,1.63,1.63,2.87,3.87,1.82

Y Spacing

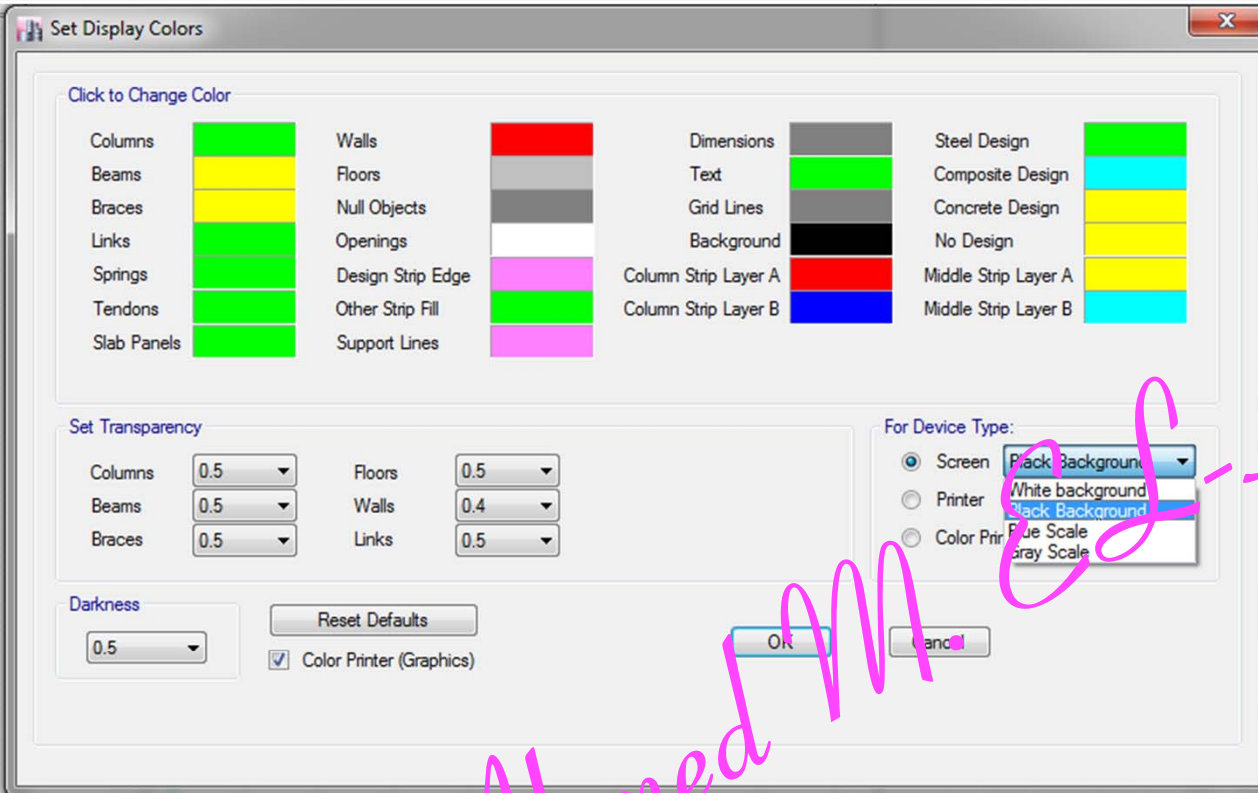
3.38,2.74,1.5,1.31,2.25,1.31,1.5,2.68,3.44



4- Grid, Axes, Story data according your project

Master story & similar stories (F2 is master)

3- Options – Graphic Colors - Display

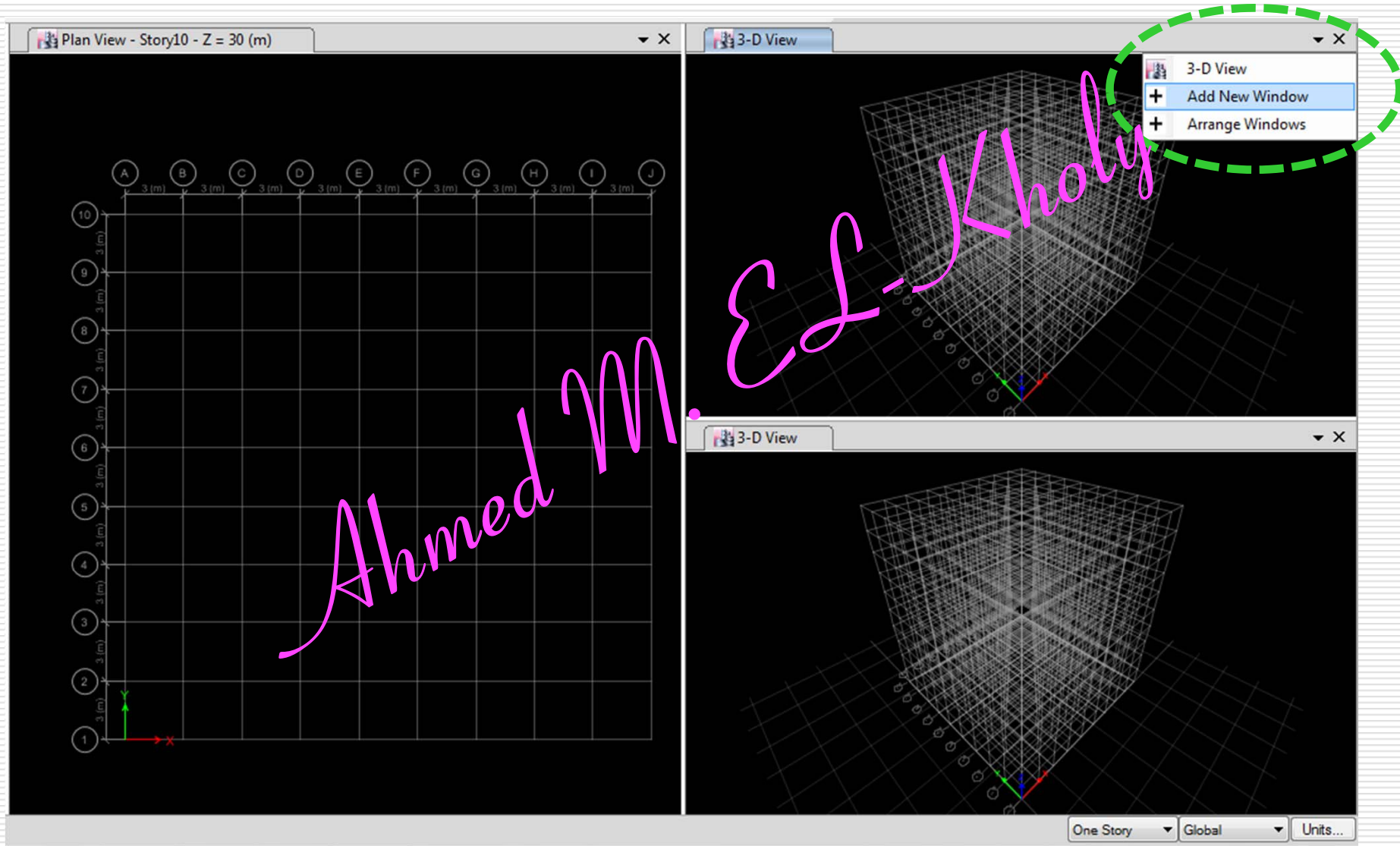


Elholy

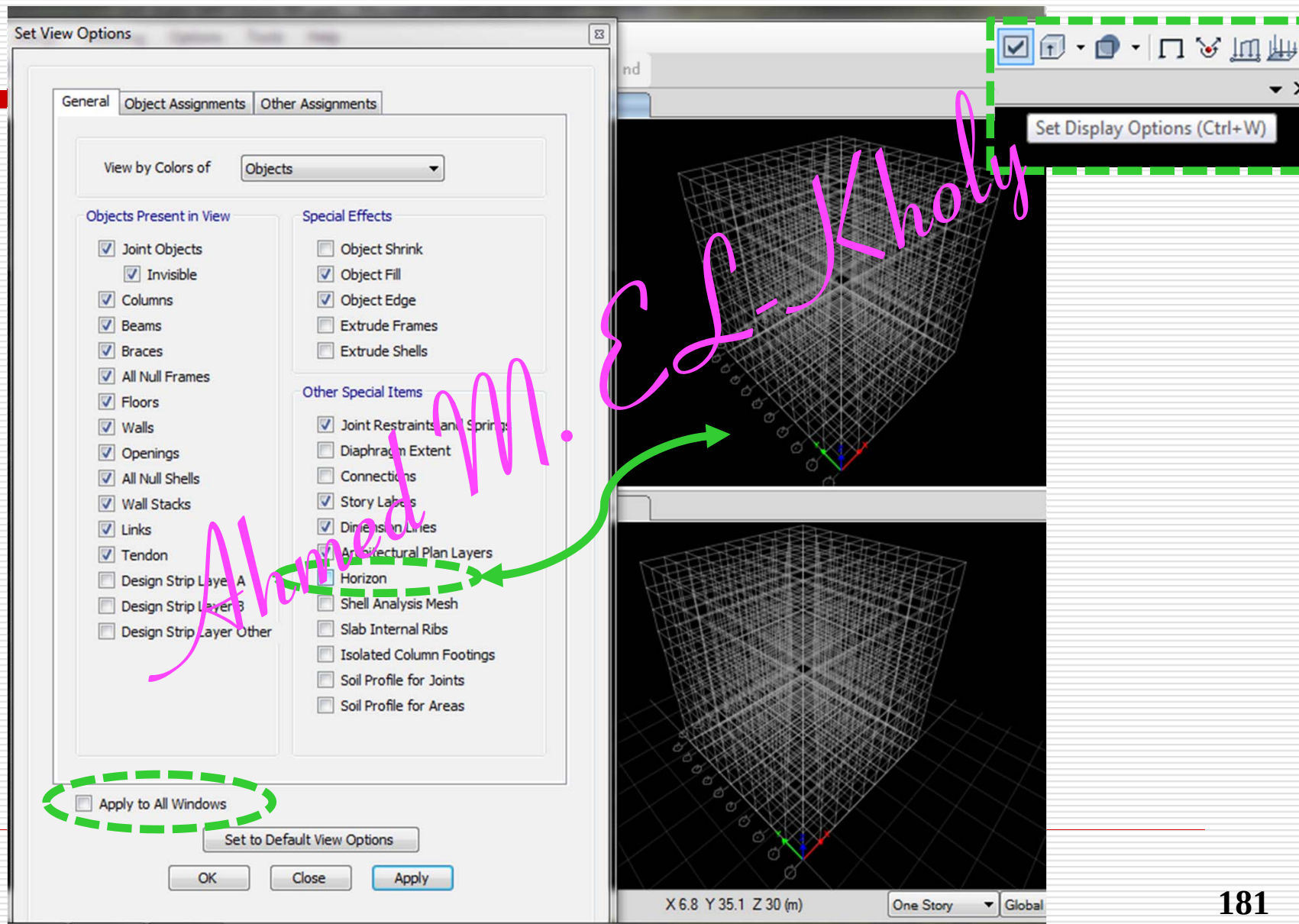
Ahmed M.

One story
Similar stories
All

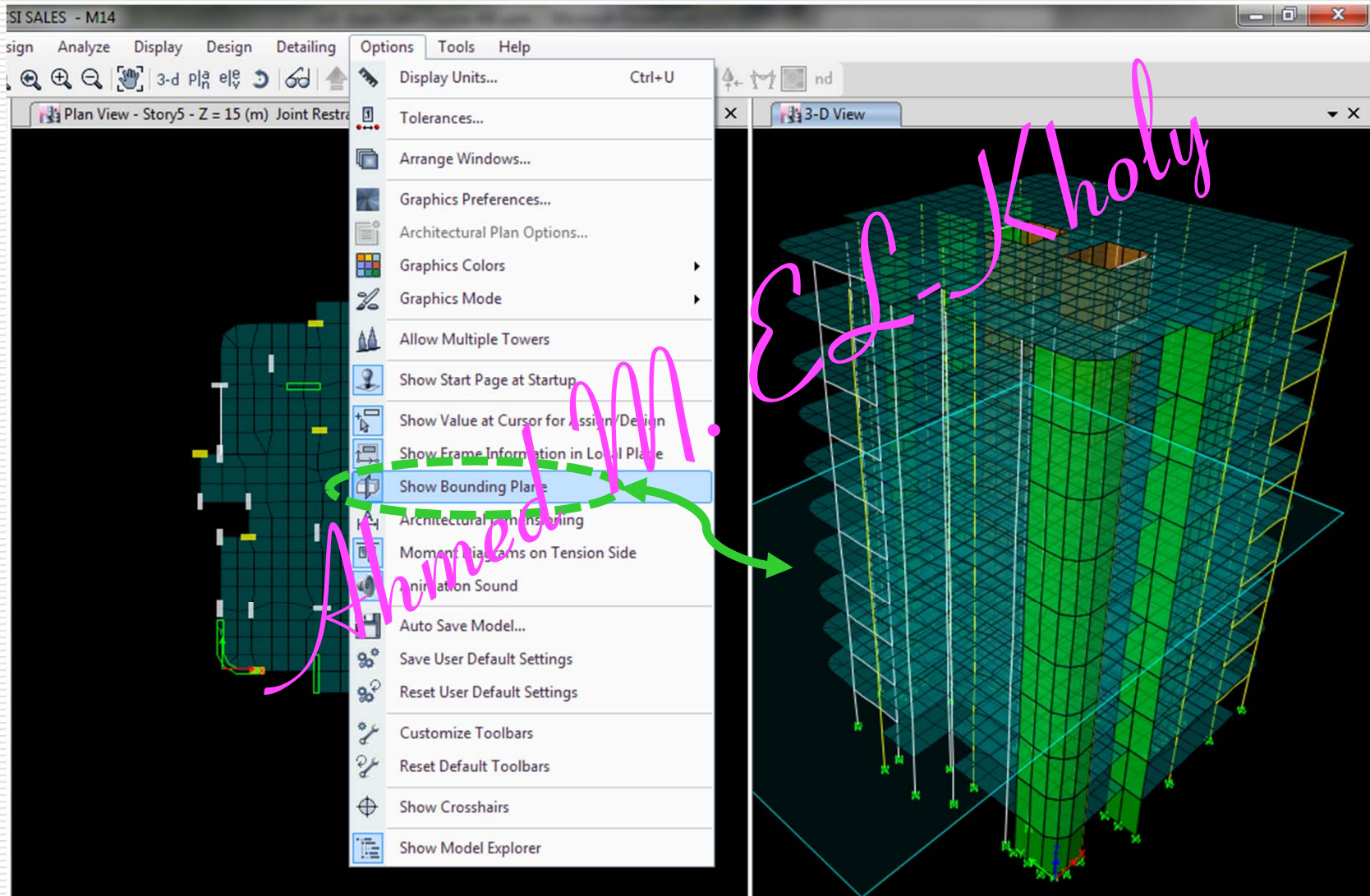
3- Change the windows number if you want



4- Change the Horizon if you want



4- Show bounding Plane if you want



Display Units

5- Units

Item	Length Unit	Force Unit	Temperature Unit	Units Label	Decimal Places
Structure Dimensions					
Absolute Distance	m			m	
Relative Distance					
Structure Area	m			m2	
Angles				deg	
Section Dimensions					
Length	cm			cm	
Area	cm			cm2	
Length3	cm			cm3	
Length4	cm			cm4	
Length6	cm			cm6	
Rebar Area	cm			cm2	6
Rebar Area/Length	cm2/m			cm2/m	5
Displacements					
Translational Displ	m			m	6
Rotational Displ				rad	6
Drift					6
Gen Displ L/Rad	m			m/rad	5
Gen Displ Rad/L	m			rad/m	3
Forces					
Force		tonf		tonf	4
Force/Length	m	tonf		tonf/m	3
Force/Area	m	tonf		tonf/m2	3
Moment	m	tonf		tonf-m	4
Moment/Length	m	tonf		tonf-m/m	4
Stresses					
Modulus	cm	kgf		kgf/cm2	2
Stress Input	cm	kgf		kgf/cm2	2
Stress Output	cm	kgf		kgf/cm2	2
Strain	m			m/m	6

Named Units Sets

SET AMK

Consistent Units

Length Unit: m
Force Unit: tonf
Temperature Unit: C

Ton-m

OK Cancel

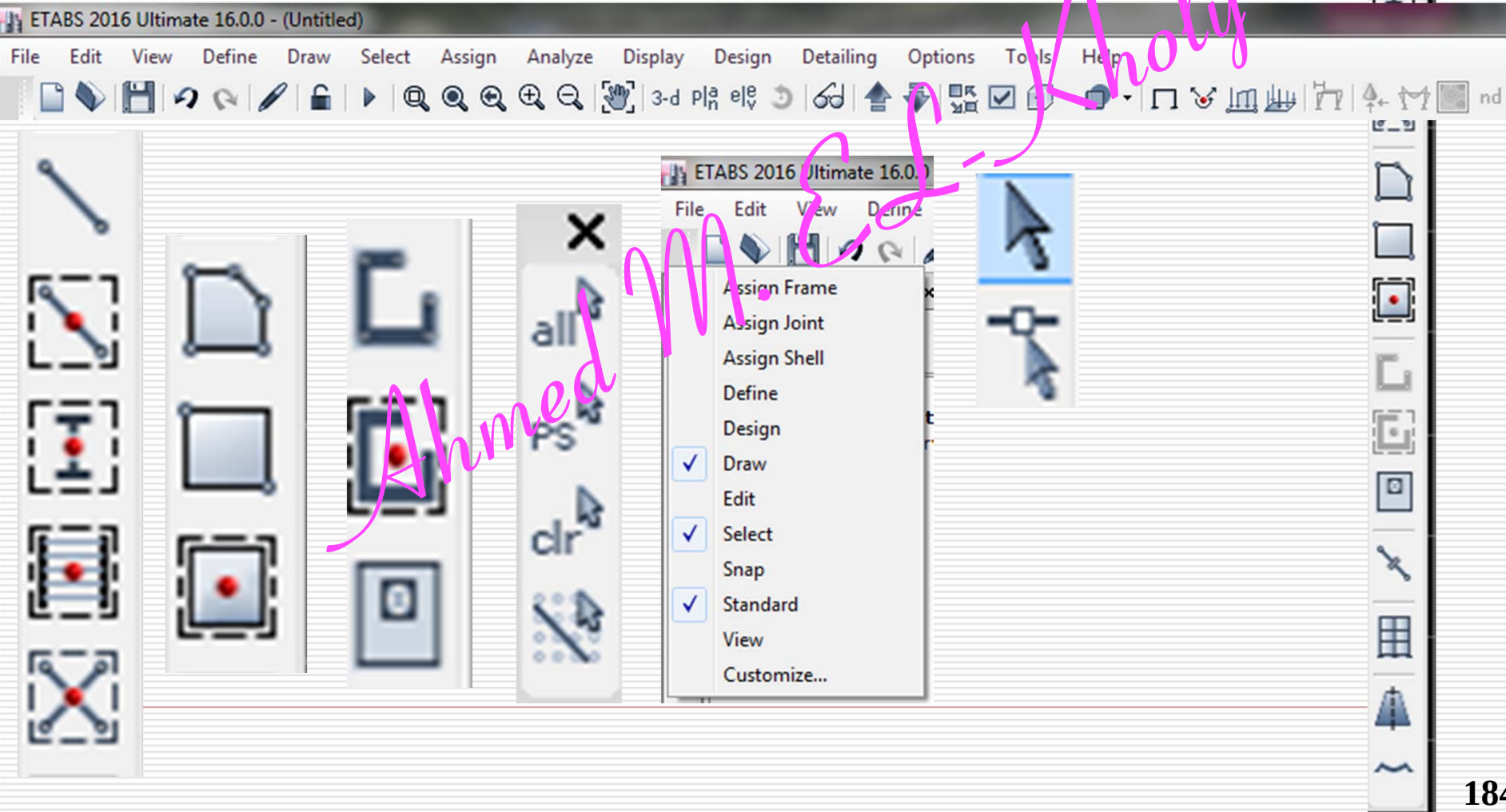
U.S. Defaults
Metric SI Defaults
Metric MKS Defaults
Consistent Units...
Show Units Form...

U.S. Defaults
Metric SI Defaults
Metric MKS Defaults
Consistent Units...
SET AMK
Show Units Form...

Ahmed M. Elholy

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6- Etabs Commands & Icons



6- Etabs Commands & Icons

Model Explorer

- Model Windows
 - Plan View - Story 10 - Z = 30 (m)
 - 3-D View
 - View
 - 3D
 - Elevation
 - Limits
 - Options
 - View by Colors of
 - Objects Present in View
 - Special Effects
 - Other Special Items
 - Joint Assignments
 - Frame Assignments
 - Shell Assignments
 - Link Assignments

Command List

View	Define	Draw	Select	Assign	Ana
3-d	Set 3D View...				Shift+Ctrl+F3
pl	Set Plan View...				Shift+Ctrl+F1
el	Set Elevation View...				Shift+Ctrl+F2
	Set Building View Limits...				
	Set Display Options...				Ctrl+W
	Rubber Band Zoom				F2
	Restore Full View				F3
	Previous Zoom				
	Zoom In One Step				Shift+F2
	Zoom Out One Step				Shift+F3
	Pan				F10
	Set Grid System Visibility...				Ctrl+D
	Show Axes				
	Change Axes Location...				
	Show Selected Objects Only				Shift+Ctrl+J
	Invert Visibility of Objects				
	Make Selected Objects Invisible				
	Restore Visibility of Previous Selection				
	Show All Objects				Shift+Ctrl+A
	Refresh Window				Shift+Ctrl+W
	Refresh View				Shift+Ctrl+V
	Show Rendered View				
	Show Rendered View (Ray Tracing)				

Snap Options

Snap to

- ☒ Joints
- ☐ Line Ends and Midpoints
- ☒ Grid Intersections
- ☐ Lines and Frames
- ☐ Edges
- ☐ Perpendicular Projections

Settings

- ☐ Intersection
- ☐ Fine Grid
- ☐ Extensions
- ☐ Parallels
- ☒ Intelligent Snaps
- ☒ Arch. Layer

Plan Fine Grid Spacing 0.25 m

Plan Nudge Value 0.25 m

Screen Selection Tolerance 5 pixels

Screen Snap To Tolerance 5 pixels

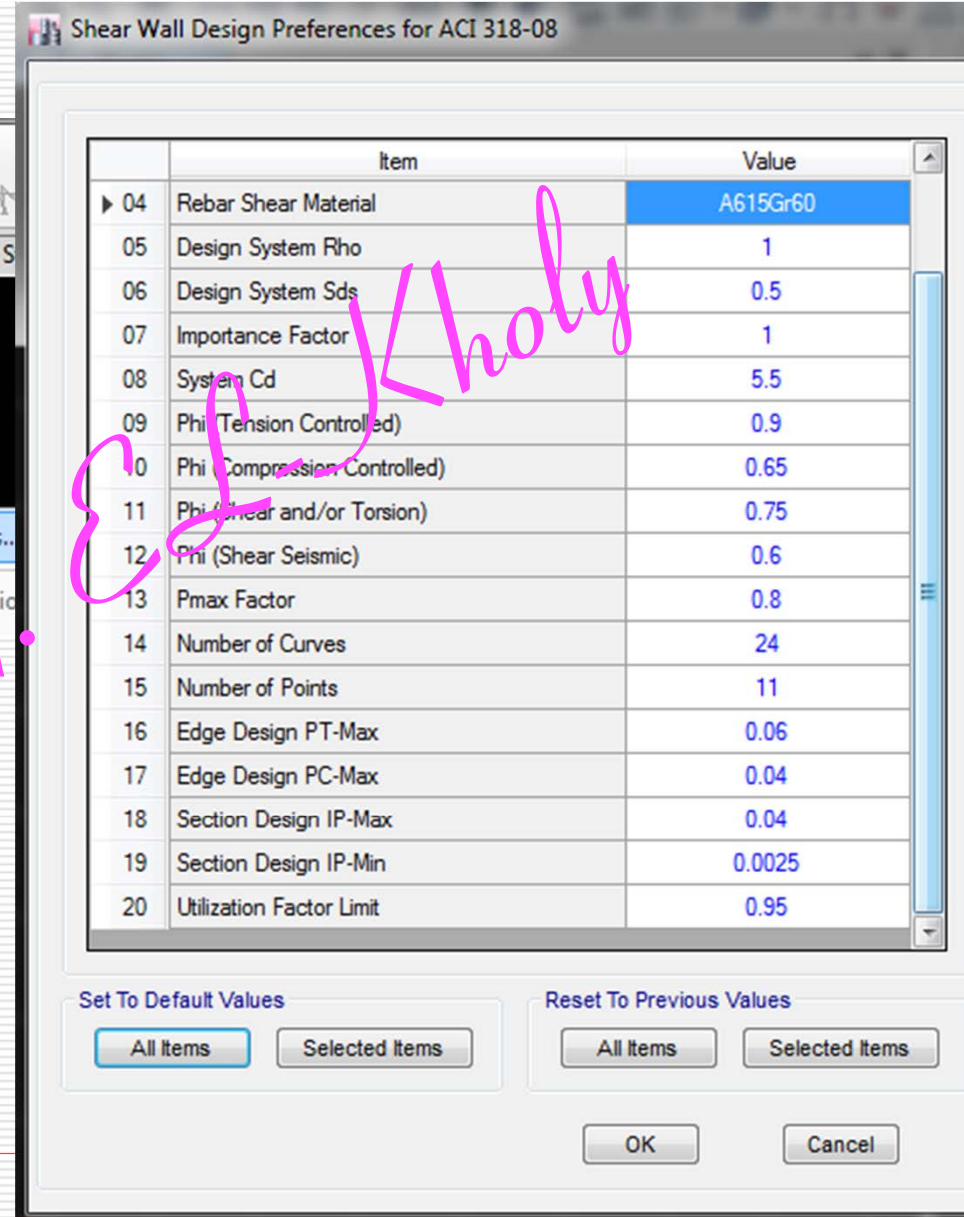
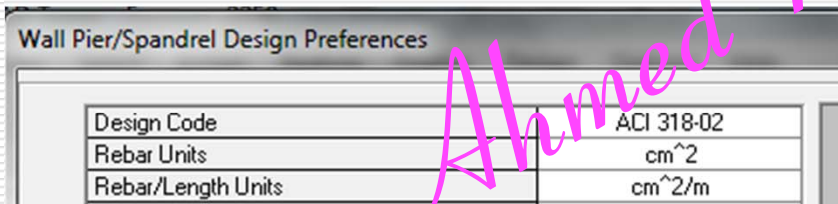
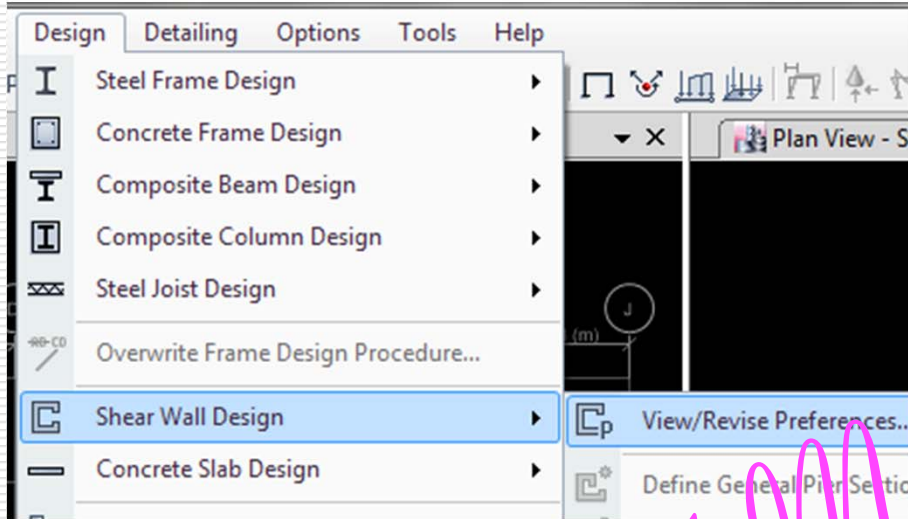
Drawing Scale 1:10

Snap Increments

- ☒ (Imperial in Inches) Snap at length increments of 12; 6; 1; 0.25;
- ☒ (Metric in mm) Snap at length increments of 500; 100; 25; 5;
- ☒ (Degree) Snap at angle increments 1;

Apply **Close**

7- Define Design Data for Shear Walls



7- Define Design Data For Columns

Design Detailing Options Tools Help

Steel Frame Design

Concrete Frame Design

Composite Beam Design

View/Revise Preferences...

View/Revise Concrete Frame Design Preferences for ACI 318-08

IBS 2016

Concrete Frame Design Preferences

Item	Value
01 Design Code	ACI 318-08
02 Multi-Response Case Design	Step-by-Step All
03 Number of Interaction Curves	24
04 Number of Interaction Points	11
05 Consider Minimum Eccentricity?	Yes
06 Seismic Design Category	C
07 Design System Rho	1
08 Design System Sds	0.5
09 Phi (Tension Controlled)	0.9
10 Phi (Compression Controlled Tied)	0.65
11 Phi (Compression Controlled Spiral)	0.75
12 Phi (Shear and/or Torsion)	0.75
13 Phi (Shear Seismic)	0.6
14 Phi (Joint Shear)	0.85
15 Pattern Live Load Factor	0.75
16 Utilization Factor Limit	1

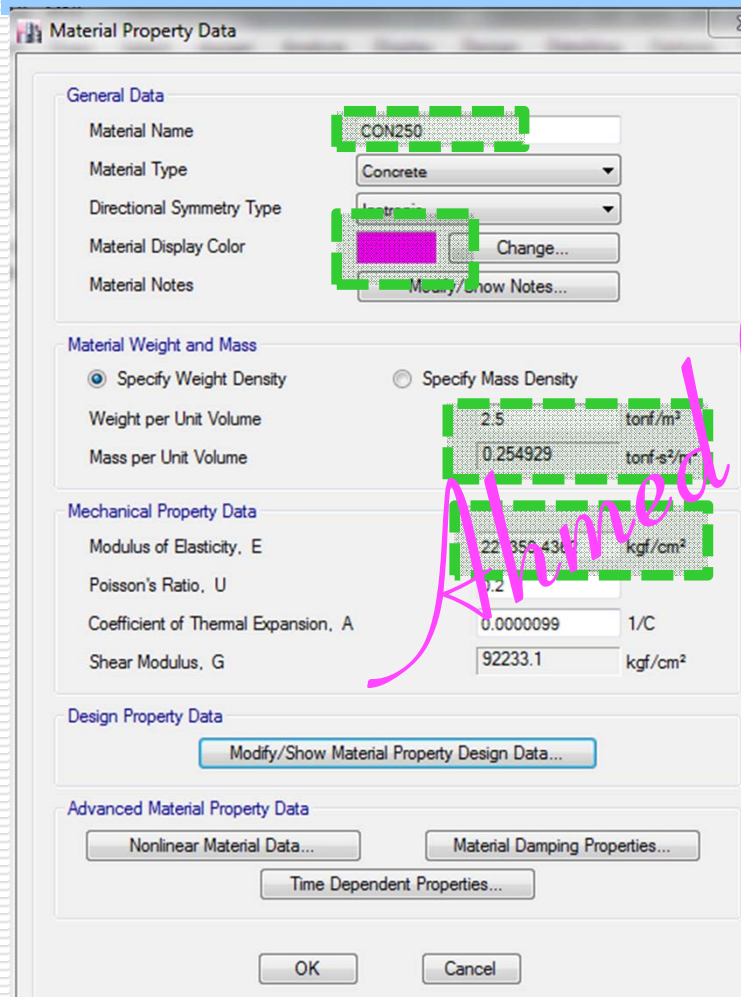
Concrete Frame Design Preferences

Design Code	ACI 318-02
Seismic Design Category	D
Number of Interaction Curves	2
Number of Interaction Points	11
Consider Minimum Eccentricity	Yes
Phi (Tension Controlled)	0.9
Phi (Compression Controlled Tied)	0.65
Phi (Compression Controlled Spiral)	0.7
Phi (Shear and/or Torsion)	0.75
Phi (Shear Seismic)	0.6
Phi (Shear Joint)	0.85
Pattern Live Load Factor	0.75
Utilization Factor Limit	0.95

Handwritten notes: "Ahmed" and "Lholy" with arrows pointing to the design code and seismic design category respectively.

8- Define Material

8- Material properties (Define-Material Properties- Concrete 350 for vertical elements and 250 for horizontal elements) according the considered code



Material Property Data

General Data

Material Name: CON250

Material Type: Concrete

Directional Symmetry Type: Isotropic

Material Display Color: [Color Selection Box] Change...

Material Notes: [Text Area] Modify/Show Notes...

Material Weight and Mass

☒ Specify Weight Density ☐ Specify Mass Density

Weight per Unit Volume: 2.5 tonf/m³

Mass per Unit Volume: 0.254929 tonf-s³/m³

Mechanical Property Data

Modulus of Elasticity, E: 22350431 kgf/cm²

Poisson's Ratio, U: 0.2

Coefficient of Thermal Expansion, A: 0.0000099 1/C

Shear Modulus, G: 92233.1 kgf/cm²

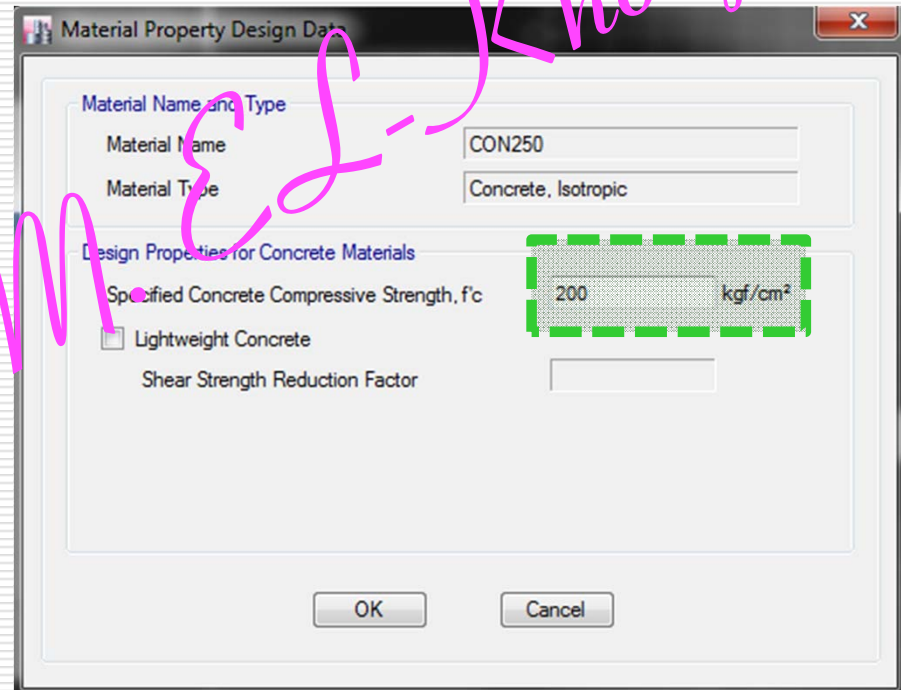
Design Property Data

Modify/Show Material Property Design Data...

Advanced Material Property Data

Nonlinear Material Data... Material Damping Properties... Time Dependent Properties...

OK Cancel



Material Property Design Data

Material Name and Type

Material Name: CON250

Material Type: Concrete, Isotropic

Design Properties for Concrete Materials

Specified Concrete Compressive Strength, f_c: 200 kgf/cm²

☐ Lightweight Concrete

Shear Strength Reduction Factor: [Text Box]

OK Cancel

8- Define Material

8- Material properties (Define - Material Properties – Steel RFT 36/52 for ribbed bars and Steel RFT 24/48 for smooth bars such as ties in columns)

Shahid

Shahid

Material Property Data

General Data

Material Name: RFT-ST36/52

Material Type: Rebar

Directional Symmetry Type: Uniaxial

Material Display Color: [Blue Box] Change...

Material Notes: Modify/Show Notes...

Material Weight and Mass

☒ Specify Weight Density ☐ Specify Mass Density

Weight per Unit Volume: 7.85 tonf/m³

Mass per Unit Volume: 0.800477 tonf-s²/m⁴

Mechanical Property Data

Modulus of Elasticity, E: 2100000 kgf/cm²

Coefficient of Thermal Expansion, A: 0.0000117 1/C

Design Property Data

Modify/Show Material Property Design Data...

Advanced Material Property Data

Nonlinear Material Data... Material Damping Properties... Time Dependent Properties...

Material Property Design Data

Material Name and Type

Material Name: RFT-ST36/52

Material Type: Rebar, Uniaxial

Design Properties for Rebar Materials

Minimum Yield Strength, Fy	3600	kgf/cm ²
Minimum Tensile Strength, Fu	5200	kgf/cm ²
Expected Yield Strength, Fye	3600	kgf/cm ²
Expected Tensile Strength, Fue	5200	kgf/cm ²

OK Cancel

**9-beams.... Define-Frame sections (Add Rectangular) ..
Create C30x100, C40x90, B25x60, B12x60**

9.1. Beams

Frame Section Property Data

General Data

Property Name: B25x60
 Material: CON250
 Notional Size Data: Modify/Show Notional Size...
 Display Color: Change...
 Notes: Modify/Show Notes...

Shape

Section Shape: Concrete Rectangular

Section Property Source

Source: User Defined

Section Dimensions

Depth: 60 cm
 Width: 25 cm

Property Modifiers

Modify/Show Modifiers...
 Currently User Specified

Reinforcement

Modify/Show Rebar...

Design Type

☐ P-M2-M3 Design (Column)
☒ M3 Design Only (Beam)

Rebar Material

Longitudinal Bars: RFT-ST36/S2
 Confinement Bars (Ties): RFT-ST24/35

Cover to Longitudinal Bars (Column Center)

Top Bars: 3 cm
 Bottom Bars: 3 cm

Reinforcement Area Overwrites for Ductile Beams

Top Bars at I-End: 0 cm²
 Top Bars at J-End: 0 cm²
 Bottom Bars at I-End: 0 cm²
 Bottom Bars at J-End: 0 cm²

Other Dialogs:

Shear Area

Shear Area in 2 direction: 1
 Shear Area in 3 direction: 1
 Torsional Constant: 0.5
 Moment of Inertia about 2 axis: 0.5
 Moment of Inertia about 3 axis: 0.5
 Mass: 1
 Weight: 1

Buttons: OK, Cancel, Show Section Properties...

9- Define Wall, Column, Beam, Slab Sections

9-beams.... Define-Frame sections (Add Rectangular) ..
Create C30x100, C40x90, B25x60, B12x60

9.2. Columns

Property/Stiffness Modification Factors

Shear Area in 3 direction

Torsional Constant

Moment of Inertia about 2 axis

Moment of Inertia about 3 axis

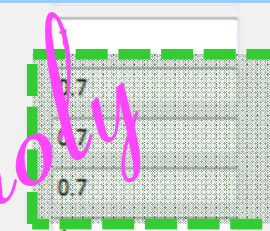
Mass

0.7

0.7

0.7

1



Frame Section Property Reinforcement Data

Design Type

☒ P-M-M3 Design (Column)

☐ M3 Design Only (Beam)

Rebar Material

Longitudinal Bars

RFT-ST36/S2

Confinement Bars (Ties)

RFT-ST24/35

Reinforcement Configuration

☒ Rectangular

☐ Circular

Confinement Bars

☒ Ties

☐ Spirals

Check/Design

☐ Reinforcement to be Checked

☒ Reinforcement to be Designed

Longitudinal Bars

Clear Cover for Confinement Bars

2

cm

Number of Longitudinal Bars Along 3-dir Face

3

Number of Longitudinal Bars Along 2-dir Face

8

Longitudinal Bar Size and Area

16

2.011

cm²

Corner Bar Size and Area

16

2.011

cm²

Confinement Bars

Confinement Bar Size and Area

8

0.503

cm²

Longitudinal Spacing of Confinement Bars (Along 1-Axis)

166.6667

cm

Number of Confinement Bars in 3-dir

6

Number of Confinement Bars in 2-dir

2

General Data

Property Name

C30x100

Material

CON350

Notional Size Data

Modify/Show Notional Size...

Display Color

Change...

Notes

Modify/Show Notes...

Shape

Section Shape

Concrete Rectangular

Section Property Source

Source: User Defined

Section Dimensions

Depth

100

cm

Width

30

cm

Property Modifiers

Modify/Show Modifiers...

Currently User Specified

Reinforcement

Modify/Show Rebar...

OK

Cancel

OK

Cancel

9- Define Wall, Column, Beam, Slab Sections

9- Slabs.... Define- Slab.. sections Slab20 and Slab22

9.3. Slabs

Especially

Aimed

The image shows a software interface with two main dialog boxes. The 'Slab Property Data' dialog box on the left has a 'General Data' section with the following fields: Property Name (Slab20), Slab Material (CON250), Notional Size Data (Modify/Show Notional Size...), Modeling Type (Shell-Thin), Modifiers (Currently Default) (Modify/Show...), Display Color (Change...), and Property Notes (Modify/Show...). The 'Property Data' section has Type (Slab) and Thickness (20 cm). The 'Property/Stiffness Modification Factors' dialog box on the right has a 'Property Stiffness Modifiers for Analysis' section with the following fields: Membrane f11 Direction (1), Membrane f22 Direction (1), Membrane f12 Direction (1), Bending m11 Direction (0.25), Bending m22 Direction (0.25), Bending m12 Direction (0.25), Shear v13 Direction (1), Shear v23 Direction (1), Mass (1), and Weight (1). The 'Bending m11 Direction', 'Bending m22 Direction', and 'Bending m12 Direction' fields are highlighted with a green dashed border. The 'OK' and 'Cancel' buttons are at the bottom of both dialog boxes.

Property Name	Value
Slab20	
CON250	
Shell-Thin	
Slab	
20	cm

Property Stiffness Modifiers for Analysis	Value
Membrane f11 Direction	1
Membrane f22 Direction	1
Membrane f12 Direction	1
Bending m11 Direction	0.25
Bending m22 Direction	0.25
Bending m12 Direction	0.25
Shear v13 Direction	1
Shear v23 Direction	1
Mass	1
Weight	1

9- Define Wall, Column, Beam, Slab Sections

9- Walls.... Define- Wall.. sections W30 and W40

9.4. Walls

Wall Property Data

General Data

Property Name: W30

Property Type: Specified

Wall Material: CON350

Notional Size Data: Modify/Show Notional Size...

Modeling Type: Shell-Thin

Modifiers (Currently User Specified): Modify/Show...

Display Color: Change...

Property Notes: Modify/Show...

Property Data

Thickness: 30

OK Cancel

Property/Stiffness Modification Factors

Property Stiffness Modifiers for Analysis

Membrane f11 Direction: 1

Membrane f22 Direction: 1

Membrane f12 Direction: 1

Bending m11 Direction: 0.35

Bending m22 Direction: 0.35

Bending m12 Direction: 0.35

Shear v13 Direction: 1

Shear v23 Direction: 1

Mass: 1

Weight: 1

OK Cancel

Ammed

Only

9- Define Wall, Column, Beam, Slab Sections

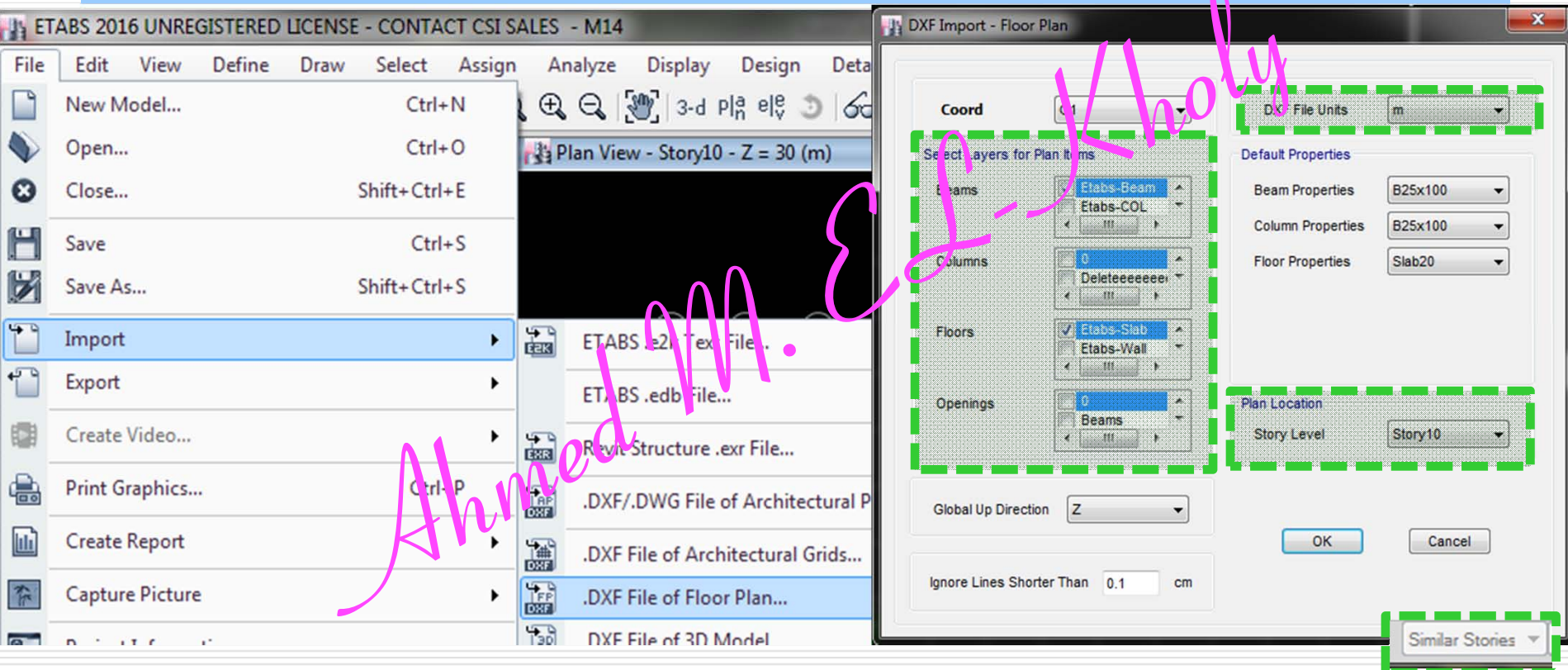
Modifiers....

	ECL 12	Euro Code 8	IBC 2015	UBC 97
Column	0.7	0.5	0.7	0.7
Shear Wall	0.35	0.5	0.35	0.35
Beam	0.5	0.5	0.35	0.35
Slab	0.25	0.5	0.25	0.25

These modifier for M1,M2,M12
Egyptian RC Code - Chapter 6
Egyptian Loads Code - Chapter 8
International Building Code 2015
Uniform Building Code 1997

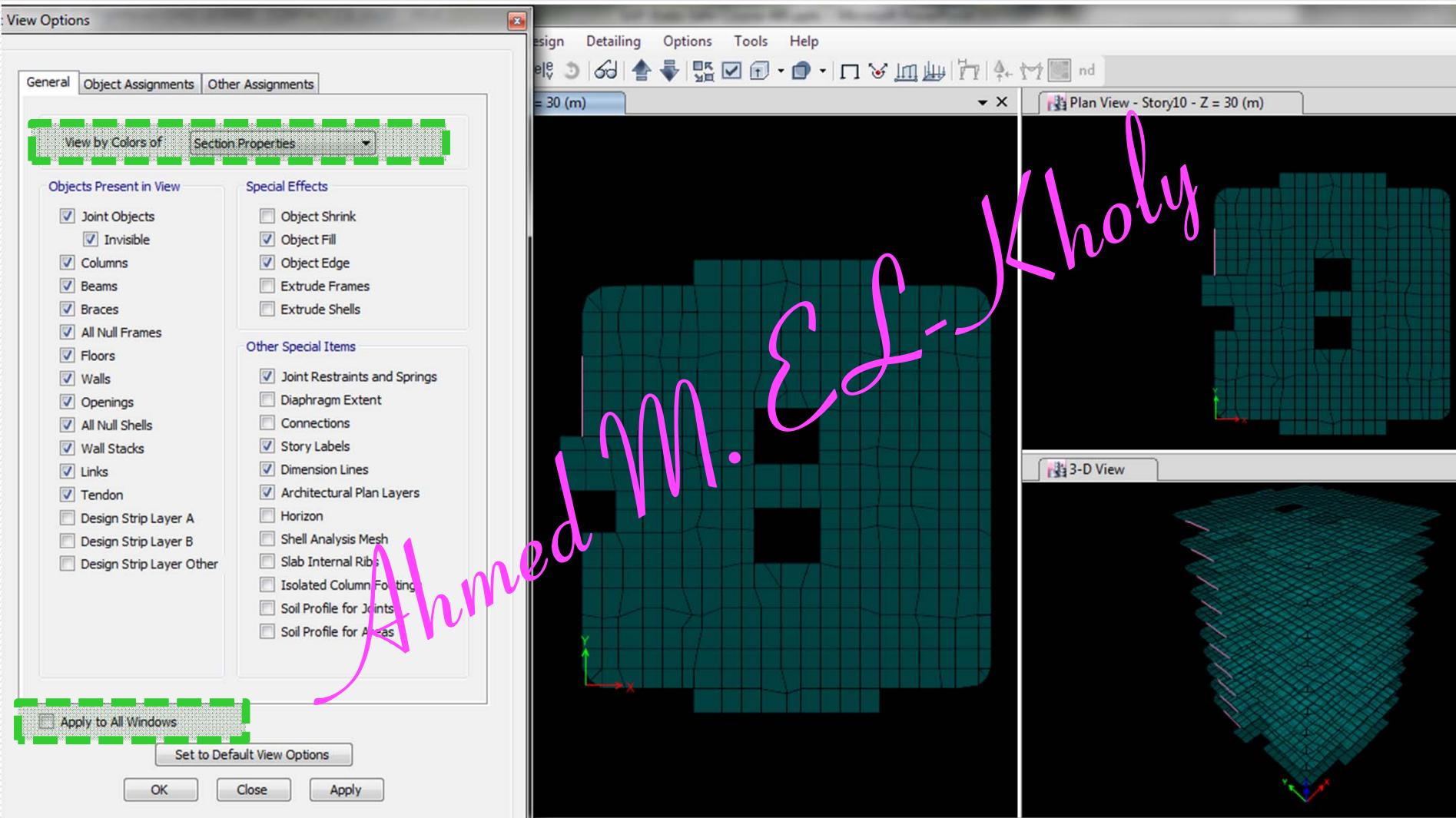
10- Import your DXF floors

File-Import-DXF floor plan



- **Select Layers for Plan Items** options. Check the check boxes to select beams, columns, floors and openings to be imported into ETABS, or select the zero check box to exclude that layer type from the import. Use the **Default Properties** drop-down lists to select properties for the beams, columns and floors, which will be imported into ETABS as assignments. ETABS will import 3dFace and Polyline entities in the DXF drawing as floors or openings and line entities as beams/columns.

المودل بعد سحبه و تغيير قطاع البلاطة بالقطاع الفعلى



**11-Select Alland then goto Assign... Shell Slab Section
..... and choose Slab20**

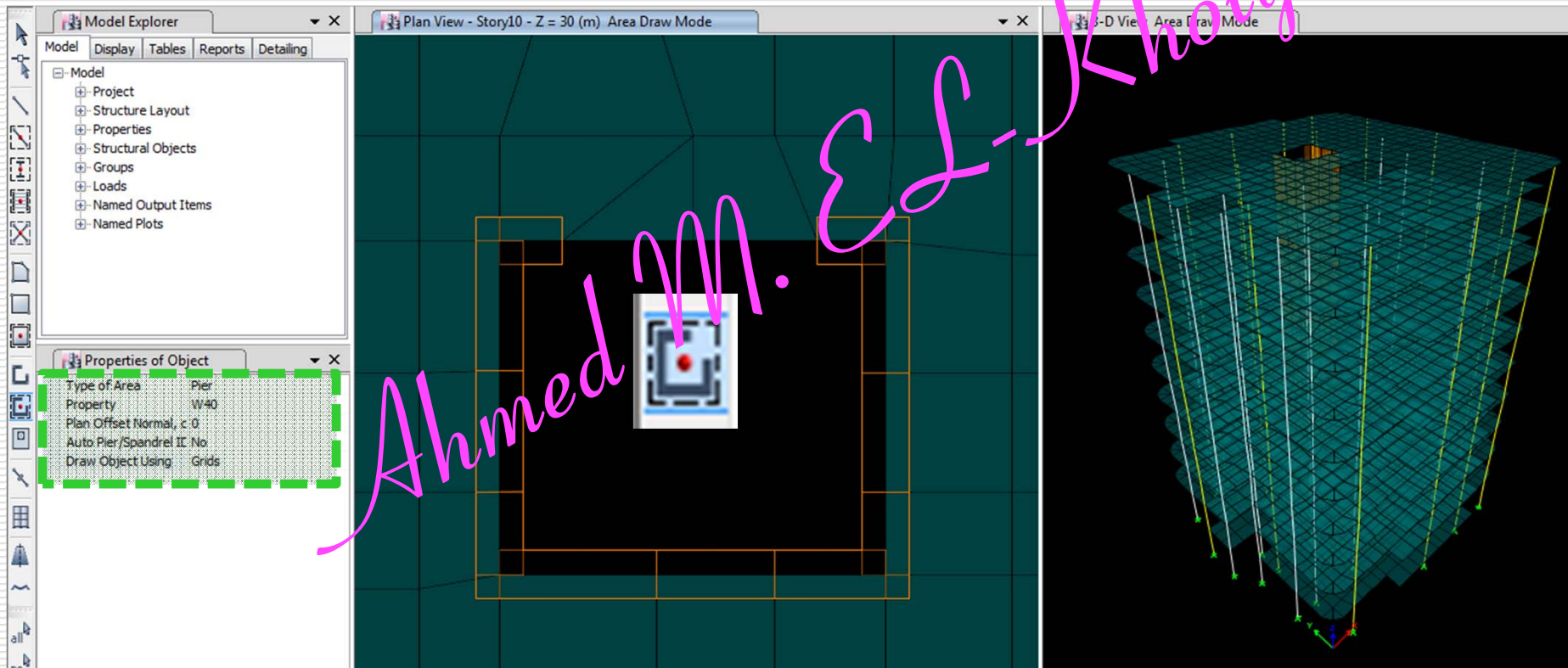
12- Draw Beams, Col, Shear walls

Draw beams, columns, shear walls with exact cross sections in Etabs



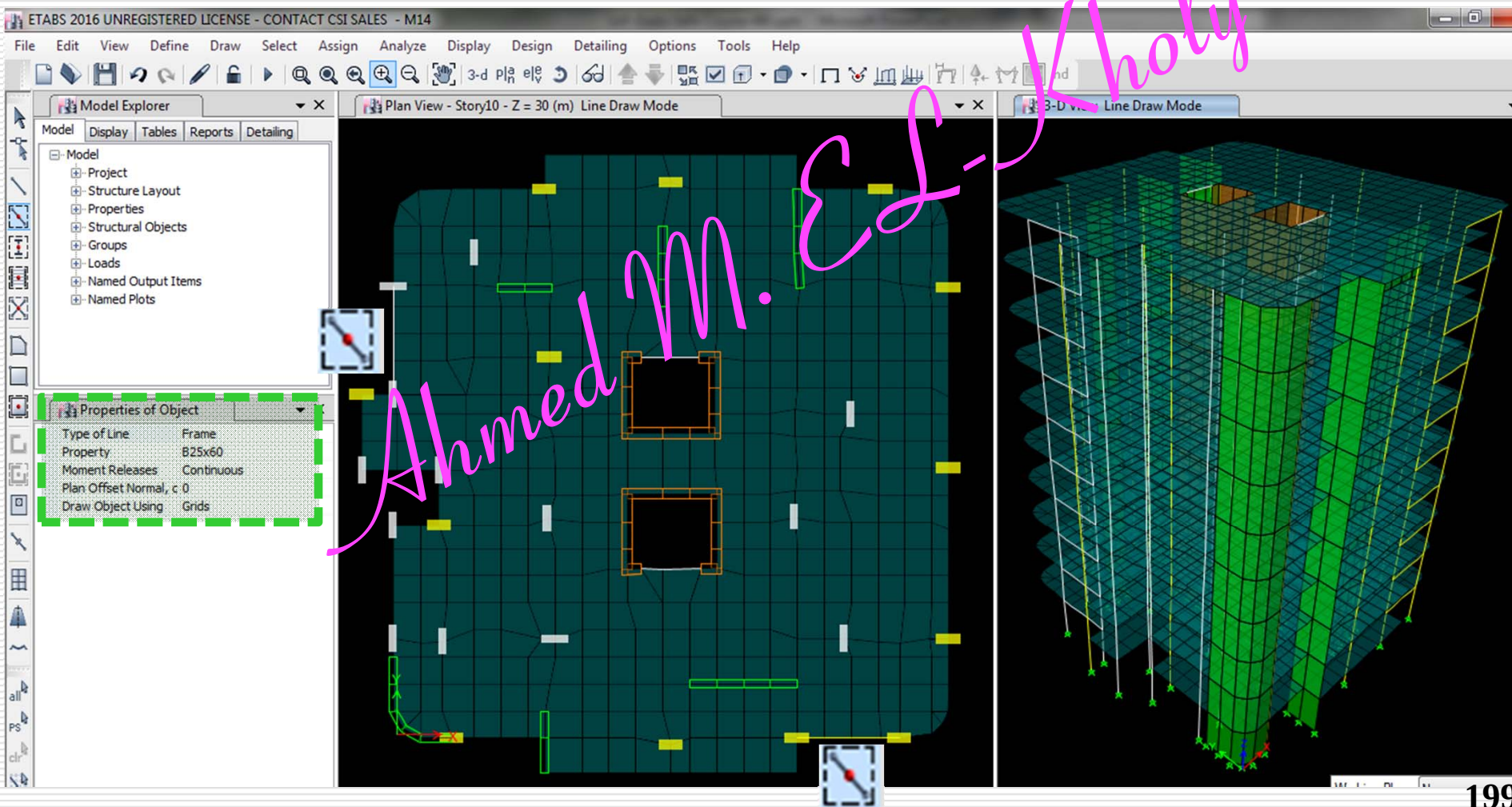
12- Draw Beams, Col, Shear walls

Draw beams, columns, shear walls with exact cross sections in Etabs



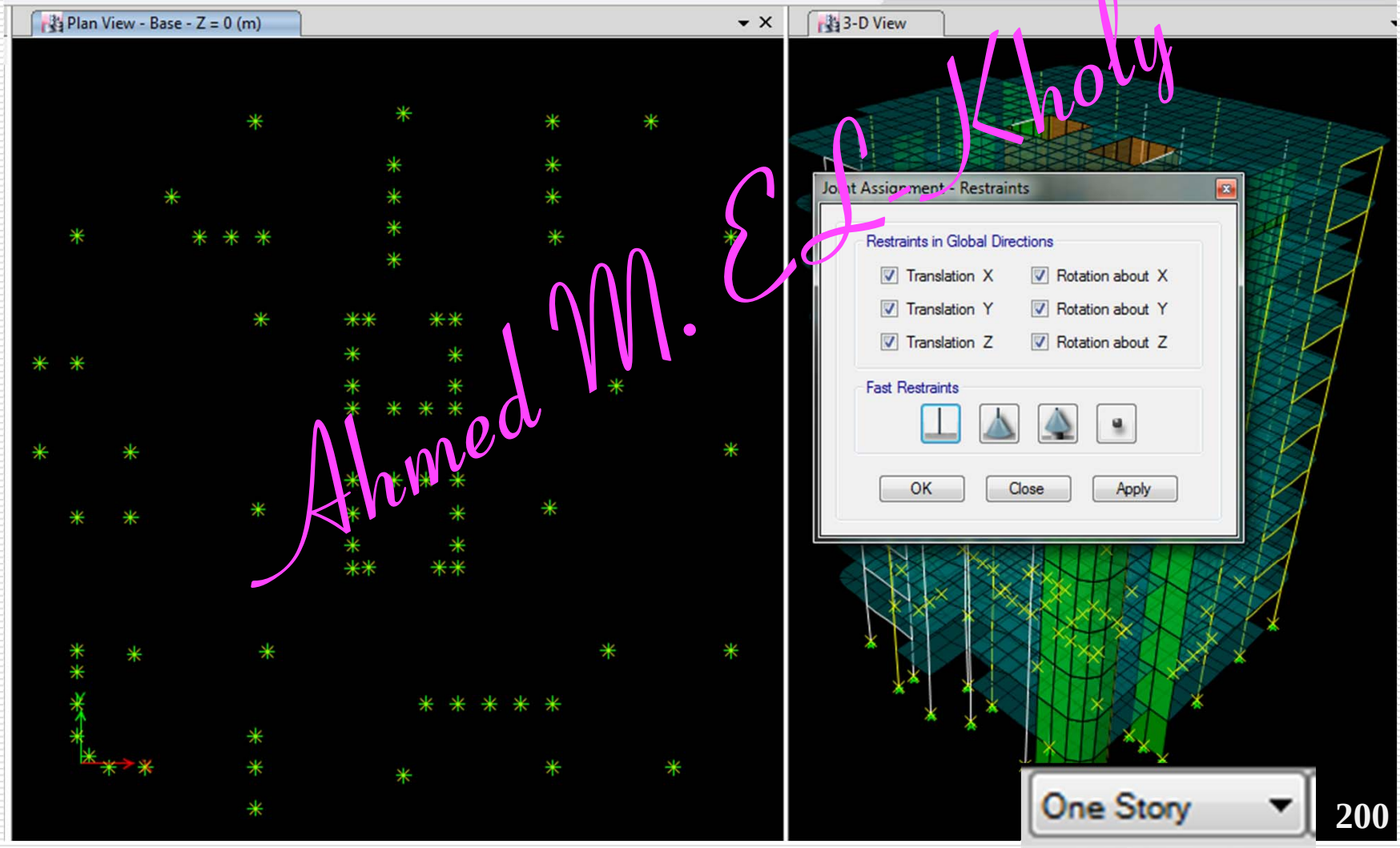
12- Draw Beams, Col, Shear walls

Draw beams, columns, shear walls with exact cross sections in Etabs

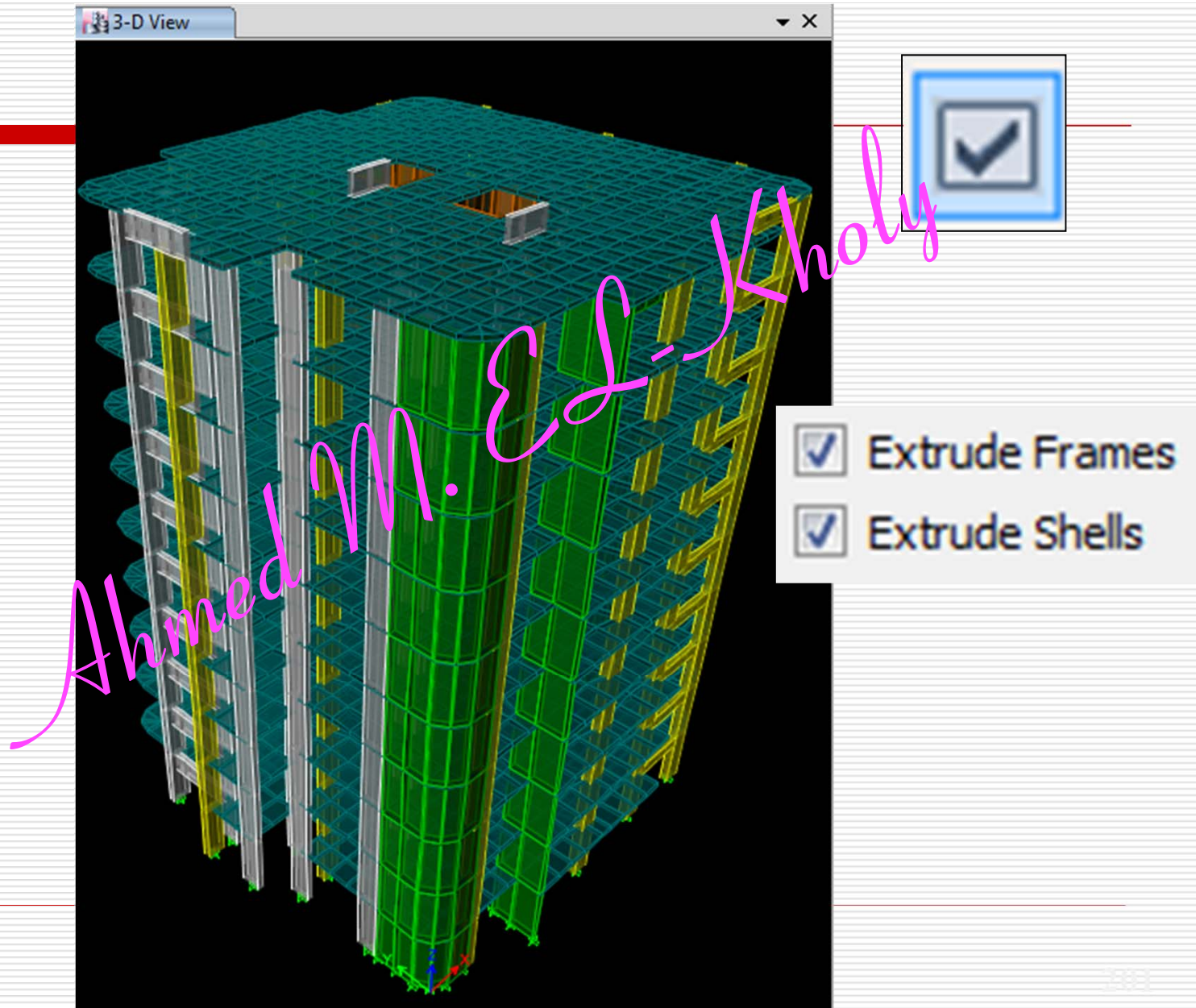


13- Fix the base points

Select the base points and then, Assign-joints-restraints and choose fixed

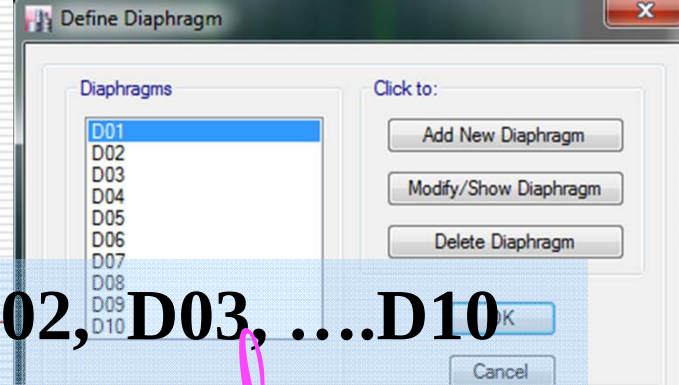


...Extrude



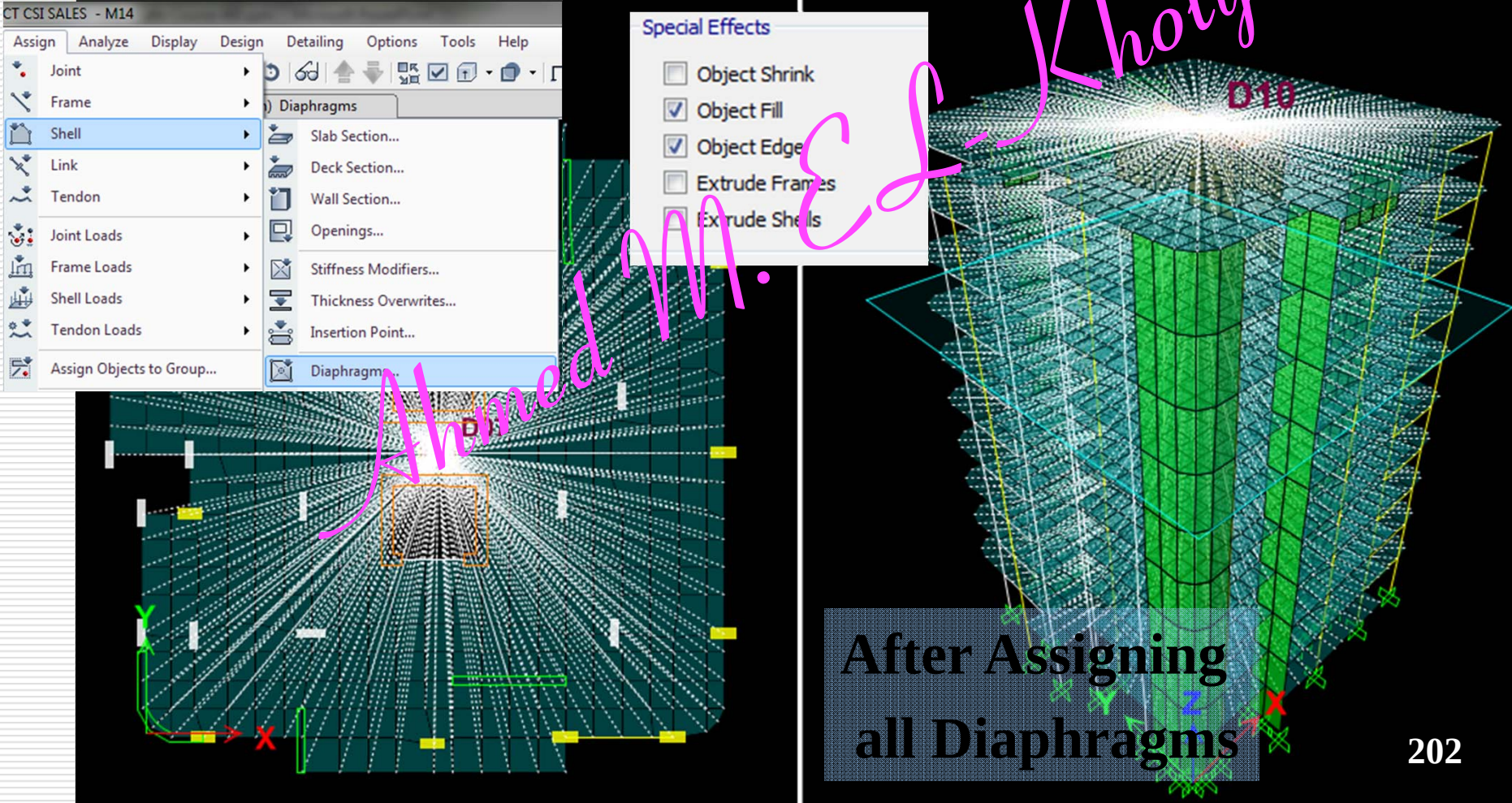
14- Define & Assign Diaphragms for floors

Menu: Define-diaphragm D01, D02, D03,D10



Plan View - Story7 - Z = 21 (m) Diaphragms

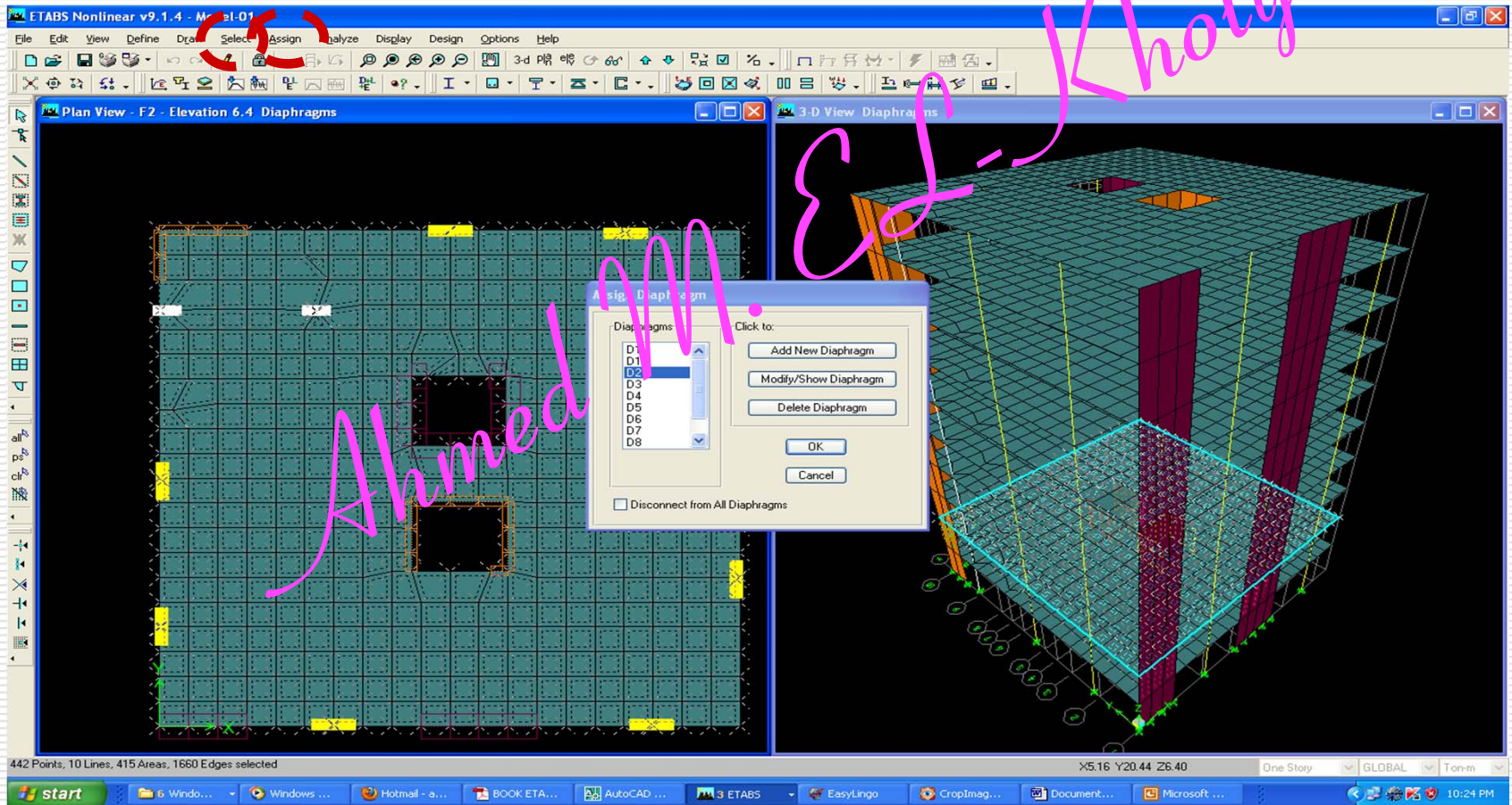
3-D View



14- Assign Diaphragms for floors

Menu: Select-by story- story2

Assign-Shell- Diaphragm D02



- 15- Mesh Shear Wall Areas
- 16- Define Static Load Cases → *D, L, Equivalent Static EQ, ...Temp, H, Wind, Snow*
- 17- Define Response Spectrum Functions } *Only for Spectra Method*
- 18- Define Response Spectrum Cases }
- 19- Define Load Combinations ?? *Spectra or not?*
- 20- Assign Loads ...D, L, ...
- 21- P-delta Effect/Dynamic Analysis
- 22- Define Mass source
- 23- Assign Piers
- 24- Check model
- 25- Run Analysis & Check Log File
- 26- If Spectra Method is utilized, Scale the Base Shear of Spectra Method to the 0.85 Base Shear of Equivalent Static. ...ECL2012 P141
- 27- Re-Run & Check Log File...
- 28- Checks: Mass Ratio, Drift, Overturning & Sliding
- 29- Read Straining Actions
- 30- Design

D, L, Equivalent Static EQ, ...Temp, H, Wind, Snow

Only for Spectra Method

Retaining Wall !!.. Scale level

26- If Spectra Method is utilized, Scale the Base Shear of Spectra Method to the 0.85 Base Shear of Equivalent Static. ...ECL2012 P141

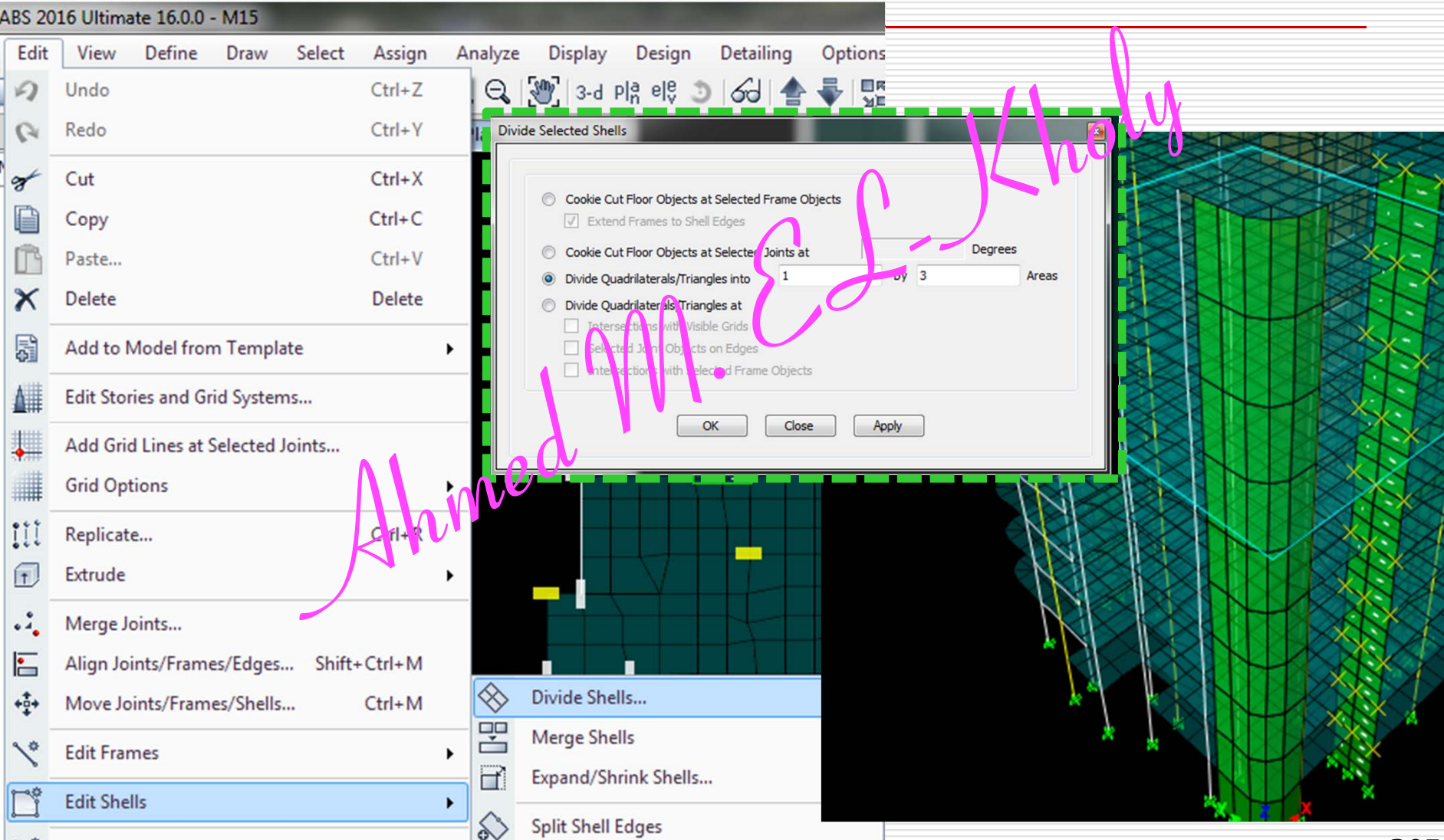
27- Re-Run & Check Log File...

26 26 26 26 26 26 26 26 26 26 26

15-Mesh (Vertically) Shear Wall Areas

..Two Alternatives

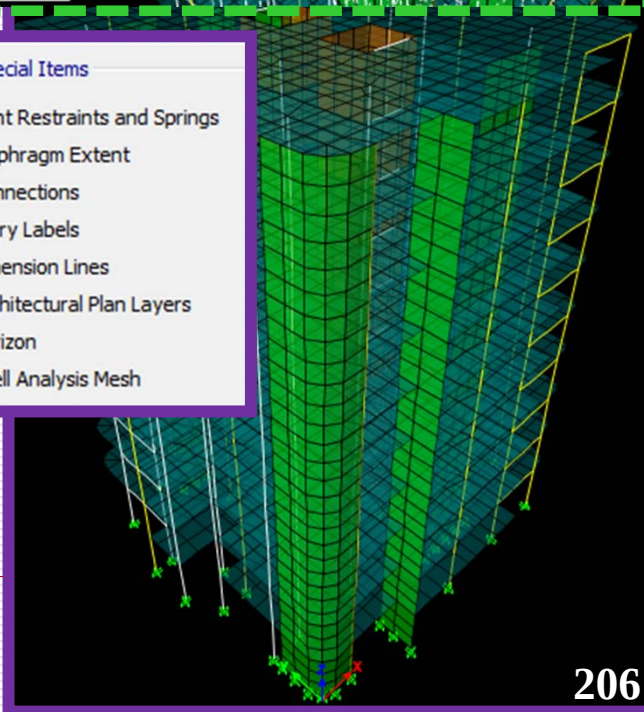
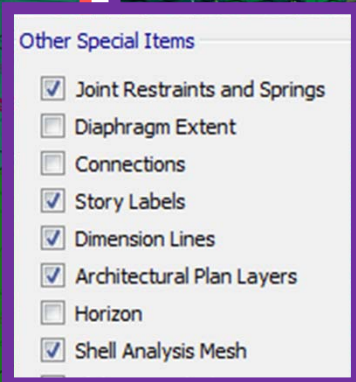
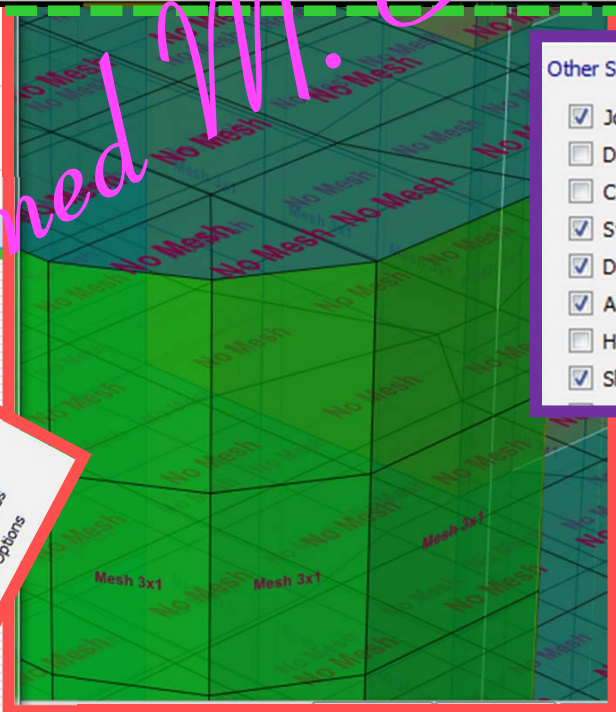
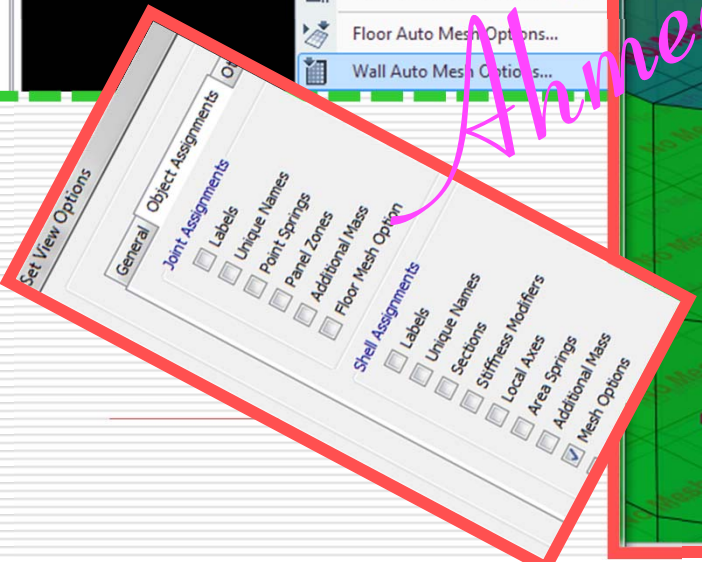
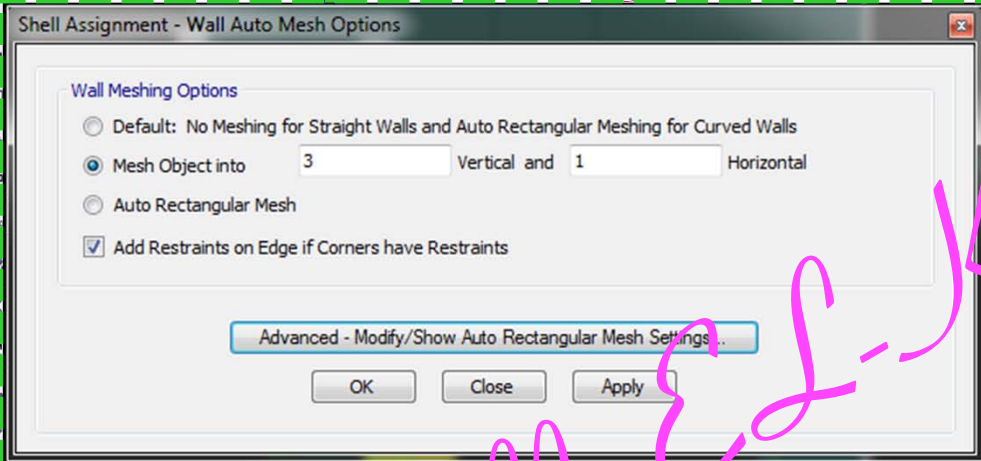
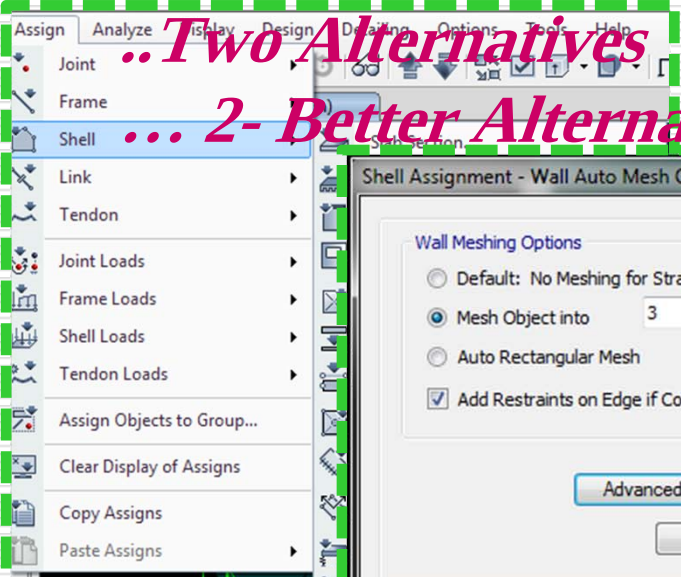
... 1- Bad Alternative ..Edit... Shell .. Divide Shells



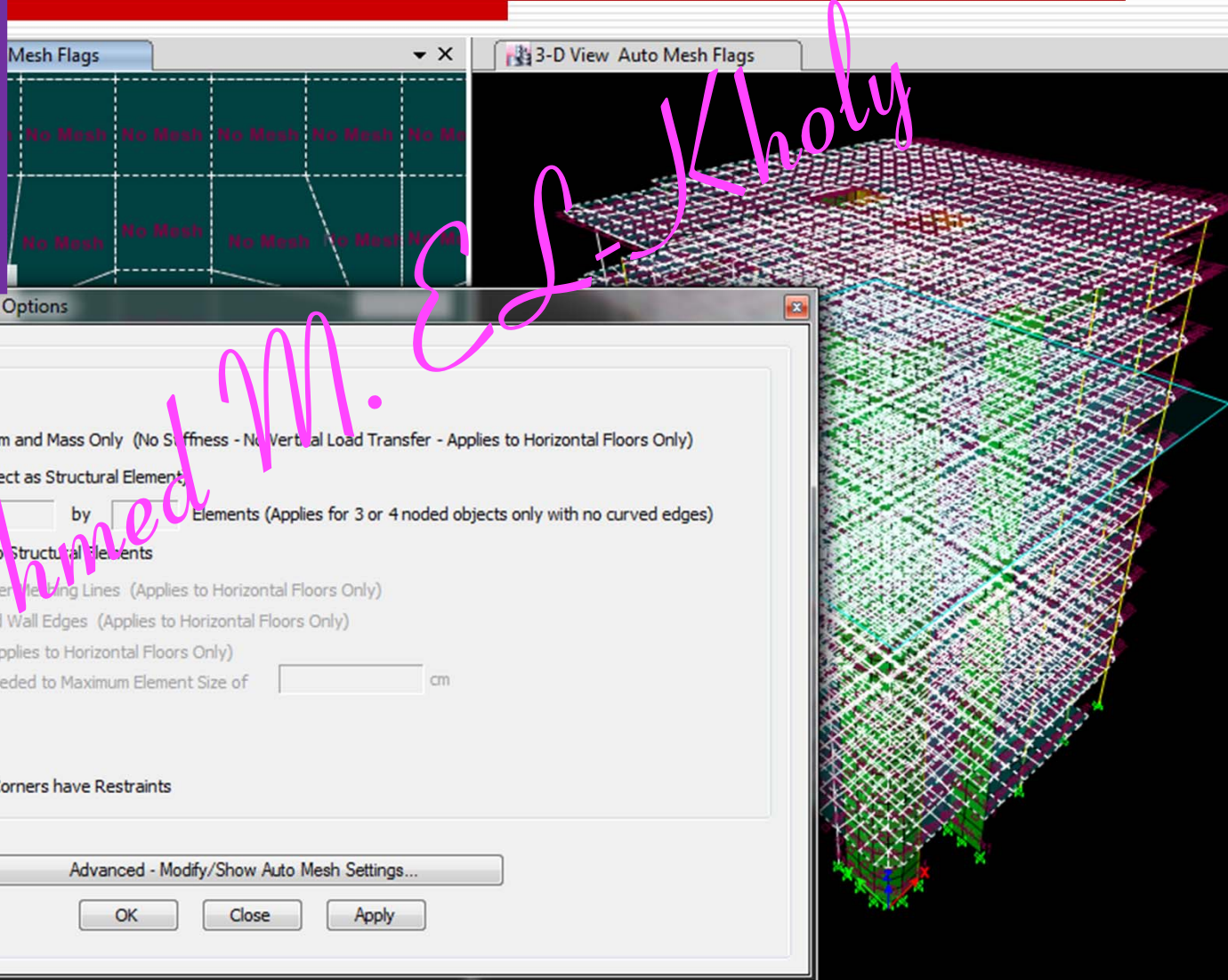
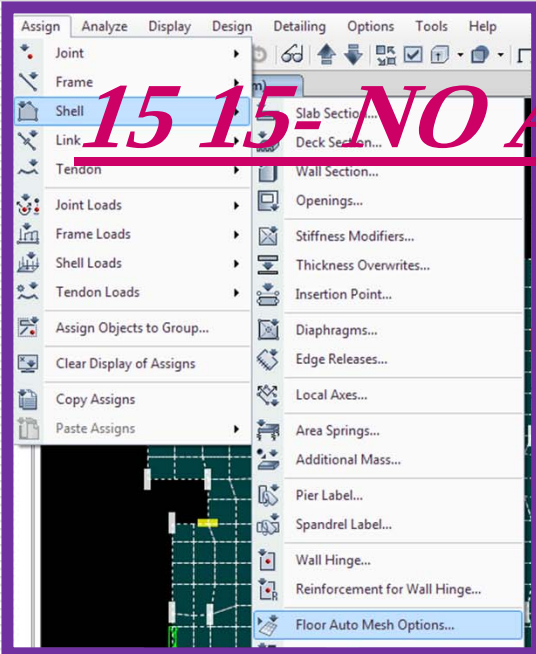
15-Mesh (Vertically) Shear Wall Areas

..Two Alternatives

... 2- Better Alternative ..Assign... Shell.. Wall Auto Mesh

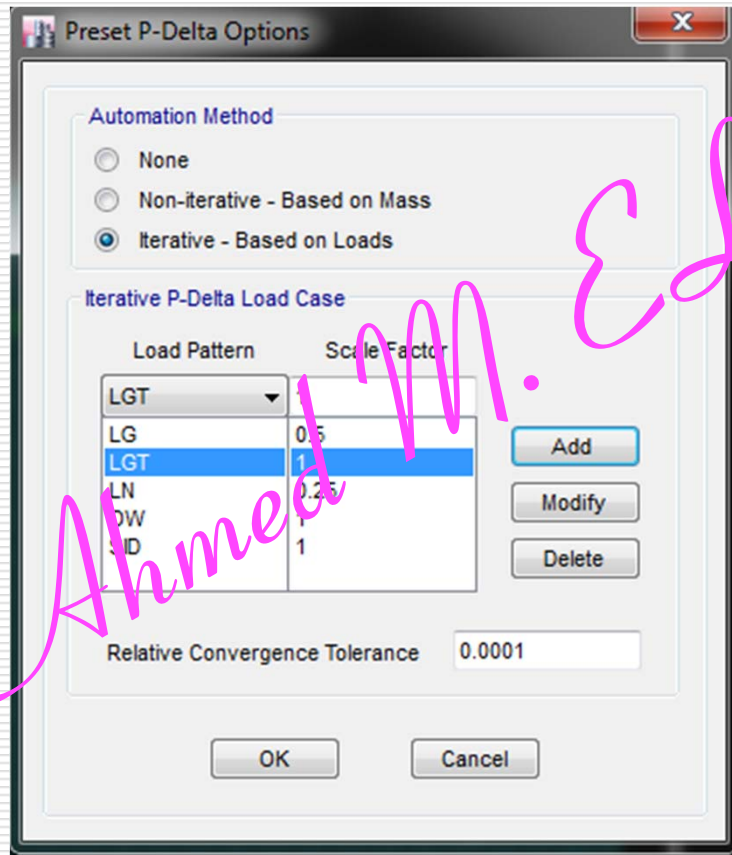


15-15- NO Auto Mesh for ALL floors



16- P- Δ Parameters

...Define.. P-Delta Options..



17- Static Load Cases

..Define.. Load Patterns

	Load	Type	SWM	Auto Lateral Loads	Comment
<u>1</u>	OW	Dead	1		Own Wight
<u>2</u>	SID	Dead	0		Flooring+Walls+....
<u>3</u>	LN	Live	0		$\psi=0.25$, Table 8-7
<u>4</u>	LG	Live	0		$\psi=0.5$, Table 8-7
<u>5</u>	LGT	Live	0		$\psi=1.0$, Table 8-7
<u>6</u>	EXA	Quake	0	User Loads	+X dir & Ecc=+0.05
<u>7</u>	EXB	Quake	0	User Loads	+X dir & Ecc=-0.05
<u>8</u>	EYA	Quake	0	User Loads	+Y dir & Ecc=+0.05
<u>9</u>	EYB	Quake	0	User Loads	+Y dir & Ecc=-0.05

17 17
..Define....
.Load Cases
&
check
every case

18- Mass Source

...Define..Mass Source..

The screenshot shows the 'Mass Source Data' dialog box. A red horizontal line is at the top. Handwritten pink text 'Ahmed M. Elholy' is written diagonally across the dialog. The 'Mass Source Name' field contains 'MSegy'. In the 'Mass Source' section, 'Specified Load Patterns' is selected. The 'Mass Multipliers for Load Patterns' table is highlighted with a green box and contains the following data:

Load Pattern	Multiplier
LGT	1
SW	1
SID	1
LN	0.25
LG	0.5
LGT	1

In the 'Mass Options' section, 'Include Lateral Mass' and 'Lump Lateral Mass at Story Levels' are checked. The 'OK' and 'Cancel' buttons are at the bottom.

19- Modal Analysis

...Define ... Modal Case

The image shows a 'Modal Case Data' dialog box with several sections. Handwritten pink annotations include 'S-L' and 'holy' near the 'General' section, 'Amm' near the 'Loads Applied' table, and 'M.' near the 'P-Delta/Nonlinear Stiffness' section.

Modal Case Data

General

Modal Case Name: Modal
Modal Case Sub Type: Ritz
Exclude Objects in this Group: Not Applicable
Mass Source: MsSrc1

P-Delta/Nonlinear Stiffness

☒ Use Preset P-Delta Settings: None
☐ Use Nonlinear Case (Loads at End of Case NOT included)
Nonlinear Case:
Modify/Show...

Loads Applied

Load Type	Load Name	Maximum Cycles	Target Dyn. Par. Ratio %
Acceleration	IX	0	98
Acceleration	LY	0	98

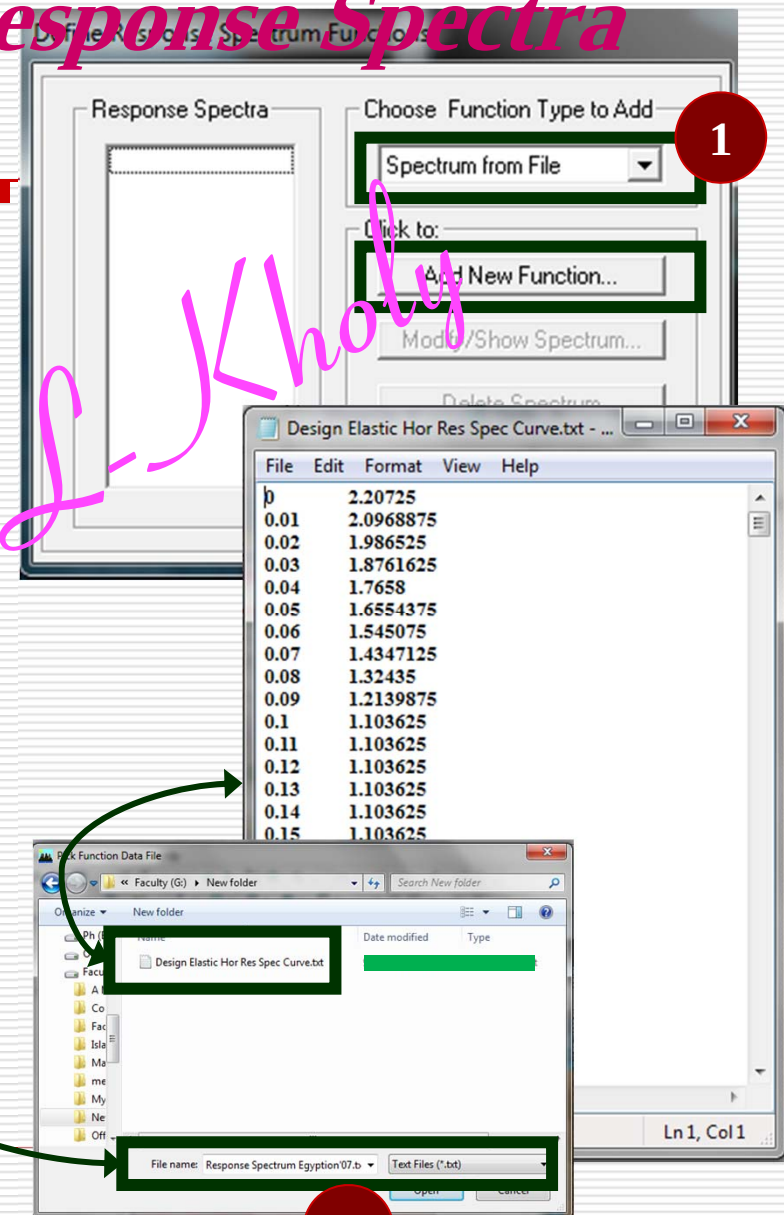
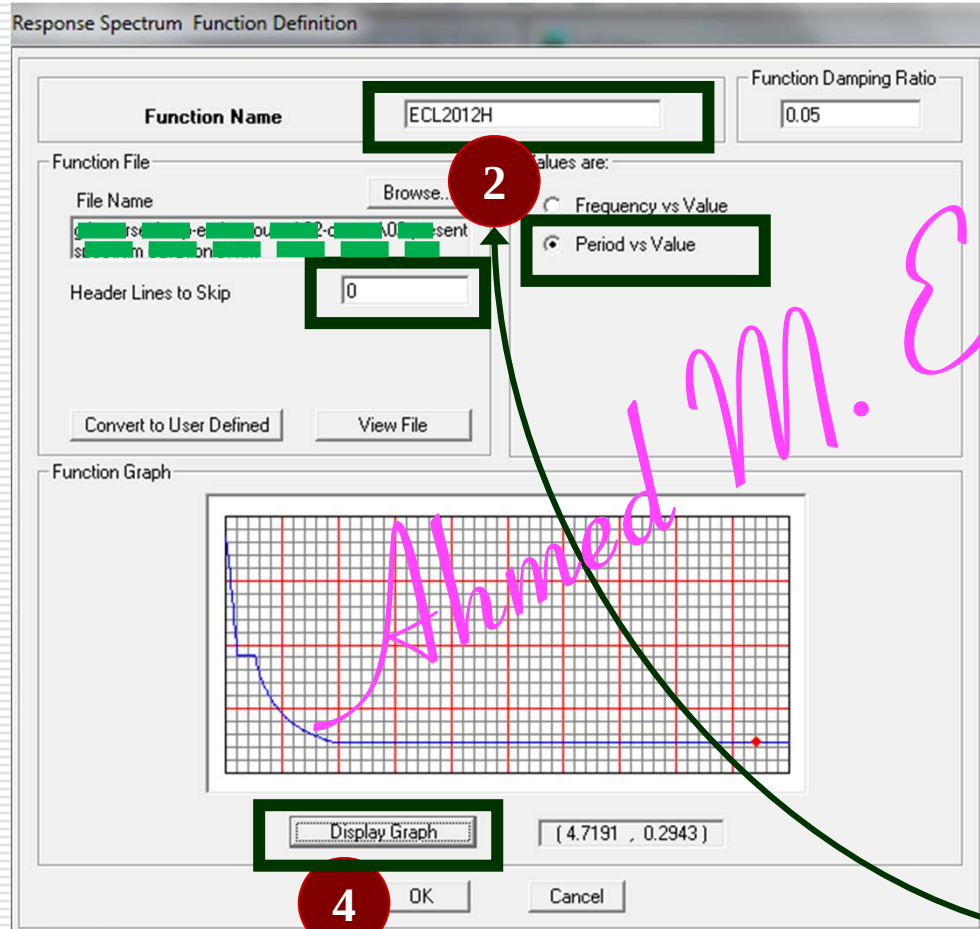
Other Parameters

Maximum Number of Modes: 15
Minimum Number of Modes: 10

OK Cancel

20-Response Spectra Functions

..Define.. Functions ..Response Spectra



21-Response Spectra Load Cases

..Define.. Load Cases .. Response Spectrum

Load Case Data

General

Load Case Name: SPECX Design...
Load Case Type: Response Spectrum Notes...
Exclude Objects in this Group: Not Applicable
Mass Source: Previous (MsSrc1)

Loads Applied

Load Type	Load Name	Function	Scale Factor
Acceleration	U1	ECL2012	1

Add
Delete
☐ Advanced

Other Parameters

Modal Load Case: Modal
Modal Combination Method: CQC
☐ Include Rigid Response
Rigid Frequency, f1:
Rigid Frequency, f2:
Periodic + Rigid Type:
Earthquake Duration, td:
Directional Combination Type: SRSS
Absolute Directional Combination Scale Factor:
Modal Damping: Constant at 0.05 Modify/Show...
Diaphragm Eccentricity: 0.05 for All Diaphragms Modify/Show...
OK Cancel

Load Case Data

General

Load Case Name: SPECY Design...
Load Case Type: Response Spectrum Notes...
Exclude Objects in this Group: Not Applicable
Mass Source: Previous (MsSrc1)

Loads Applied

Load Type	Load Name	Function	Scale Factor
Acceleration	U2	ECL2012	

Add
Delete
☐ Advanced

Other Parameters

Modal Load Case: Modal
Modal Combination Method: CQC
☐ Include Rigid Response
Rigid Frequency, f1:
Rigid Frequency, f2:
Periodic + Rigid Type:
Earthquake Duration, td:
Directional Combination Type: SRSS
Absolute Directional Combination Scale Factor:
Modal Damping: Constant at 0.05 Modify/Show...
Diaphragm Eccentricity: 0.05 for All Diaphragms Modify/Show...
OK Cancel

SPECX

SPECY

22-Load Combinations..Define..Load Combinations

	Combination	Equation	Comment	Equ
<u>1</u>	SD	OW+SID	Service Dead (Deflection)	
<u>2</u>	SL	LN+LG+LGT	Service Live (Deflection)	
<u>3</u>	SDL	OW+SID+LN+LG+LGT	Service Dead+Live	
<u>4</u>	UD	0.9OW+0.9SID	Ultimate Dead	
<u>5</u>	UDL	1.4(OW+SID)+1.6(LN+LG+LGT)	Ultimate Dead+Live	
<u>6</u>	UDLEXA	1.12SD+ α SL+EXA	Ultimate Dead+Live+EX+ECC	(3-5)
<u>7</u>	UDLEXAN	1.12SD+ α SL-EXA	Ultimate Dead+Live-EX+ECC	
<u>8</u>	UDLEXB	1.12SD+ α SL+EXB	Ultimate Dead+Live+EX-ECC	
<u>9</u>	UDLEXBN	1.12SD+ α SL-EXB	Ultimate Dead+Live-EX-ECC	
<u>10</u>	UDLEYA	1.12SD+ α SL+EYA	Ultimate Dead+Live+EY+ECC	(3-5)
<u>11</u>	UDLEYAN	1.12SD+ α SL-EYA	Ultimate Dead+Live-EY+ECC	
<u>12</u>	UDLEYB	1.12SD+ α SL+EYB	Ultimate Dead+Live+EY-ECC	
<u>13</u>	UDLEYBN	1.12SD+ α SL-EYB	Ultimate Dead+Live-EY-ECC	
<u>14</u>	UDEXA	0.9SD+EXA	Ultimate Dead+EX+ECC	(3-9)
<u>15</u>	UDEXAN	0.9SD-EXA	Ultimate Dead-EX+ECC	
<u>16</u>	UDEXB	0.9SD+EXB	Ultimate Dead+EX-ECC	
<u>17</u>	UDEXBN	0.9SD-EXB	Ultimate Dead-EX-ECC	
<u>18</u>	UDEYA	0.9SD+EYA	Ultimate Dead+EY+ECC	(3-9)
<u>19</u>	UDEYAN	0.9SD-EYA	Ultimate Dead-EY+ECC	
<u>20</u>	UDEYB	0.9SD+EYB	Ultimate Dead+EY-ECC	
<u>21</u>	UDEYBN	0.9SD-EYB	Ultimate Dead-EY-ECC	

Static Load Combinations

Ahmed M E L Kholy

22-Load Combinations

...Define..Load Combinations

	Combination	Equation	Comment	Equ
<u>22</u>	UDLSpecX	$1.12SD + \alpha SL + \text{SpecX}$	Ultimate Dead+Live+SpecX+ECC	(3-5)
<u>23</u>	UDLSpecY	$1.12SD + \alpha SL + \text{SpecY}$	Ultimate Dead+Live+SpecY+ECC	(3-5)
<u>24</u>	UDSpecX	$0.9SD + \text{SpecX}$	Ultimate Dead+SpecX+ECC	(3-9)
<u>25</u>	UDSpecY	$0.9SD + \text{SpecY}$	Ultimate Dead+SpecY+ECC	(3-9)

Dynamic Load Combinations

23-Assign Loads

...Assign.. Shell Loads... Uniform

*Assign the loads for the slabs in the cases
SID, LN, LG & LGT*

*Be careful and avoid selecting the walls
when assigning loads.*

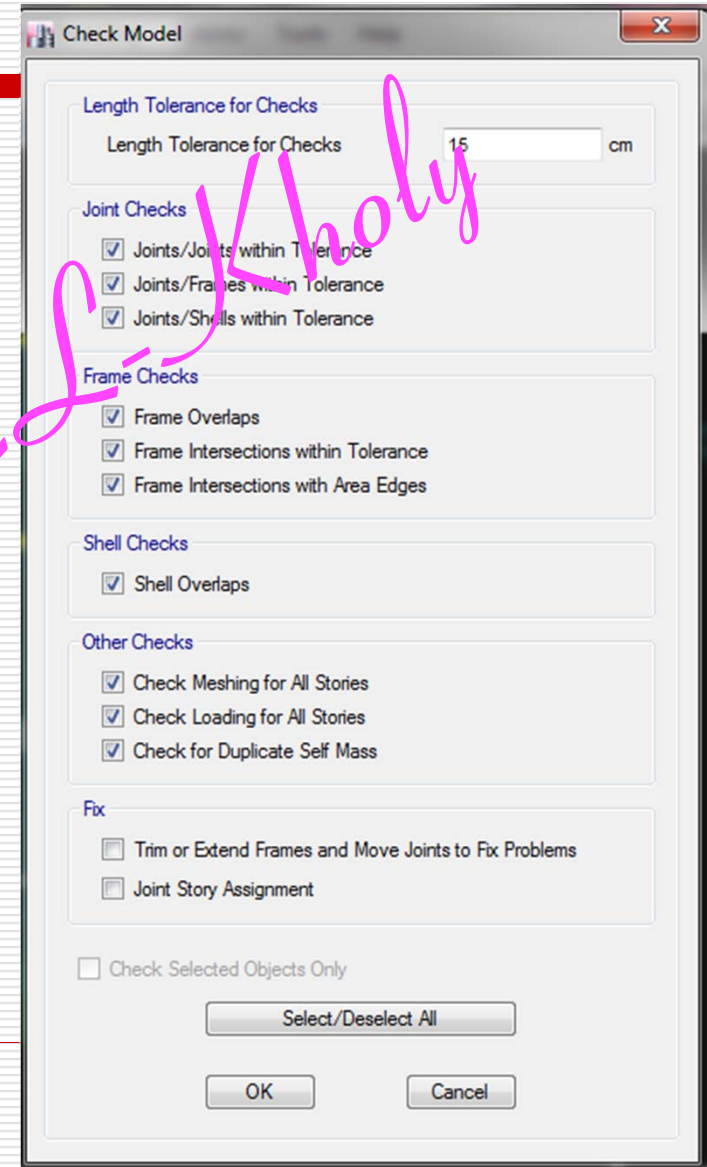
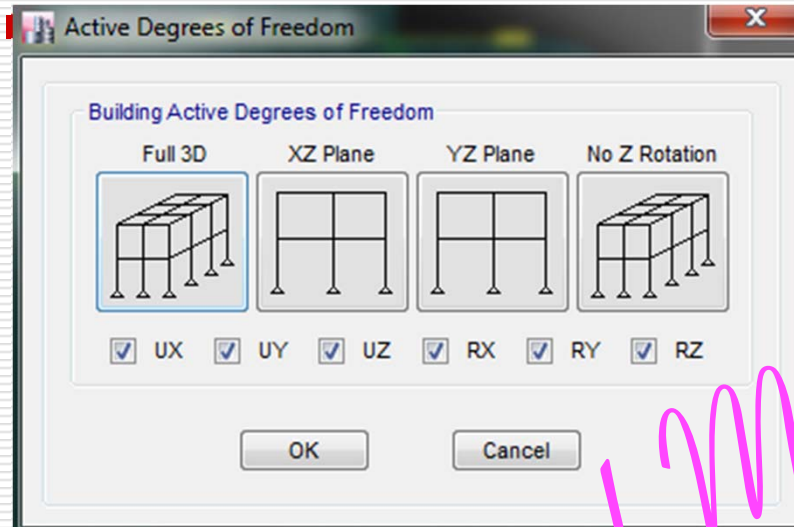
*Assign the loads to ONLY the slabs.
DO NOT Assign loads to walls.*

24- DOF

...Analyze.. Set DOF..

24- Check Model

...Analyze.. Check Model..

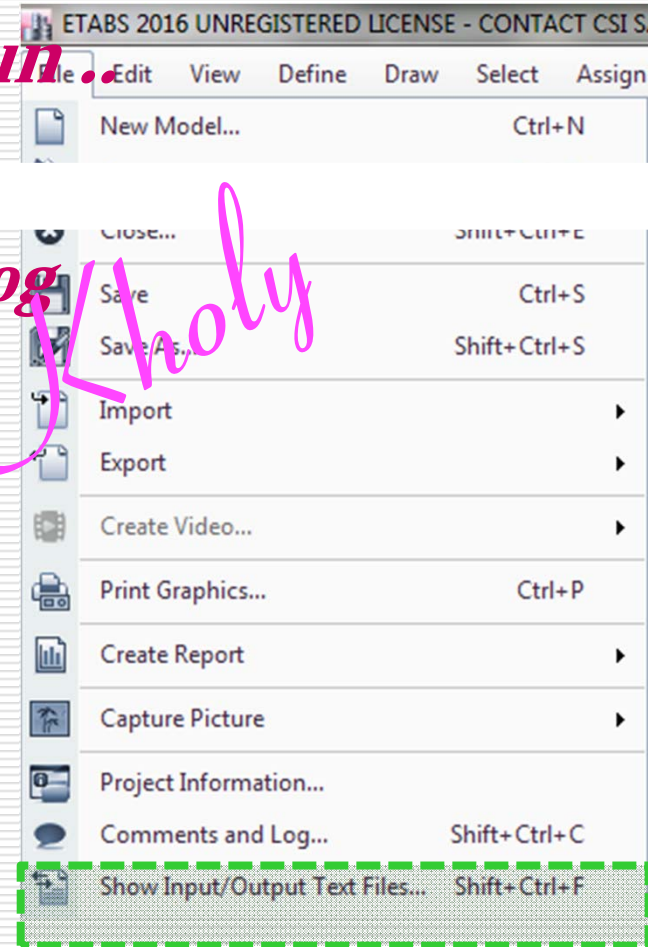
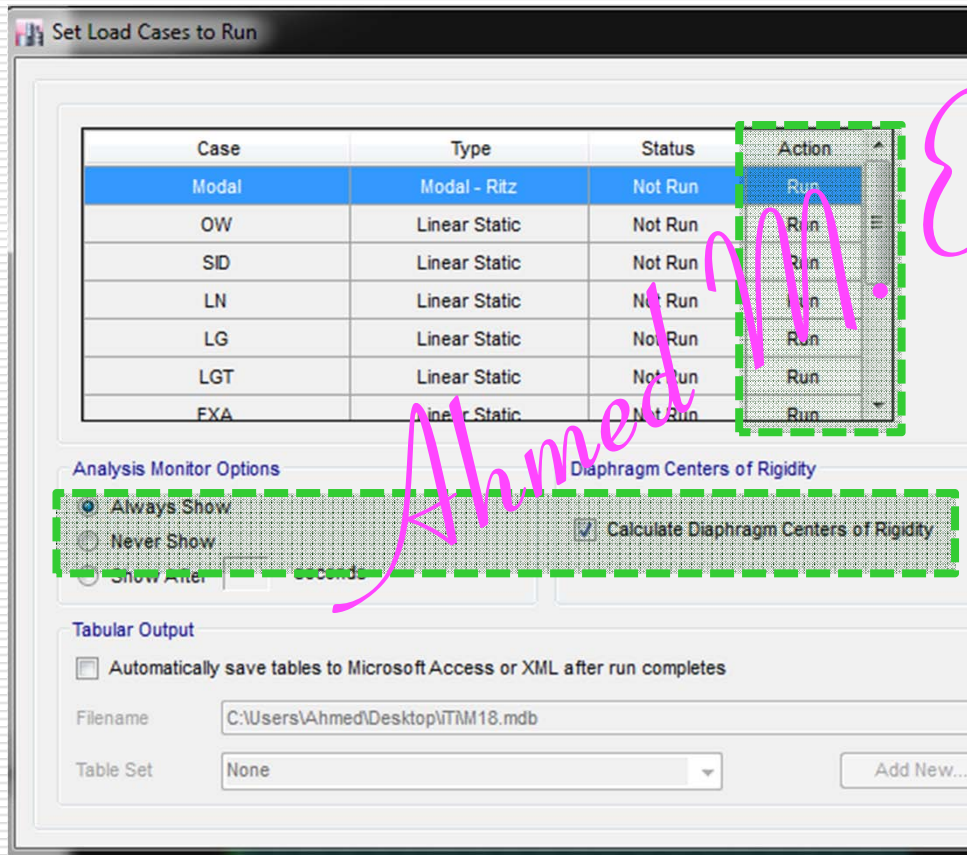


25- Run ...Check log file

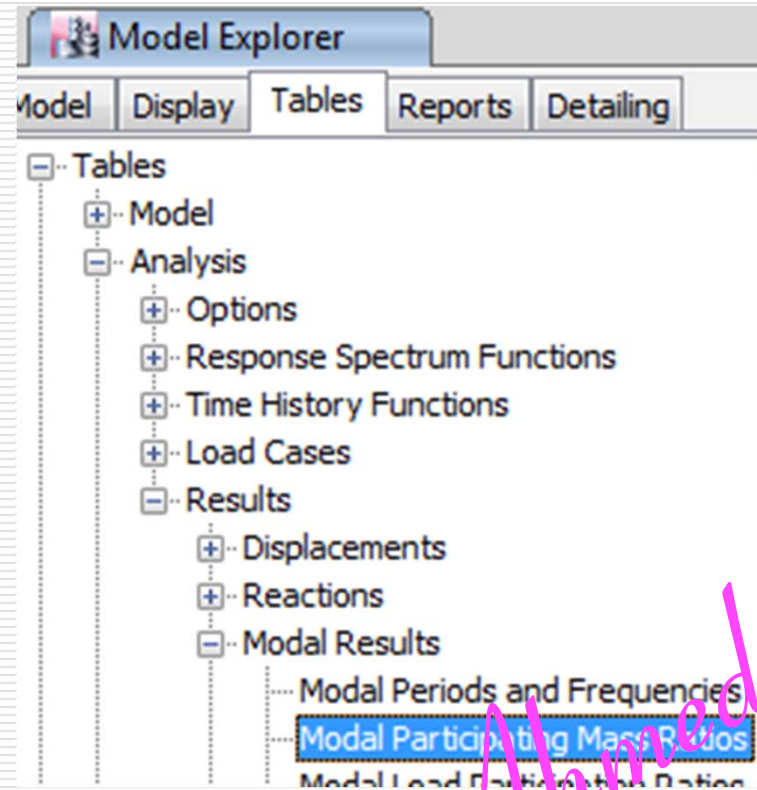
...Analyze ... Set Load Cases to Run...

....Analyze ... Run

...File .. Show Input & Output file .log



26- Check Mass Participating Ratios

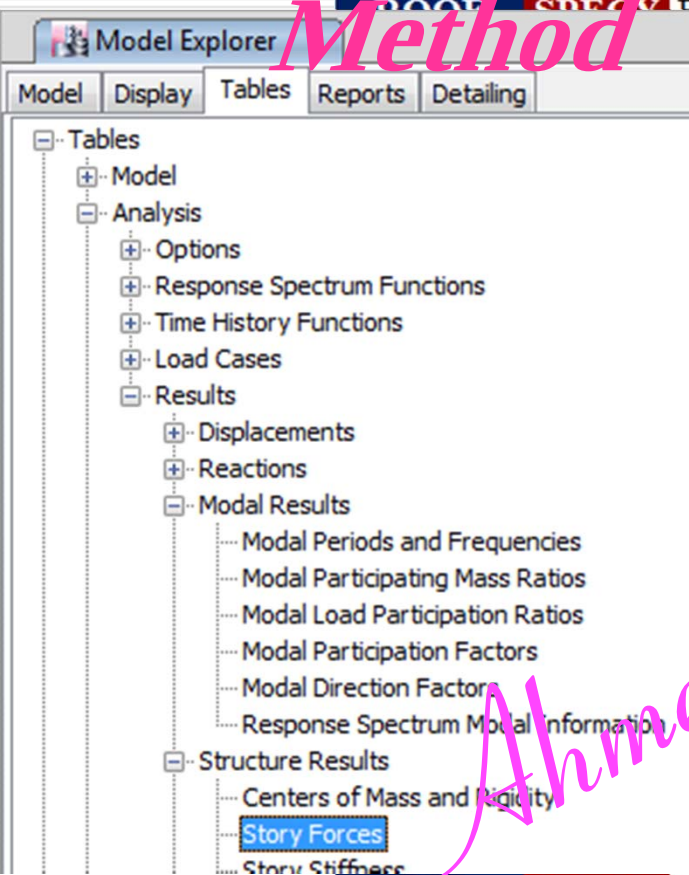


Mode	Period	UX	UY	UZ	SumUX	SumUY	SumUZ
1	4.07	0.12	7.35	0.00	0.12	7.35	0.00
2	3.83	11.71	3.26	0.00	11.71	3.26	0.00
3	2.88	38.57	15.32	0.00	54.43	55.32	0.00
4	1.07	0.01	0.53	0.00	54.44	55.85	0.00
5	0.77	1.21	9.78	0.00	55.65	65.63	0.00
6	0.64	11.72	1.08	0.00	67.37	66.72	0.00
7	0.55	0.00	0.00	0.00	67.37	66.72	0.00
8	0.55	0.00	0.00	0.00	67.37	66.72	0.00
9	0.53	0.00	0.21	0.00	67.37	66.92	0.00
10	0.36	0.08	4.87	0.00	67.45	71.79	0.01
11	0.34	0.00	0.00	0.36	67.46	71.79	1.36
12	0.33	0.25	0.47	0.01	67.71	72.26	1.37
13	0.32	0.12	0.01	23.62	67.82	72.28	24.99
14	0.30	0.02	0.02	1.04	67.84	72.30	26.03
15	0.29	3.73	0.22	11.34	71.58	72.52	37.36
16	0.28	1.33	0.02	2.94	72.91	72.54	40.30
17	0.27	0.89	0.20	11.56	73.80	72.74	51.87
18	0.25	0.02	0.09	6.47	73.82	72.83	58.34
19	0.24	0.38	0.09	0.00	74.20	72.92	58.34
20	0.22	0.01	0.01	8.31	74.21	72.93	66.65
21	0.21	0.01	3.85	0.03	74.22	76.78	66.68
22	0.17	5.08	0.12	0.30	79.30	76.90	66.98
23	0.17	0.07	0.03	9.54	79.38	76.93	76.52
24	0.15	0.03	3.04	0.05	79.40	79.97	76.57
25	0.12	0.09	0.05	8.03	79.49	80.03	84.60
26	0.11	7.46	0.11	0.16	86.95	80.14	84.77
27	0.11	0.42	6.94	0.07	87.37	87.08	84.84
28	0.07	7.32	3.57	0.00	94.69	90.65	84.84
29	0.06	2.73	6.99	0.03	97.42	97.64	84.87
30	0.05	0.00	0.04	8.37	97.42	97.67	93.24

Item 8-7-3-3-1-5
ECL 2012
 $\geq 90\%$

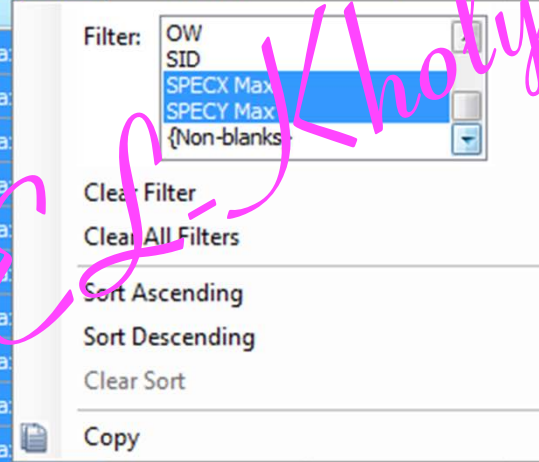
27- Scale the Base Shear for Spectra

Method



Story	Load	Loc	P	VX	VY	T	MX	MY
ROOF	SPECX	Top	107.15	156.66	45.99	2900.4	2566.3	3776.6
ROOF	SPECY	Bottom	111.60	163.00	49.35	3004.3	2521.2	3512.1
ROOF	SPECX	Top	129.63	73.96	160.78	4434.3	3387.1	3335.7
ROOF	SPECY	Bottom	133.82	77.32	168.13	4616.3	3191.4	3322.6
Top			1000.26	480.77	213.44	10200	18714	23759
Bottom			1001.73	484.26	214.27	10232	19030	24433

Story	Load Case/Combo	Location	P	VX tonf	VY tonf
Story10	SPECX Max			353	31.6063
Story10	SPECY Max			1778	49.5168
Story9	SPECX Max			3885	46.3979
Story9	SPECY Max			3465	72.9143
Story8	SPECX Max			3794	51.4274
Story8	SPECY Max			3322	80.5475
Story7	SPECX Max			4806	53.0107
Story7	SPECY Max			7788	83.9205
Story6	SPECX Max			272	54.9188
Story6	SPECY Max			5686	87.6585
Story5	SPECX Max	Bottom	0	98.1119	62.4232



BS1	SPECX	Bottom	1222.49	679.62	250.86	13571	23830	31332
BS1	SPECY	Top	1463.22	325.39	705.29	22258	32078	30615
BS1	SPECY	Bottom	1480.90	327.88	706.75	22391	33568	31119
BS2	SPECX	Top	1302.42	722.48	314.20	16713	25262	31749
BS2	SPECX	Bottom	1325.96	738.81	332.40	17658	26175	33099
BS2	SPECY	Top	1578.37	397.70	734.71	23113	35072	31737
BS2	SPECY	Bottom	1607.10	419.72	756.40	23273	36796	32304

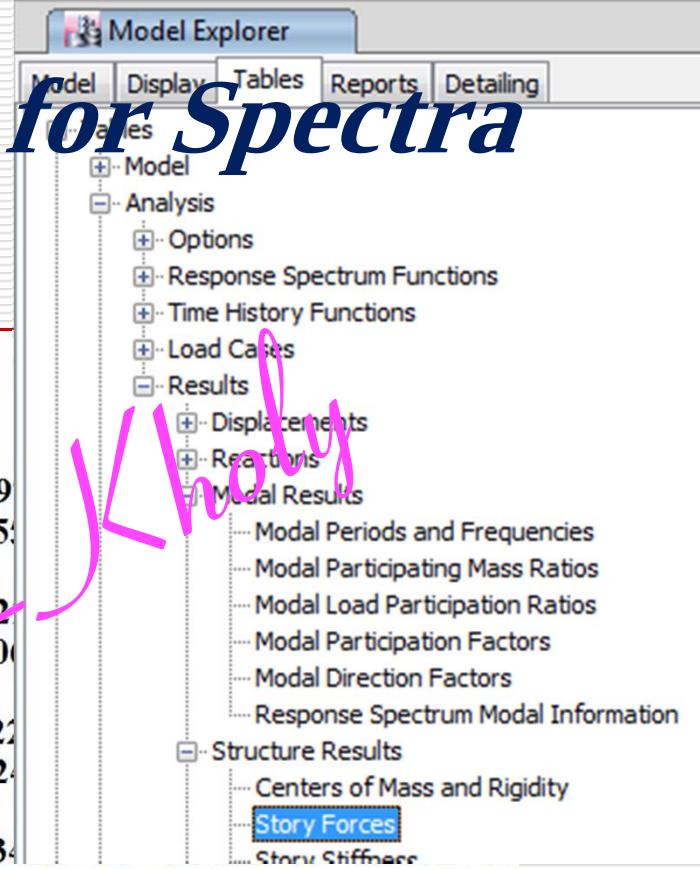
Vdynamic

27- Scale the Base Shear for Spectra Method

STORY	LOAD	LOC	P	VX	VY
ROOF	EXA	Top	-3.906E-06	-4.281E+02	4.307E-07
		Bottom	-3.905E-06	-4.372E+02	4.306E-07
ROOF	EYA	Top	4.882E-06	2.510E-07	-4.281E+02
		Bottom	4.881E-06	2.502E-07	-4.372E+02
F19-TP32	EXA	Top	-3.907E-06	-6.494E+02	2.482E-09
		Bottom	-3.907E-06	-6.587E+02	8.665E-10
F19-TP32	EYA	Top	4.900E-06	-4.221E-07	-6.494E+02
		Bottom	4.900E-06	-4.227E-07	-6.587E+02
BS2	EXA	Top	-3.740E-06	-1.548E+03	-1.778E-05
		Bottom	-3.740E-06	-1.549E+03	-1.778E-05
BS2	EYA	Top	8.090E-06	8.468E-06	-1.548E+03
		Bottom	8.090E-06	8.468E-06	-1.549E+03

Y static

Must be equal to Base Shear estimated manually



Story	Load Case/Case	Location	VX kNf	VY tonf
Story7	EXA			0
Story7	EYA			-170
Story6	EXA			0
Story6	EYA			-200
Story5	EXA			0
Story5	EYA			-225
Story4	EXA			0
Story4	EYA			-245
Story3	EXA			0
Story3	EYA	Bottom	0	-260
Story2	EXA	Bottom	-270	0
Story2	EYA	Bottom	0	-270
Story1	EXA	Bottom	-277	0
Story1	EYA	Bottom	0	-277

27- Scale the Base Shear for Spectra

Method

Item 8-7-3-3-1-8
ECL 2012

Scale Factor SpecX = Scale Factor SpecX

0.85 Vstatic X

Vdynamic X

Ahmed



Load Case Data

General

Load Case Name: SPECX

Load Case Type

Exclude Objects in this Group

Mass Source

Loads Applied

Load Type	Load Name	Function	Scale Factor
Acceleration	U1	ECL2012	1.48

Buttons: Add, Delete, Advanced

Input Parameters

Modal Load

Modal Combin

☐ Incl

Earthquake Duration, td

Directional Combination Type: SRSS

Absolute Directional Combination Scale Factor

Modal Damping: Constant at 0.05

Diaphragm Eccentricity: 0.05 for All Diaphragms

Buttons: OK, Cancel

27- Scale the Base Shear for Spectra Method

Scale Factor SpecY = Scale Factor SpecY

0.85 Vstatic Y

Vdynamic Y

Item 8-7-3-3-1-8
ECL 2012

Re-Run
!!!
Check Log File
Check Base Shear

28 Check Drifts

UDLSpecX
UDLSpecY

Item 8-8-3-1-a
ECL 2012
 ≤ 0.005



	Z	DriftX	DriftY
71	86.95	0.00076	
25	86.95		0.00043
25	86.95	0.00069	
25	86.95		0.00074
59	83.25	0.00090	
91	83.25		0.00054
59	83.25	0.00086	
91	83.25		0.00093

Handwritten pink text: "ECL holy"

X 0.7 R
X v

Max Drift X	Max Drift Y
0.00205	0.00215
0.00716	0.00752
0.00358	0.00376
Safe	Safe
Code	0.00500

OR
SpecX
SpecY

Sto									
RO									
RO									
RO									
RO									
F21									
F21									
F21									
F21									
F20-TP3	Max Drift X	UDLSPCX	3124	36.896	39.459	79.55	0.00099		
F20-TP3	Max Drift Y	UDLSPCX	2792	37.535	33.91	79.55	0.00060		
F20-TP3	Max Drift X	UDLSPCY	3124	36.896	39.459	79.55	0.00097		
F20-TP3	Max Drift Y	UDLSPCY	2792	37.585	33.91	79.55	0.00105		
F19-TP32	Max Drift X	UDLSPCX	3192	37.402	40.139	75.85	0.00111		
F19-TP32	Max Drift Y	UDLSPCX	2775	37.884	33.586	75.85	0.00068		
F19-TP32	Max Drift X	UDLSPCY	3192	37.402	40.139	75.85	0.00111		
F19-TP32	Max Drift Y	UDLSPCY	2775	37.884	33.586	75.85	0.00116		
F18-TP2	Max Drift X	UDLSPCX	3192	37.402	40.139	72.15	0.00123		
F18-TP2	Max Drift Y	UDLSPCX	2775	37.884	33.586	72.15	0.00076		
F18-TP2	Max Drift X	UDLSPCY	3192	37.402	40.139	72.15	0.00125		
F18-TP2	Max Drift Y	UDLSPCY	2775	37.884	33.586	72.15	0.00129		
F17-TP2	Max Drift X	UDLSPCX	3192	37.402	40.139	68.45	0.00132		

Story Load	Loc	P	VX	VY	T	MX	MY	
TOR	SD	Top	0	-56.65	47.42	-426.647	0	0
TOR	SD	Bottom	1648.83	0	0	-4.52	26514.645	86701.675
ROOF	SD	Top	409.65	0	0	-4.32	31.3503	94.452
ROOF	SD	Bottom	409.65	0	0	-4.32	31.3503	94.452
F21-TP3	SD	Top	6526.81	0	0	-5.379	115004.828	-131985.054
F21-TP3	SD	Bottom	7030.2	0	0	-5.822	124244.26	-142028.047
F20-TP3	SD	Top	8587.63	0	0	-5.822	150764.997	-170509.854
F20-TP3	SD	Bottom	9091.91	0	0	-6.307	159341.436	-180571.941
F19-TP32	SD	Top	11205.29	0	0	-6.307	193887.539	-218584.742
F19-TP32	SD	Bottom	11708.67	0	0	-6.886	202483.671	-228851.961
F18-TP2	SD	Top	13677.32	0	0	-6.886	232299.385	-265629.634
F18-TP2	SD	Bottom	14187.38	0	0	-6.886	232299.385	-265629.634
F17-TP2	SD	Top	16156.03	0	0	-6.886	232299.385	-265629.634
F17-TP2	SD	Bottom	16667.87	0	0	-6.886	232299.385	-265629.634
F16-TP2	SD	Top	18636.52	0	0	-6.886	232299.385	-265629.634
F16-TP2	SD	Bottom	19148.35	0	0	-6.886	232299.385	-265629.634
F15-TP3	SD	Top	20705.84	0	0	-6.886	232299.385	-265629.634
F15-TP3	SD	Bottom	21231.64	0	0	-6.886	232299.385	-265629.634
F14-TP31	SD	Top	23138.5	0	0	-6.886	232299.385	-265629.634
F14-TP31	SD	Bottom	23671.49	0	0	-6.886	232299.385	-265629.634
F13-TP1	SD	Top	25488.08	0	0	-6.886	232299.385	-265629.634
F13-TP1	SD	Bottom	26021.64	0	0	-6.886	232299.385	-265629.634
F12-TP1	SD	Top	27838.23	0	0	-6.886	232299.385	-265629.634
F12-TP1	SD	Bottom	28371.22	0	0	-6.886	232299.385	-265629.634
F11-TP1	SD	Top	30187.81	0	0	-6.886	232299.385	-265629.634
F11-TP1	SD	Bottom	30720.81	0	0	-6.886	232299.385	-265629.634
F10-TP1	SD	Top	32537.4	0	0	-6.886	232299.385	-265629.634
F10-TP1	SD	Bottom	33083.63	0	0	-6.886	232299.385	-265629.634
F09-TP2	SD	Top	34917.5	0	0	-6.886	232299.385	-265629.634
F09-TP2	SD	Bottom	35463.73	0	0	-6.886	232299.385	-265629.634
F08-TP1	SD	Top	37280.32	0	0	-6.886	232299.385	-265629.634
F08-TP1	SD	Bottom	37826.54	0	0	-6.886	232299.385	-265629.634
F07-TP1	SD	Top	39643.13	0	0	-6.886	232299.385	-265629.634
F07-TP1	SD	Bottom	40189.35	0	0	-6.886	232299.385	-265629.634
F06-TP1	SD	Top	42005.55	0	0	-6.886	232299.385	-265629.634
F06-TP1	SD	Bottom	42567.23	0	0	-6.886	232299.385	-265629.634
F05-TP1	SD	Top	44383.02	0	0	-12.902	703543.55	-814937.684
F05-TP1	SD	Bottom	44945.11	0	0	-12.902	733155.65	-849021.305
F04-TP1	SD	Top	46761.7	0	0	-12.935	742312.798	-860272.76
F04-TP1	SD	Bottom	47327.98	0	0	-12.935	771924.898	-894356.381
F03-TP1	SD	Top	49139.57	0	0	-12.909	781082.114	-905608.287
F03-TP1	SD	Bottom	49700.85	0	0	-12.909	810694.214	-939691.909
F02-TP1	SD	Top	51517.44	0	0	-12.839	819851.783	-950944.111
F02-TP1	SD	Bottom	52078.73	0	0	-12.839	849463.883	-985027.732
F02-TP1	SD	Bottom	52078.73	0	0	-12.766	858622.302	-996280.637
F01	SD	Top	54375.85	0	0	-12.766	895722.767	-1050533.56
F01	SD	Bottom	55121.7	0	0	-12.685	907778.895	-1066458.405
PODIUM	SD	Top	57896.93	0	0	-12.685	929323.982	-1130610.169
PODIUM	SD	Bottom	58788.65	0	0	-12.667	942701.728	-1149856.485
GROUND	SD	Top	63892.79	0	0	-12.667	1018848.553	-1200110.218
GROUND	SD	Bottom	65651.56	0	0	-12.68	1056718.602	-1212918.137
BS1	SD	Top	69459.71	0	0	-12.68	1117378.052	-1250412.685
BS1	SD	Bottom	70901.17	0	0	-12.674	1148390.569	-1261839.498
BS2	SD	Top	75801.19	0	0	-12.674	1233765.51	-1301045.575
BS2	SD	Bottom	77246	0	0	-13	1264548	-1312539

Options/Preferences Data

☐ Miscellaneous Data

☒ **ANALYSIS RESULTS (1 of 26 tables)**

☐ Displacements

☐ Reactions

☐ Modal Information

☒ **Building Output**

☒ Building Output

☐ Table: Center Mass Rigidity

☒ Table: Story Shears

☐ Table: Tributary Area and PLLF

☐ Section Cut Forces

☐ Frame Output

☐ Area Output

☐ Wall Output

☐ Objects and Elements

Select Output

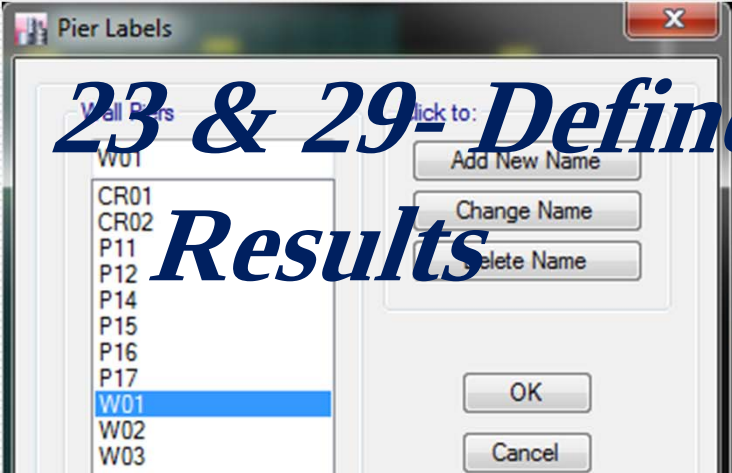
Select

- H Static Load
- LG Static Load
- LN Static Load
- OW Static Load
- OW1 Static Load
- OWSQ Static Nonlin
- SD Combo**
- SDEXA Combo
- SDEXAN Combo
- SDEXB Combo
- SDEXBN Combo

OK

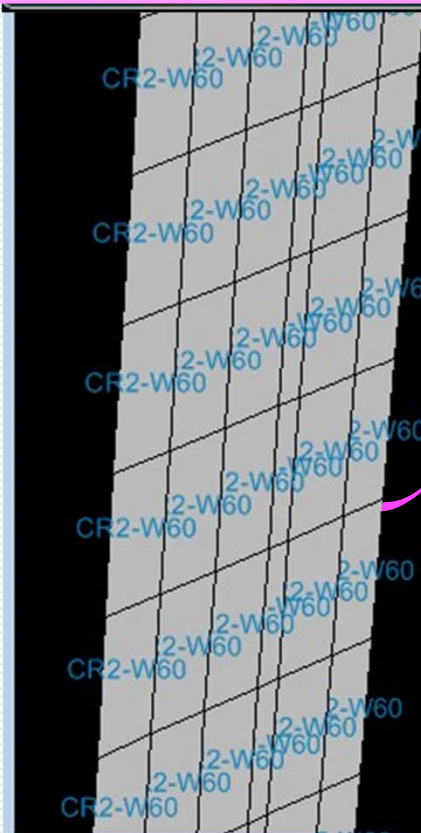
Cancel

Clear All

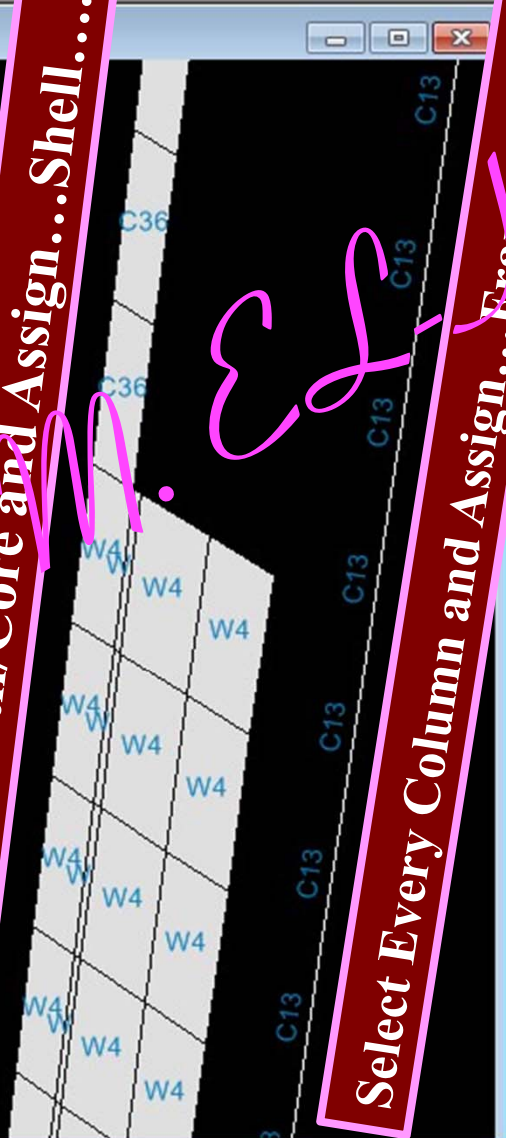


23 & 29- Define & Assign Piers, Read Results

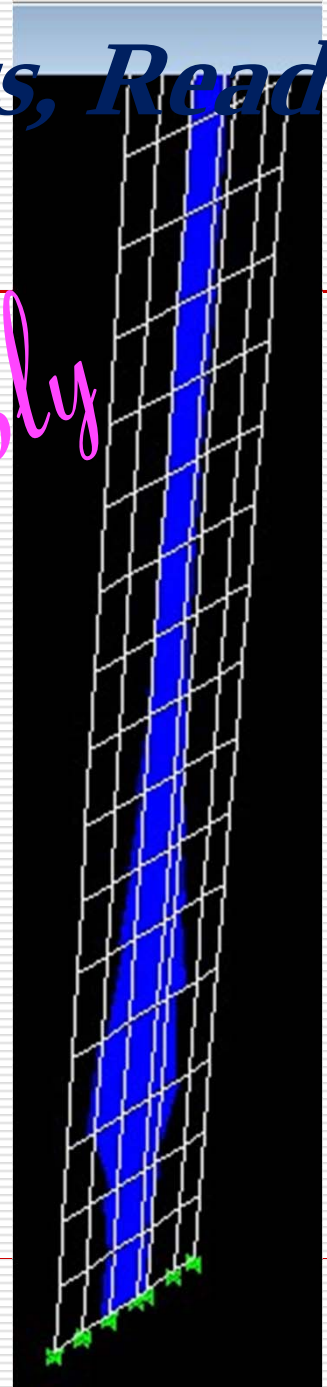
Define Pier Labels



Select Every Wall/Core and Assign...Shell....Pier Label



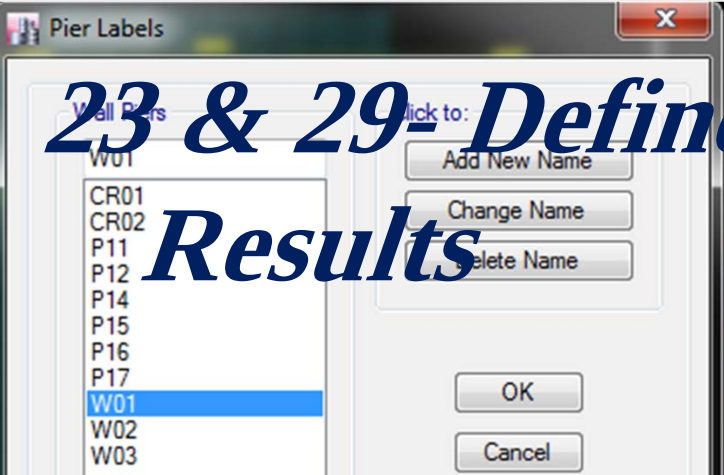
Select Every Column and Assign...Frame....Pier Label



Ahmed M. El-Holy

Read Results of Columns
Read Results of Shear Walls
Exporting Results to Excel & CSI
Pier Local Axes

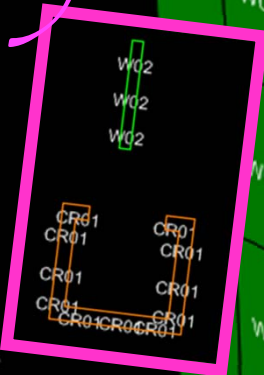
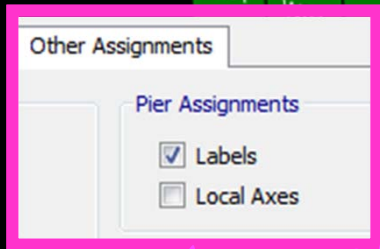
Design of Columns
Design of Shear Walls
Using Etabs (ACI 318)



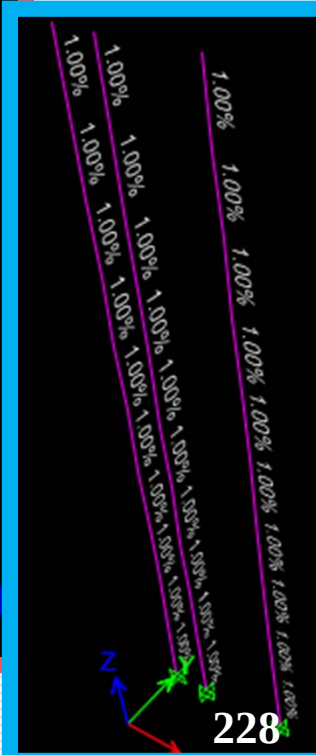
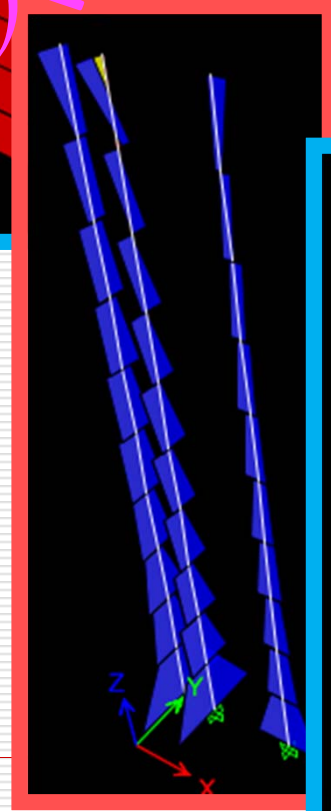
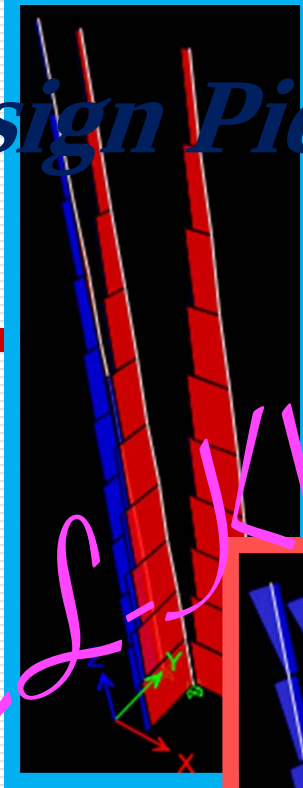
23 & 29- Define & Assign Piers, Read Results

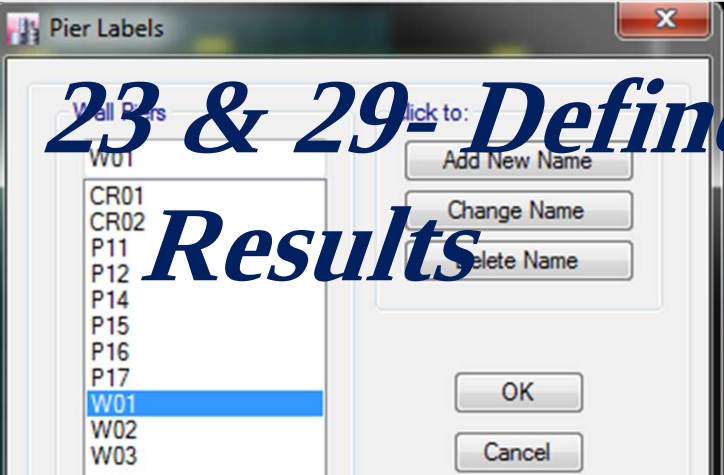
Define Pier Labels

Select Every Column
and Assign....Frame....Pier Label



Select Every Wall/Core and Assign....Shell....Pier Label

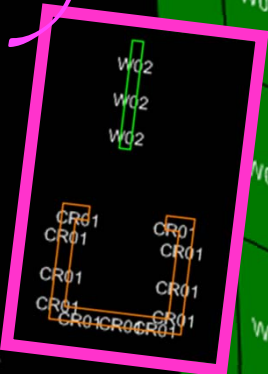
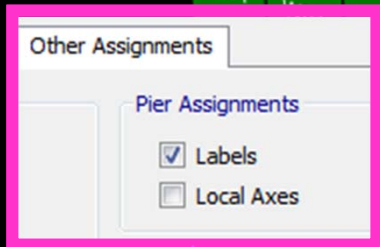




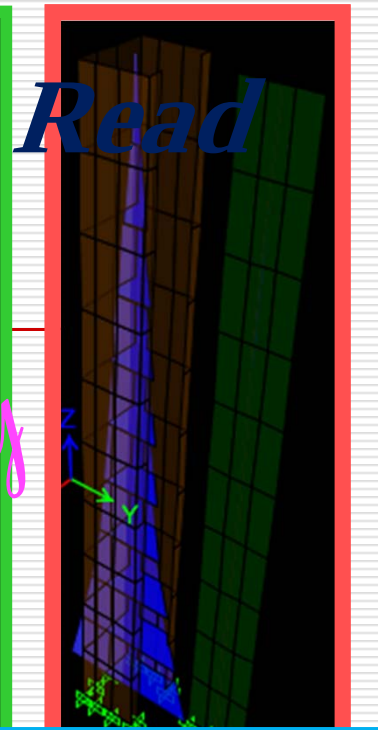
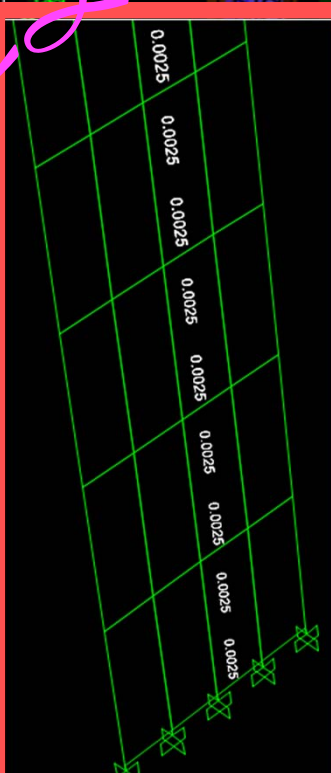
23 & 29- Define & Assign Piers, Read Results

Define Pier Labels

Select Every Column
and Assign....Frame....Pier Label



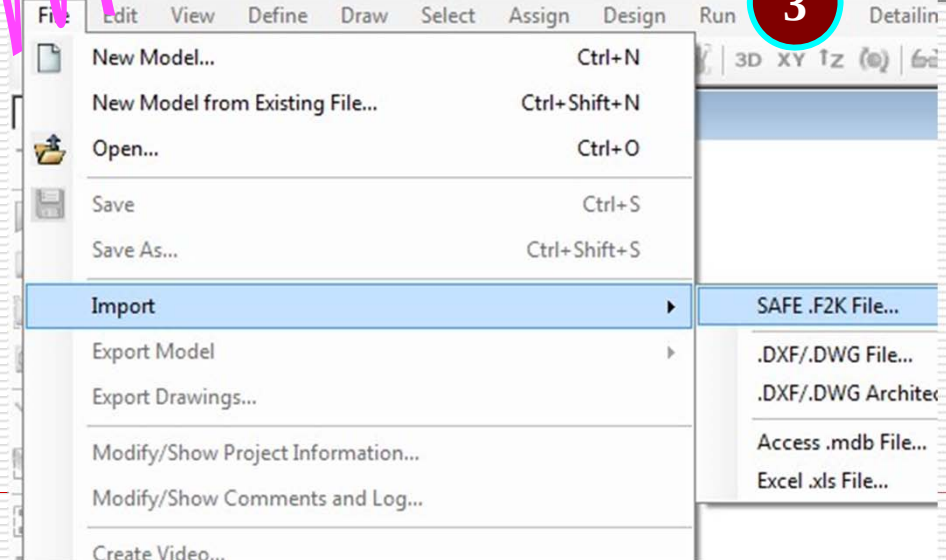
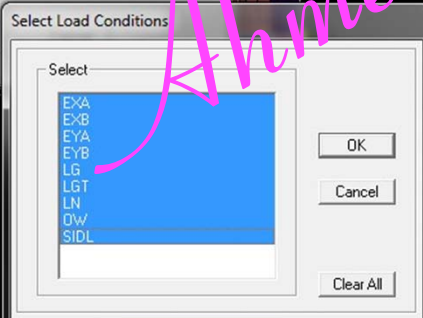
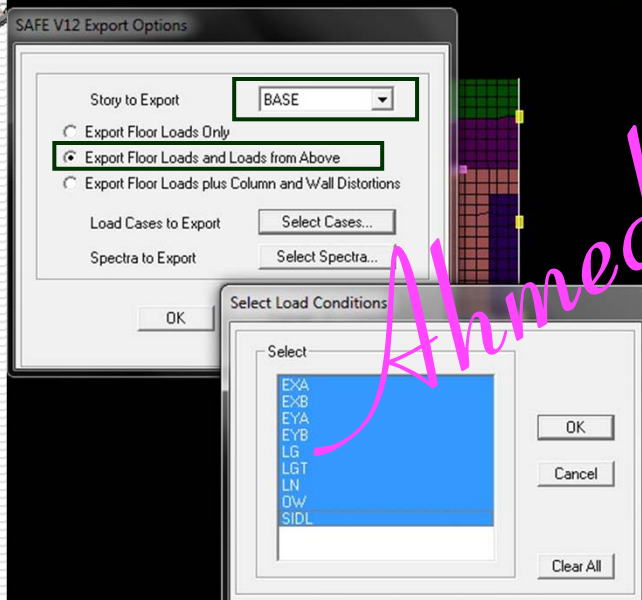
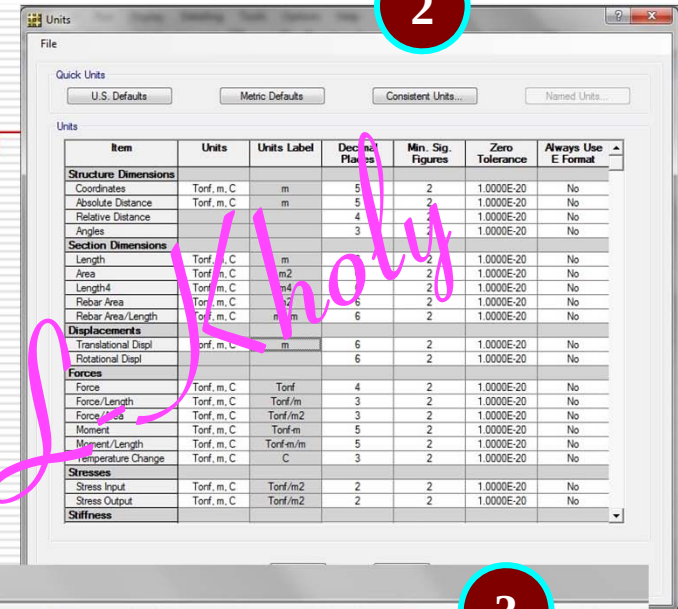
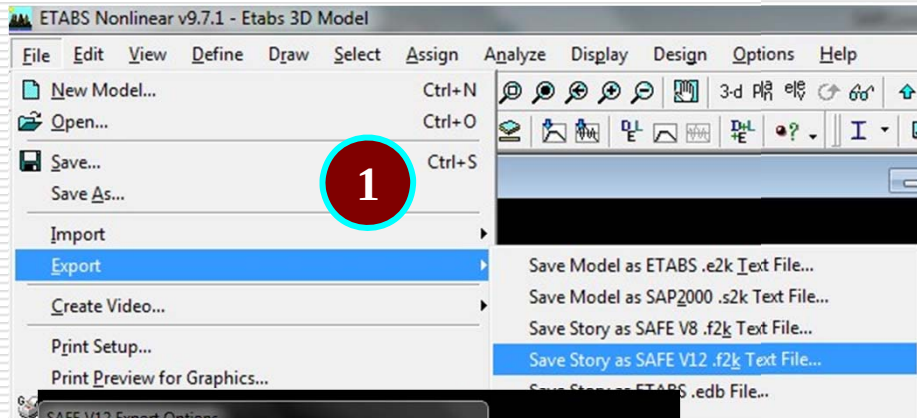
Select Every Wall/Core and Assign...Shell....Pier Label



Ahmed M. El-Holy

SAFE *Ahmed M. EL Kholy*
Introduction
Ahmed ***Raft***

Export Base Level to SAFE, New Safe File, Import F2K file into SAFE



Check Columns Loads, Export to ACAD, Adjust Point Style, Draw Raft boundaries, DXF..

4 Point Object Information

Assignments	Geometry	Loads	Design
Load Pattern		OW	
Point Loads			
Force in Global X Direction (Tonf)		0.011	
Force in Global Y Direction (Tonf)		-0.0223	
Force in Gravity Dir (-Global Z) (Tonf)		74.2879	
Moment about Global X Axis (Tonf-m)		0.03057	
Moment about Global Y Axis (Tonf-m)		0.00743	
Moment about Global Z Axis (Tonf-m)		9.077E-05	
Load Size X Dimension (m)		0.85	
Load Size Y Dimension (m)		0.3	
Load Pattern		SIDL	
Point Loads			
Force in Global X Direction (Tonf)		0.0101	
Force in Global Y Direction (Tonf)		-0.0122	
Force in Gravity Dir (-Global Z) (Tonf)		40.2602	
Moment about Global X Axis (Tonf-m)		0.01924	
Moment about Global Y Axis (Tonf-m)		0.00849	
Moment about Global Z Axis (Tonf-m)		-3.668E-06	
Load Size X Dimension (m)		0.86	

5 SAFE 12.3.0 - RaftOK

File | New Model... | New Model from Existing File... | Open... | Save | Save As... | Import | **Export Model** | Export Drawings | Modify/Show Project I... | Modify/Show Commer...

6 DXF File Import Option

Want to use existing template DXF file for layers?

Yes No

7 Point Style

Point Size: 0.2500 Units

☐ Set Size Relative to Screen
☒ Set Size in Absolute Units

OK Cancel Help

8 AutoCAD

Then, save as DXF
& Exit ACAD otherwise
SAFE will not import DXF

Import DXF to SAFE, Define Material; Raft Section & Soil Prop., Assign Section & Support Data.

9 File > Import > .DXF/.DWG File...

10 Material Property Data dialog box. Material Name: CON300. Material Type: Concrete. Material Display Color: [Color Selection]. Material Notes: [Text Area]. Material Weight: 2.5 Tonn/m3. Modulus of Elasticity, E: 2424871.1305964 Tonn/m2. Poisson's Ratio, U: 0.2. Coefficient of Thermal Expansion, A: 9.9E-06 1/C. Shear Modulus, G: 1010262.97 Tonn/m2. Other Properties for Concrete Materials: Specified Concrete Compressive Strength, Fc: 2400. [OK] [Cancel]

11 Slab Property Data dialog box. Property Name: RAFT120m. Slab Material: CON300. Display Color: [Color Selection]. Property Notes: [Text Area]. Analysis Property Data: Type: [Dropdown]. Thickness: 1.2 m. [OK] [Cancel]

12 Assign > Design > Run > Display > Detailing > Tools > Options > Help > Slab Data > Properties...

13 Columns & Walls Sections may be Deleted to Provide Conservative Solution for the Raft

14 Soil Subgrade Property Data dialog box. General Data: Property Name: SOIL-BC 15 Ton/m2. Display Color: [Color Selection]. Property Notes: [Text Area]. Property: Subgrade Modulus: 1500 Tonn/m3. [OK] [Cancel]

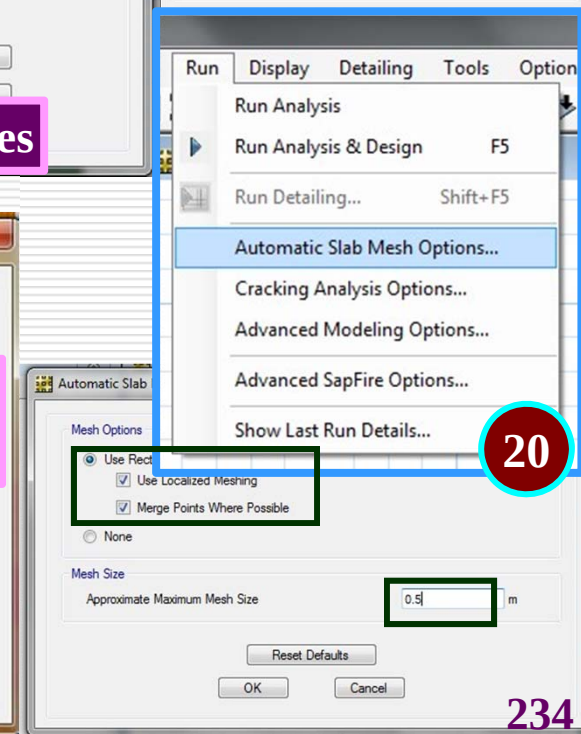
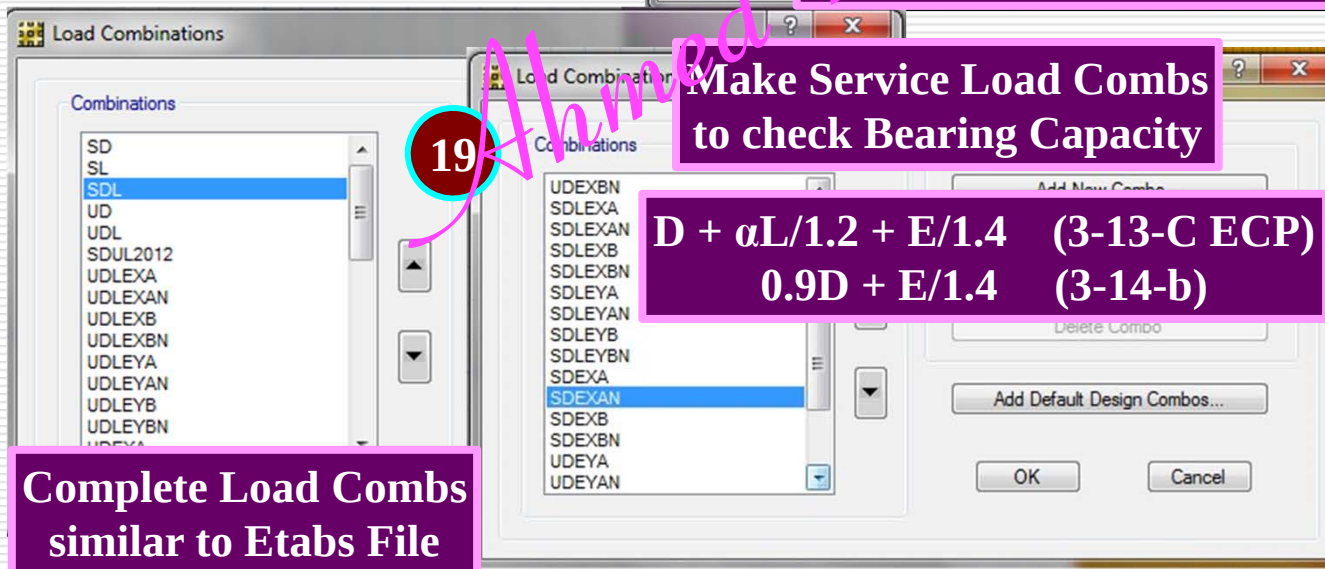
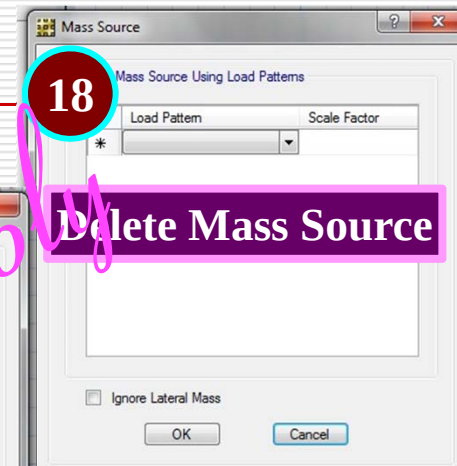
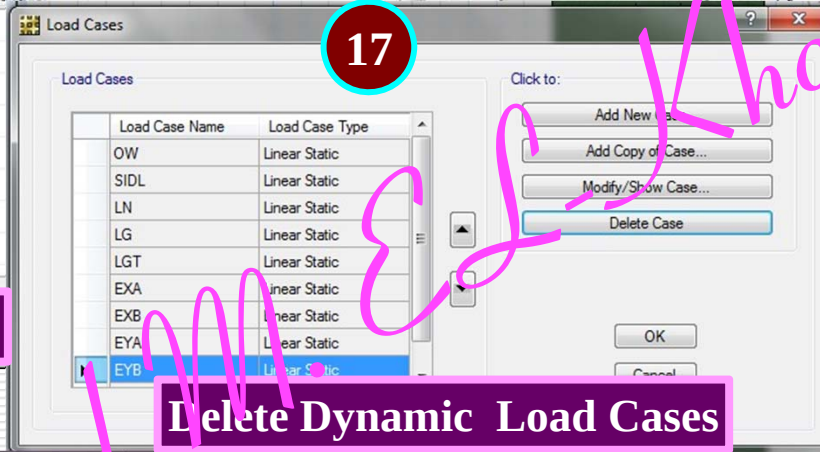
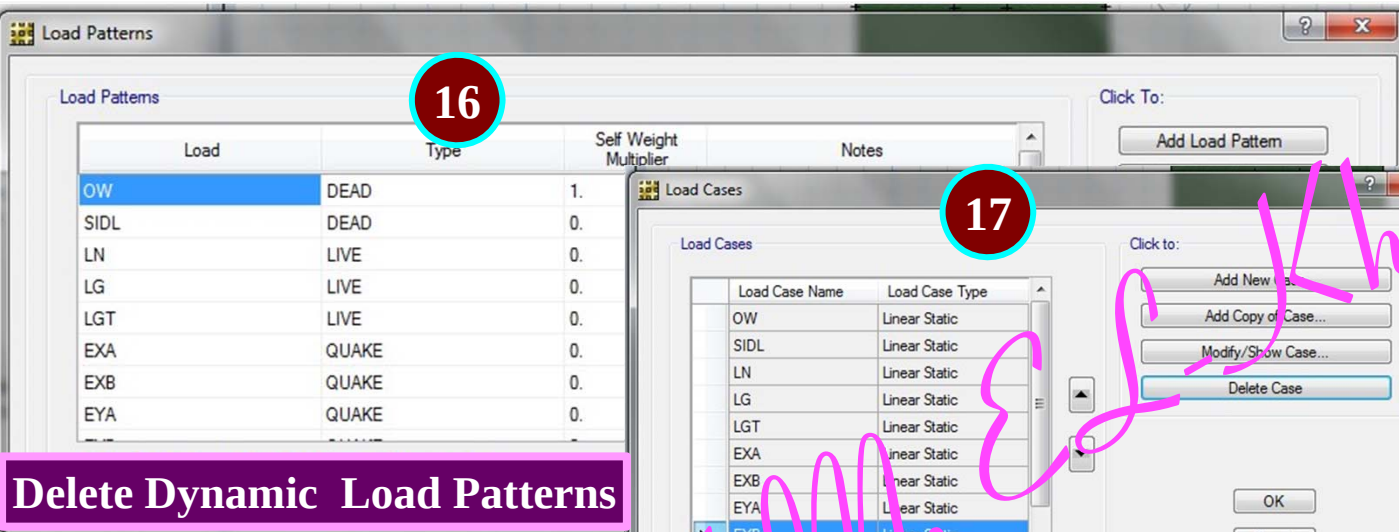
15 Assign > Design > Run > Slab Data > Beam Data > Column/Brace > Wall/Ramp Data > Tendon Properties... > Support Data > Load Data > Soil Properties... > Line Springs...

holy

Ammed

Dynamic Load Patterns, Load Cases, Mass Source, Load Combinations (Working & Ult.), Auto Mesh

...



Run, Check Bearing Capacity, Design the Raft and find RFT meshes form M_{11} & M_{22} , Punching..

