مسائل محلوله على برنامج الساب

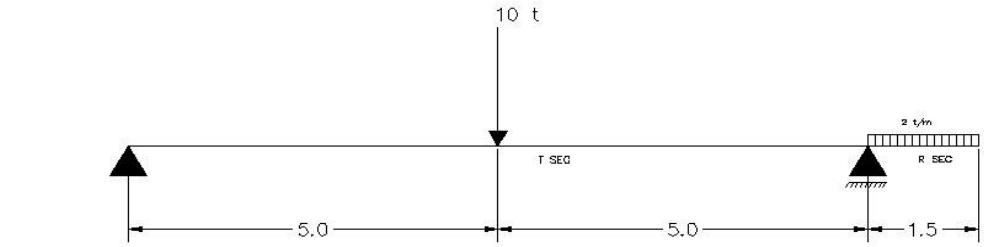
إعداد

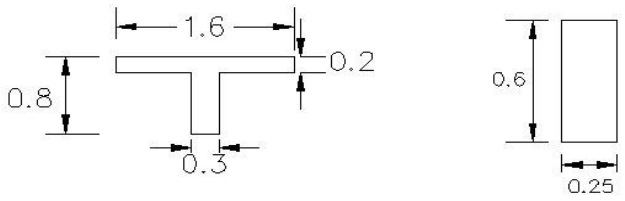
Eng.kh_ahmed@yahoo.com

01063366722 Or 01140506722

Beams

Ex :





Material

RC γ = 2.5 μ = .22 E = 2000000

Loads

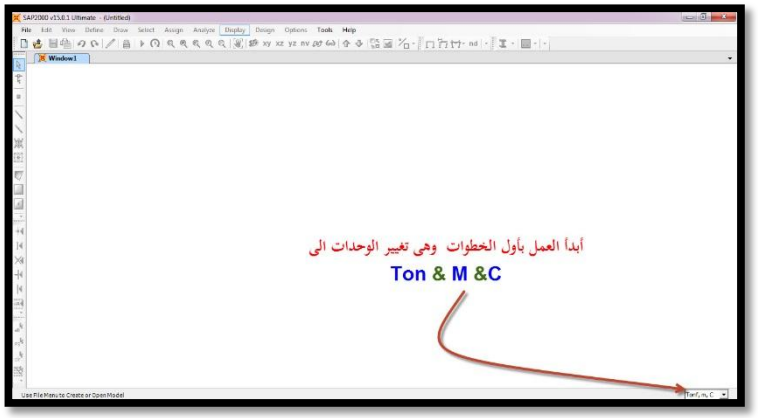
L.L = 2 t/m F.C = 1.5 t/m

Req

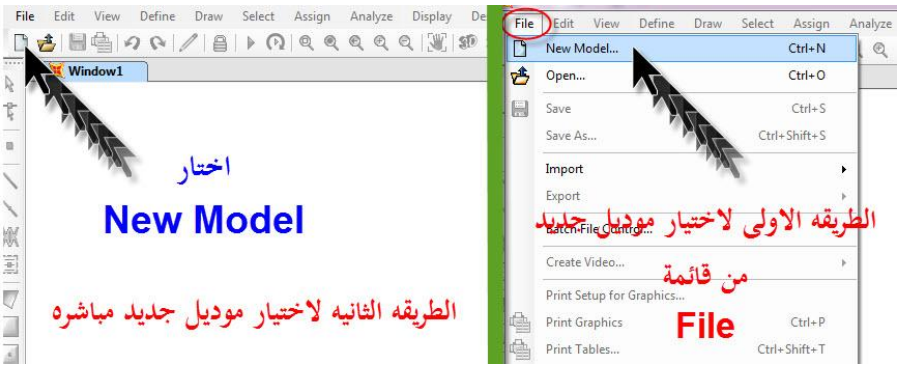
S.F.D & B.M.D

SOLUTION

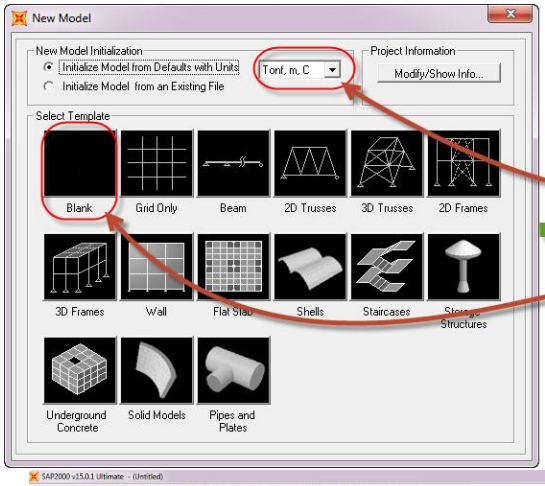
- UNITES



ثم اقوم باختيار New Model



تظهر النافذة التاليه بعد فتح موديل جديد



اذا لم نقم بتعديل الوحدات

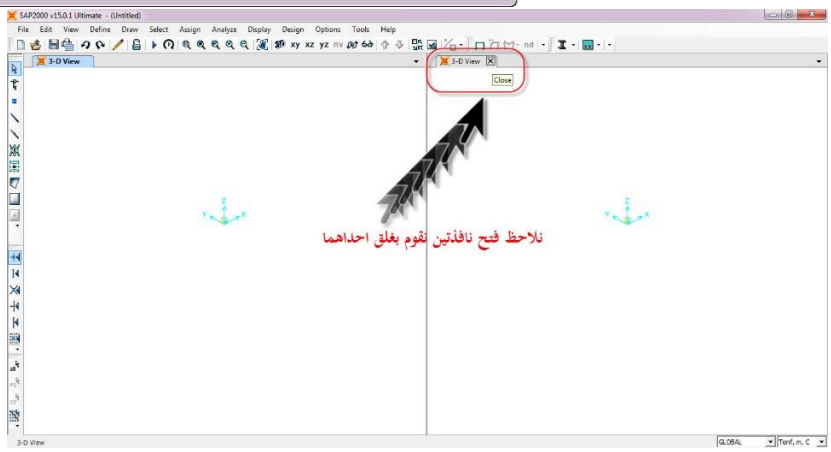
فى بداية العمل نقوم بتعديلها

من هذا الاختيار

نقوم بعد ذلك بتحديد

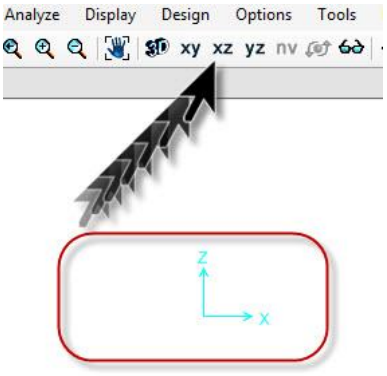
حاله

Blank



من هذة الاوامر نقوم باختيار

المستوى المناسب للعمل

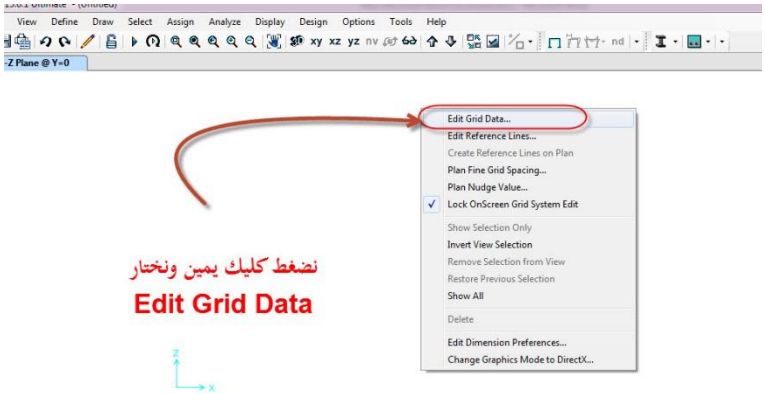


في حال العمل على

الكمرات فإننا نقوم باختيار

مستوى

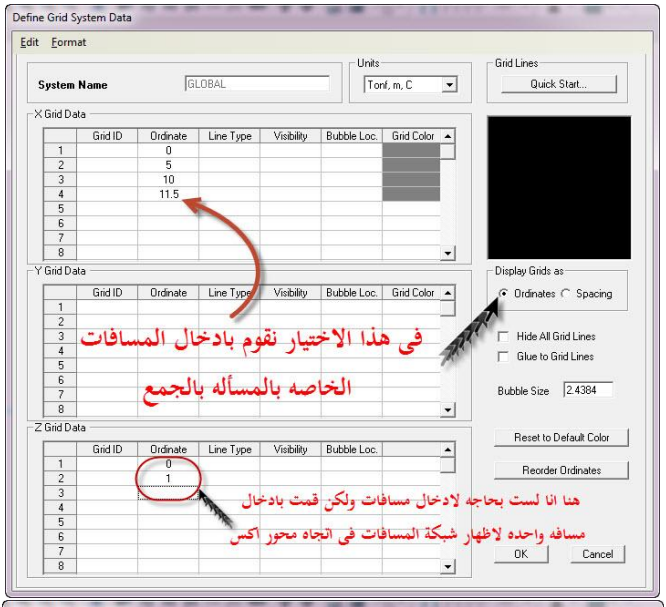
xz Or yz

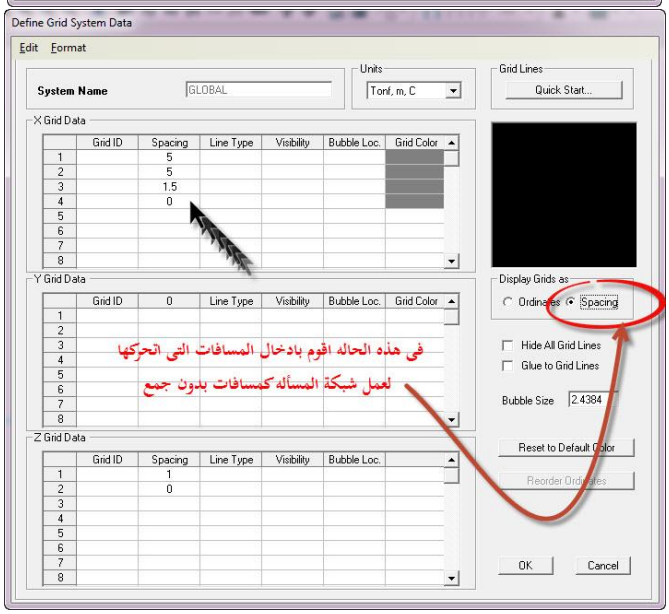


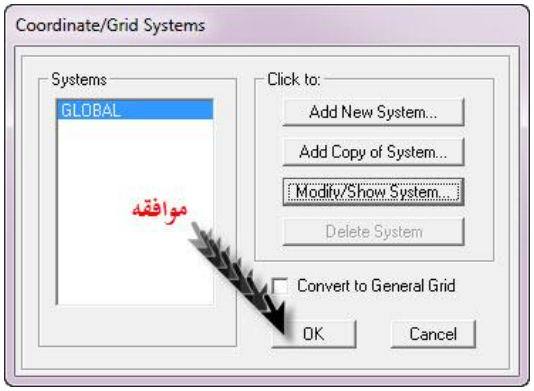
نضغط كليك يمين ونختار

Edit Grid Data

نختار تعديل

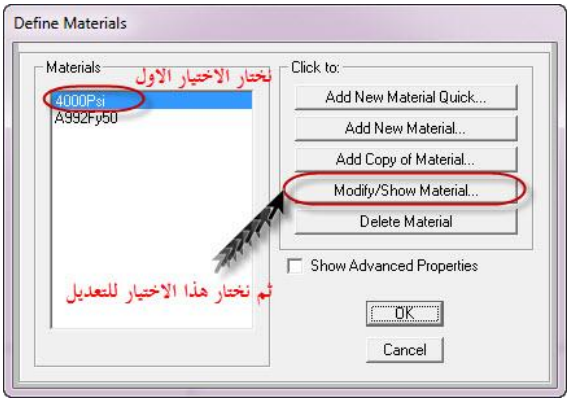


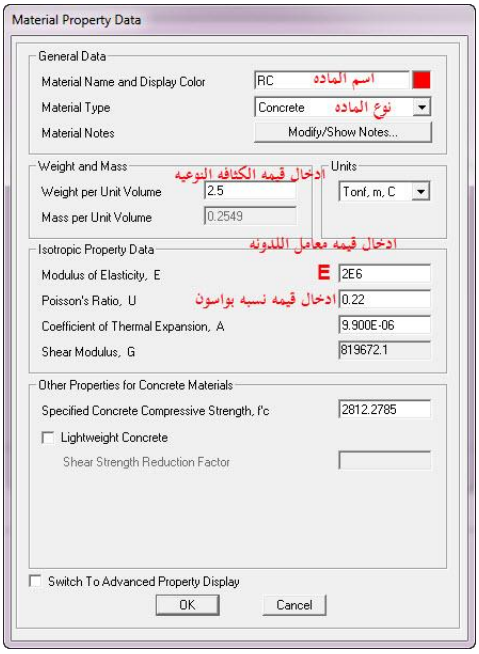




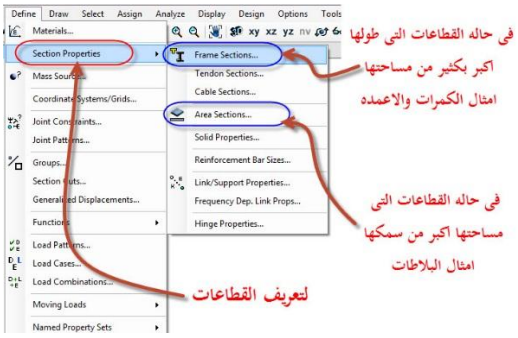
شبكة الخطوط بعد تكوينها

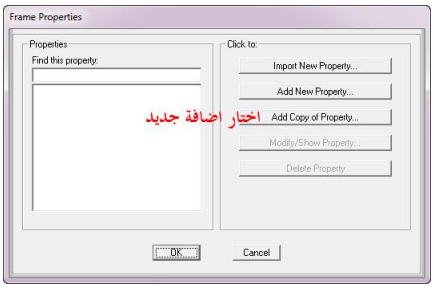
- Define Mterial

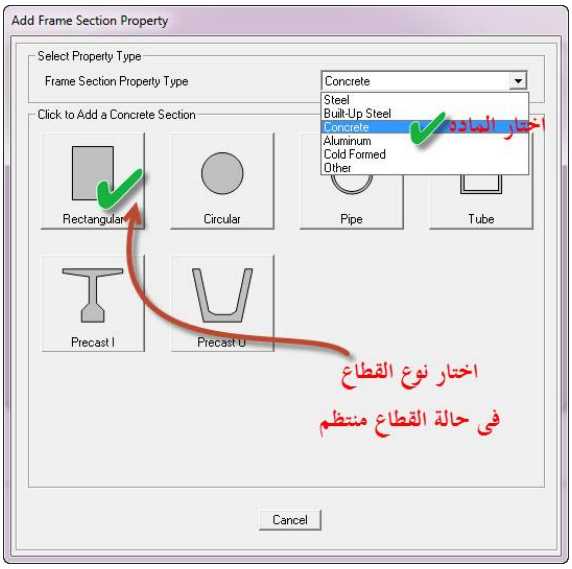


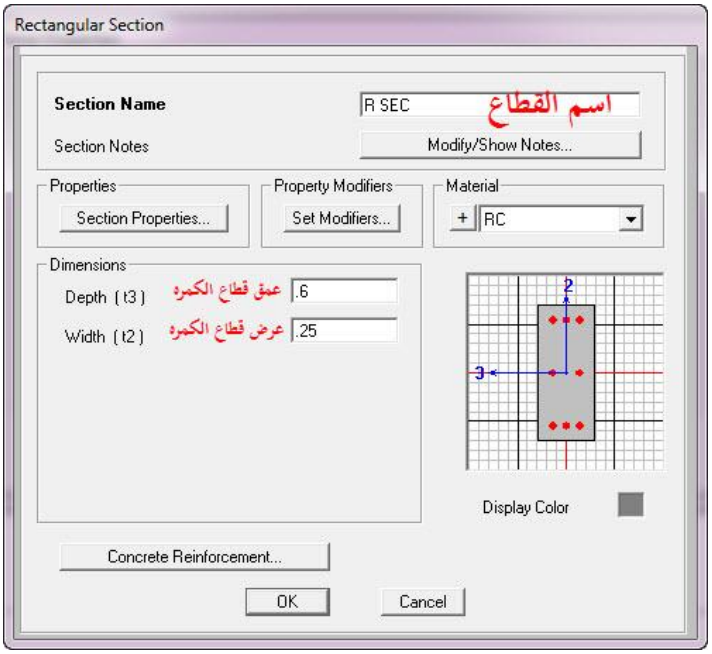


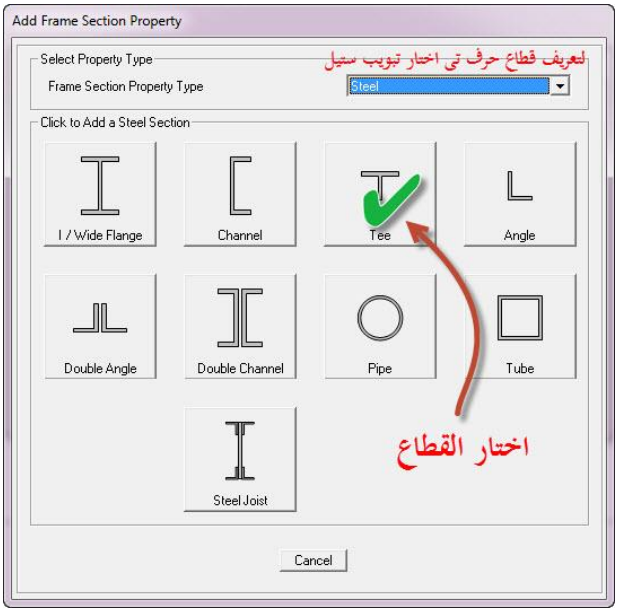
- Define Sections

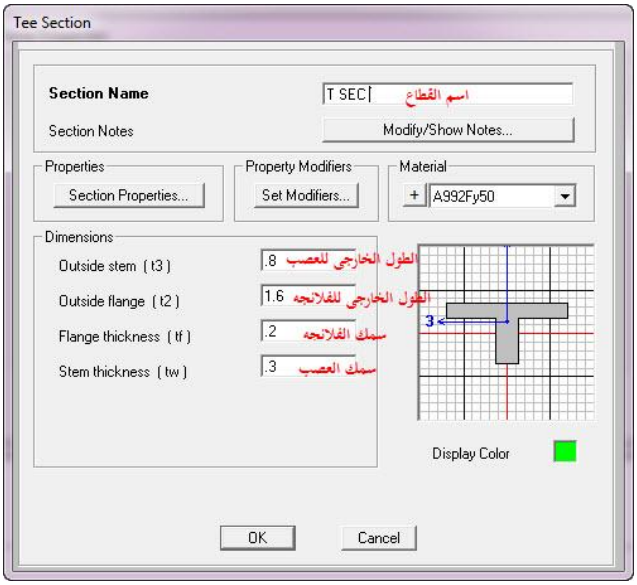

Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Frame Sections...
Tendon Sections...
Cable Sections...
Area Sections...
Solid Properties...
Reinforcement Bar Sizes...
Link/Support Properties...
Frequency Dep. Link Props...
Hinge Properties...
في حاله القطاعات التى طولها
اكبر بكثير من مساحتها
امثال الكمرات والاعمده
في حاله القطاعات التى
مساحتها اكبر من سمكها
امثال البلاطات
لتعريف القطاعات

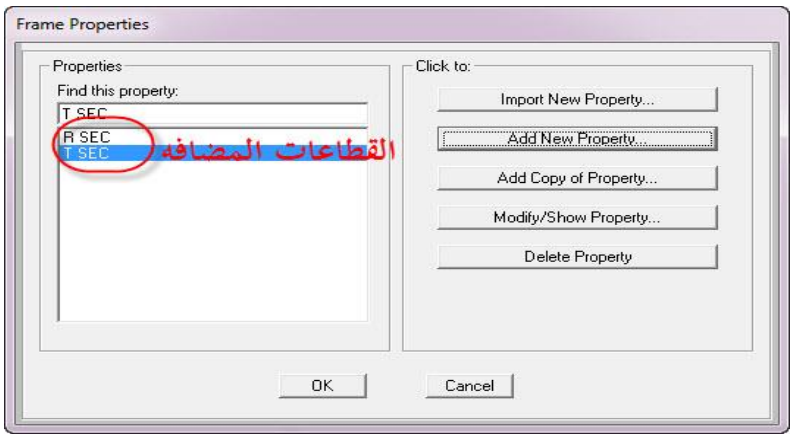

Frame Properties
Properties
Find this property:
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
اختيار اضافة جديد
OK
Cancel


Add Frame Section Property
Select Property Type
Frame Section Property Type
Concrete
Steel
Built-Up Steel
Concrete
Aluminum
Cold Formed
Other
اختيار الماده
Click to Add a Concrete Section
Rectangular
Circular
Pipe
Tube
Precast I
Precast U
اختيار نوع القطاع
فى حالة القطاع منتظم
Cancel

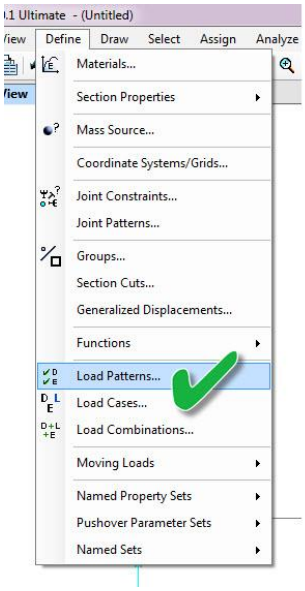

Rectangular Section
Section Name
R SEC
اسم القطاع
Section Notes
Modify/Show Notes...
Properties
Section Properties...
Property Modifiers
Set Modifiers...
Material
RC
Dimensions
Depth (t3)
عمق قطاع الكمره
.6
Width (t2)
عرض قطاع الكمره
.25
2
3
Display Color
Concrete Reinforcement...
OK
Cancel


Add Frame Section Property
Select Property Type
لتعريف قطاع حرف تي اختار تيوب ستيل
Frame Section Property Type
Steel
Click to Add a Steel Section
I / Wide Flange
Channel
Tee
Angle
Double Angle
Double Channel
Pipe
Tube
Steel Joist
اختار القطاع
Cancel

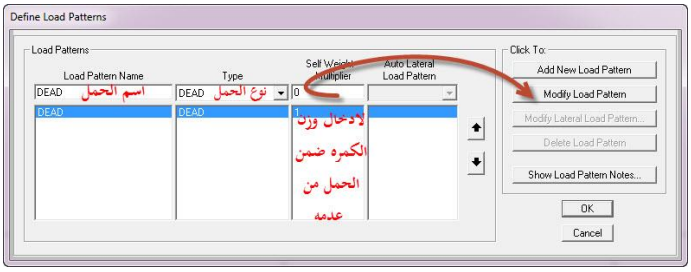




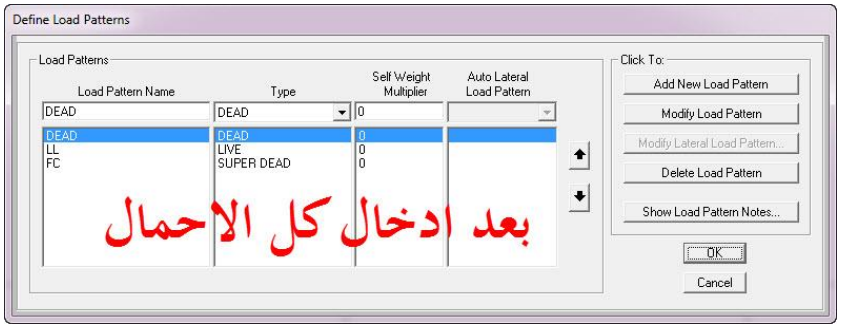
- Define Loads



تعريف الاحمال

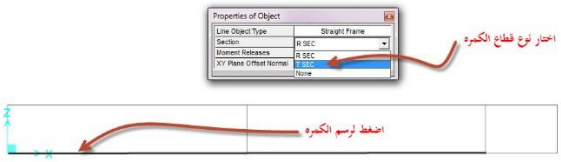

Define Load Patterns
Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
DEAD
اسم الحمل
DEAD
نوع الحمل
0
1
لادخال وزن الكمره ضمن الحمل من عدمه
Click To:
Add New Load Pattern
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel


Define Load Patterns
Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
LL
LIVE
0
DEAD
LL
DEAD
LIVE
0
0
بعد ادخال الحمل اضغط لاضافته
Click To:
Add New Load Pattern
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel


Define Load Patterns
Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
DEAD
DEAD
0
DEAD
LL
FC
DEAD
LIVE
SUPER DEAD
0
0
0
بعد ادخال كل الاحمال
Click To:
Add New Load Pattern
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel

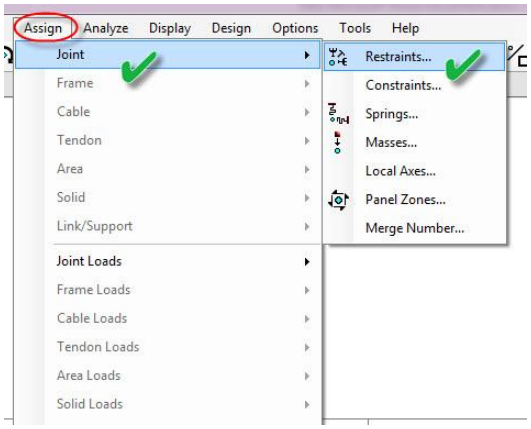
- Draw

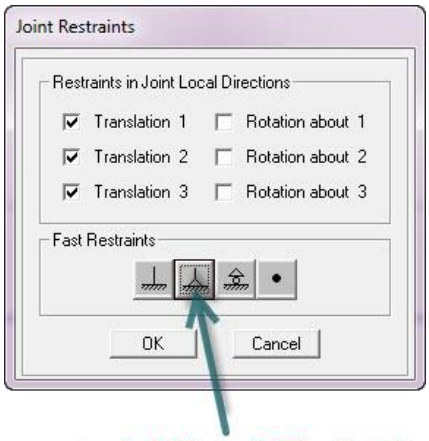

رسم الكمرات بالطريقه
البسيطة
رسم الكمرات بضغطه
واحده


Properties of Object
Line Object Type
Straight Frame
Section
R SEC
Moment Releases
R SEC
XY Plane Offset Normal
T SEC
None
اختار نوع قطاع الكمره
اضغط لرسم الكمره

- Assign

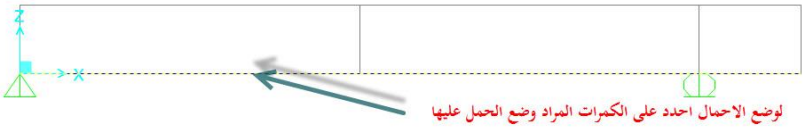
لوضع الركائز احدد على مكان الركيزة بالماوس



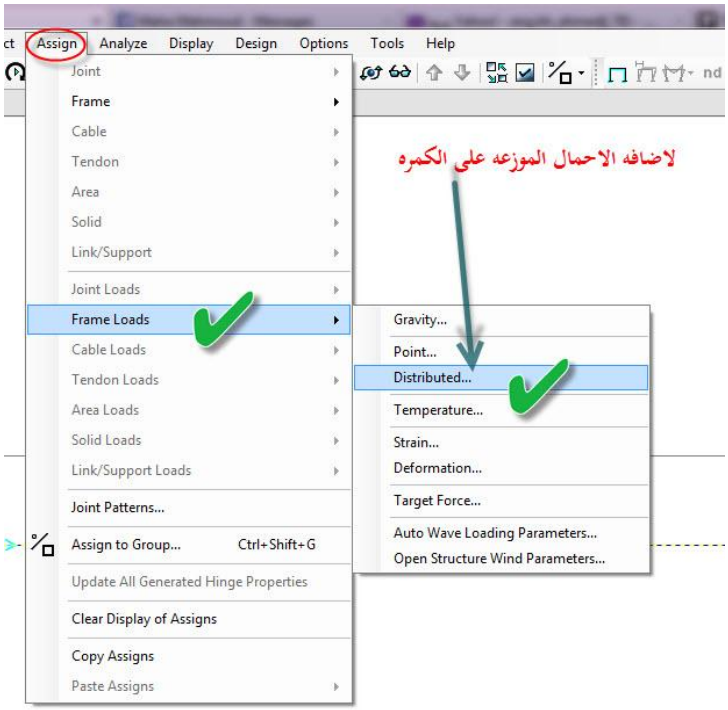


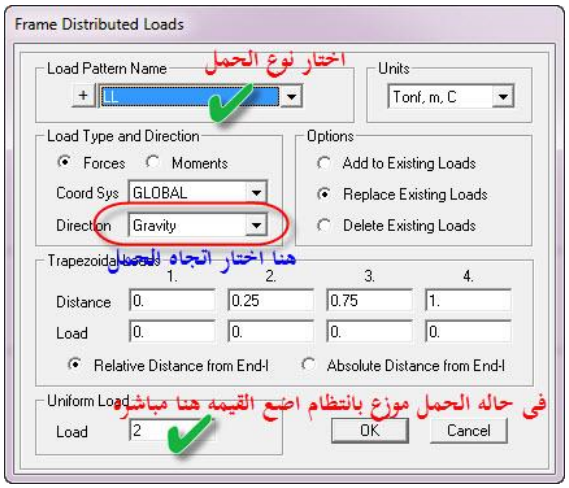
اختار نوع الركيزة عند النقطه المحدده

شكل الكمره بعد اضافة الركائز

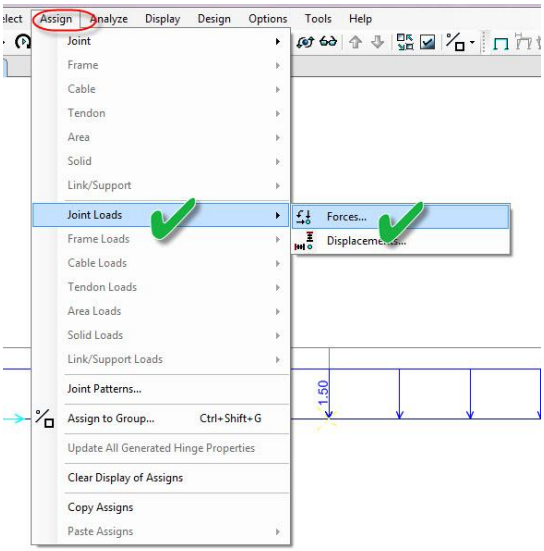


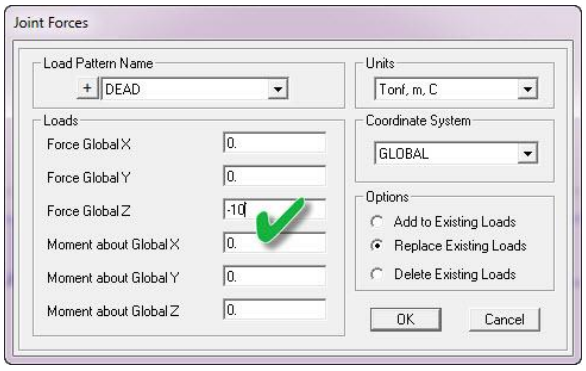
لوضع الاحمال احدد على الكمرات المراد وضع الحمل عليها

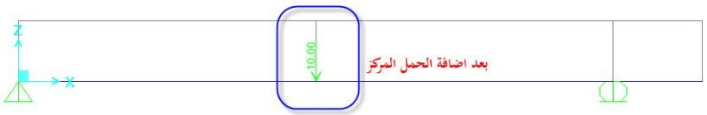




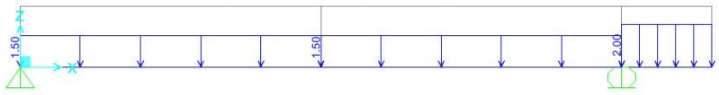
الشكل بعد اضافة الاحمال الحيه





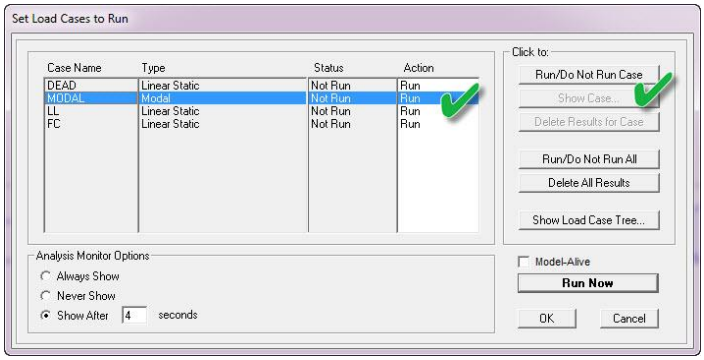


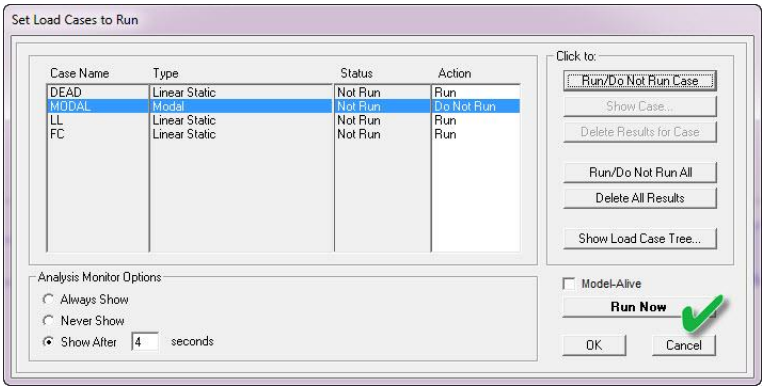
الشكل النهائى بعد الانتهاء من اضافة كل الاحمال والركائز



- Analyses

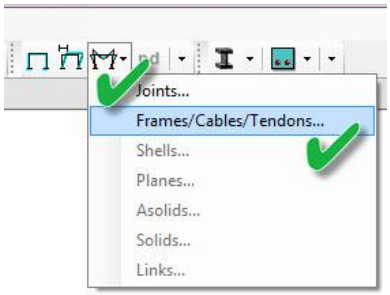

Ultimate - (Untitled)
Define
Draw
Select
Distributed Loads (FC)
اضغط تشغيل


Set Load Cases to Run
Case Name
Type
Status
Action
DEAD
Linear Static
Not Run
Run
MODAL
Modal
Not Run
Run
LL
Linear Static
Not Run
Run
FC
Linear Static
Not Run
Run
Click to:
Run/Do Not Run Case
Show Case...
Delete Results for Case
Run/Do Not Run All
Delete All Results
Show Load Case Tree...
Analysis Monitor Options
Always Show
Never Show
Show After
4
seconds
Model-Alive
Run Now
OK
Cancel

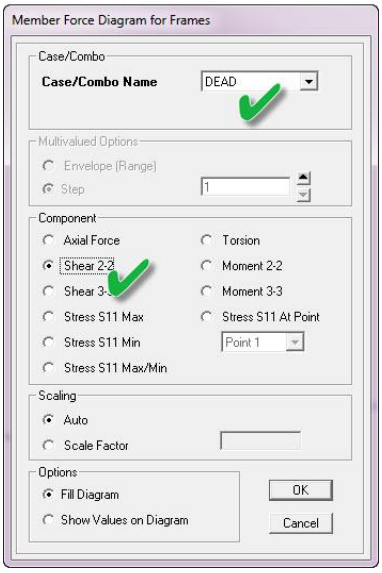

Set Load Cases to Run
Case Name
Type
Status
Action
DEAD
Linear Static
Not Run
Run
MODAL
Modal
Not Run
Do Not Run
LL
Linear Static
Not Run
Run
FC
Linear Static
Not Run
Run
Click to:
Run/Do Not Run Case
Show Case...
Delete Results for Case
Run/Do Not Run All
Delete All Results
Show Load Case Tree...
Analysis Monitor Options
Always Show
Never Show
Show After
4
seconds
Model-Alive
Run Now
OK
Cancel

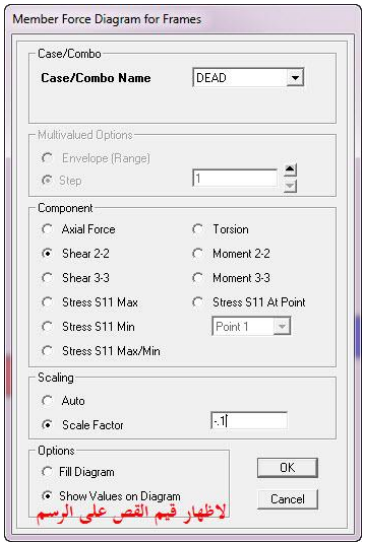

Save Model File As
Desktop
Search Desktop
Organize
New folder
Favorites
Downloads
Recent Places
Desktop
Libraries
Documents
Music
Pictures
Videos
Computer
Libraries
System Folder
SootMuslim
System Folder
اختار مكان الحفظ
Computer
System Folder
Network
System Folder
beam
File name:
beam
اختار اسم للكمره
Save as type:
SAP2000 Model Files (*.sdb)
Hide Folders
Save
Cancel

شكل الكمره نتيجة الاحمال



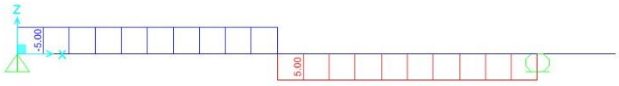
SFD



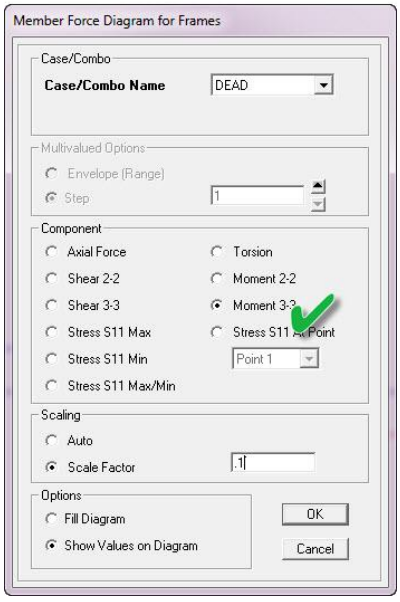


قيمة قوى القص

SFD



BMD



مسائل محلوله على برنامج الساب

إعداد

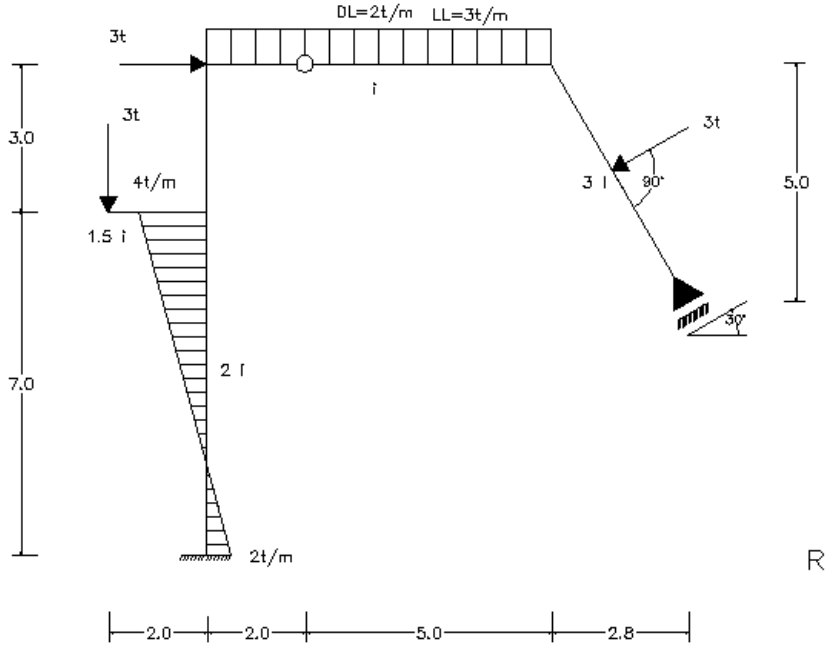
مهندس : خالد عبدالكريم

Eng.kh_ahmed@yahoo.com

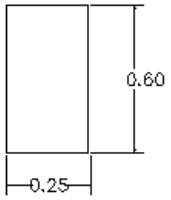
01063366722 Or 01140506722

www.facebook.com/Eng.Khaled.Abdelkarim

Frame

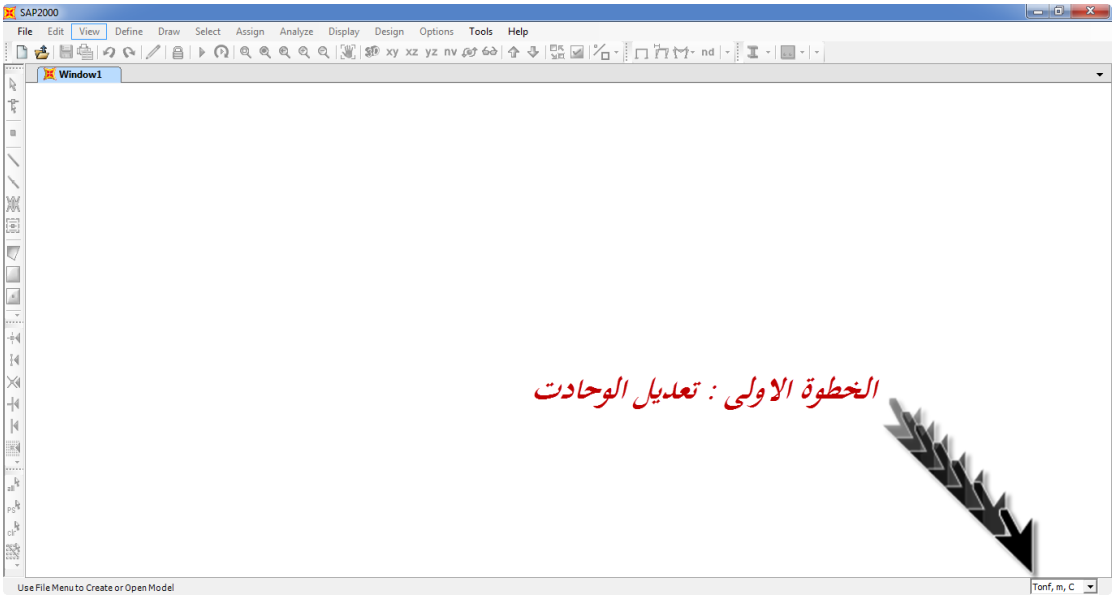


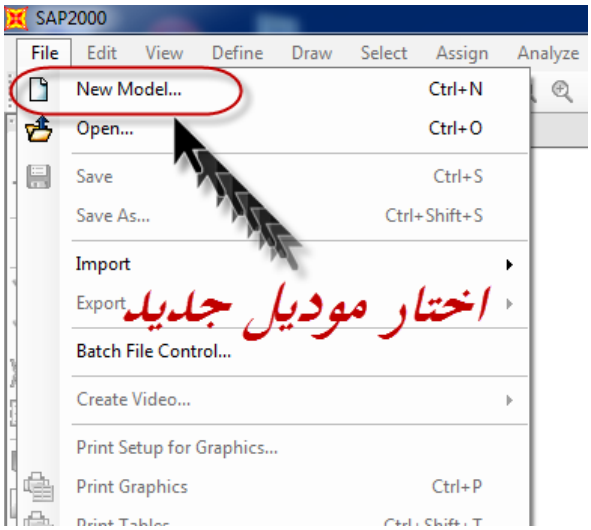
Material			
RC	γ = 2.5	μ = .22	EI=4500

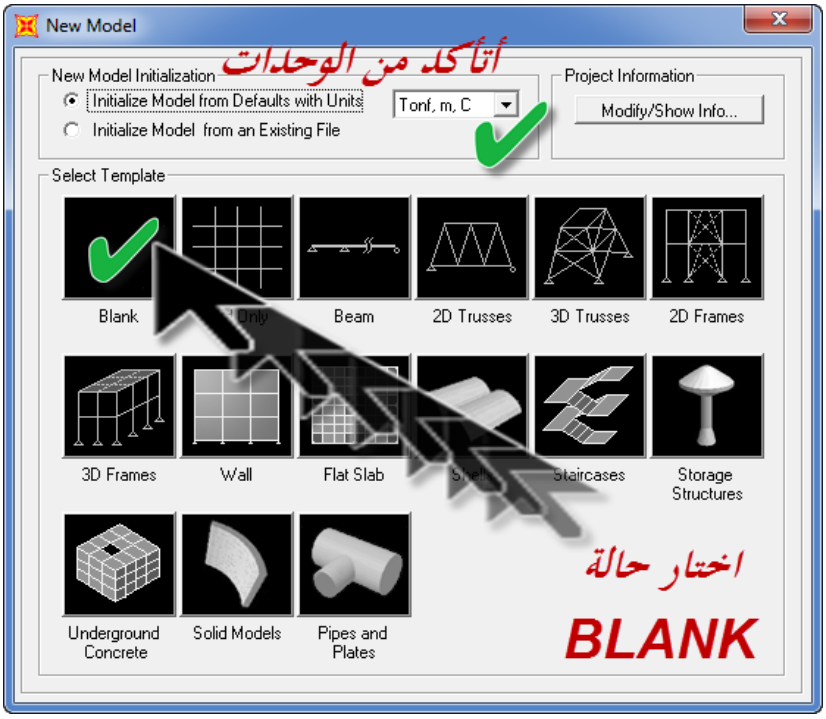


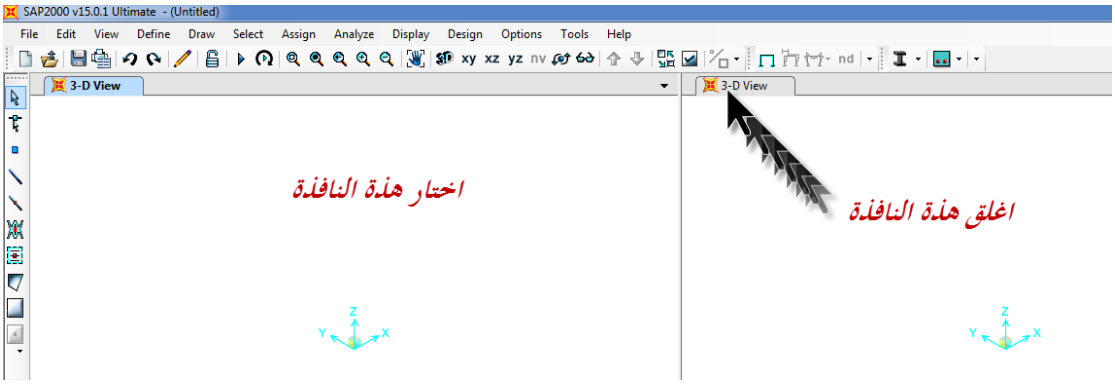
R SECTION

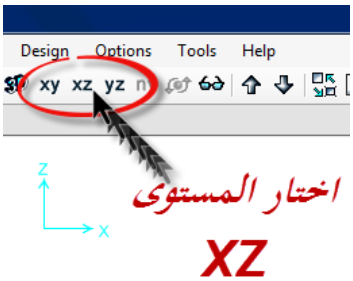
REQ: SFD & BMD IN WORKING AND UL CASE


SAP2000
File Edit View Define Draw Select Assign Analyze Display Design Options Tools Help
Window1
الخطوة الاولى : تعديل الوحادت
Use File Menu to Create or Open Model
Tonf, m, C

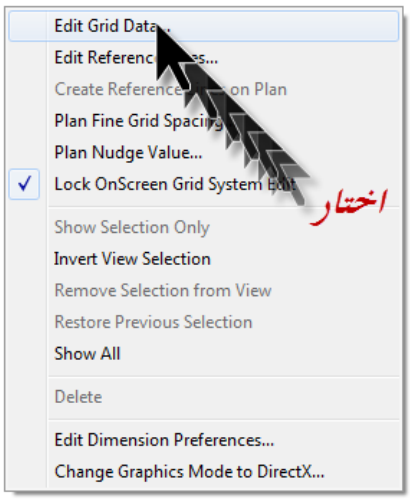

SAP2000
File Edit View Define Draw Select Assign Analyze
New Model... Ctrl+N
Open... Ctrl+O
Save Ctrl+S
Save As... Ctrl+Shift+S
Import
Export
Batch File Control...
Create Video...
Print Setup for Graphics...
Print Graphics Ctrl+P
اختار موديل جديد

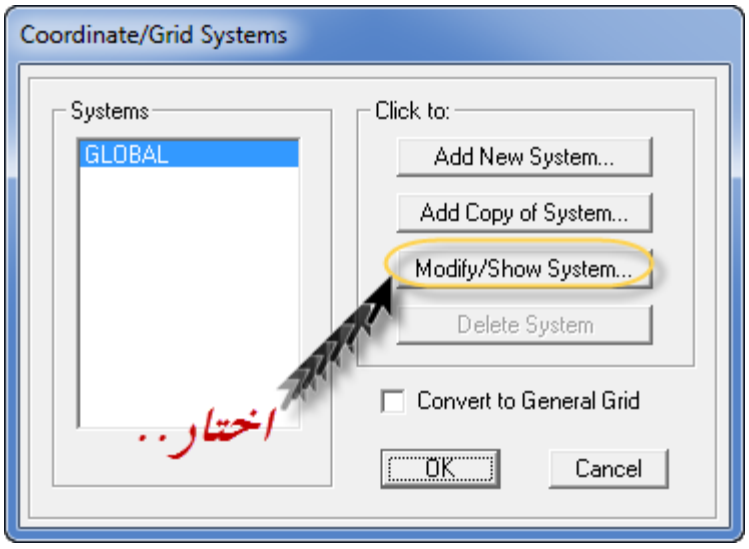

New Model
أتأكد من الوحدات
New Model Initialization
Initialize Model from Defaults with Units
Initialize Model from an Existing File
Tonf, m, C
Project Information
Modify/Show Info...
Select Template
Blank
Beam
2D Trusses
3D Trusses
2D Frames
3D Frames
Wall
Flat Slab
Staircases
Storage Structures
Underground Concrete
Solid Models
Pipes and Plates
اختار حالة
BLANK

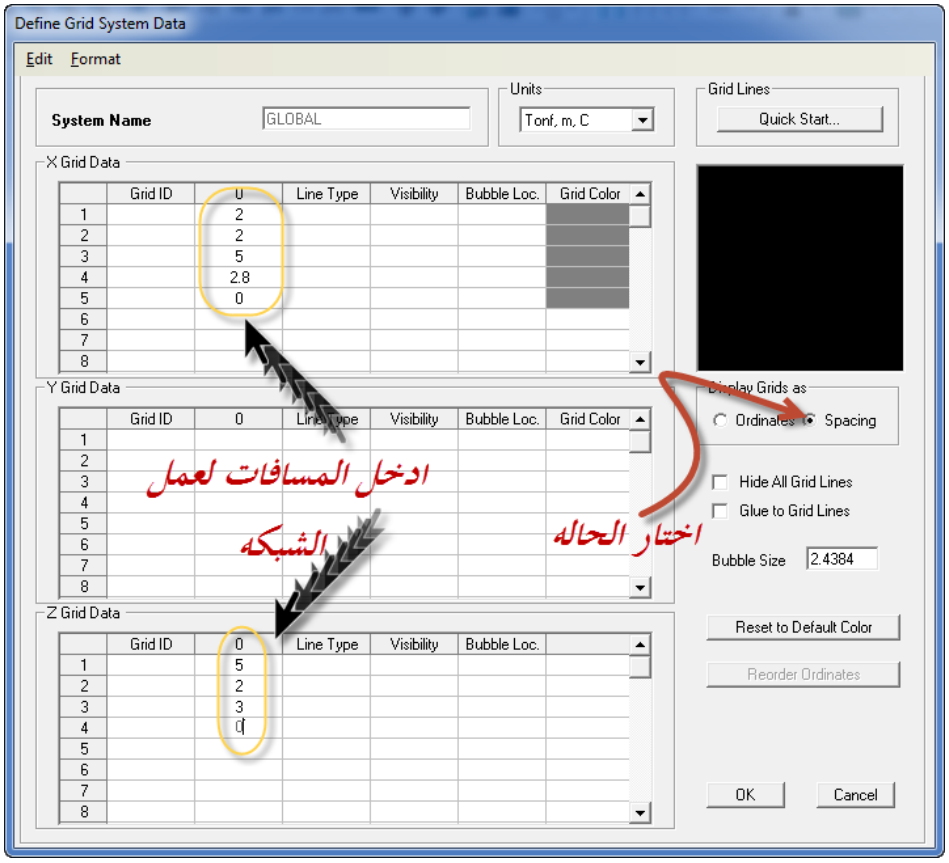

SAP2000 v15.0.1 Ultimate - (Untitled)
File Edit View Define Draw Select Assign Analyze Display Design Options Tools Help
3-D View
3-D View
اختار هذة النافذة
اغلق هذة النافذة


Design Options Tools Help
xy xz yz
اختار المستوى
XZ

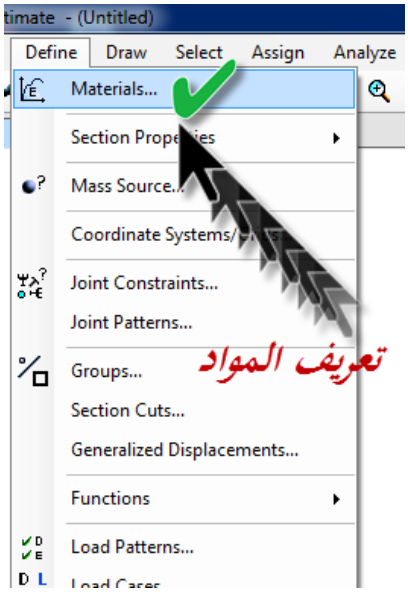
اضغط كليك يمين بالماوس فى اى مكان على اللوحه

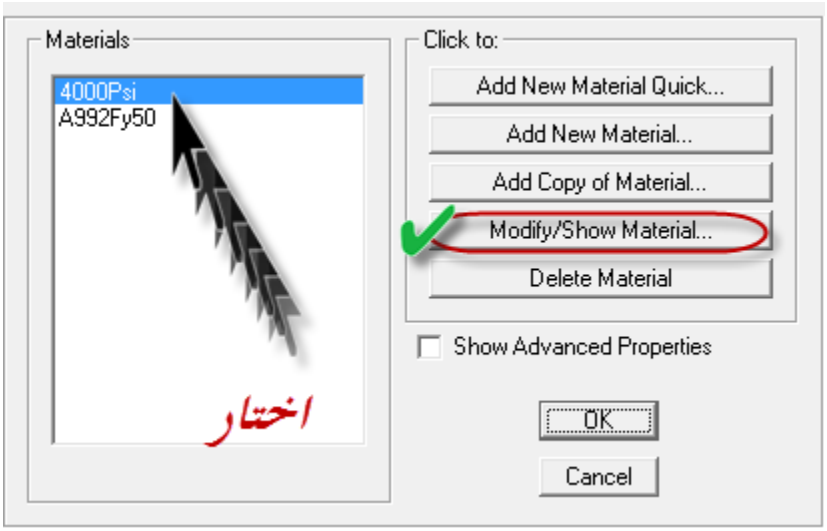


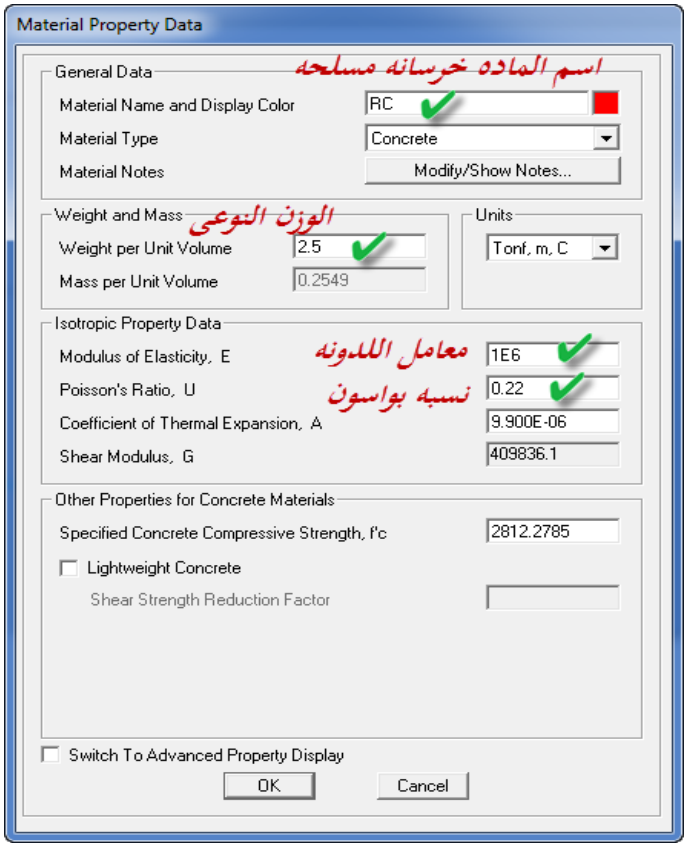


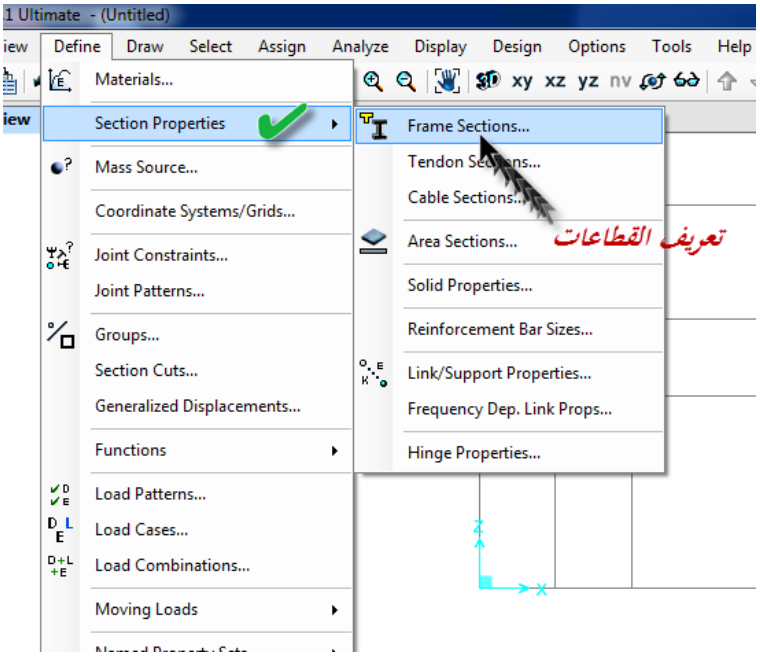

Define Grid System Data
Edit Format
System Name
GLOBAL
Units
Tonf, m, C
Grid Lines
Quick Start...
X Grid Data
Grid ID
0
Line Type
Visibility
Bubble Loc.
Grid Color
2
2
5
2.8
0
Y Grid Data
Z Grid Data
5
2
3
0
Display Grids as
Ordinates
Spacing
Hide All Grid Lines
Glue to Grid Lines
Bubble Size
2.4384
Reset to Default Color
Reorder Ordinates
OK
Cancel
ادخل المسافات لعمل الشبكه
اختار الحاله


شبكة المسافات المكونه نتيجة ادخال المسافات
Z
X

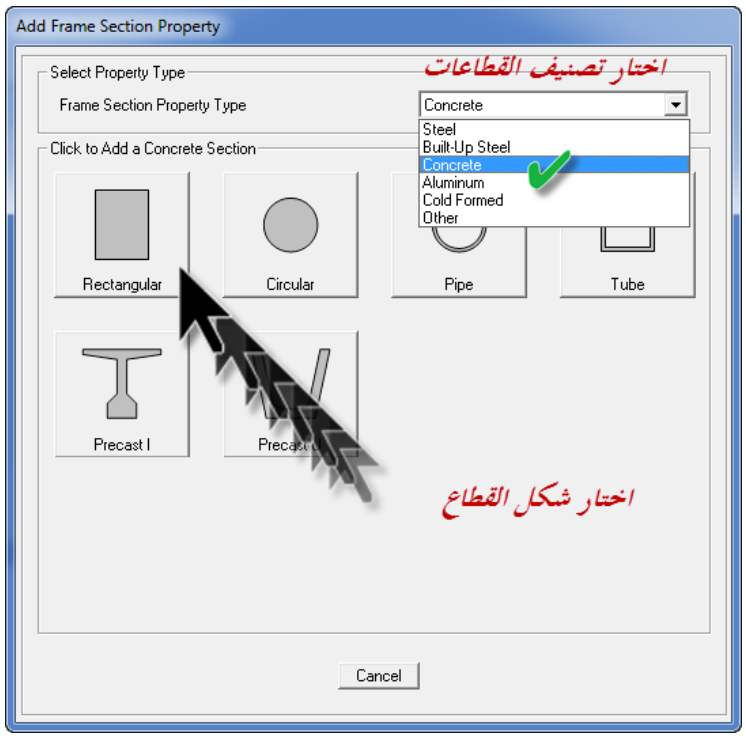

timate - (Untitled)
Define
Draw
Select
Assign
Analyze
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
تعريف المواد

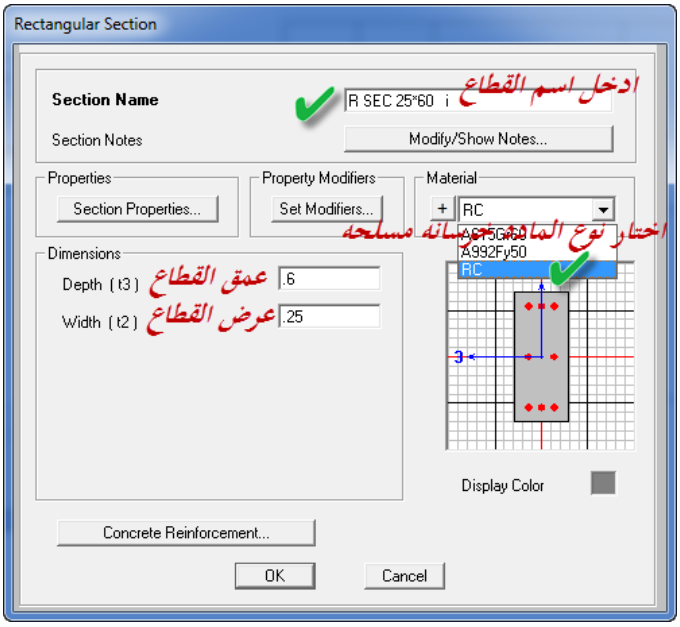

Materials
4000Psi
A992Fy50
اختار
Click to:
Add New Material Quick...
Add New Material...
Add Copy of Material...
Modify/Show Material...
Delete Material
Show Advanced Properties
OK
Cancel


Material Property Data
General Data
اسم الماده خرسانه مسلحه
Material Name and Display Color
RC
Material Type
Concrete
Material Notes
Modify/Show Notes...
Weight and Mass
الوزن النوعى
Weight per Unit Volume
2.5
Mass per Unit Volume
0.2549
Units
Tonf, m, C
Isotropic Property Data
معامل اللدونه
Modulus of Elasticity, E
1E6
نسبه بواسون
Poisson's Ratio, U
0.22
Coefficient of Thermal Expansion, A
9.900E-06
Shear Modulus, G
409836.1
Other Properties for Concrete Materials
Specified Concrete Compressive Strength, f'c
2812.2785
Lightweight Concrete
Shear Strength Reduction Factor
Switch To Advanced Property Display
OK
Cancel

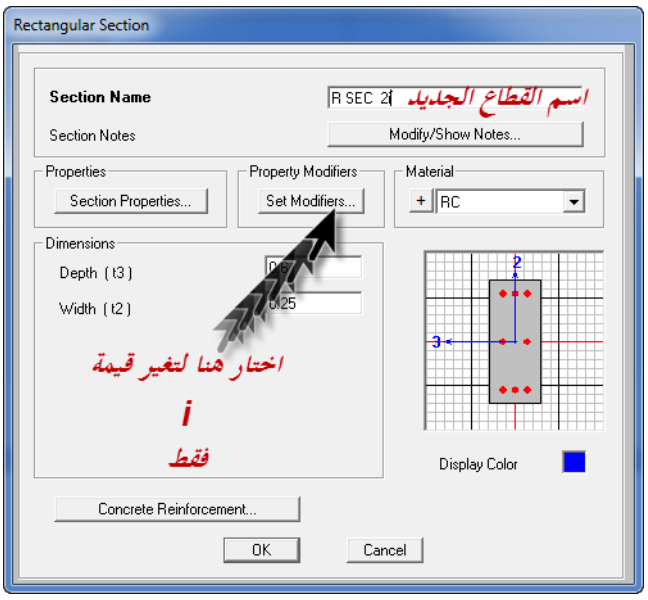

Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Help
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Frame Sections...
Tendon Sections...
Cable Sections...
Area Sections...
Solid Properties...
Reinforcement Bar Sizes...
Link/Support Properties...
Frequency Dep. Link Props...
Hinge Properties...
تعريف القطاعات

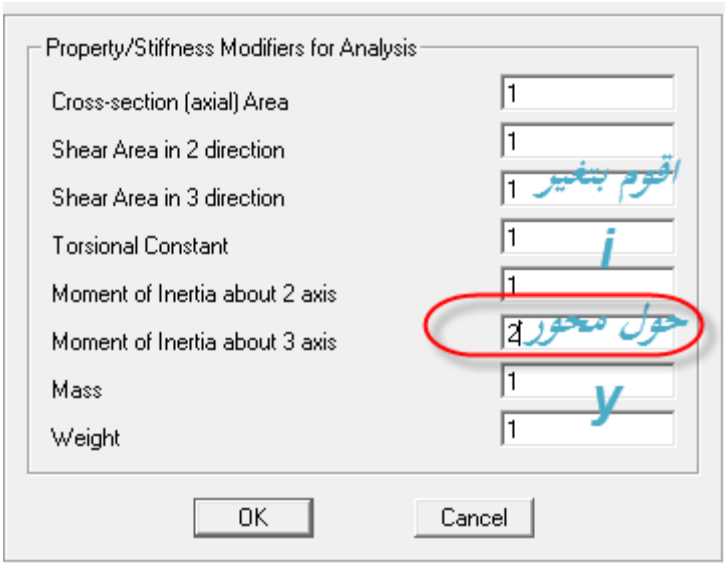

Frame Properties
Properties
Find this property:
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
اختار لاضافة قطاع جديد
OK
Cancel

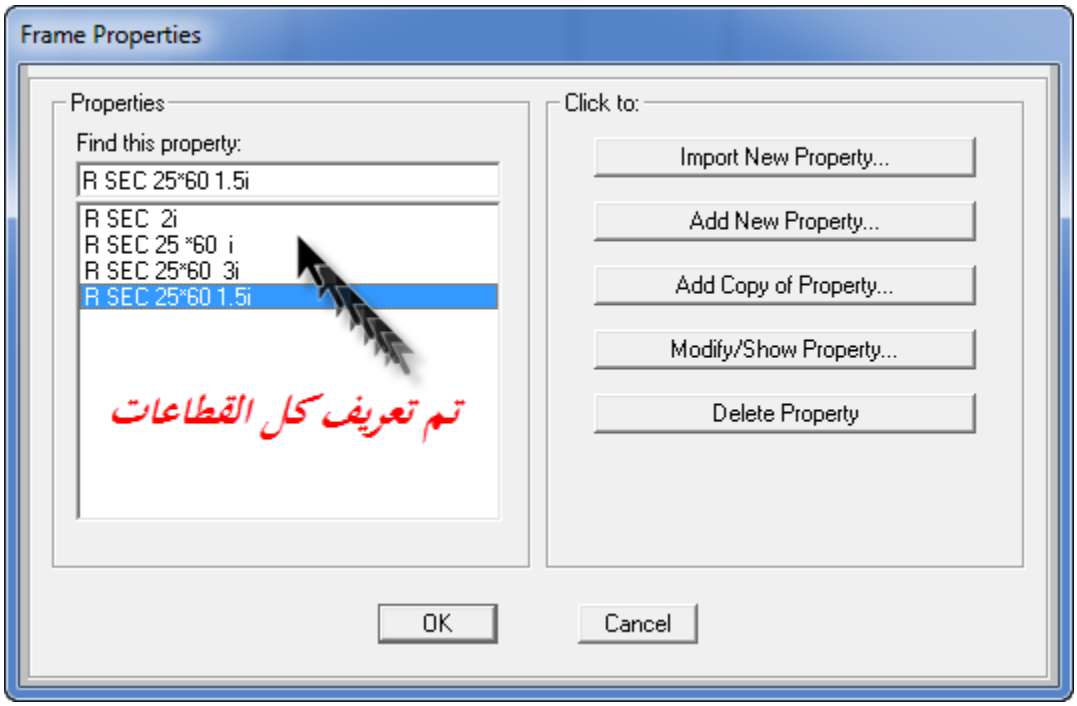

Add Frame Section Property
اختار تصنيف القطاعات
Select Property Type
Frame Section Property Type
Concrete
Steel
Built-Up Steel
Concrete
Aluminum
Cold Formed
Other
Click to Add a Concrete Section
Rectangular
Circular
Pipe
Tube
Precast I
اختار شكل القطاع
Cancel

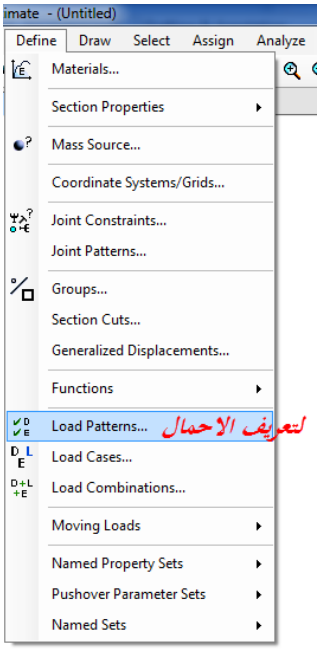

Rectangular Section
Section Name
R SEC 25*60 i
ادخل اسم القطاع
Section Notes
Modify/Show Notes...
Properties
Section Properties...
Property Modifiers
Set Modifiers...
Material
RC
A992Fy50
RC
اختار نوع المادة خرسانه مسلحه
Dimensions
Depth (t3)
.6
عمق القطاع
Width (t2)
.25
عرض القطاع
Display Color
Concrete Reinforcement...
OK
Cancel

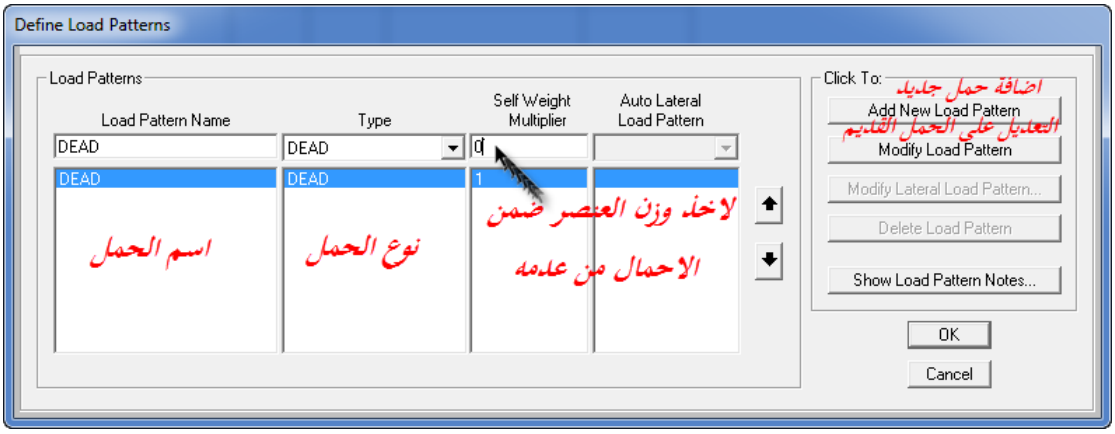

Frame Properties
Properties
Find this property:
R SEC 25 *60 i
R SEC 25 *60 i
احدد على القطاع
خذ نسخه من القطاع لعمل
قطاع اخر مختلف فى قيمة
i
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
OK
Cancel

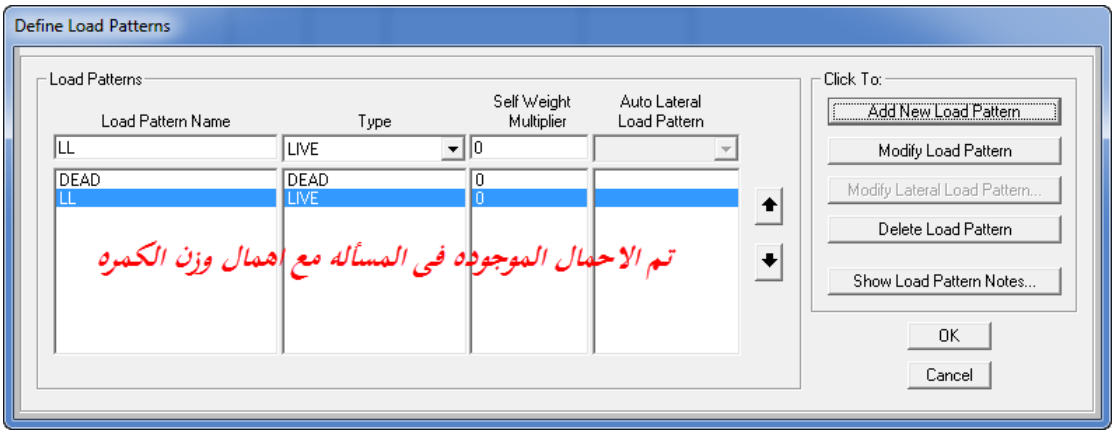

Rectangular Section
Section Name
R SEC 2
اسم القطاع الجديد
Section Notes
Modify/Show Notes...
Properties
Section Properties...
Property Modifiers
Set Modifiers...
Material
RC
Dimensions
Depth (t3)
Width (t2)
0.25
اختار هنا لتغير قيمة
i
فقط
Display Color
Concrete Reinforcement...
OK
Cancel

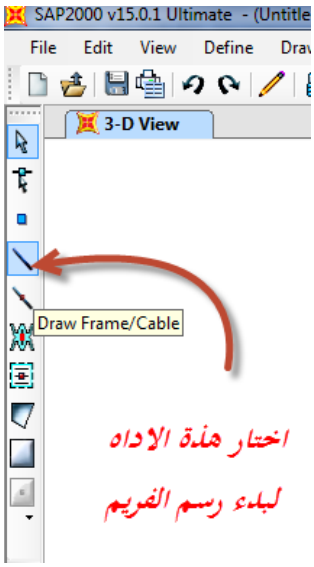

Property/Stiffness Modifiers for Analysis
Cross-section (axial) Area
Shear Area in 2 direction
Shear Area in 3 direction
Torsional Constant
Moment of Inertia about 2 axis
Moment of Inertia about 3 axis
Mass
Weight
1
1
1
1
1
2
1
1
OK
Cancel
اقوم بتغير
i
حول محور
y


Frame Properties
Properties
Find this property:
R SEC 25*60 1.5i
R SEC 2i
R SEC 25 *60 i
R SEC 25*60 3i
R SEC 25*60 1.5i
تم تعريف كل القطاعات
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
OK
Cancel


imate - (Untitled)
Define
Draw
Select
Assign
Analyze
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
لتعريف الاحمال
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets

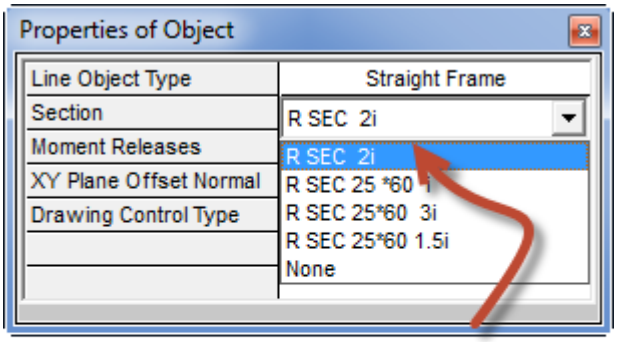

Define Load Patterns
Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
DEAD
DEAD
0
DEAD
DEAD
1
اسم الحمل
نوع الحمل
لاخذ وزن العنصر ضمن
الاحمال من عدمه
Click To:
اضافة حمل جديد
Add New Load Pattern
التعديل على الحمل القديم
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel


Define Load Patterns
Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
LL
LIVE
0
DEAD
DEAD
0
LL
LIVE
0
تم الاحمال الموجوده فى المسأله مع اهمال وزن الكمره
Click To:
Add New Load Pattern
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel



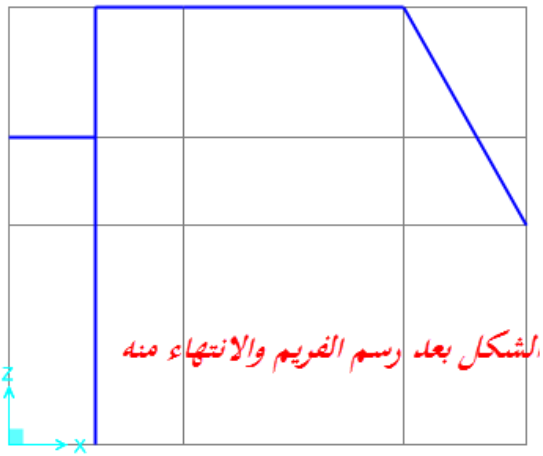
اختار هذة الاداه

لبدء رسم الفريم

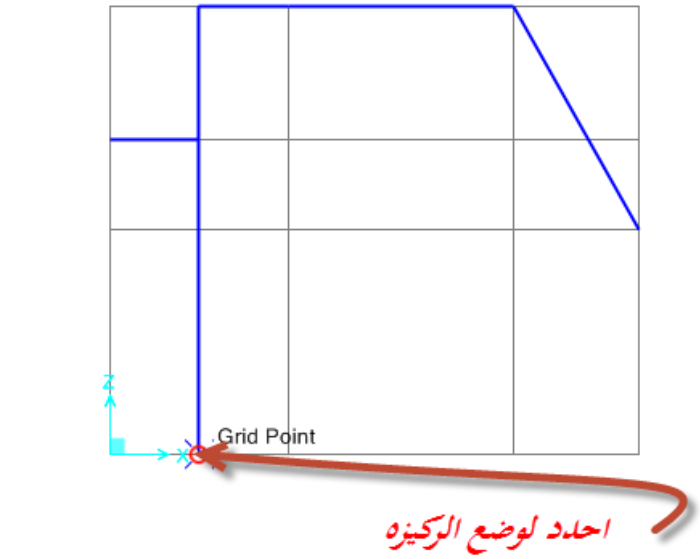


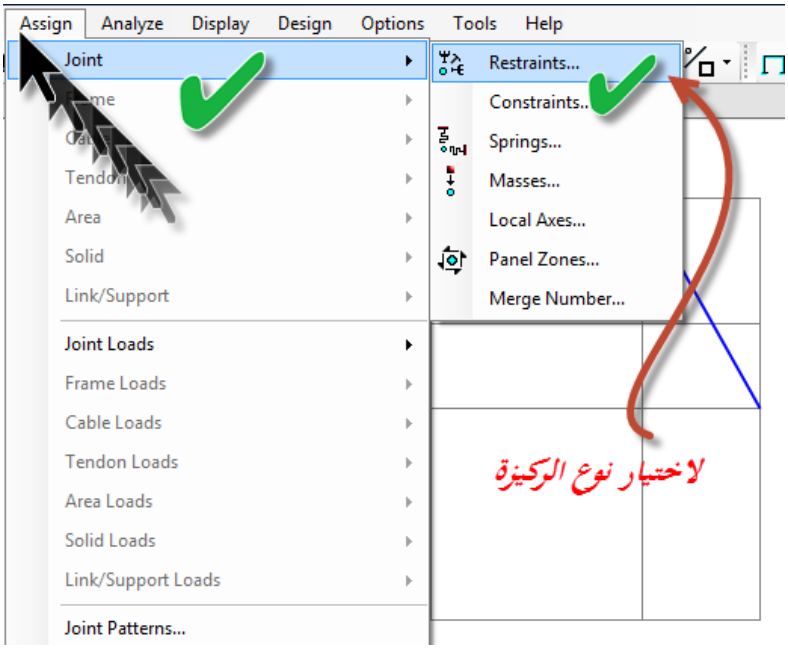
اختار القطاع المناسب وابدأ فى

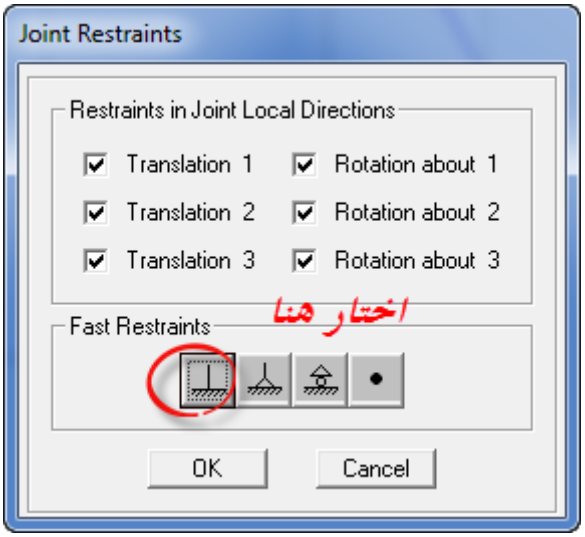
الرسم

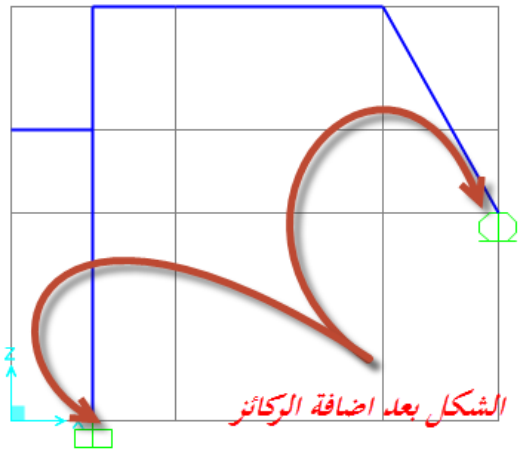


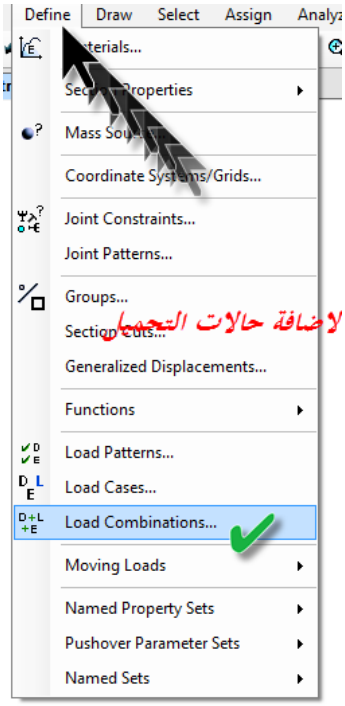
الشكل بعد رسم الفريم والانتهاء منه

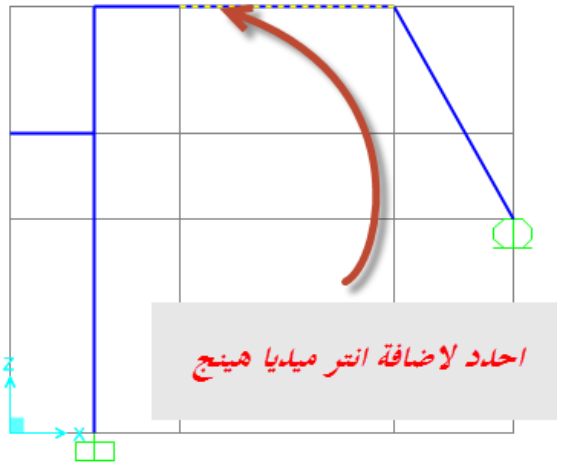

Grid Point
احدد لوضع الركيزه

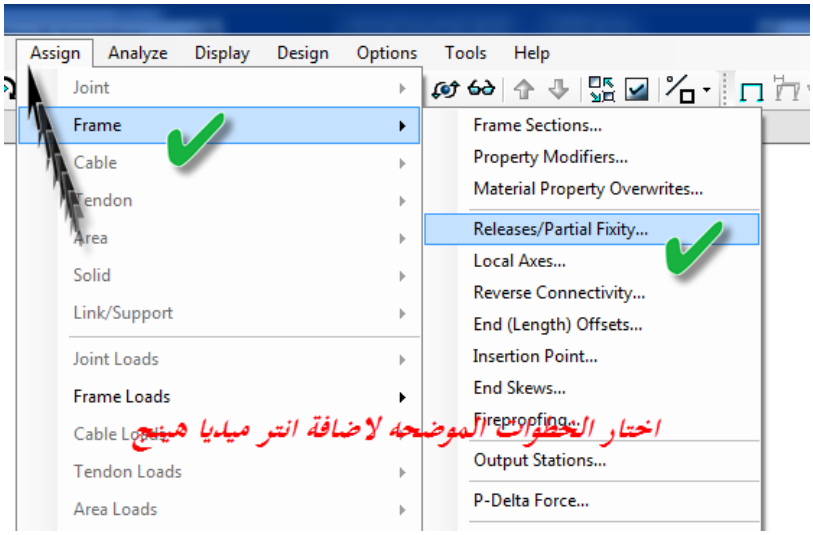

Assign
Analyze
Display
Design
Options
Tools
Help
Joint
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Joint Patterns...
Restraints...
Constraints...
Springs...
Masses...
Local Axes...
Panel Zones...
Merge Number...
لاختيار نوع الركيزة

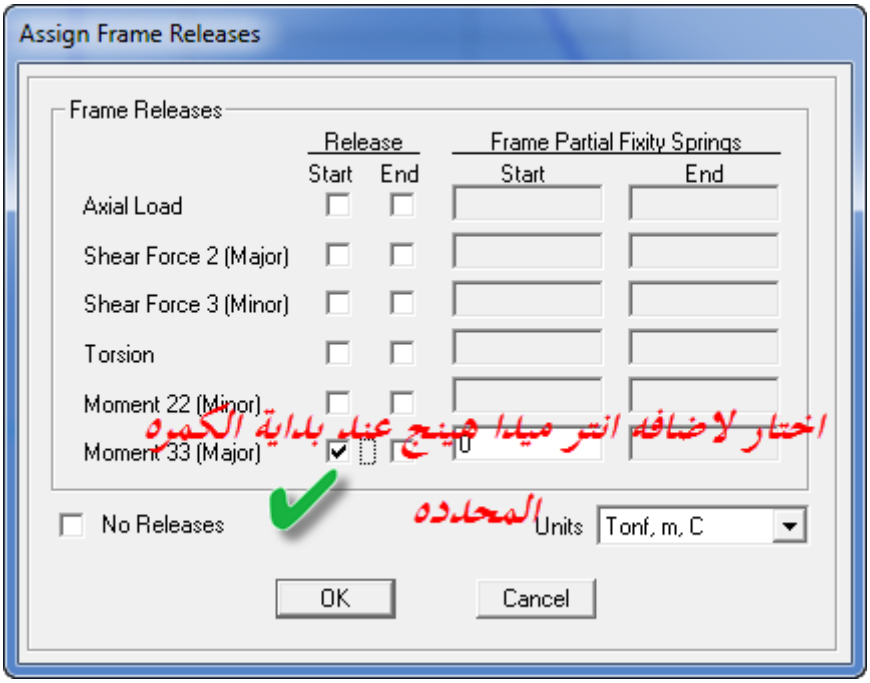

Joint Restraints
Restraints in Joint Local Directions
Translation 1
Translation 2
Translation 3
Rotation about 1
Rotation about 2
Rotation about 3
اختار هنا
Fast Restraints
OK
Cancel

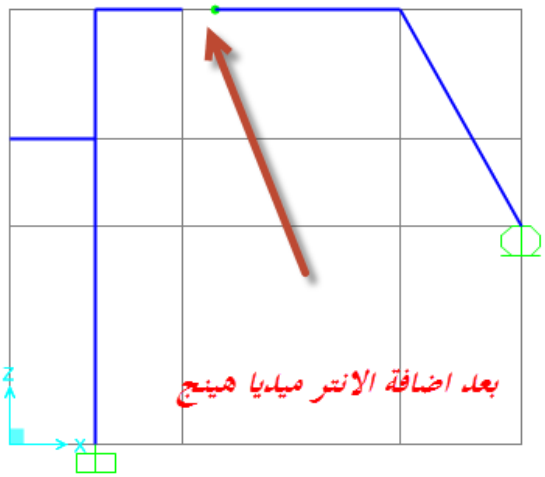

الشكل بعد اضافة الركائز

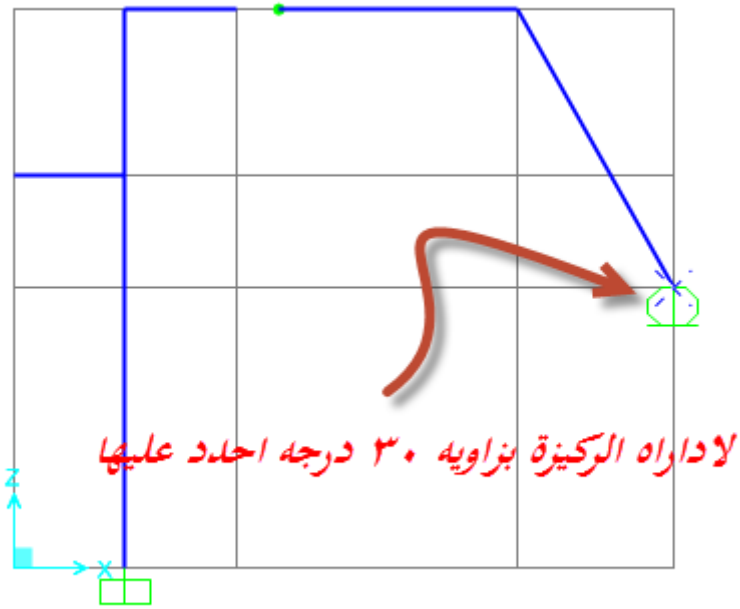

Define
Draw
Select
Assign
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
لاضافة حالات التحميل

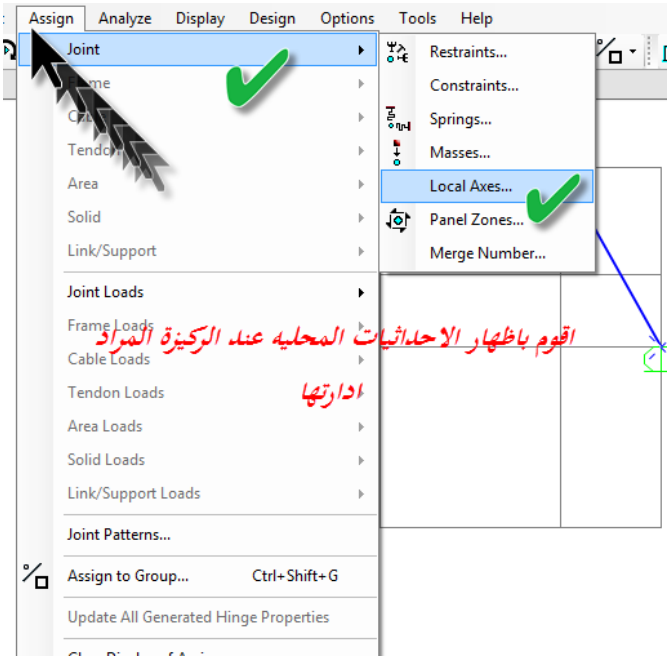

احدد لاضافة انتر ميديا هينج

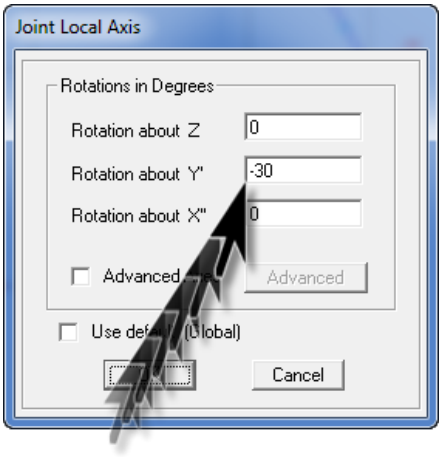

Assign
Analyze
Display
Design
Options
Tools
Help
Joint
Frame
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Frame Sections...
Property Modifiers...
Material Property Overwrites...
Releases/Partial Fixity...
Local Axes...
Reverse Connectivity...
End (Length) Offsets...
Insertion Point...
End Skews...
Fireproofing...
Output Stations...
P-Delta Force...
اختار الخطوات الموضحه لاضافة انتر ميديا هينج


Assign Frame Releases
Frame Releases
Release
Start
End
Frame Partial Fixity Springs
Start
End
Axial Load
Shear Force 2 (Major)
Shear Force 3 (Minor)
Torsion
Moment 22 (Minor)
Moment 33 (Major)
0
اختار لاضافه انتر ميدا هينج عند بداية الكمره
المحدده
No Releases
Units
Tonf, m, C
OK
Cancel


بعد اضافة الانتر ميديا هينج


لاداراه الركيزة بزاويه ٣٠ درجه احدد عليها


Assign
Analyze
Display
Design
Options
Tools
Help
Joint
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Joint Patterns...
Assign to Group... Ctrl+Shift+G
Update All Generated Hinge Properties
Restraints...
Constraints...
Springs...
Masses...
Local Axes...
Panel Zones...
Merge Number...
اقوم باظهار الاحداثيات المحليه عند الركيزة المراد
ادارتها

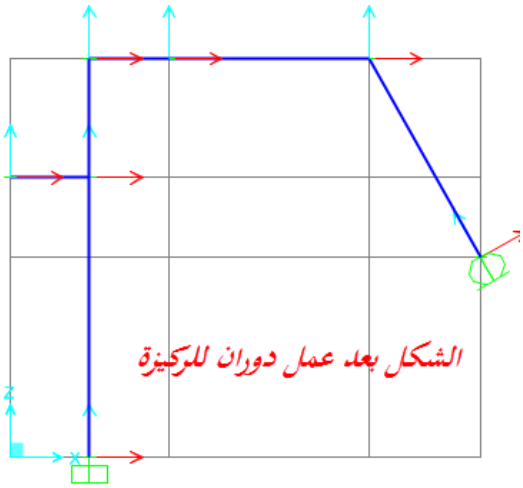


حدد الاستداره حول محور .. واقوم

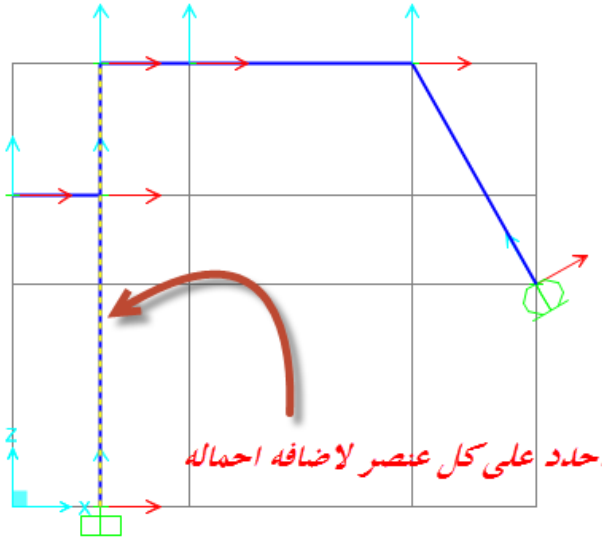
بوضع قيمتها مع الاخذ فى الاعتبار

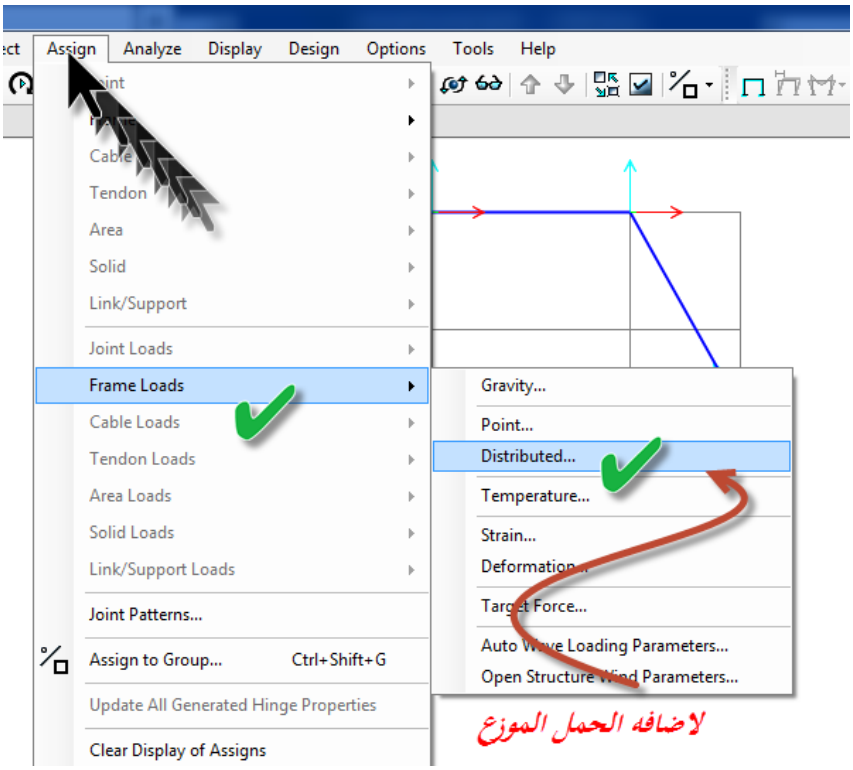
ان الاشاره السالبه لتحديد اتجاه

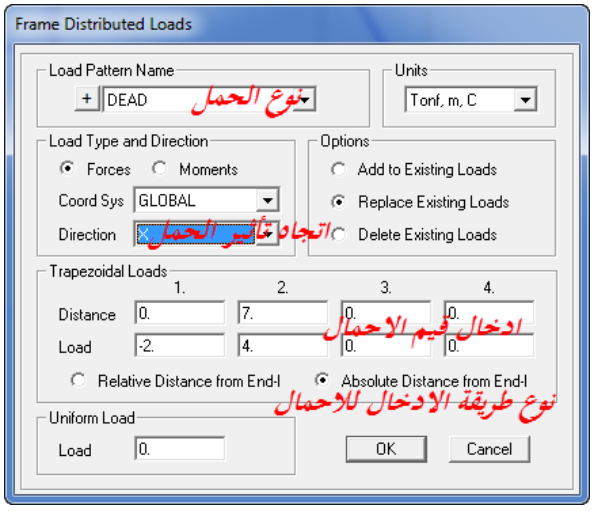
الدوران

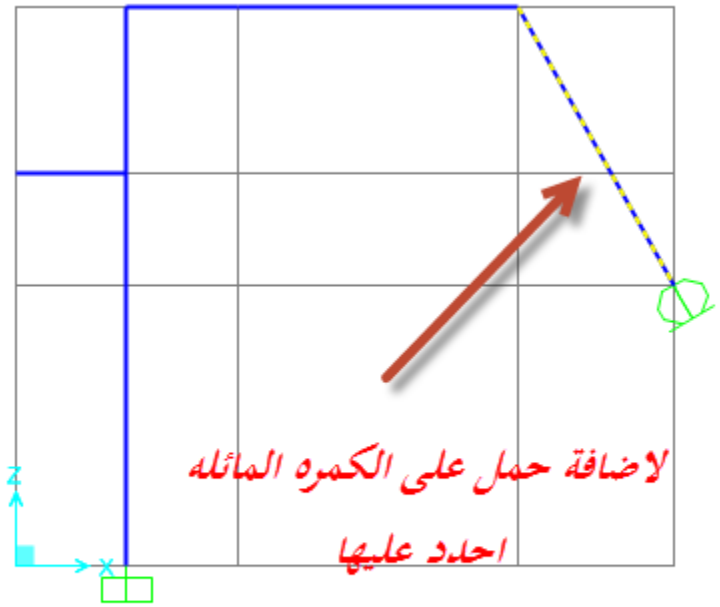


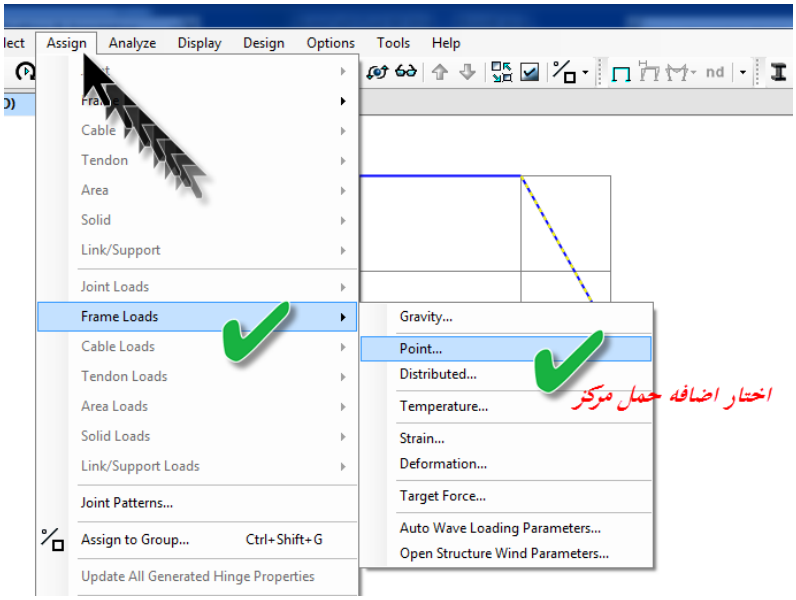
الشكل بعد عمل دوران للركيزة

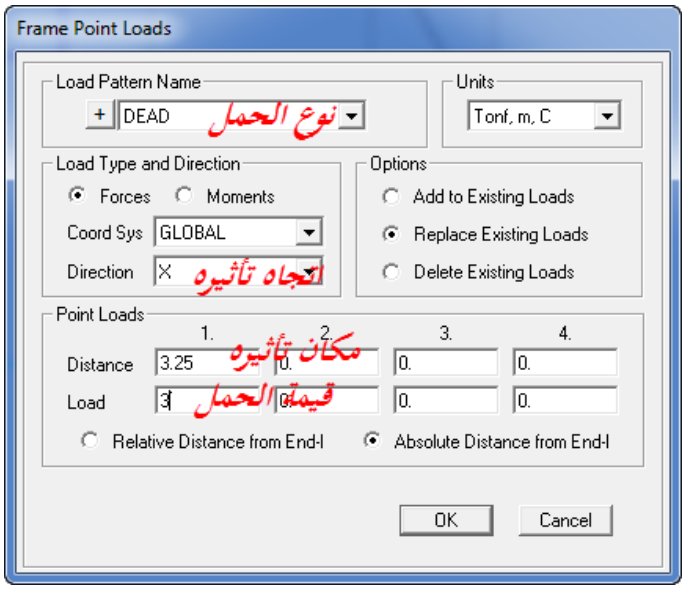

احدد على كل عنصر لاضافه احماله

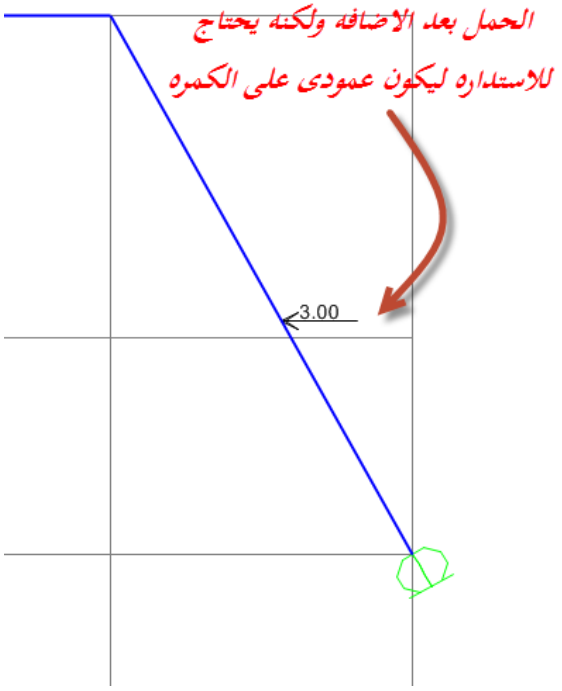

Assign
Analyze
Display
Design
Options
Tools
Help
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Joint Patterns...
Assign to Group... Ctrl+Shift+G
Update All Generated Hinge Properties
Clear Display of Assigns
Gravity...
Point...
Distributed...
Temperature...
Strain...
Deformation...
Target Force...
Auto Wave Loading Parameters...
Open Structure Wind Parameters...
لاضافه الحمل الموزع

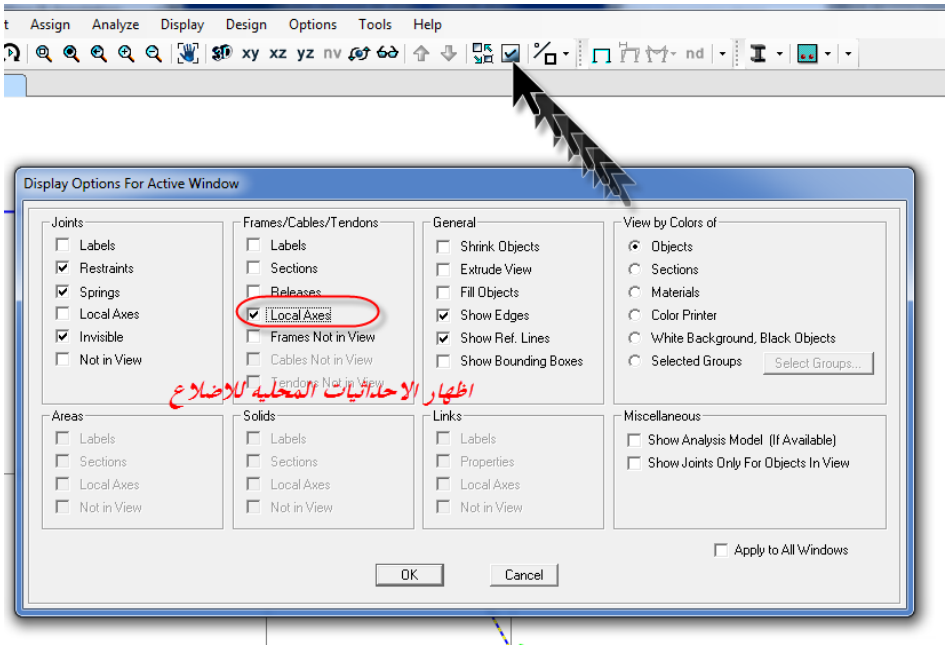

Frame Distributed Loads
Load Pattern Name
DEAD
نوع الحمل
Units
Tonf, m, C
Load Type and Direction
Forces
Moments
Coord Sys
GLOBAL
Direction
اتجاد تاثير الحمل
Options
Add to Existing Loads
Replace Existing Loads
Delete Existing Loads
Trapezoidal Loads
1.
2.
3.
4.
Distance
0.
7.
0.
0.
Load
-2.
4.
0.
0.
ادخال قيم الاحمال
Relative Distance from End-I
Absolute Distance from End-I
نوع طريقة الادخال للاحمال
Uniform Load
Load
0.
OK
Cancel

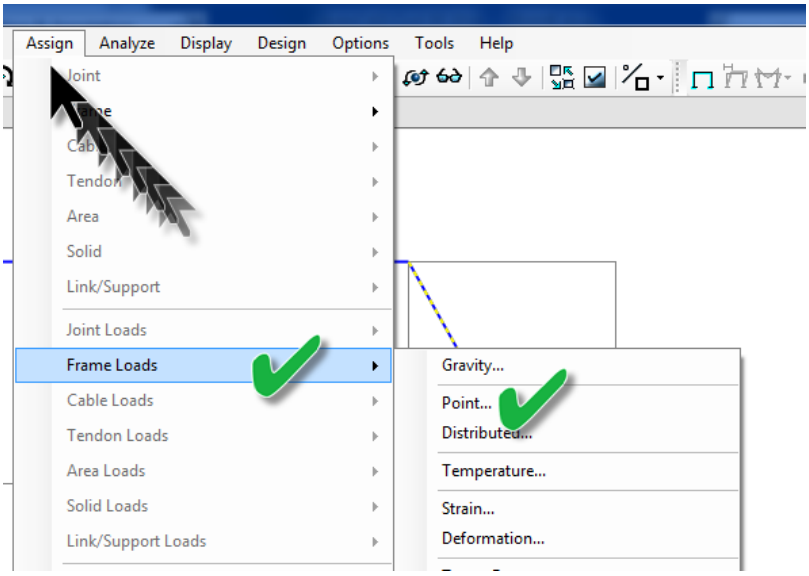

لاضافة حمل على الكمره المائله
احدد عليها
Z
X

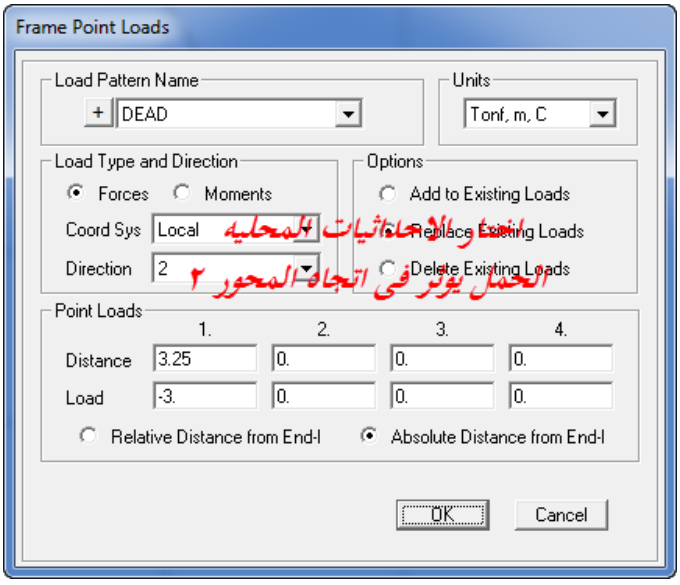

Assign
Analyze
Display
Design
Options
Tools
Help
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Joint Patterns...
Assign to Group... Ctrl+Shift+G
Update All Generated Hinge Properties
Gravity...
Point...
Distributed...
Temperature...
Strain...
Deformation...
Target Force...
Auto Wave Loading Parameters...
Open Structure Wind Parameters...
اختار اضافه حمل مركز


Frame Point Loads
Load Pattern Name
DEAD
نوع الحمل
Units
Tonf, m, C
Load Type and Direction
Forces
Moments
Coord Sys
GLOBAL
Direction
X
اتجاه تأثيره
Options
Add to Existing Loads
Replace Existing Loads
Delete Existing Loads
Point Loads
1.
2.
3.
4.
Distance
3.25
0.
0.
0.
مكان تأثيره
Load
3
0.
0.
0.
قيمة الحمل
Relative Distance from End-I
Absolute Distance from End-I
OK
Cancel

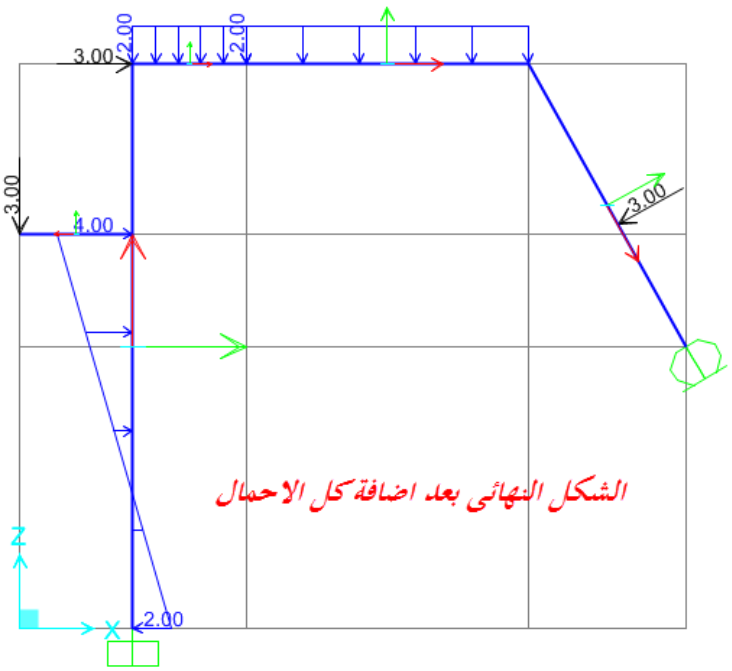

الحمل بعد الاضافه ولكنه يحتاج
للاستداره ليكون عمودى على الكمره
3.00


Assign
Analyze
Display
Design
Options
Tools
Help
Display Options For Active Window
Joints
Labels
Restraints
Springs
Local Axes
Invisible
Not in View
Frames/Cables/Tendons
Labels
Sections
Releases
Local Axes
Frames Not in View
Cables Not in View
Tendons Not in View
General
Shrink Objects
Extrude View
Fill Objects
Show Edges
Show Ref. Lines
Show Bounding Boxes
View by Colors of
Objects
Sections
Materials
Color Printer
White Background, Black Objects
Selected Groups
Select Groups...
اظهار الاحداثيات المحليه للاضلاع
Areas
Labels
Sections
Local Axes
Not in View
Solids
Labels
Sections
Local Axes
Not in View
Links
Labels
Properties
Local Axes
Not in View
Miscellaneous
Show Analysis Model (If Available)
Show Joints Only For Objects In View
Apply to All Windows
OK
Cancel

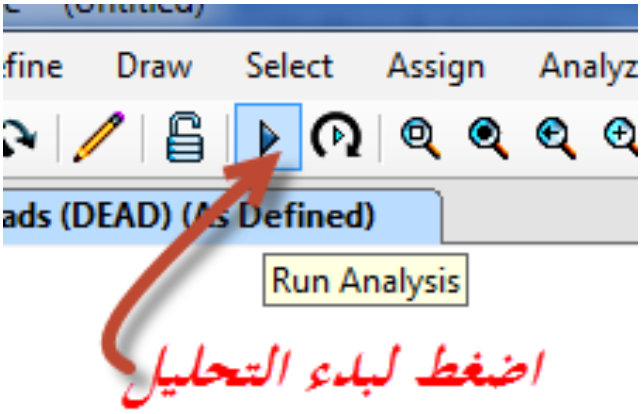

Assign
Analyze
Display
Design
Options
Tools
Help
Joint
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Gravity...
Point...
Distributed...
Temperature...
Strain...
Deformation...


Frame Point Loads
Load Pattern Name
DEAD
Units
Tonf, m, C
Load Type and Direction
Forces
Moments
Coord Sys
Local
Direction
2
Options
Add to Existing Loads
Replace Existing Loads
Delete Existing Loads
الاحداثيات المحليه
الحمل يؤثر في اتجاه المحور ٢
Point Loads
1.
2.
3.
4.
Distance
3.25
0.
0.
0.
Load
-3.
0.
0.
0.
Relative Distance from End-I
Absolute Distance from End-I
OK
Cancel

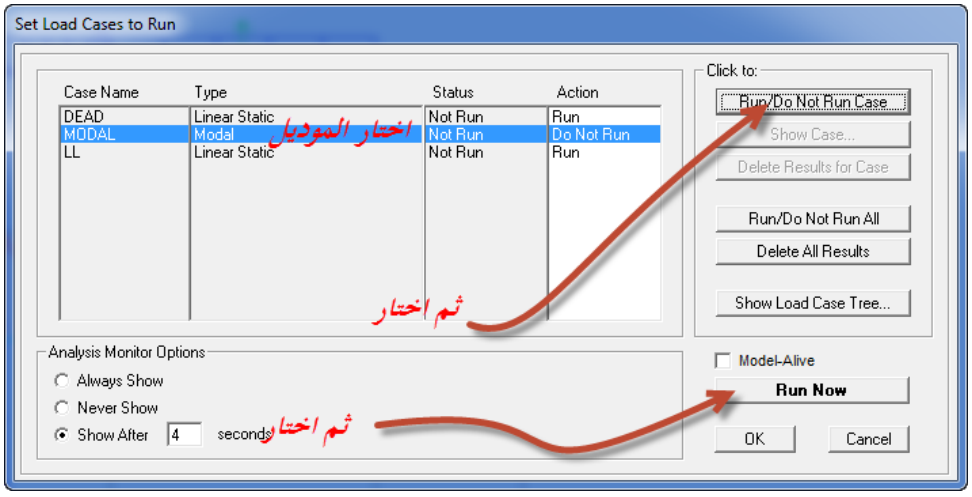

شكل الحمل بعد تعديل اتجاهه
3.00

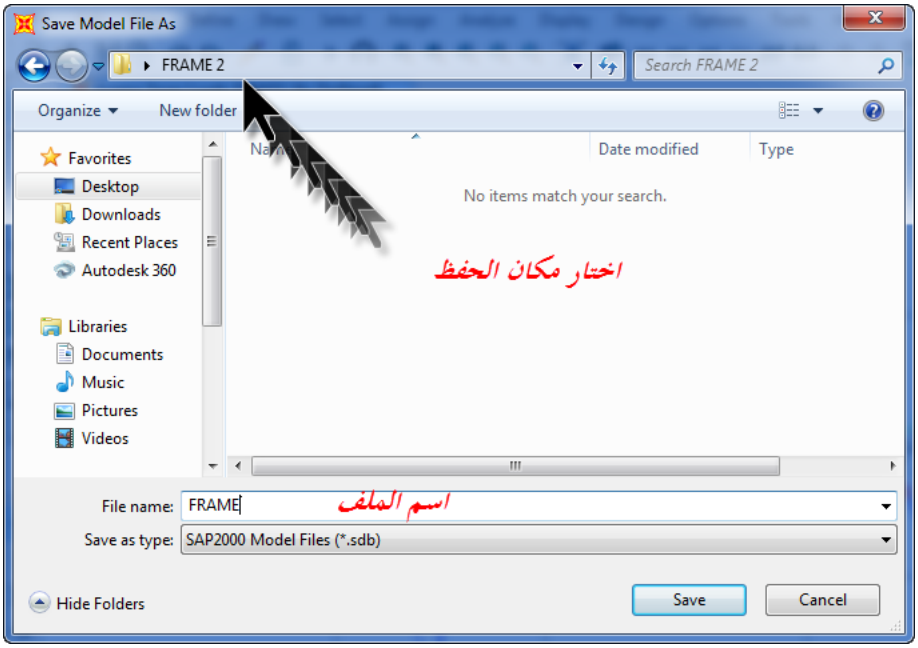


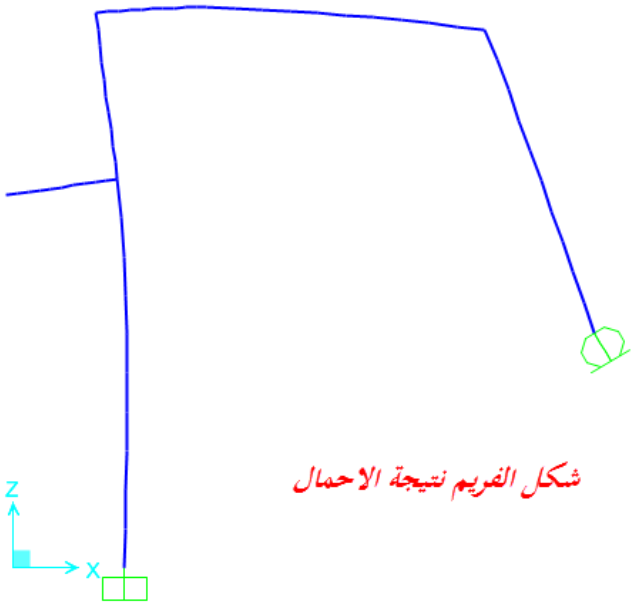
الشكل النهائى بعد اضافة كل الاحمال



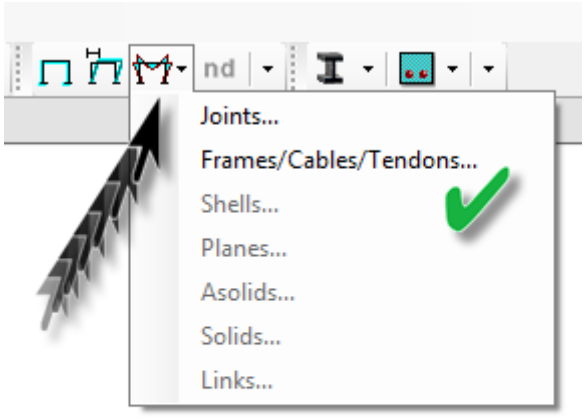
اضغط لبدء التحليل



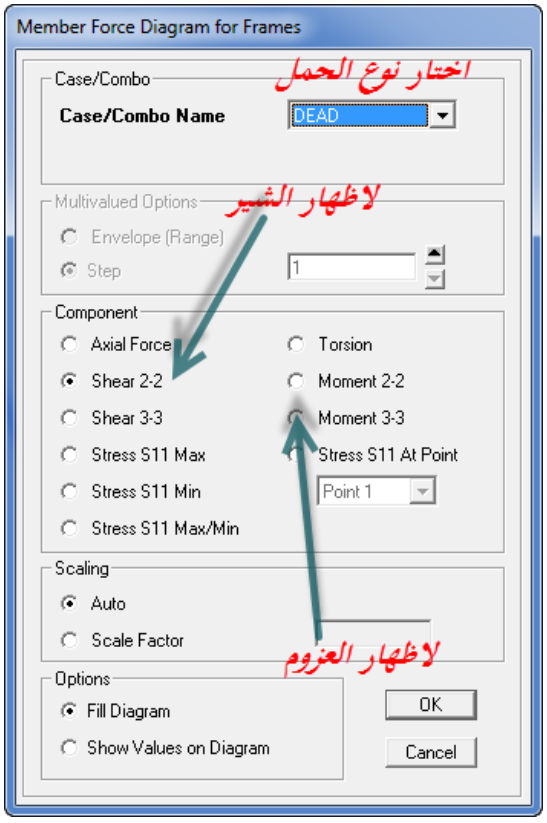


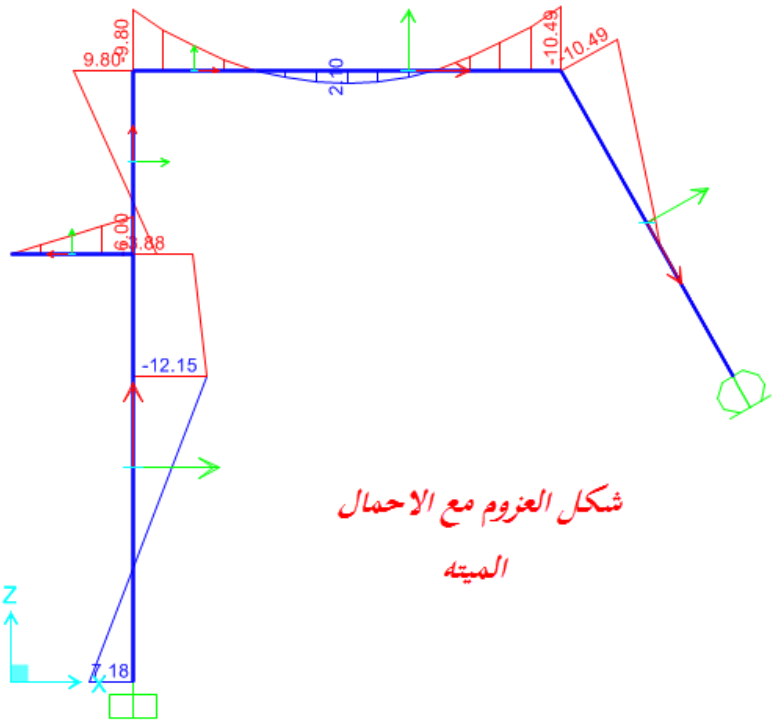


شكل الفريم نتيجة الاحمال



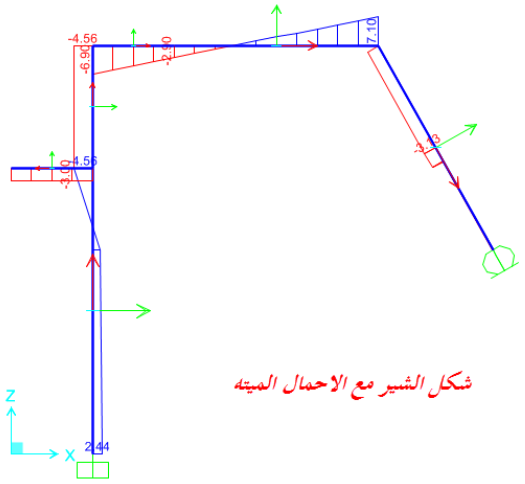
لاظهار قوى القص والعزم





شكل العزوم مع الاحمال

الميته



شكل الشير مع الاحمال الميته

مسائل محلوله على برنامج الساب

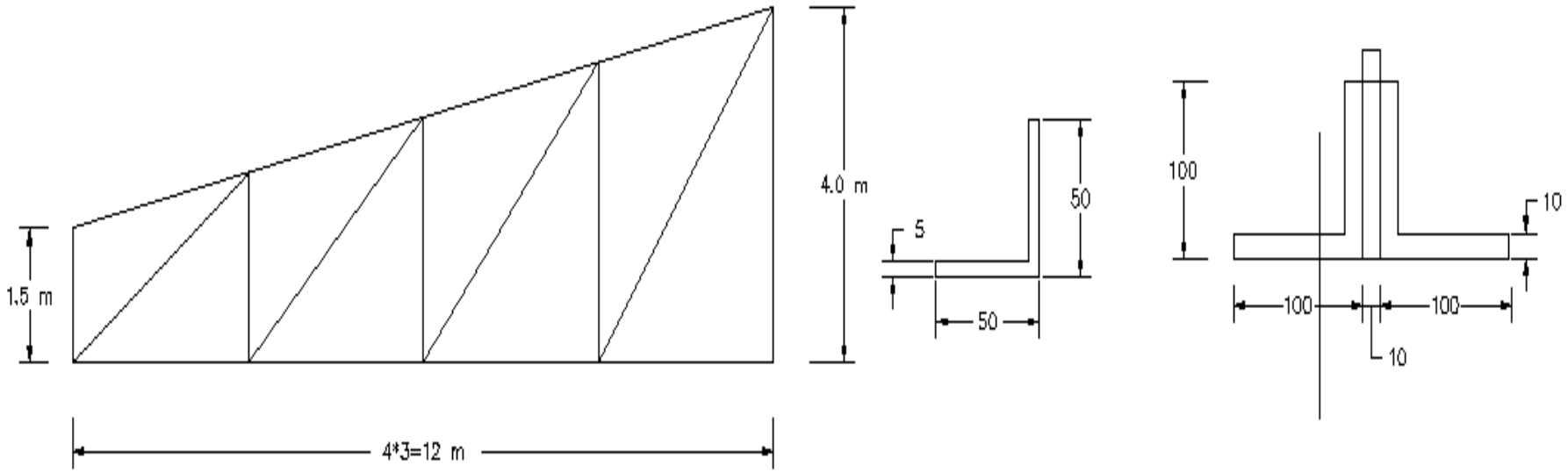
إعداد

Eng.kh_ahmed@yahoo.com

01063366722 Or 01140506722

www.facebook.com/Eng.Khaled.Abdelkarim

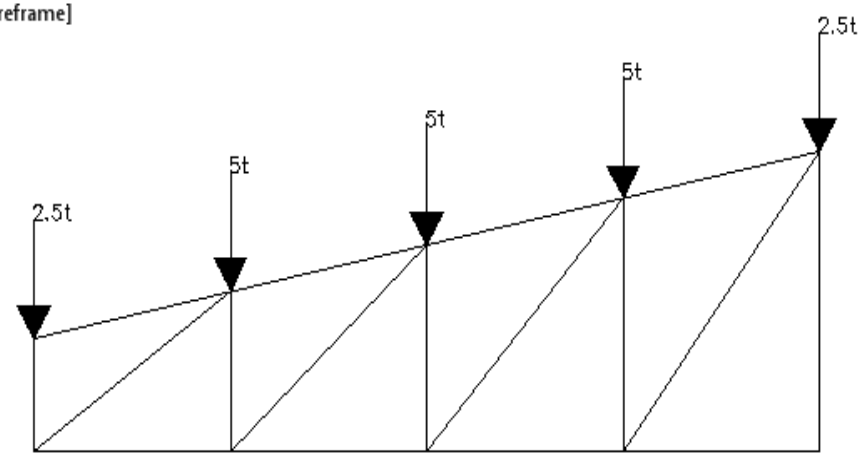
TRUSS



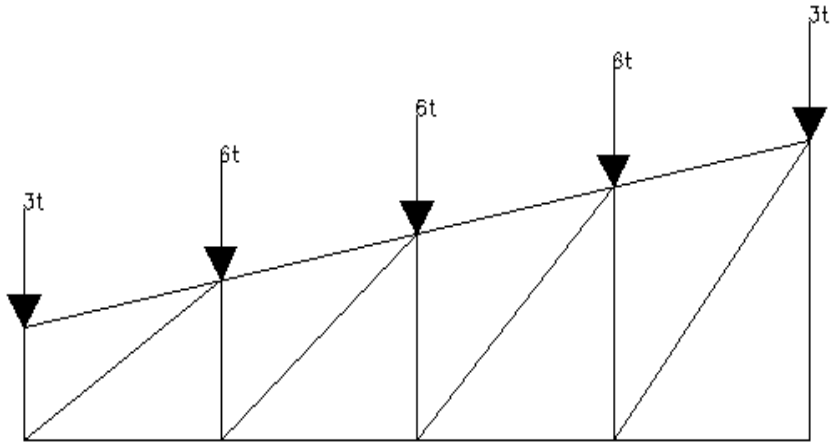
Upper and Lower Cords are 2 angles back to back 100*100*10

Vertical and Daigonal member are one angel 50*50*5

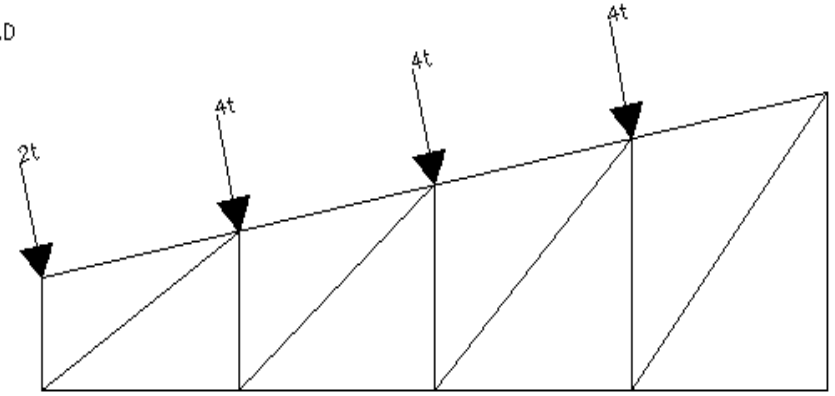
'ireframe]



DEAD LOAD



LIVE LOAD

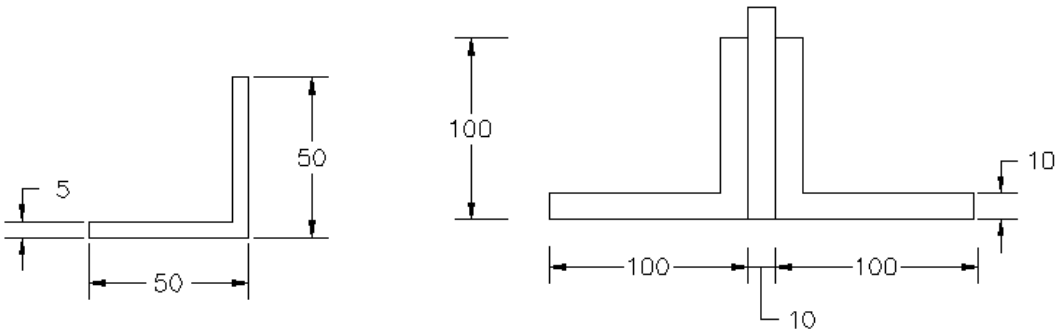


WIND LOAD

Material

Steel ɣ= 7.85 μ = 0.29 E = 2100000

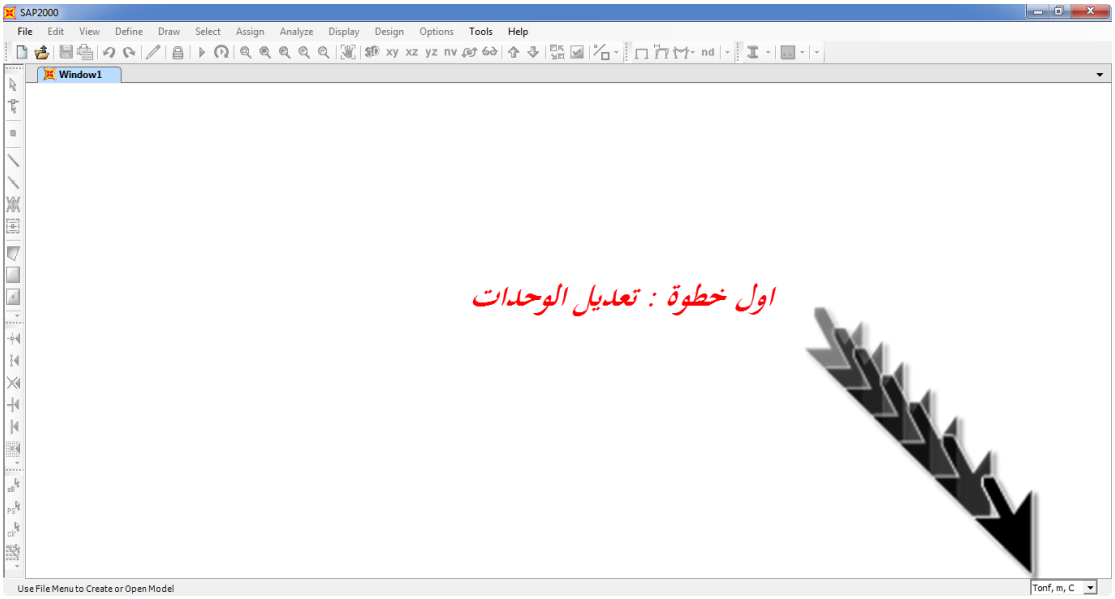
Sections

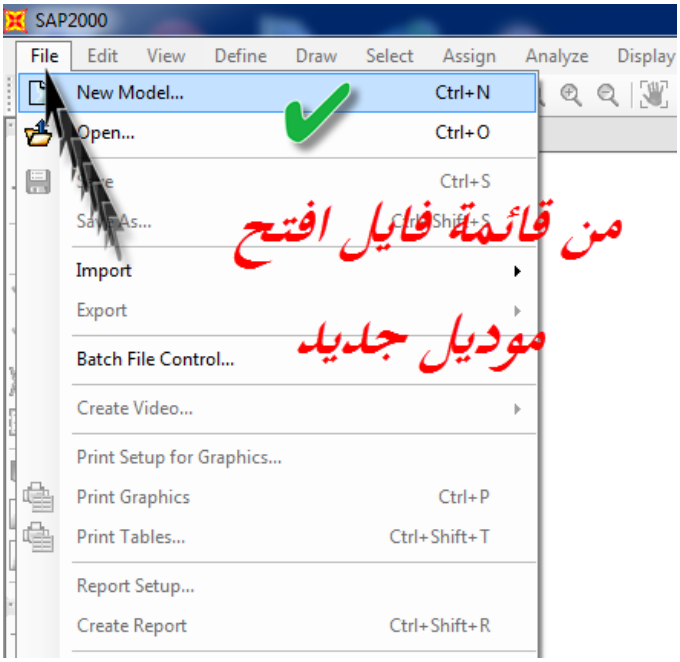


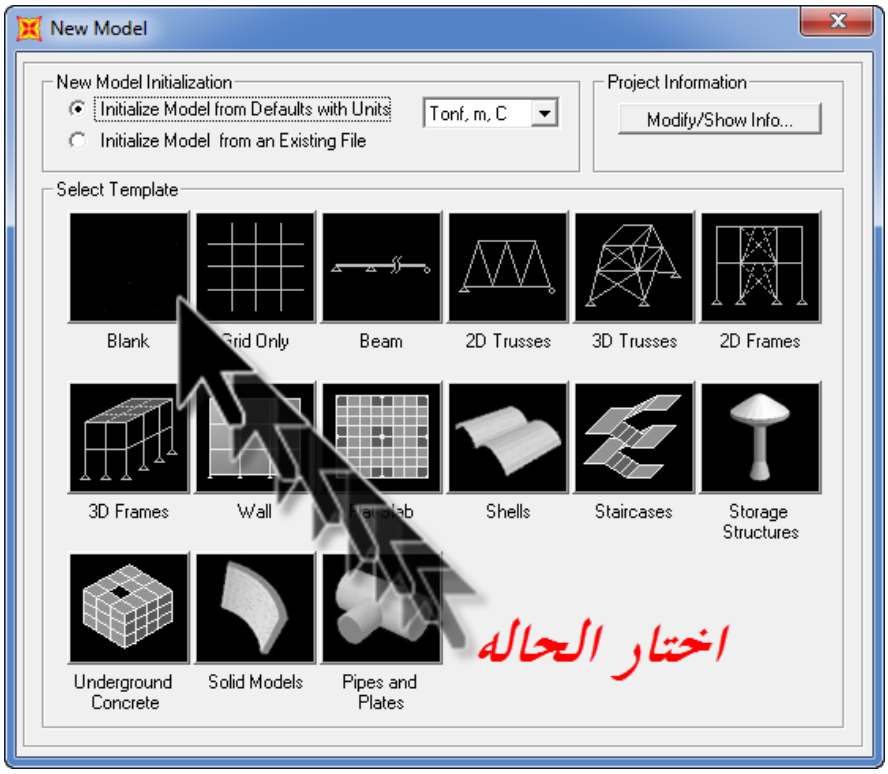
Req

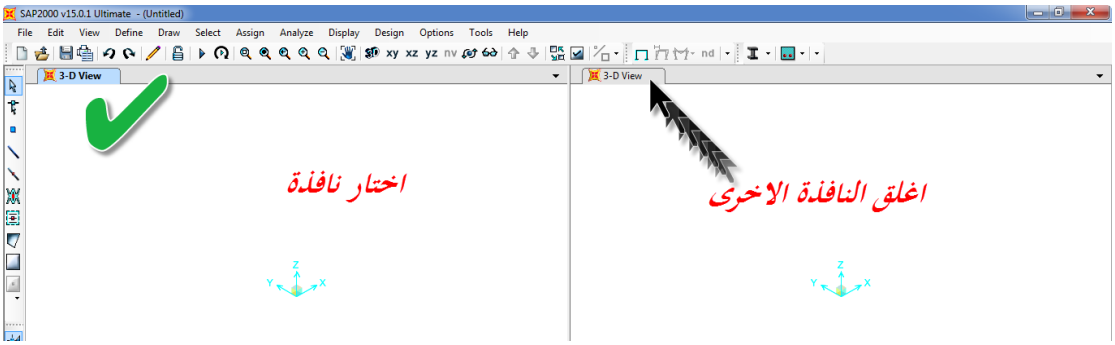
N.F.D in Case DL+LL+WL

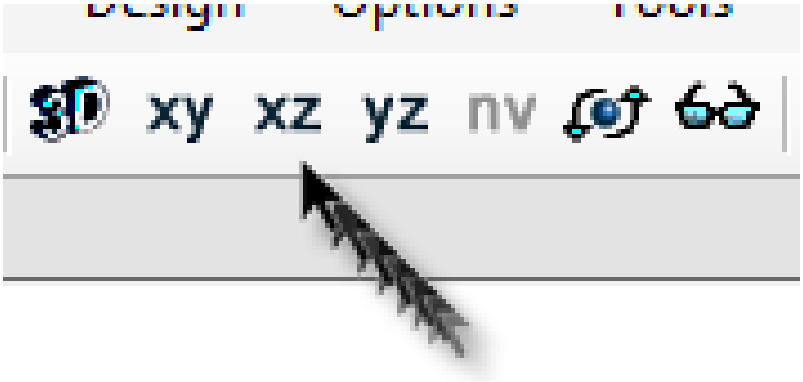
Solution


SAP2000
File Edit View Define Draw Select Assign Analyze Display Design Options Tools Help
Window1
اول خطوة : تعديل الوحدات
Use File Menu to Create or Open Model
Tonf, m, C


SAP2000
File
Edit
View
Define
Draw
Select
Assign
Analyze
Display
New Model... Ctrl+N
Open... Ctrl+O
Ctrl+S
Ctrl+Shift+S
Import
Export
Batch File Control...
Create Video...
Print Setup for Graphics...
Print Graphics Ctrl+P
Print Tables... Ctrl+Shift+T
Report Setup...
Create Report Ctrl+Shift+R
من قائمة فايل افتح
موديل جديد

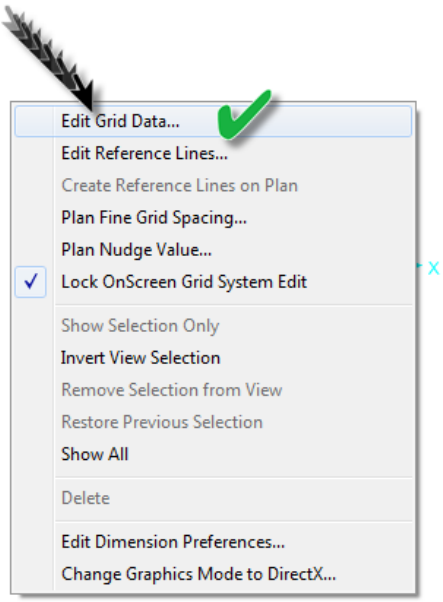

New Model
New Model Initialization
Initialize Model from Defaults with Units
Tonf, m, C
Initialize Model from an Existing File
Project Information
Modify/Show Info...
Select Template
Blank
Grid Only
Beam
2D Trusses
3D Trusses
2D Frames
3D Frames
Wall
Shells
Staircases
Storage Structures
Underground Concrete
Solid Models
Pipes and Plates
اختار الحاله

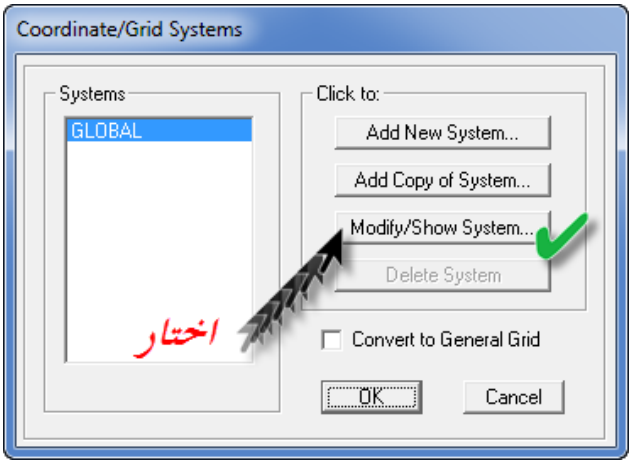

SAP2000 v15.0.1 Ultimate - (Untitled)
3-D View
اختار نافذة
اغلق النافذة الاخرى

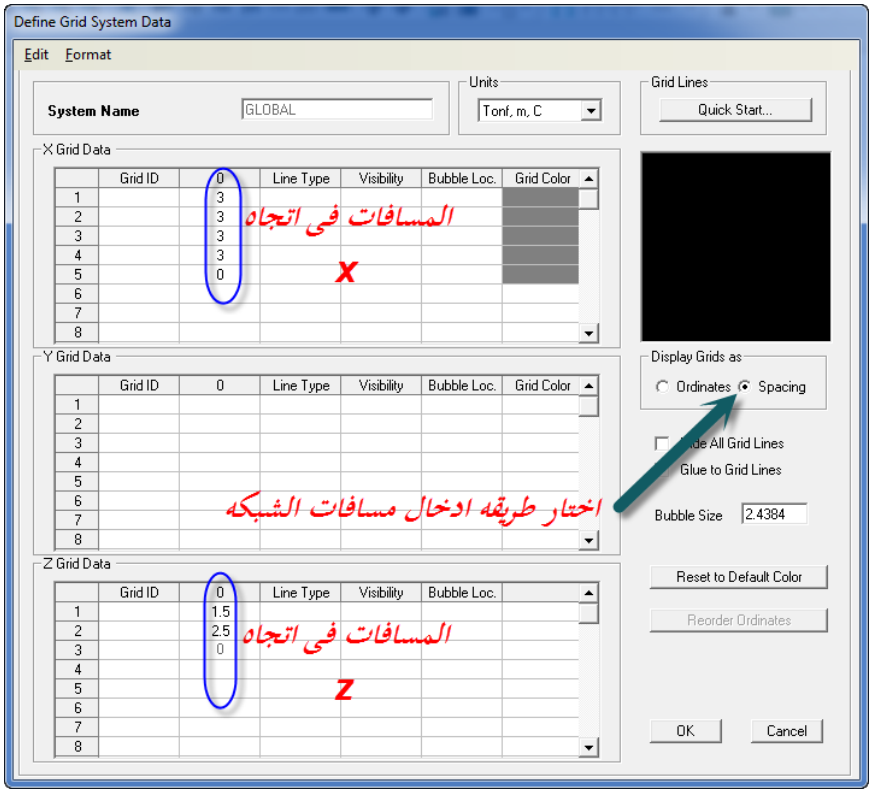


اختار المستوى

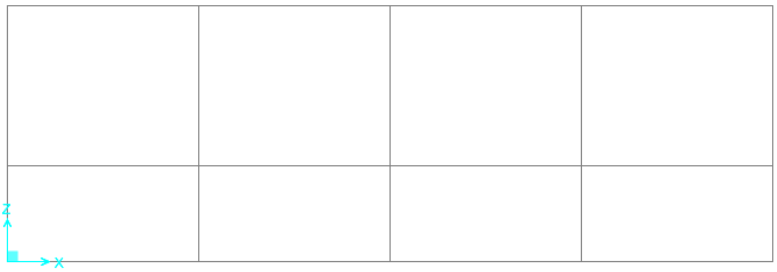
كليك يمين فى اى مكان على المستوى واختار

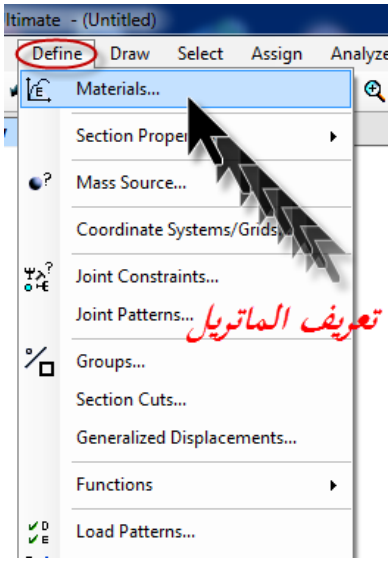


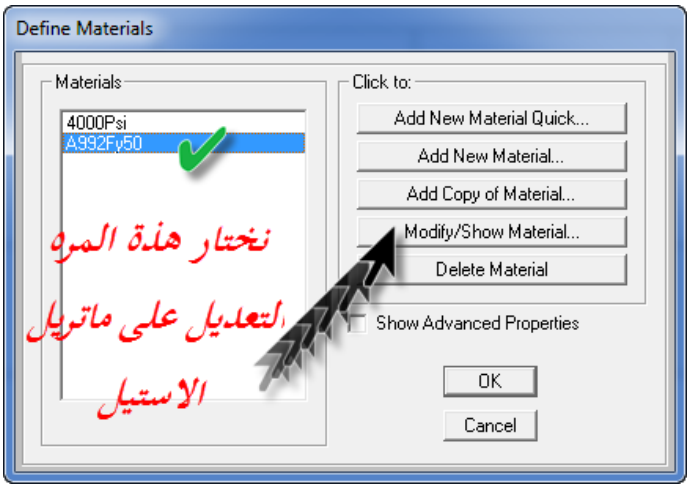


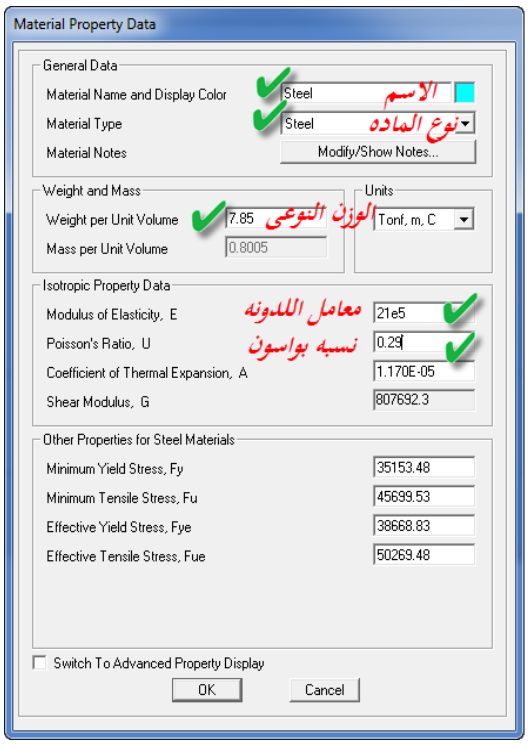


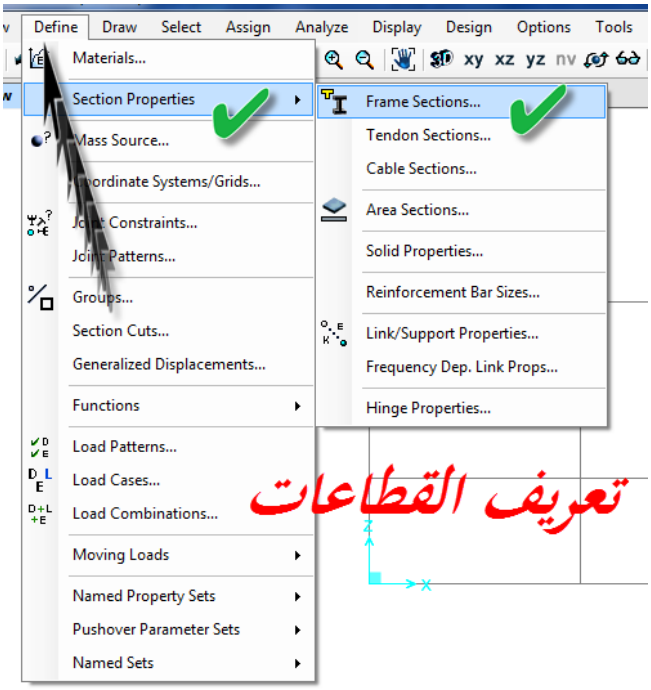
شكل شبكة المسافات المكونه




Itimate - (Untitled)
Define
Draw
Select
Assign
Materials...
Section Proper
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
تعريف الماتريل

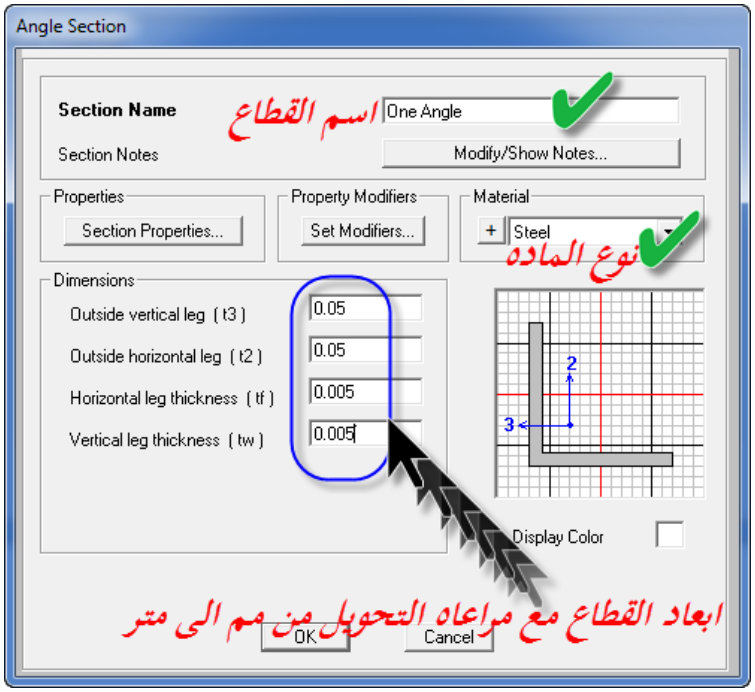

Define Materials
Materials
4000Psi
A992Fy50
Click to:
Add New Material Quick...
Add New Material...
Add Copy of Material...
Modify/Show Material...
Delete Material
Show Advanced Properties
OK
Cancel
نختار هذة المره
التعديل على ماتريل
الاستيل

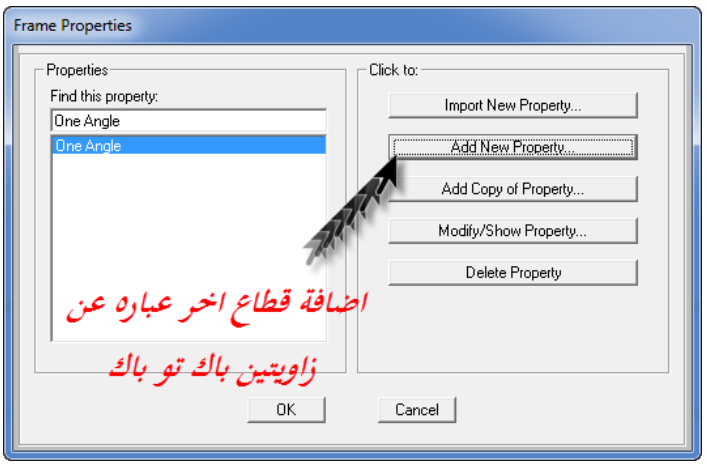

Material Property Data
General Data
Material Name and Display Color
Steel
الاسم
Material Type
Steel
نوع الماده
Material Notes
Modify/Show Notes...
Weight and Mass
Weight per Unit Volume
7.85
الوزن النوعى
Mass per Unit Volume
0.8005
Units
Tonf, m, C
Isotropic Property Data
Modulus of Elasticity, E
21e5
معامل اللدونه
Poisson's Ratio, U
0.29
نسبه بواسون
Coefficient of Thermal Expansion, A
1.170E-05
Shear Modulus, G
807692.3
Other Properties for Steel Materials
Minimum Yield Stress, Fy
35153.48
Minimum Tensile Stress, Fu
45699.53
Effective Yield Stress, Fye
38668.83
Effective Tensile Stress, Fue
50269.48
Switch To Advanced Property Display
OK
Cancel


Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
Frame Sections...
Tendon Sections...
Cable Sections...
Area Sections...
Solid Properties...
Reinforcement Bar Sizes...
Link/Support Properties...
Frequency Dep. Link Props...
Hinge Properties...
تعريف القطاعات

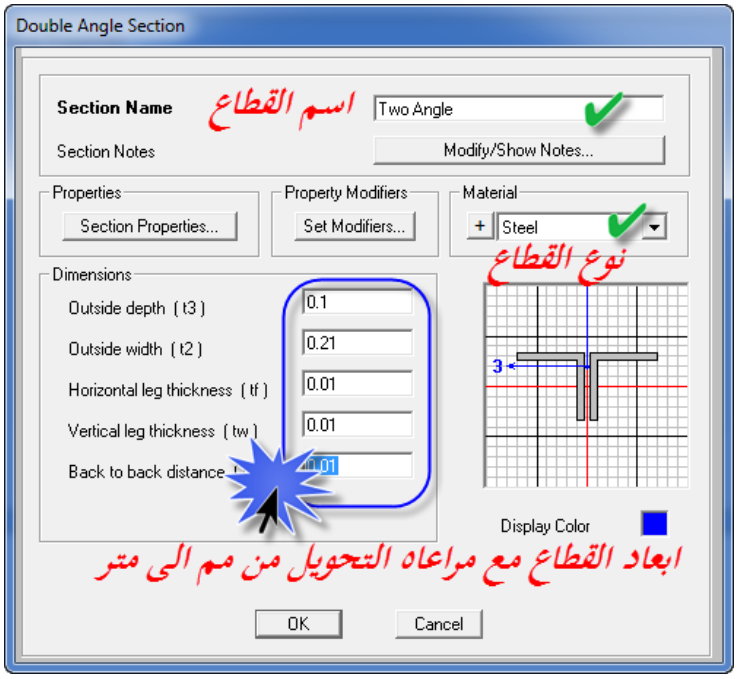

Frame Properties
Properties
Find this property:
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
اضافة قطاع جديد
OK
Cancel

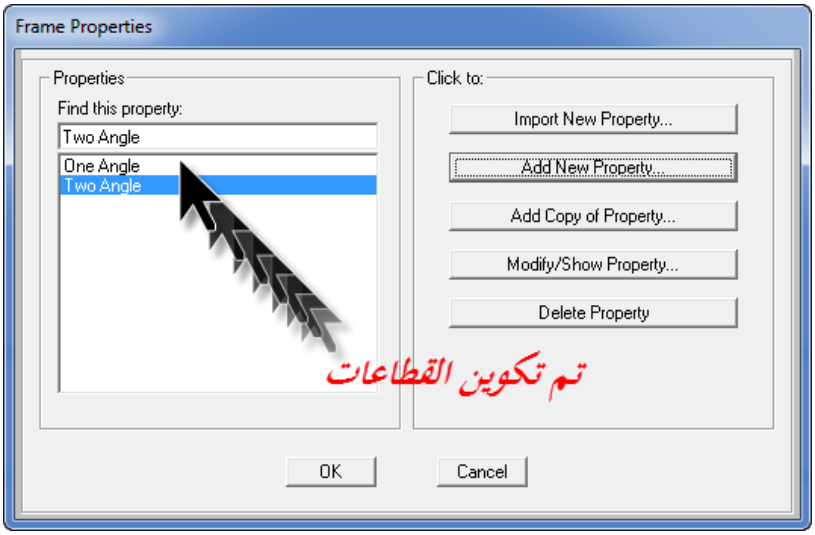

Add Frame Section Property
Select Property Type
Frame Section Property Type
Steel
Click to Add a Steel Section
I / Wide Flange
Channel
Tee
Angle
Double Angle
Double Channel
Tube
Steel Joist
اختار قطاع زاوية واحده
Cancel

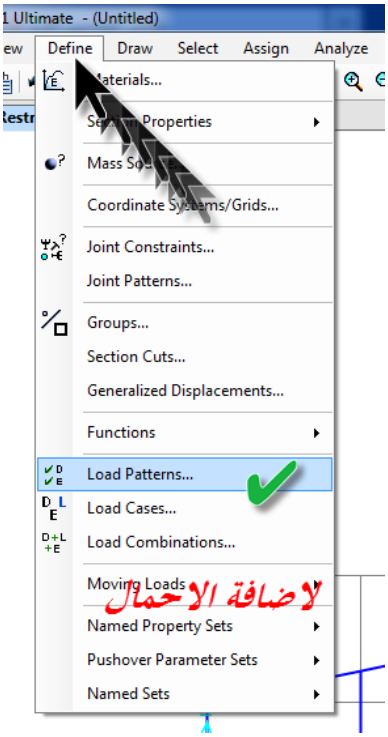

Angle Section
Section Name
اسم القطاع
One Angle
Section Notes
Modify/Show Notes...
Properties
Section Properties...
Property Modifiers
Set Modifiers...
Material
Steel
نوع الماده
Dimensions
Outside vertical leg (t3)
Outside horizontal leg (t2)
Horizontal leg thickness (tf)
Vertical leg thickness (tw)
0.05
0.05
0.005
0.005
2
3
Display Color
ابعاد القطاع مع مراعاه التحويل من مم الى متر
OK
Cancel

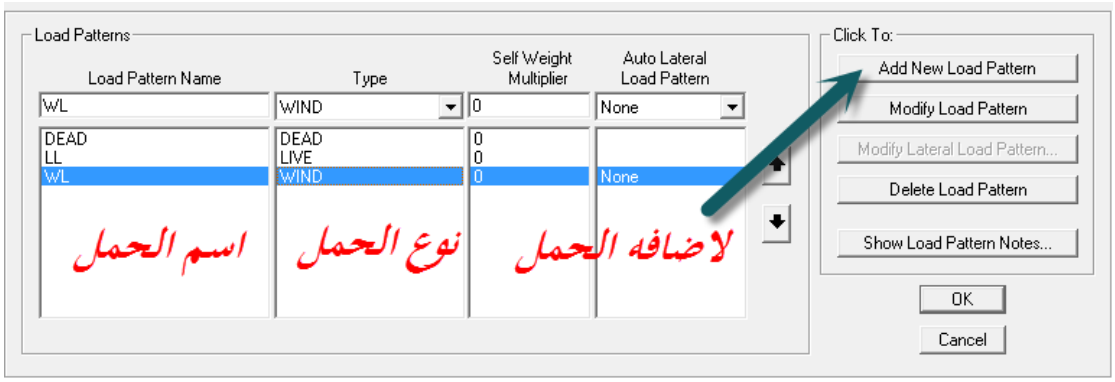

Frame Properties
Properties
Find this property:
One Angle
One Angle
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
اضافة قطاع اخر عباره عن
زاويتين باك تو باك
OK
Cancel

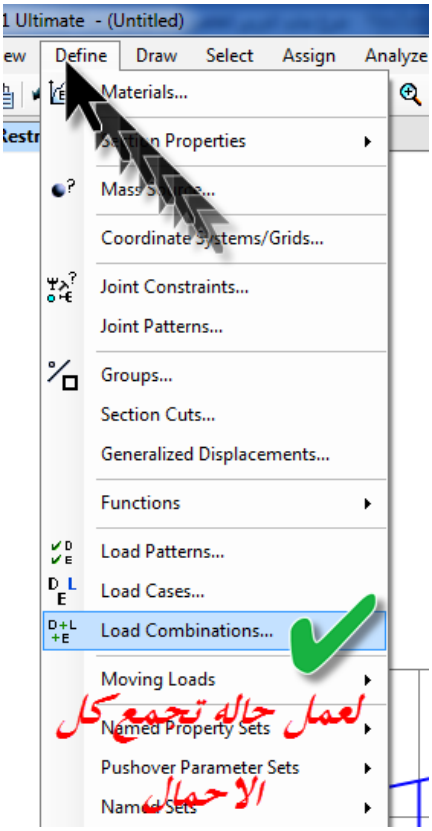

Add Frame Section Property
Select Property Type
Frame Section Property Type
Steel
Click to Add a Steel Section
I / Wide Flange
Channel
Tee
Angle
Double Angle
Double Channel
Pipe
Tube
Auto Select List
Steel Joist
اختار
Cancel


Double Angle Section
Section Name
اسم القطاع
Two Angle
Section Notes
Modify/Show Notes...
Properties
Section Properties...
Property Modifiers
Set Modifiers...
Material
Steel
نوع القطاع
Dimensions
Outside depth (t3)
Outside width (t2)
Horizontal leg thickness (tf)
Vertical leg thickness (tw)
Back to back distance
0.1
0.21
0.01
0.01
3
Display Color
ابعاد القطاع مع مراعاه التحويل من مم الى متر
OK
Cancel

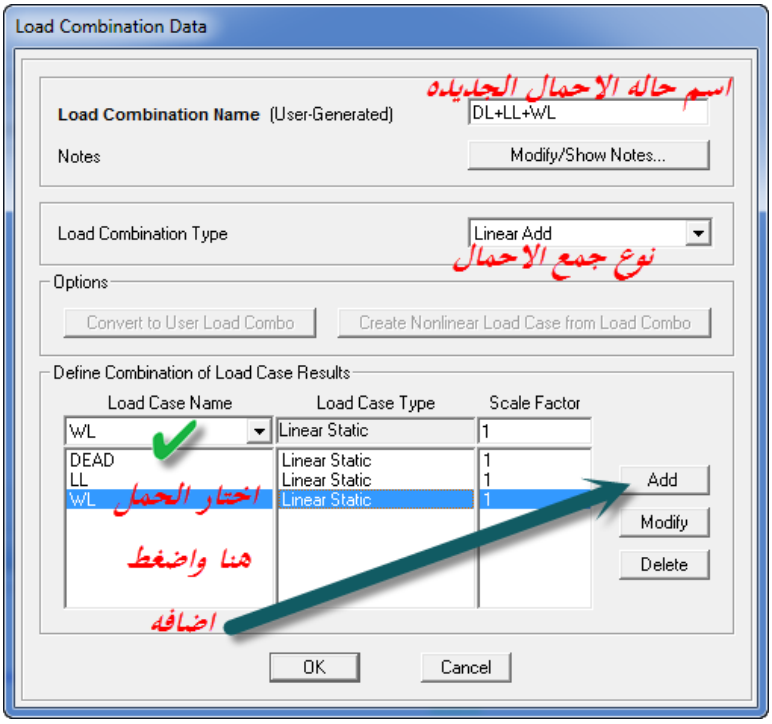

Frame Properties
Properties
Find this property:
Two Angle
One Angle
Two Angle
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
تم تكوين القطاعات
OK
Cancel

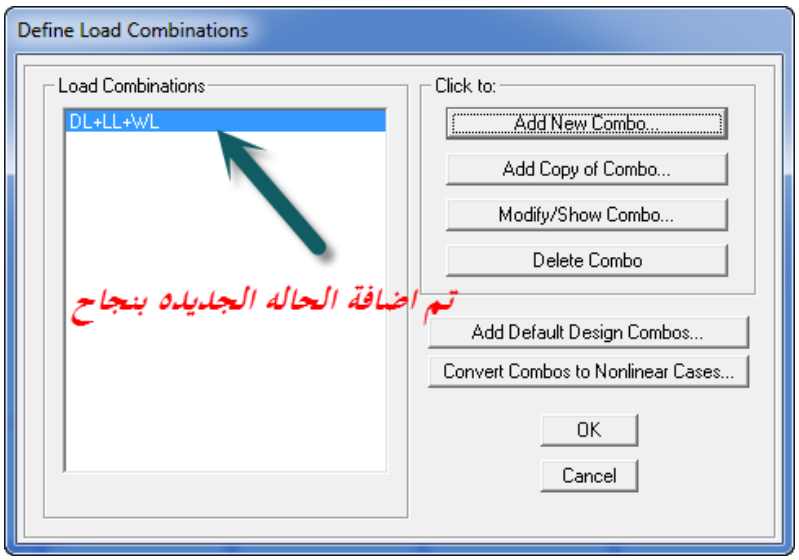

Ultimate - (Untitled)
Define
Draw
Select
Assign
Analyze
Materials...
Properties
Mass Source
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
لاضافة الاحمال

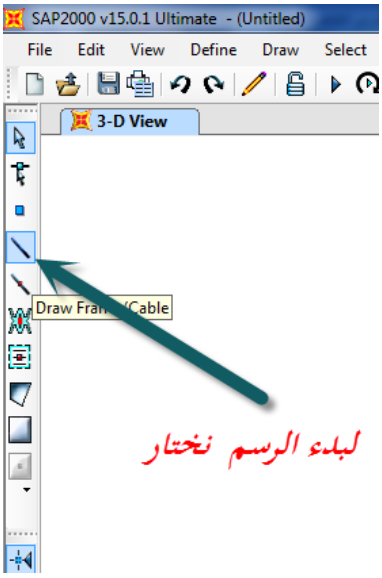

Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
WL
WIND
0
None
DEAD
LL
WL
DEAD
LIVE
WIND
0
0
0
None
اسم الحمل
نوع الحمل
لاضافه الحمل
Click To:
Add New Load Pattern
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel

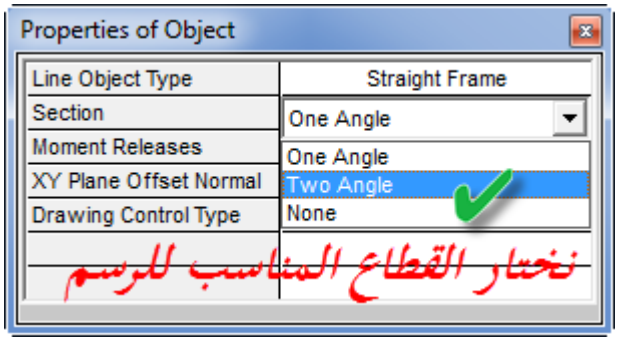

1 Ultimate - (Untitled)
Define
Draw
Select
Assign
Analyze
Materials...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Pushover Parameter Sets
لعمل حاله تجمع كل
الاحمال

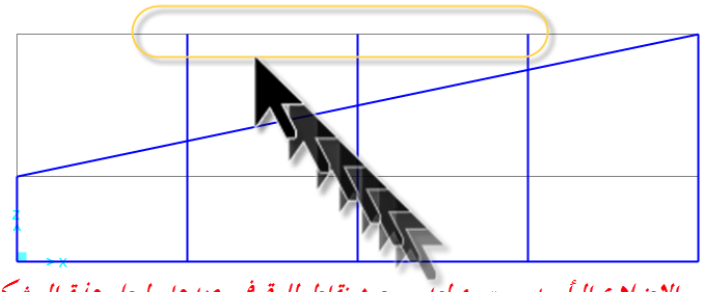

Define Load Combinations
Load Combinations
Click to:
Add New Combo...
Add Copy of Combo...
Modify/Show Combo...
Delete Combo
اضافة حاله جديده
Add Default Design Combos...
Convert Combos to Nonlinear Cases...
OK
Cancel


Load Combination Data
اسم حاله الاحمال الجديده
Load Combination Name (User-Generated)
DL+LL+WL
Notes
Modify/Show Notes...
Load Combination Type
Linear Add
نوع جمع الاحمال
Options
Convert to User Load Combo
Create Nonlinear Load Case from Load Combo
Define Combination of Load Case Results
Load Case Name
Load Case Type
Scale Factor
WL
Linear Static
1
DEAD
Linear Static
1
LL
Linear Static
1
WL
Linear Static
1
اختار الحمل
هنا واضغط
اضافه
Add
Modify
Delete
OK
Cancel


Define Load Combinations
Load Combinations
DL+LL+WL
Click to:
Add New Combo...
Add Copy of Combo...
Modify/Show Combo...
Delete Combo
تم اضافة الحاله الجديده بنجاح
Add Default Design Combos...
Convert Combos to Nonlinear Cases...
OK
Cancel

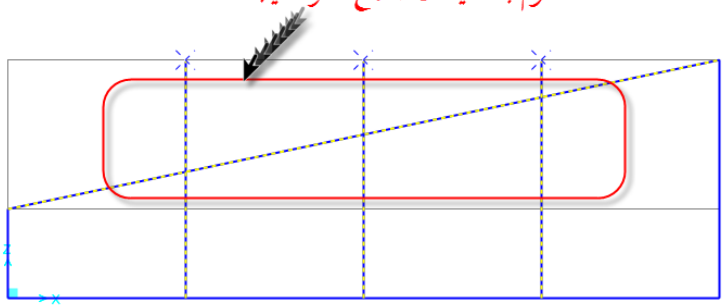

SAP2000 v15.0.1 Ultimate - (Untitled)
File
Edit
View
Define
Draw
Select
3-D View
لبدء الرسم نختار

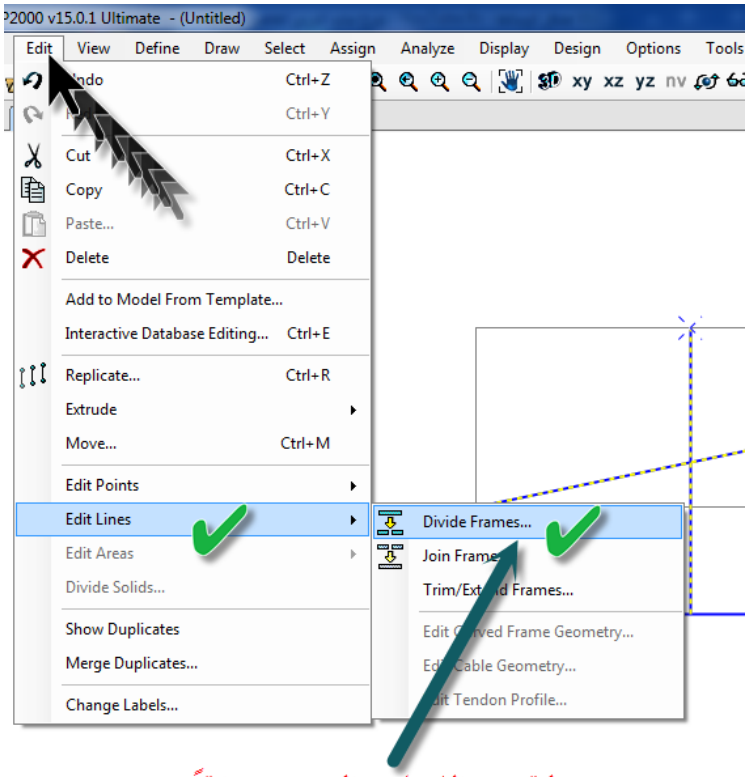

Properties of Object
Line Object Type
Straight Frame
Section
One Angle
Moment Releases
XY Plane Offset Normal
Drawing Control Type
One Angle
Two Angle
None
نختار القطاع المناسب للرسم



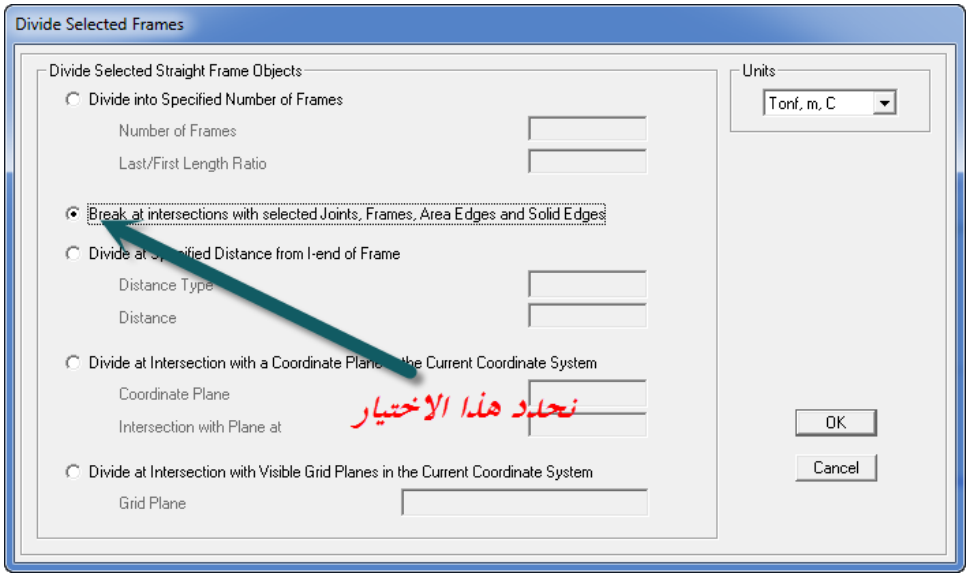
تم رسم الاضلاع الرأسيه مستمره لعدم وجود نقاط للوقوف عندها ولحل هذة المشكله نلاحظ ذلك فى الخطوات التاليه

نقوم بتحديد الاضلاع المراد ايجاد نقاط عندها



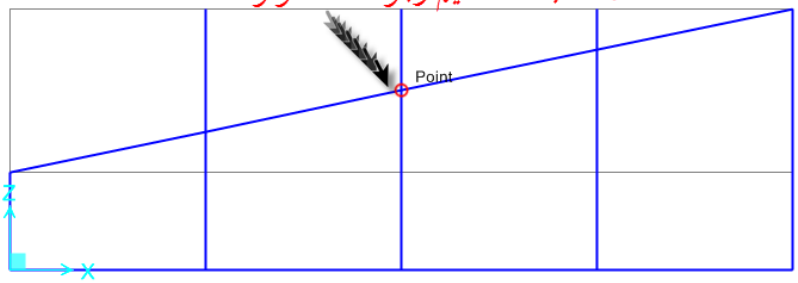


لتقسيم الاضلاع المحدده سابقاً

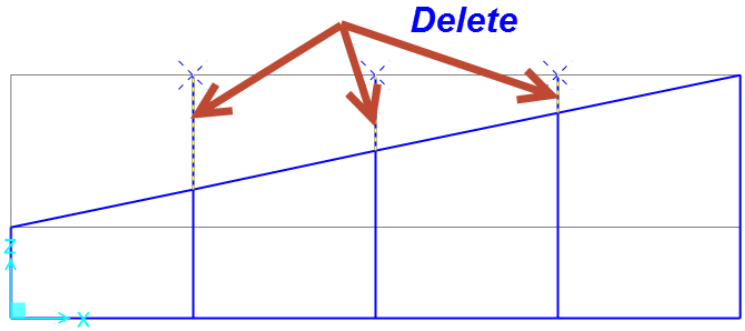


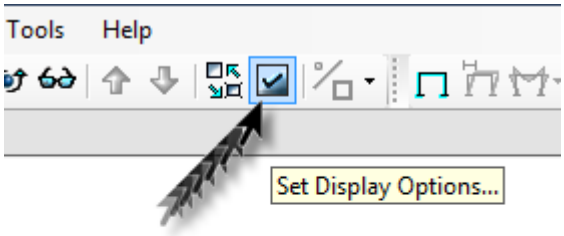
نحدد هذا الاختيار

نلاحظ بعد التقسيم وجود نقاط للوقوف عندها



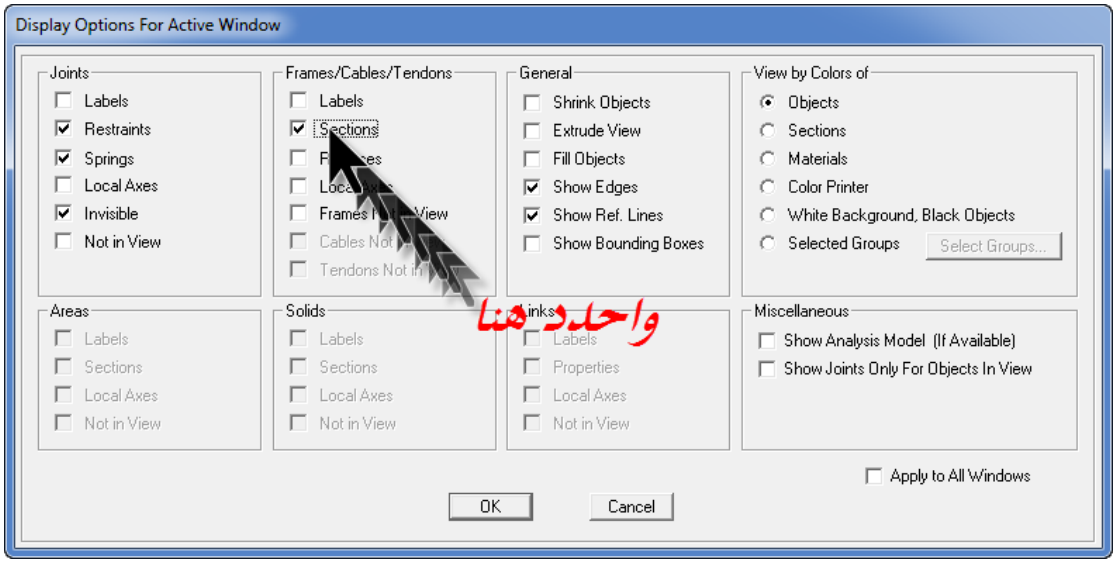
نقوم بعد ذلك بتحديد الاضلاع الزائده ومسحها باستخدام الامر





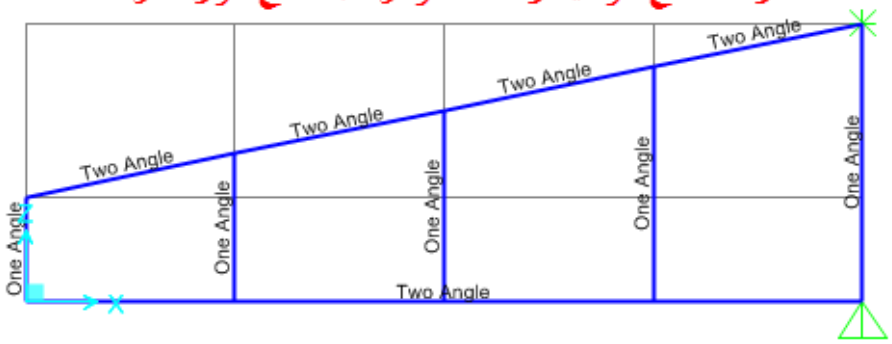
للتأكد من رسم كل ضلع بالقطاع

الخاص به

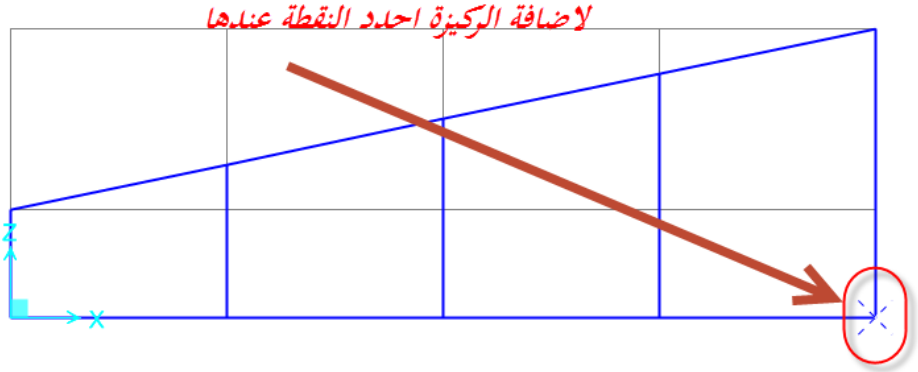


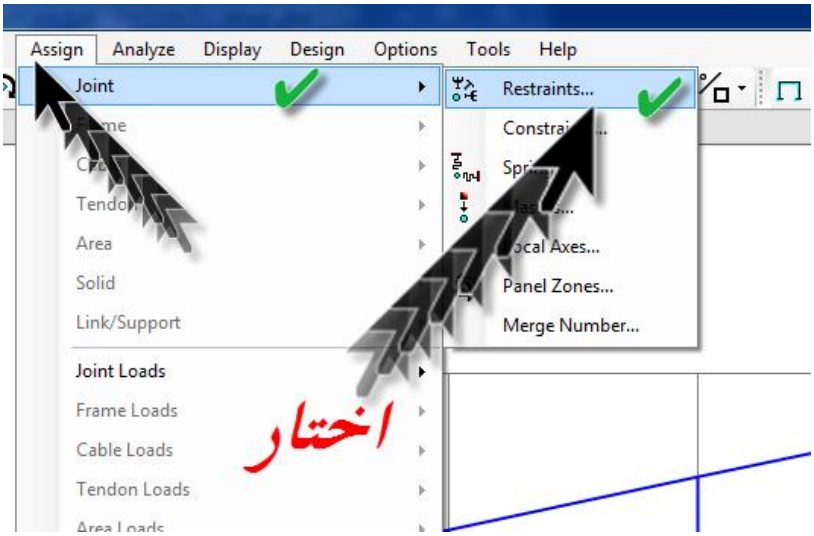
الاضلاع العلويه والسفليه مرسومه بالقطاع الزاويتين

والاضلاع الرأسيه والمائله مرسومه بالقطاع الزاويه الواحده



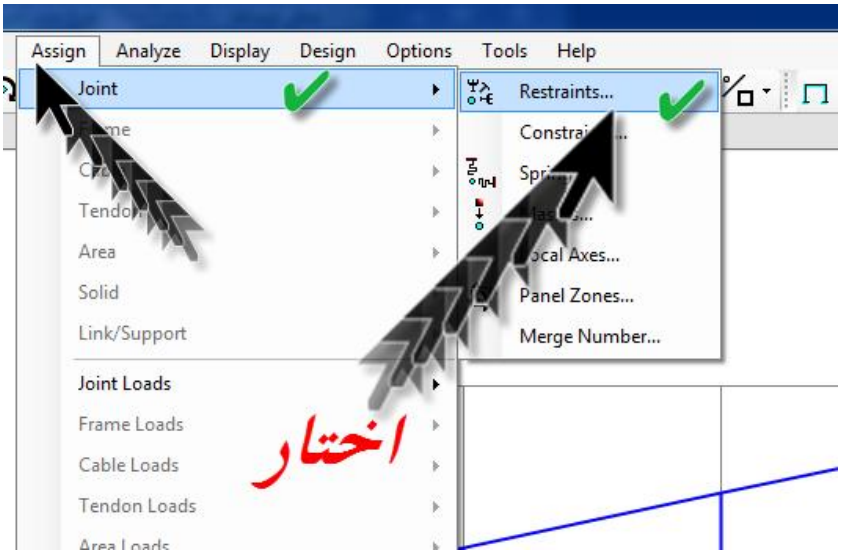
لاضافة الركيزة احدد النقطة عندها



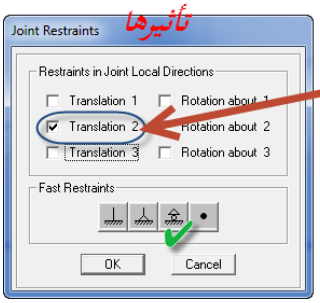

Assign
Analyze
Display
Design
Options
Tools
Help
Joint
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Restraints...
Panel Zones...
Merge Number...
اختار


Joint Restraints
Restraints in Joint Local Directions
Translation 1
Translation 2
Translation 3
Rotation about 1
Rotation about 2
Rotation about 3
اختار نوع الركيزه
Fast Restraints
OK
Cancel


Grid Point
احدد لاضافه الركيزة الثانيه



اختار نوع الركيزة مع مراعاة اختيار اتجاه تأثيرها



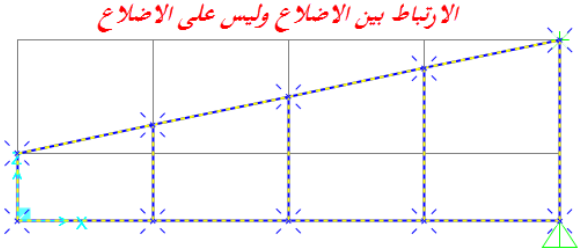
فى هذة الحاله الركيزة لا تمنع الحركه فى اتجاه محور

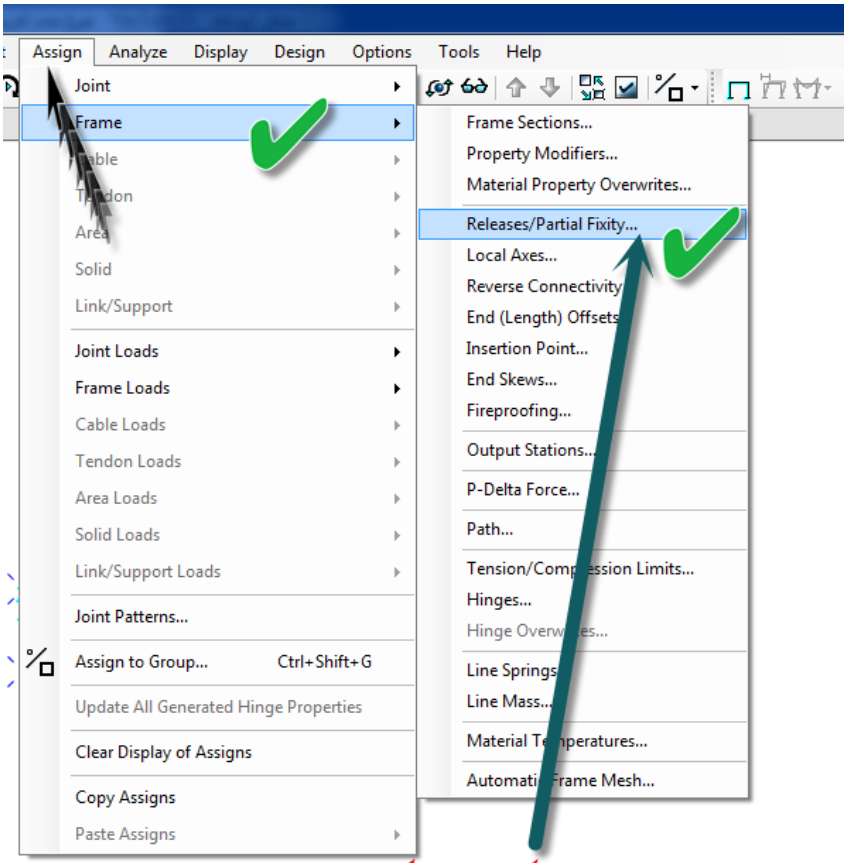
X

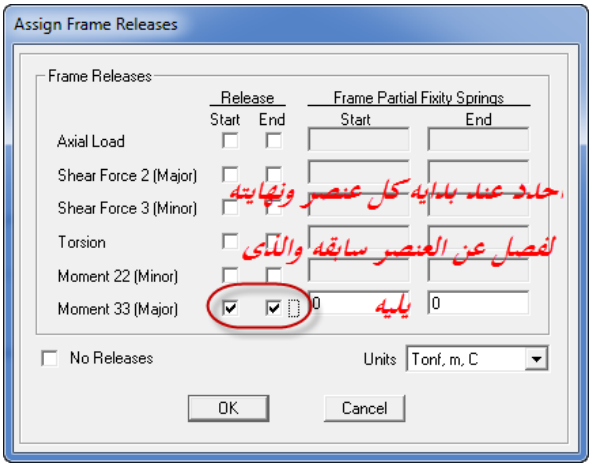
وانما تمنعها فى اتجاه محور

Z

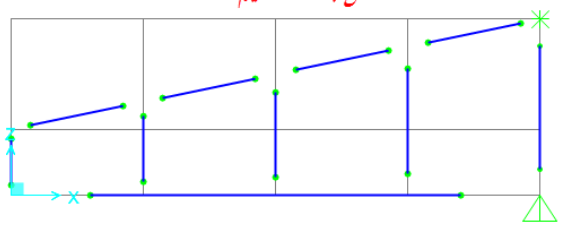
اقوم بالتحديد على التراس بأكمله لعمل فصل لكل ضلع فيه لوضع الاحمال على مكان الارتباط بين الاضلاع وليس على الاضلاع

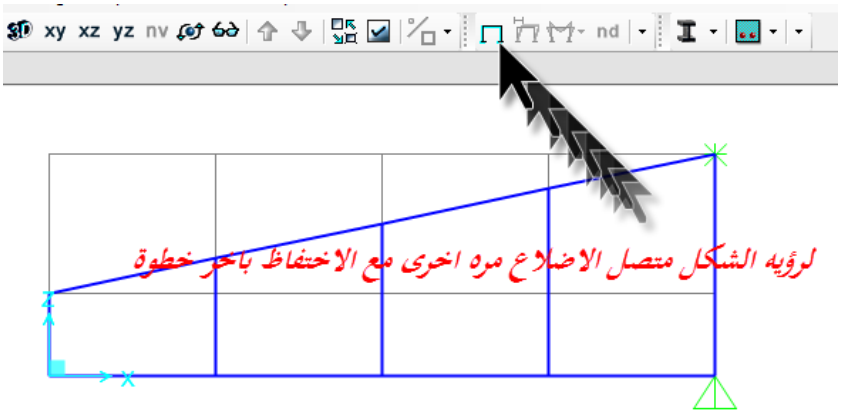




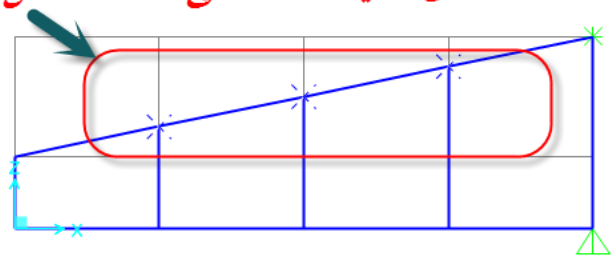


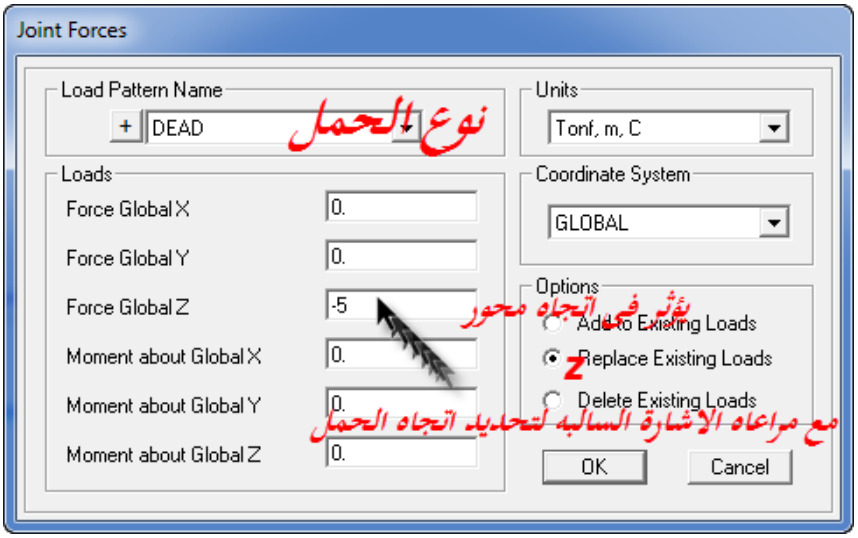
الشكل بعد التقسيم

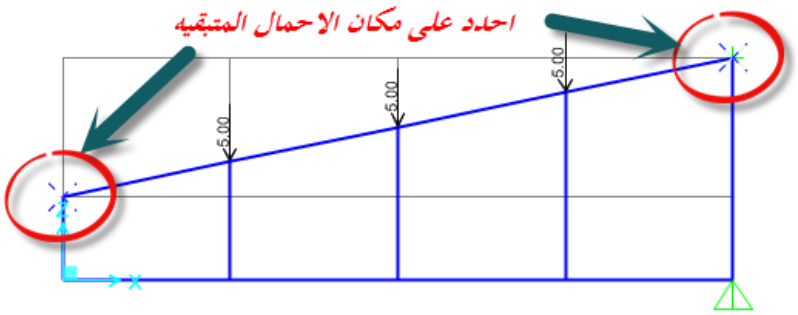


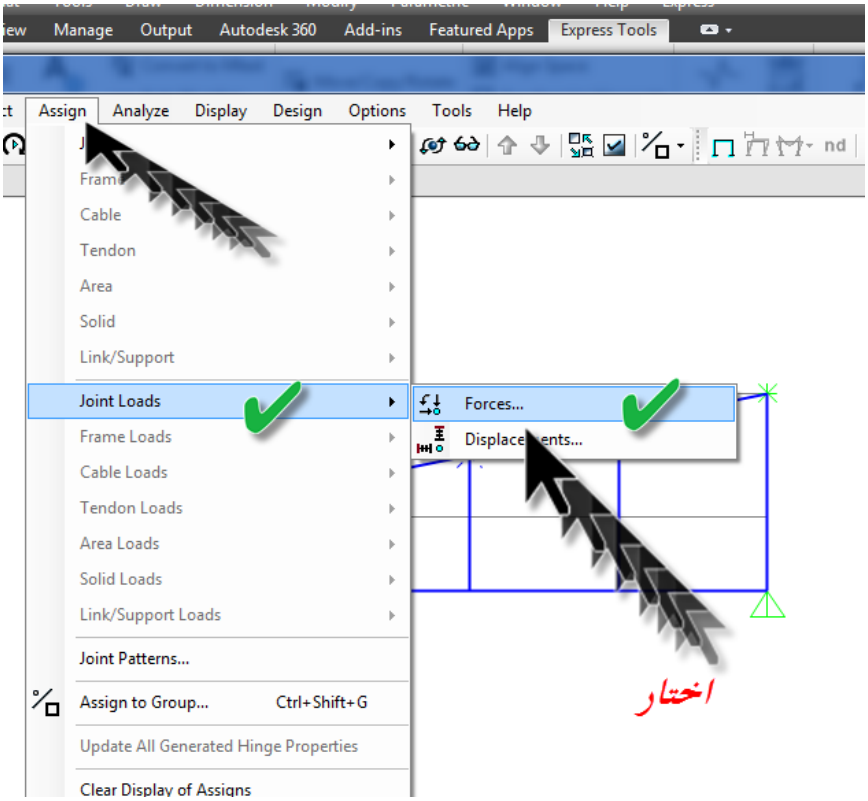


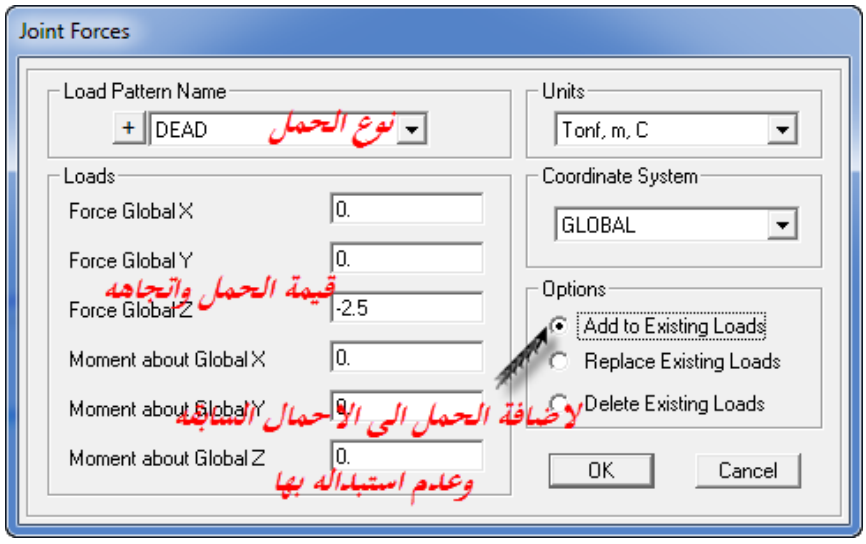
لاضافة الاحمال الميته احدد على مكان الحمل



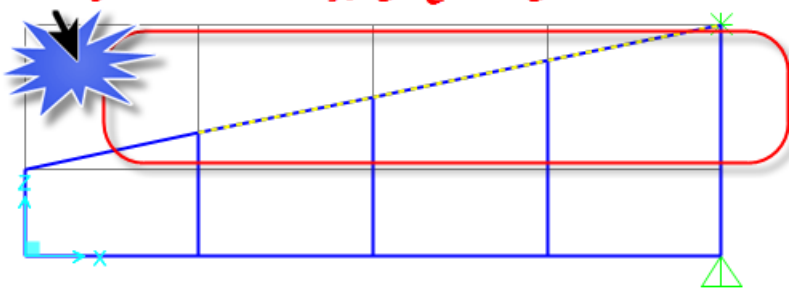


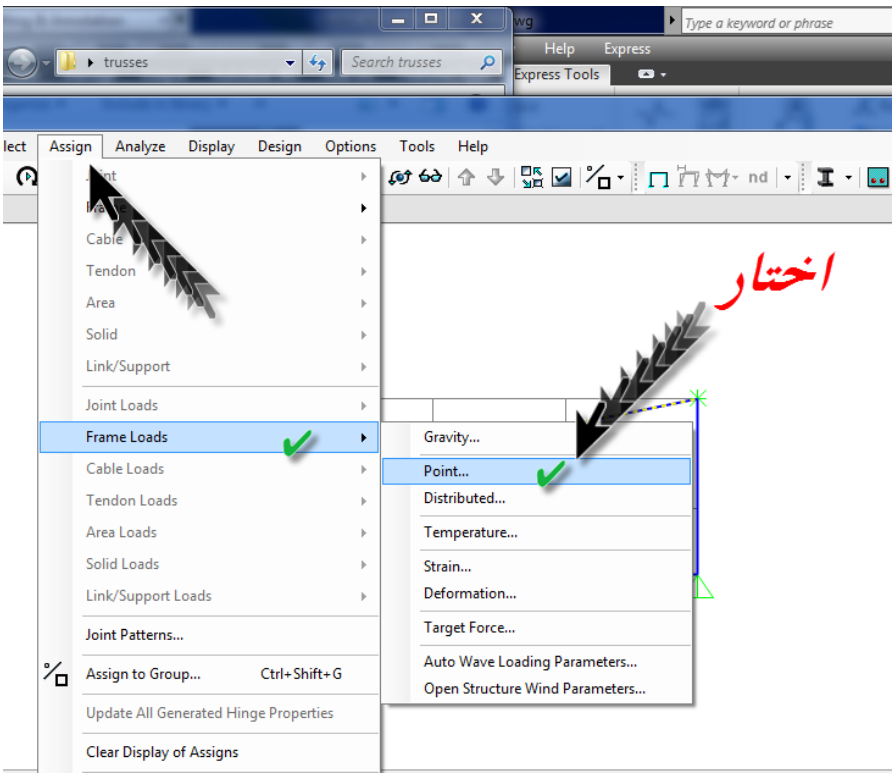

احدد على مكان الاحمال المتبقيه
5.00
5.00
5.00

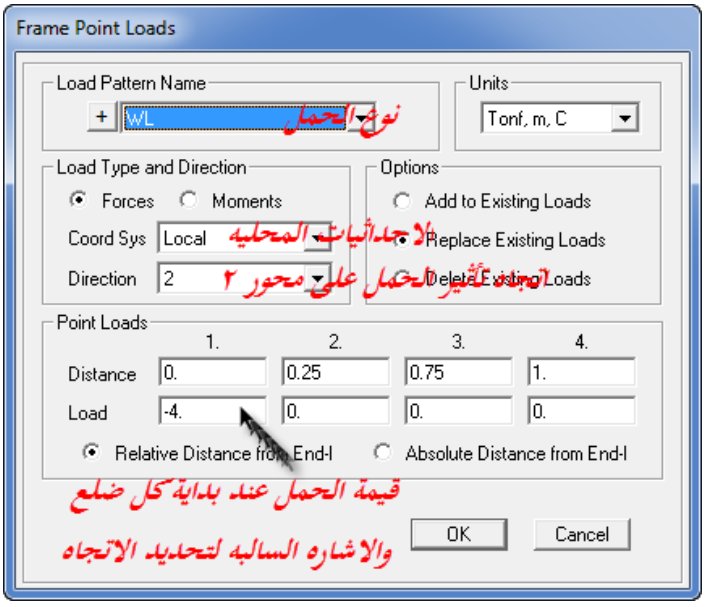

Manage
Output
Autodesk 360
Add-ins
Featured Apps
Express Tools
Assign
Analyze
Display
Design
Options
Tools
Help
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Joint Patterns...
Assign to Group... Ctrl+Shift+G
Update All Generated Hinge Properties
Clear Display of Assigns
Forces...
اختار


Joint Forces
Load Pattern Name
DEAD
نوع الحمل
Units
Tonf, m, C
Loads
Force Global X
Force Global Y
Force Global Z
Moment about Global X
Moment about Global Y
Moment about Global Z
0.
0.
-2.5
0.
0.
0.
قيمة الحمل واتجاهه
Coordinate System
GLOBAL
Options
Add to Existing Loads
Replace Existing Loads
Delete Existing Loads
لاضافة الحمل الى الاحمال السابقه
وعدم استبداله بها
OK
Cancel

احدد على الاضلاع التى تؤثر الاحمال عند بداية كل منها

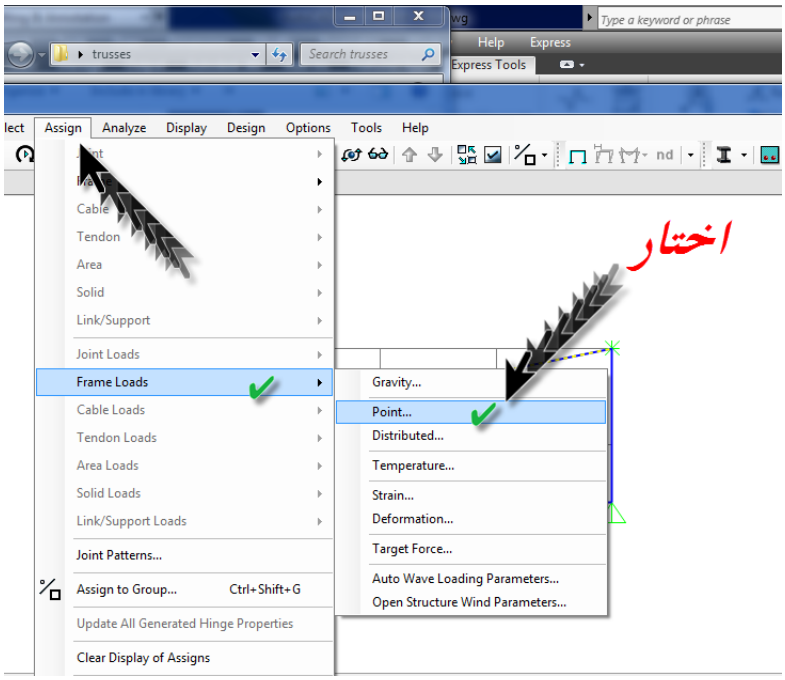


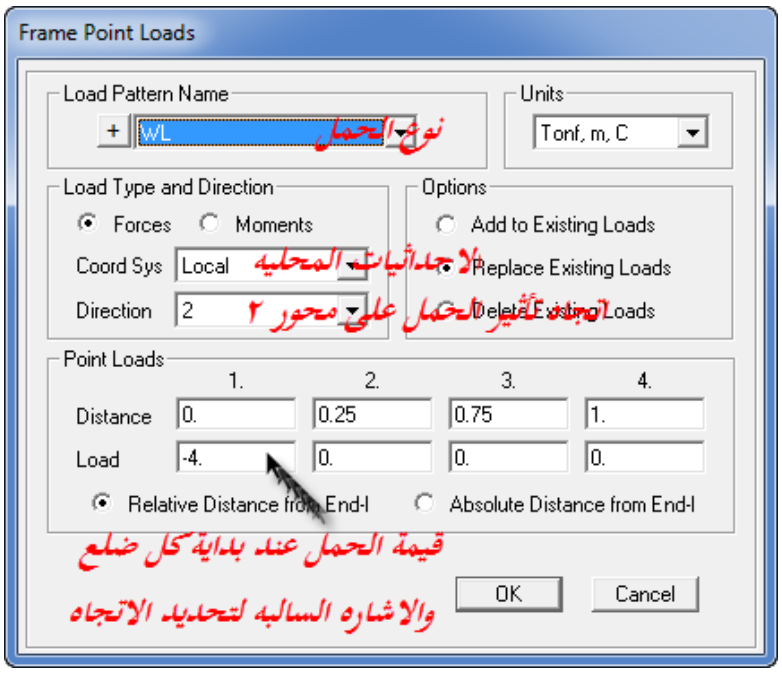




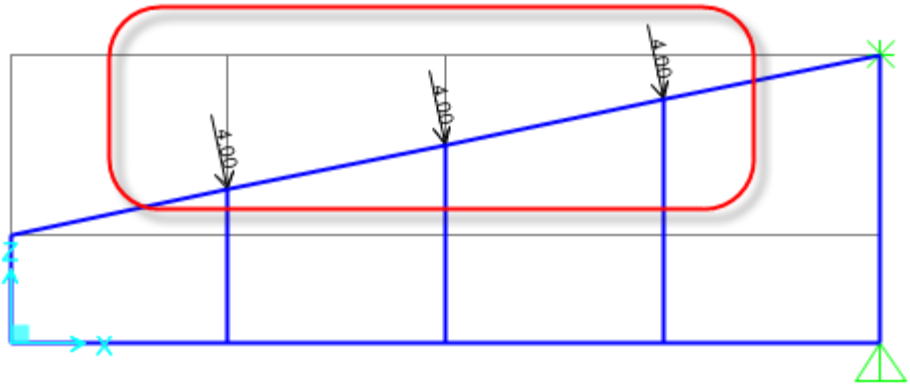
وبالمثل اضافة الاحمال الحيه

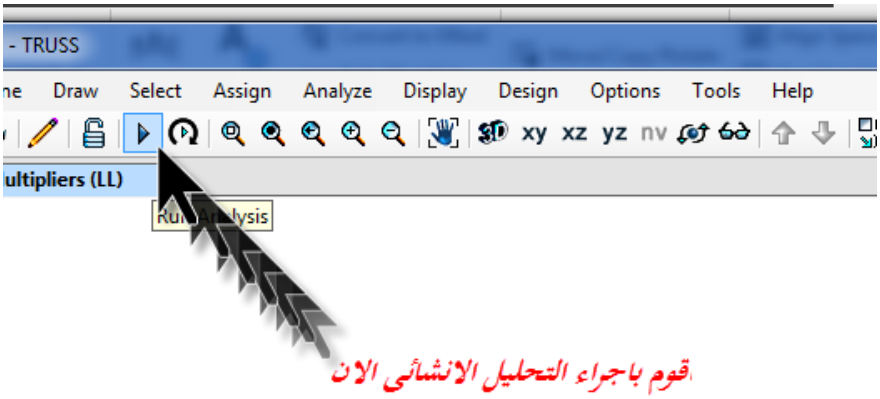
لاضافه احمال تأثير الرياح العموديه

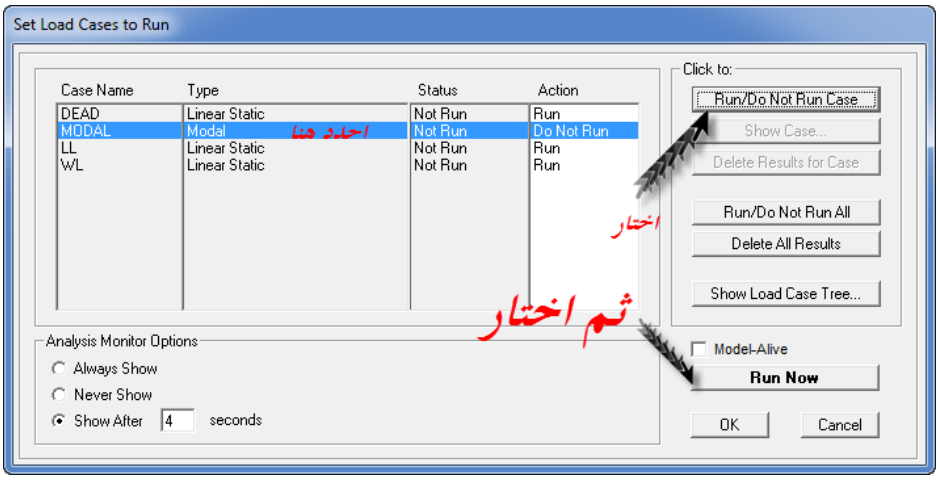


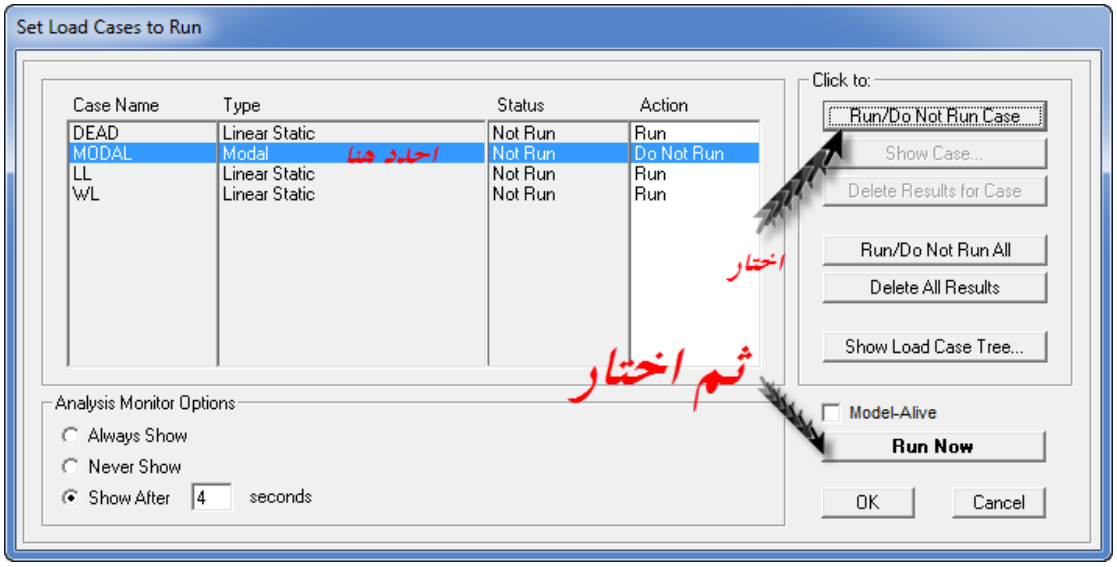


الاحمال المضافه عمودياً على الاضلاع العلويه للتراس

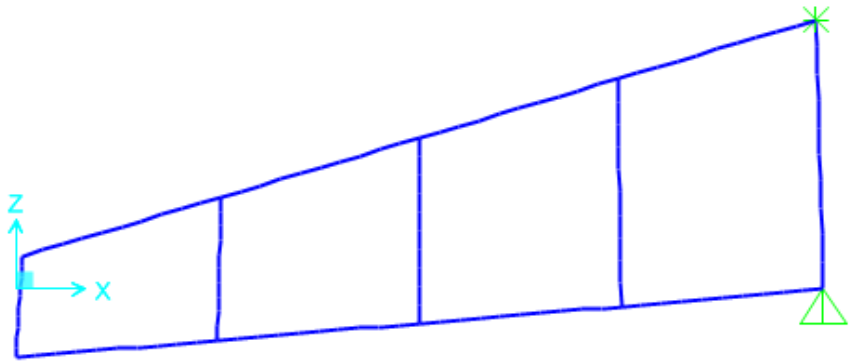


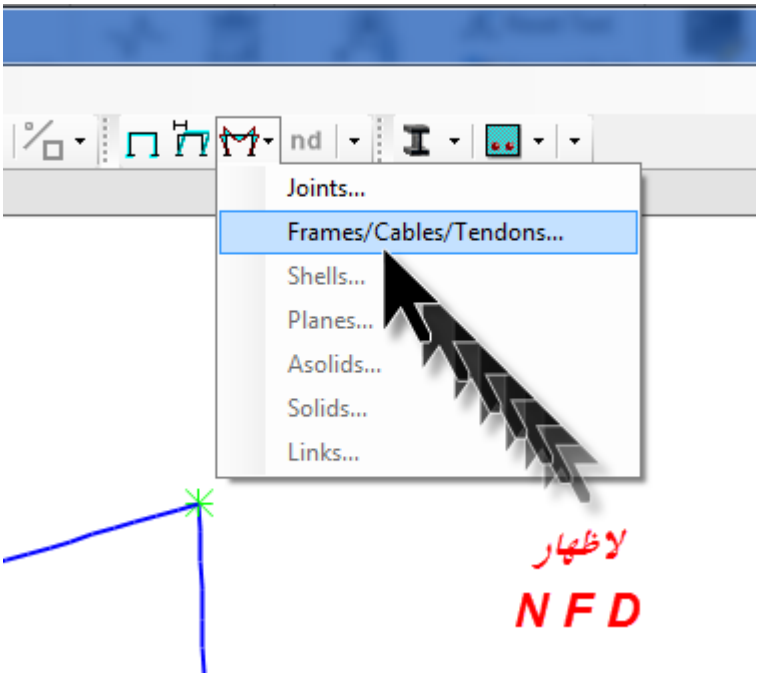




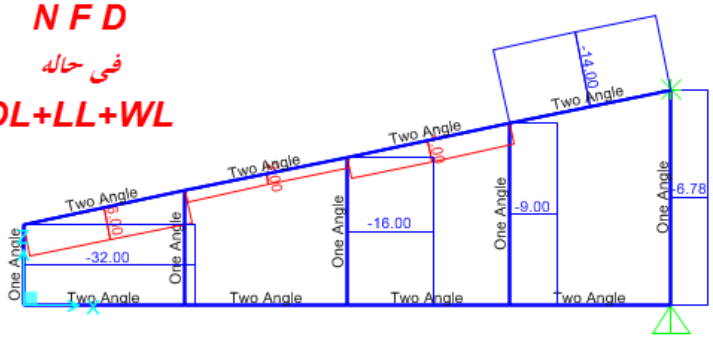


شكل التراس نتيجه وجود الاحمال عليه





الشكل النهائى
N F D
فى حاله
DL+LL+WL



تم بحمد الله

مسائل محلوله على برنامج الساب

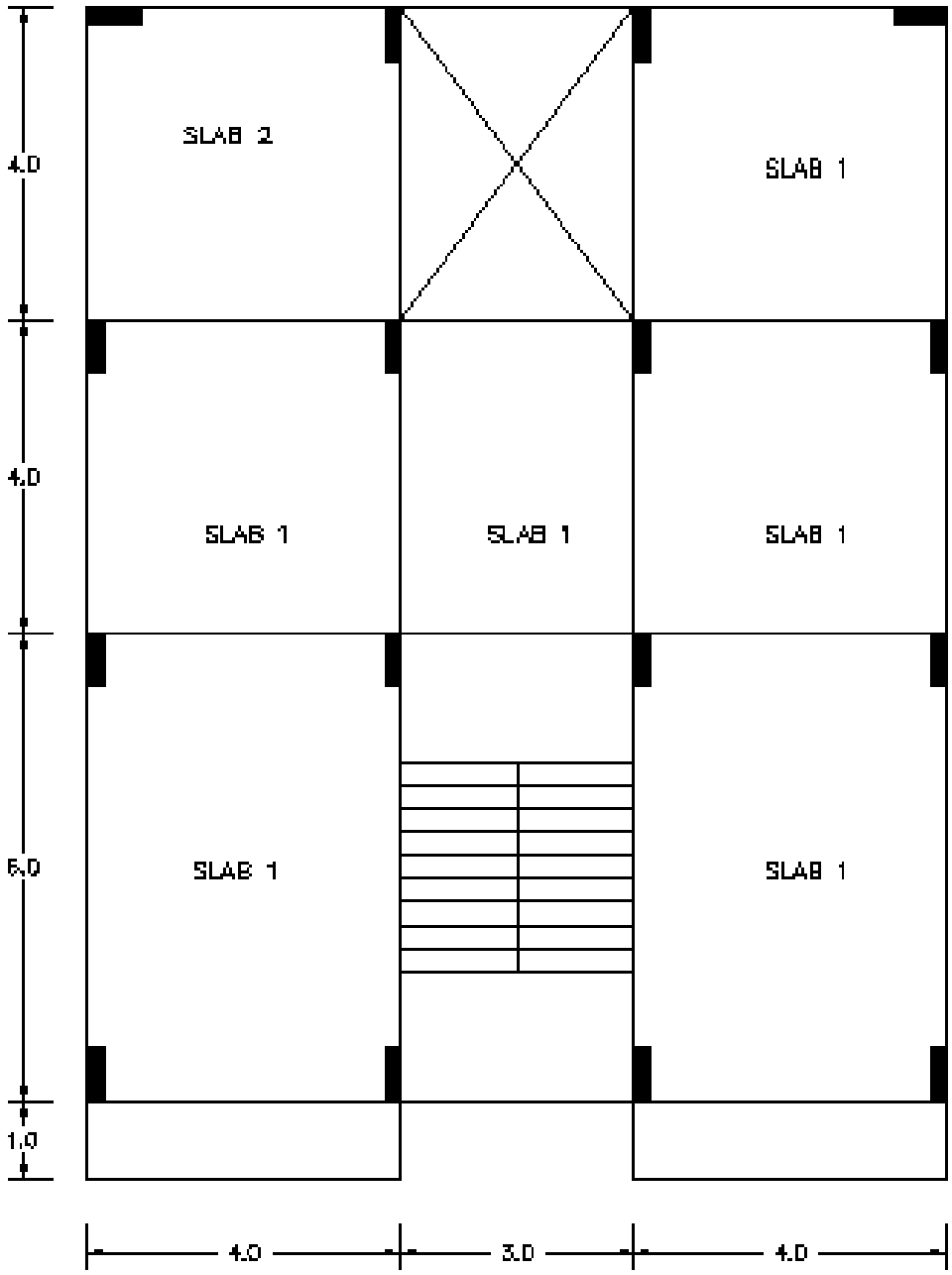
إعداد

Eng.kh_ahmed@yahoo.com

01063366722 Or 01140506722

www.facebook.com/Eng.Khaled.Abdelkarim

Solid Slab



$DL = 150\ kg/m^2$

$LL = 300\ kg/m^2$

$WL = h_w * t_w * \gamma_w$

$A_s = M_u / F_y * J * d$

ALL BEAMS R 0.12*0.60 m

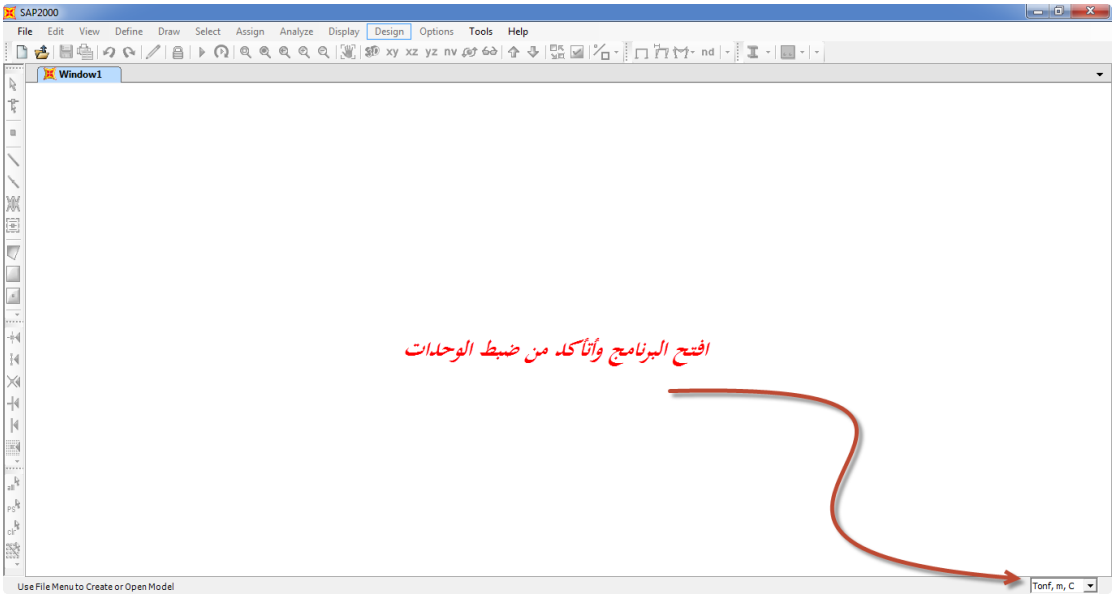
Slab 1 th = 15 cm

Slab 2 th = 10 cm

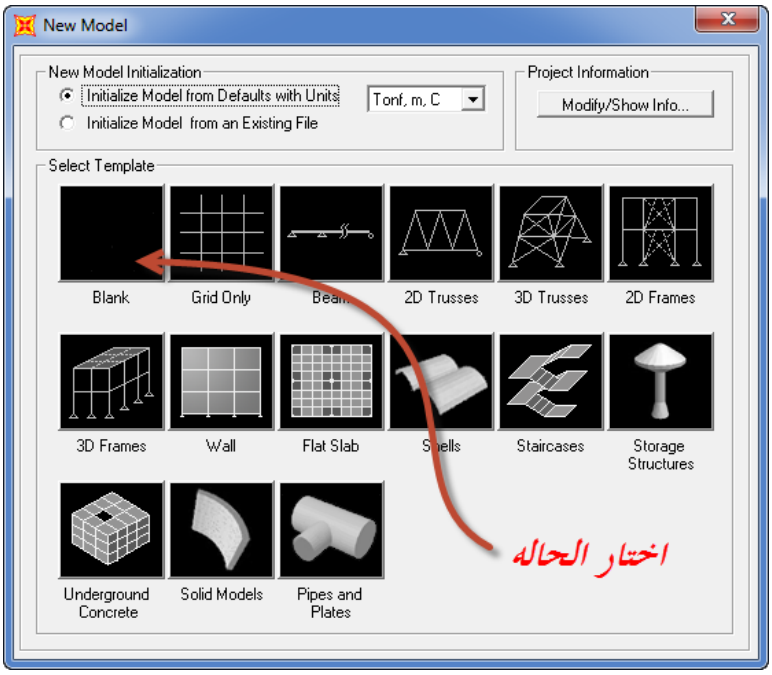
REQ :

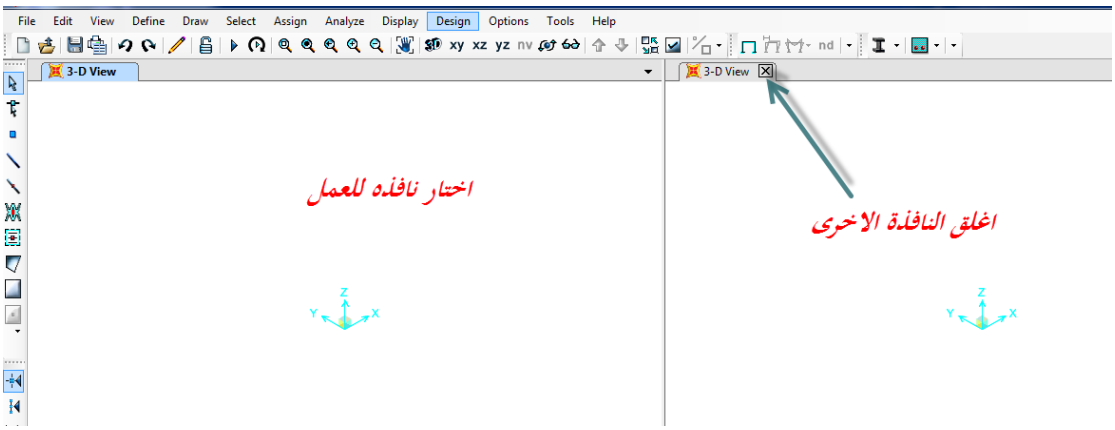
BMD Of All Slabs And Calculate As

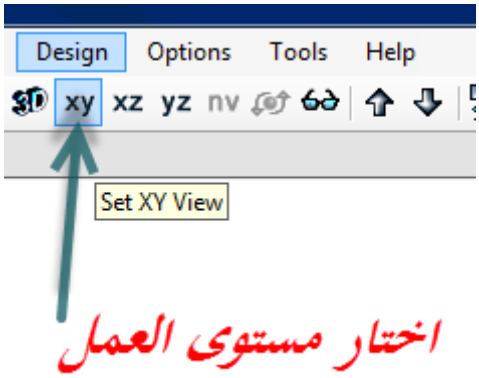
Solution



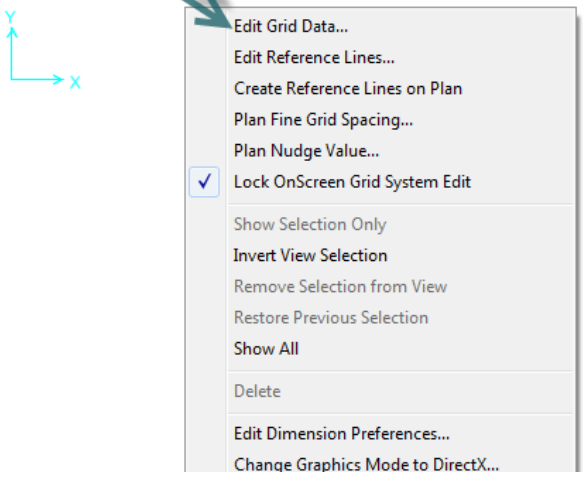

SAP2000 v15.0.1 Ultimate - (Untitled)
File Edit View Define Draw Sel
Window1
اختار موديل جديد

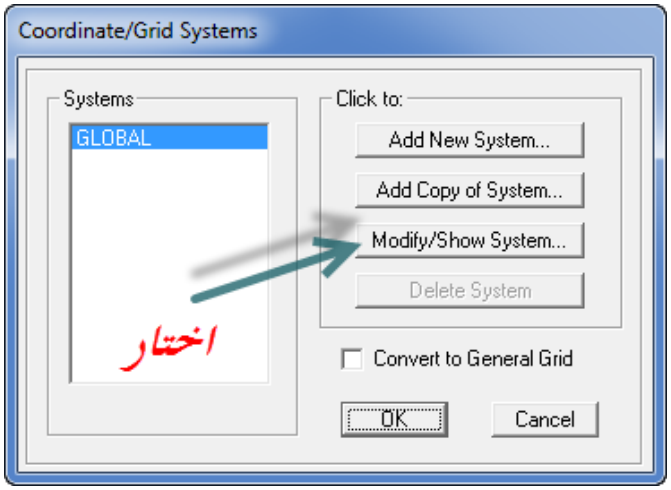

New Model
New Model Initialization
Initialize Model from Defaults with Units
Tonf, m, C
Initialize Model from an Existing File
Project Information
Modify/Show Info...
Select Template
Blank
Grid Only
2D Trusses
3D Trusses
2D Frames
3D Frames
Wall
Flat Slab
Staircases
Storage Structures
Underground Concrete
Solid Models
Pipes and Plates
اختار الحاله

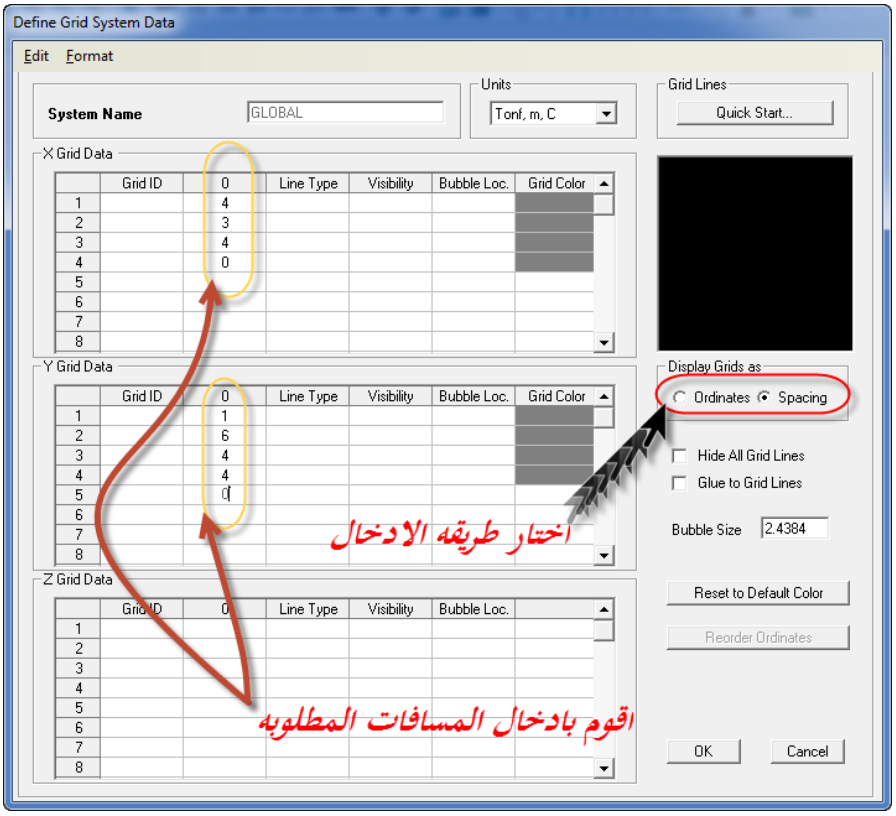

File Edit View Define Draw Select Assign Analyze Display Design Options Tools Help
3-D View
3-D View
اختار نافذه للعمل
اغلق النافذة الاخرى



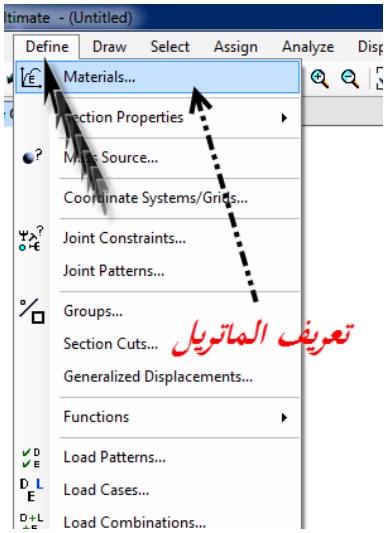
كليك يمين فى اى مكان على الشاشه واختار

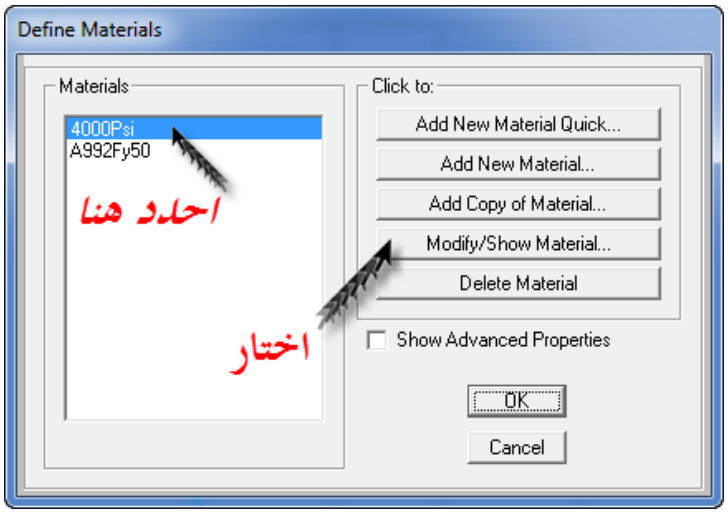


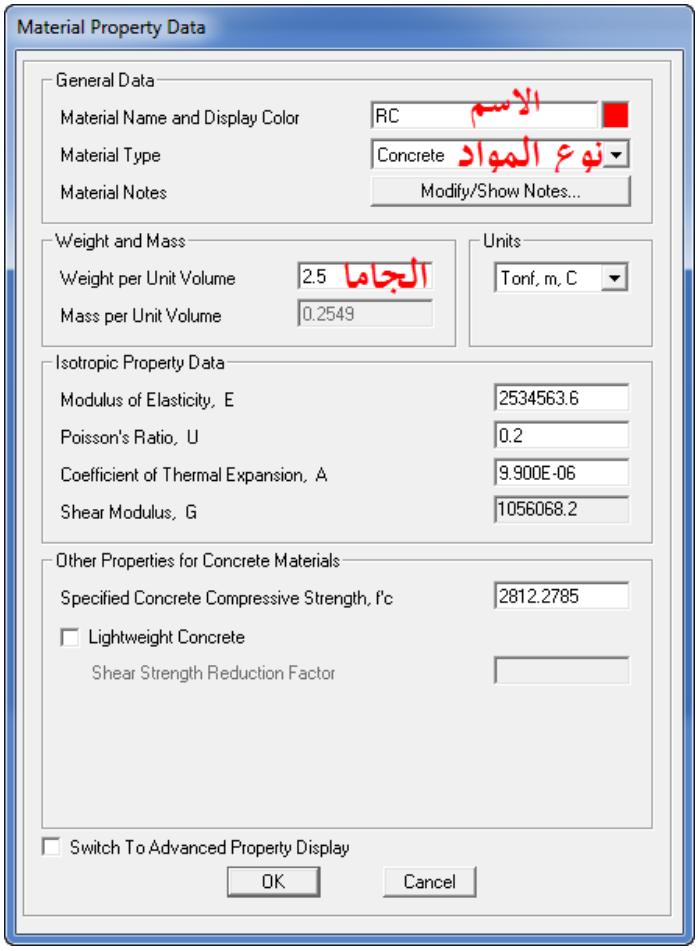


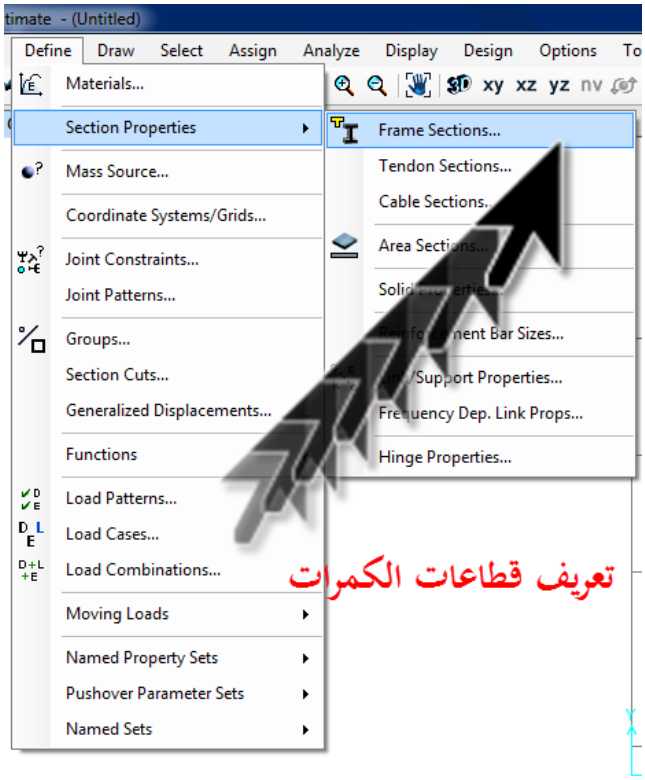

Define Grid System Data
Edit Format
System Name
GLOBAL
Units
Tonf, m, C
Grid Lines
Quick Start...
X Grid Data
Grid ID
0
Line Type
Visibility
Bubble Loc.
Grid Color
1 4
2 3
3 4
4 0
Y Grid Data
1 1
2 6
3 4
4 4
5 0
Z Grid Data
Display Grids as
Ordinates
Spacing
Hide All Grid Lines
Glue to Grid Lines
Bubble Size
2.4384
Reset to Default Color
Reorder Ordinates
OK
Cancel
اختار طريقه الادخال
اقوم بادخال المسافات المطلوبه


شبكة المسافات

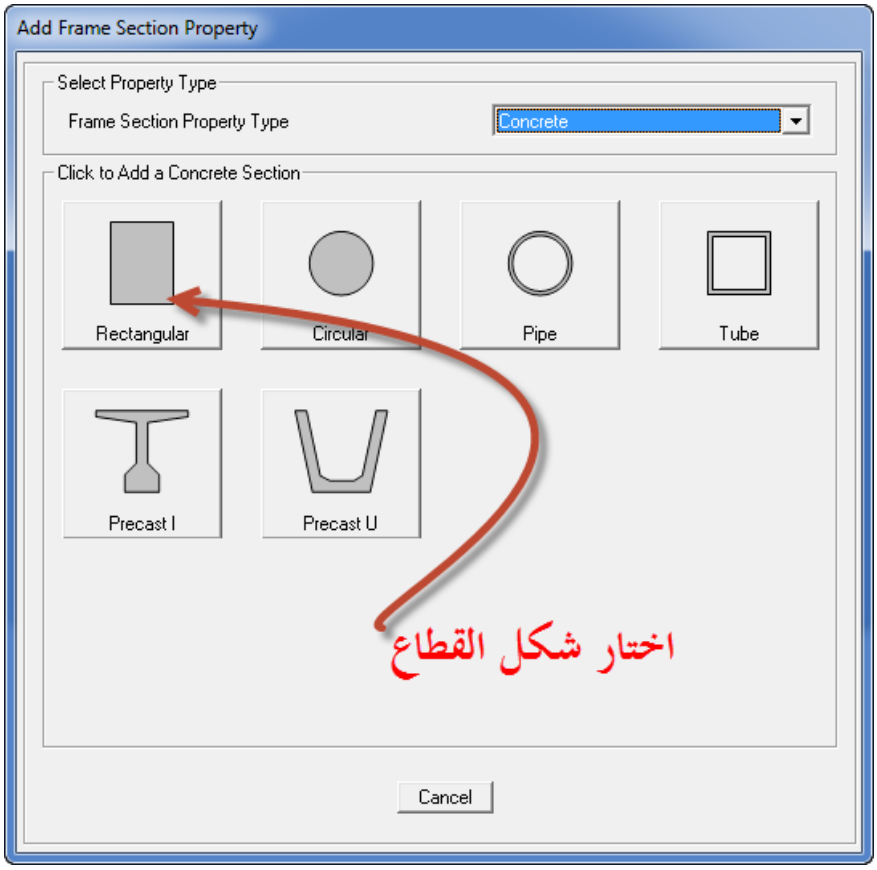

Define
Draw
Select
Assign
Analyze
Materials...
Section Properties
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
تعريف الماتريل


Define Materials
Materials
4000Psi
A992Fy50
احدد هنا
Click to:
Add New Material Quick...
Add New Material...
Add Copy of Material...
Modify/Show Material...
Delete Material
اختار
Show Advanced Properties
OK
Cancel

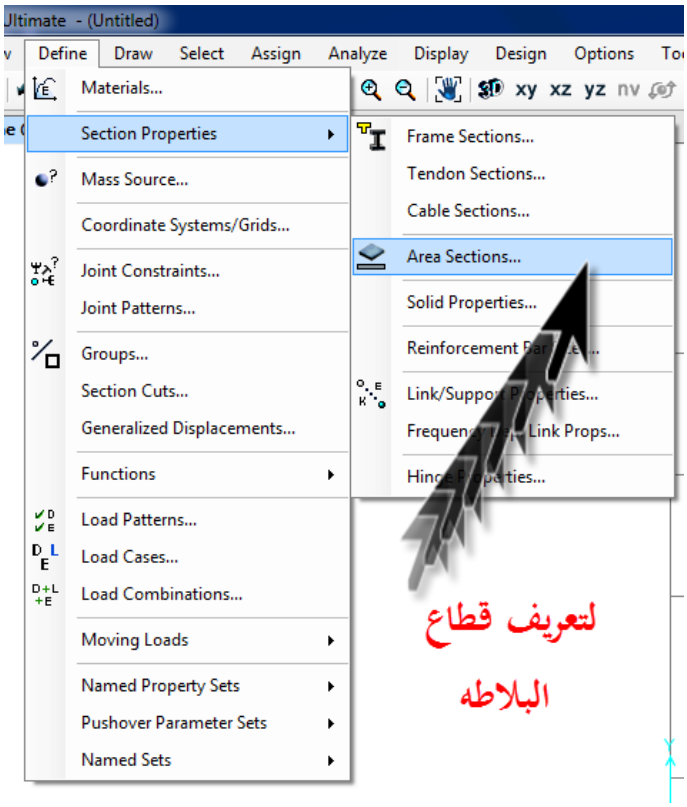

Material Property Data
General Data
Material Name and Display Color
RC
الاسم
Material Type
Concrete
نوع المواد
Material Notes
Modify/Show Notes...
Weight and Mass
Weight per Unit Volume
2.5
الجاما
Mass per Unit Volume
0.2549
Units
Tonf, m, C
Isotropic Property Data
Modulus of Elasticity, E
2534563.6
Poisson's Ratio, U
0.2
Coefficient of Thermal Expansion, A
9.900E-06
Shear Modulus, G
1056068.2
Other Properties for Concrete Materials
Specified Concrete Compressive Strength, f'c
2812.2785
Lightweight Concrete
Shear Strength Reduction Factor
Switch To Advanced Property Display
OK
Cancel


timate - (Untitled)
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
Frame Sections...
Tendon Sections...
Cable Sections...
Area Sections...
Hinge Properties...
تعريف قطاعات الكمرات

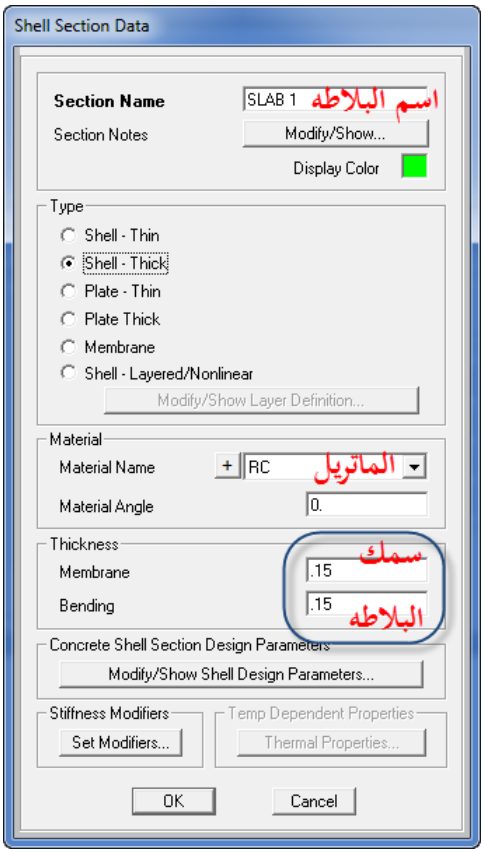

Frame Properties
Properties
Find this property:
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
اضافه قطاع جديد
OK
Cancel

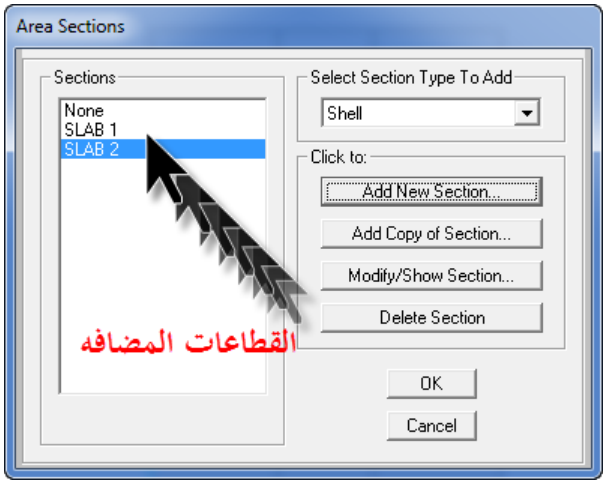

Add Frame Section Property
Select Property Type
Frame Section Property Type
Concrete
Click to Add a Concrete Section
Rectangular
Circular
Pipe
Tube
Precast I
Precast U
اختار شكل القطاع
Cancel

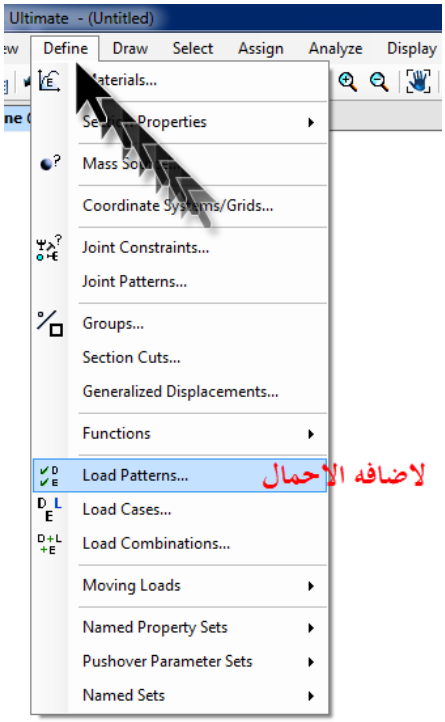

Rectangular Section
Section Name
BEAM
Section Notes
Modify/Show Notes...
Properties
Section Properties...
Property Modifiers
Set Modifiers...
Material
RC
Dimensions
Depth (t3)
.46
Width (t2)
.12
عمق القطاع مطروح منه
سمك البلاطه
Display Color
Concrete Reinforcement...
OK
Cancel

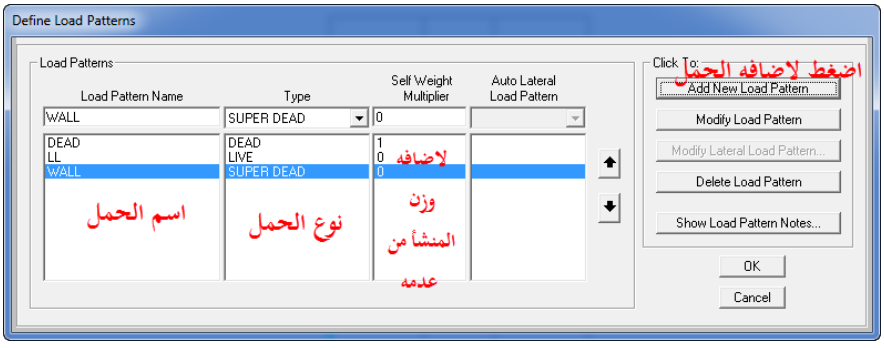

Ultimate - (Untitled)
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
Frame Sections...
Tendon Sections...
Cable Sections...
Area Sections...
Solid Properties...
Link Props...
لتعريف قطاع
البلاطه

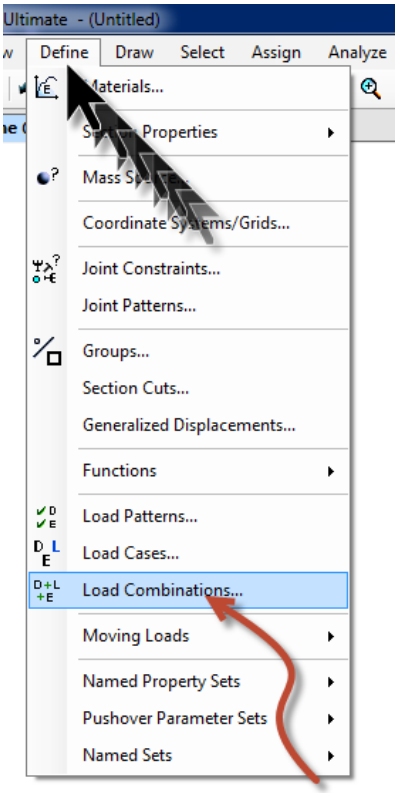

Area Sections
Sections
None
Select Section Type To Add
Shell
Click to:
Add New Section...
Add Copy of Section...
Modify/Show Section...
Delete Section
اضافة جديد
OK
Cancel


Shell Section Data
Section Name
SLAB 1
اسم البلاطه
Section Notes
Modify/Show...
Display Color
Type
Shell - Thin
Shell - Thick
Plate - Thin
Plate Thick
Membrane
Shell - Layered/Nonlinear
Modify/Show Layer Definition...
Material
Material Name
RC
الماتريل
Material Angle
0.
Thickness
Membrane
.15
سمك
Bending
.15
البلاطه
Concrete Shell Section Design Parameters
Modify/Show Shell Design Parameters...
Stiffness Modifiers
Set Modifiers...
Temp Dependent Properties
Thermal Properties...
OK
Cancel


Area Sections
Sections
None
SLAB 1
SLAB 2
القطاعات المضافه
Select Section Type To Add
Shell
Click to:
Add New Section...
Add Copy of Section...
Modify/Show Section...
Delete Section
OK
Cancel

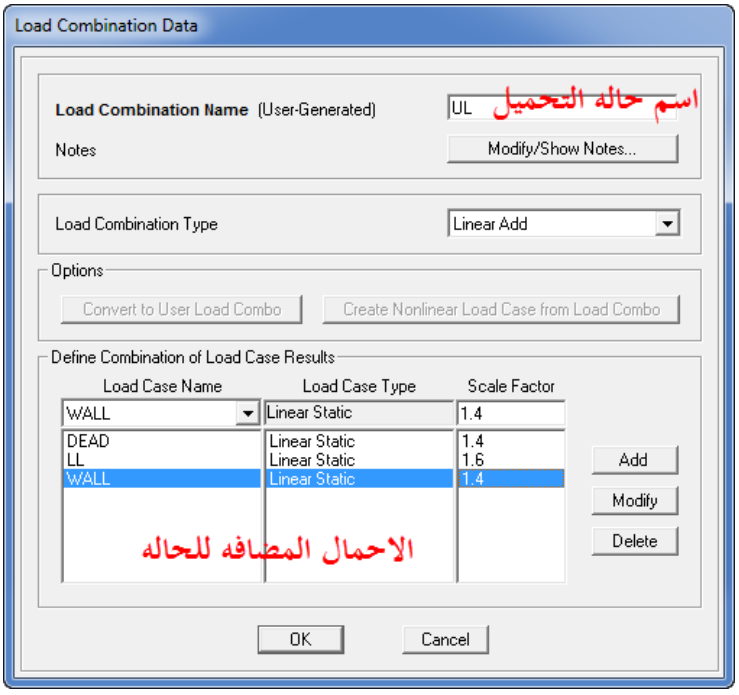

Ultimate - (Untitled)
Define
Draw
Select
Assign
Analyze
Display
Properties
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
لاضافه الاحمال
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets

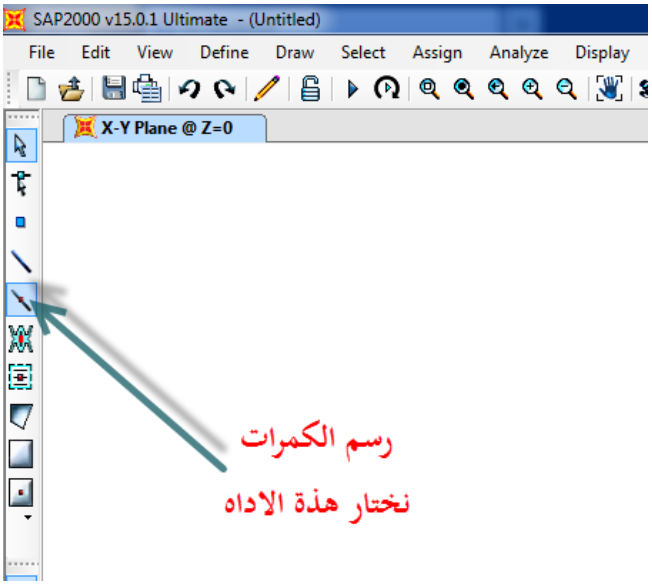

Define Load Patterns
Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
WALL
SUPER DEAD
0
DEAD
LL
WALL
DEAD
LIVE
SUPER DEAD
1
0
0
لاضافه
اسم الحمل
نوع الحمل
وزن المنشأ من عدمه
Click To:
اضغط لاضافه الحمل
Add New Load Pattern
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel

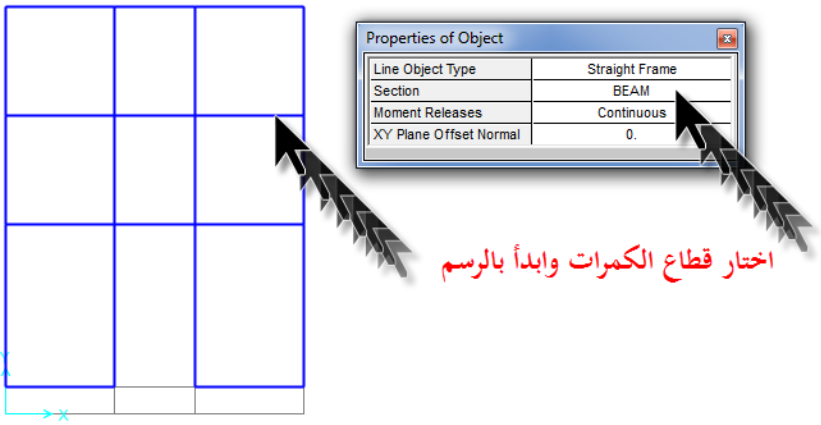


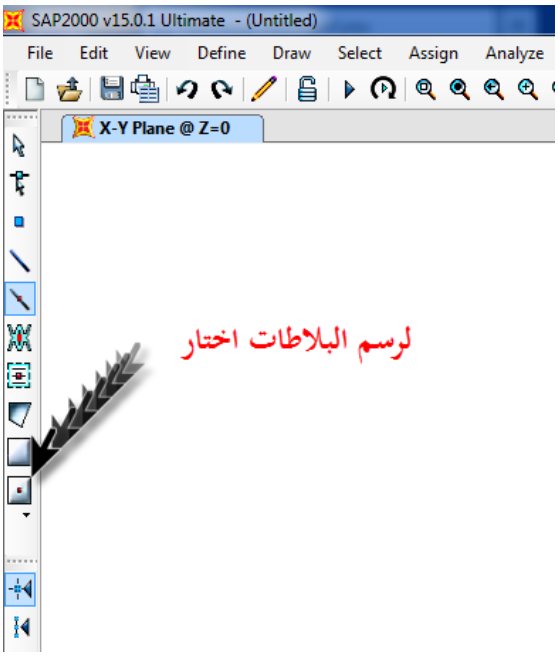
عمل حالات التحميل

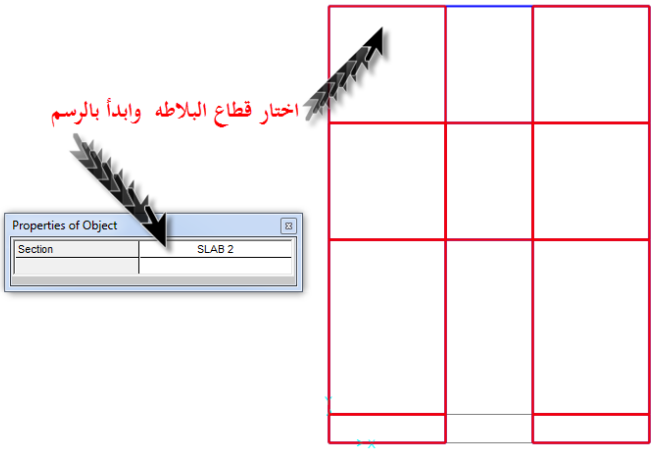
اضافه حاله تحميل جديده

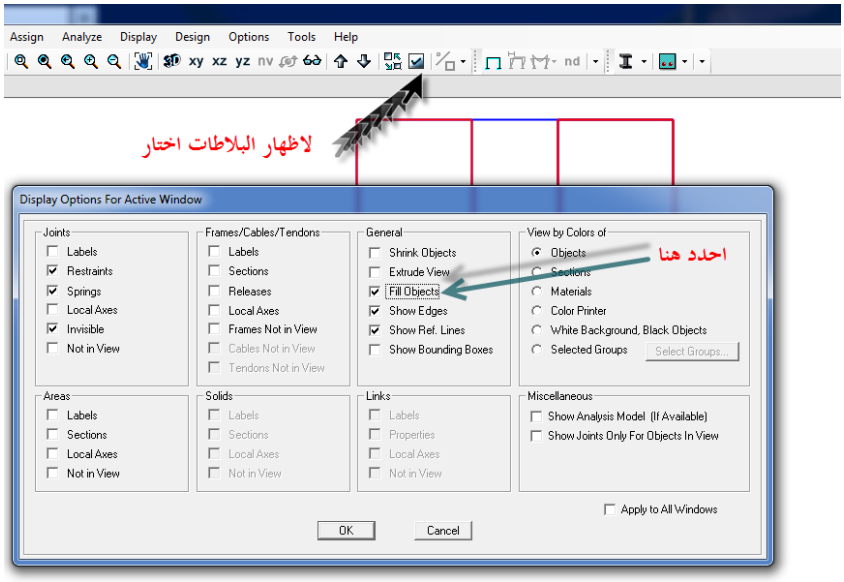

Load Combination Data
Load Combination Name (User-Generated)
UL
اسم حاله التحميل
Notes
Modify/Show Notes...
Load Combination Type
Linear Add
Options
Convert to User Load Combo
Create Nonlinear Load Case from Load Combo
Define Combination of Load Case Results
Load Case Name
Load Case Type
Scale Factor
WALL
Linear Static
1.4
DEAD
Linear Static
1.4
LL
Linear Static
1.6
WALL
Linear Static
1.4
Add
Modify
Delete
الاحمال المضافه للحاله
OK
Cancel

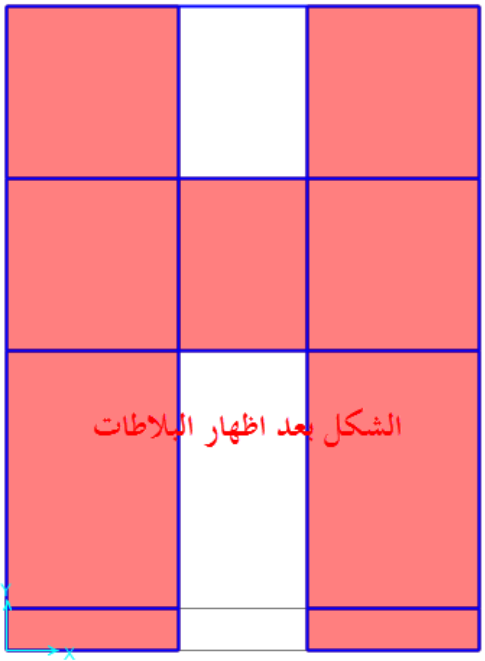

SAP2000 v15.0.1 Ultimate - (Untitled)
File
Edit
View
Define
Draw
Select
Assign
Analyze
Display
X-Y Plane @ Z=0
رسم الكمرات
نختار هذة الاداه


Properties of Object
Line Object Type
Straight Frame
Section
BEAM
Moment Releases
Continuous
XY Plane Offset Normal
0.
اختار قطاع الكمرات وابدأ بالرسم

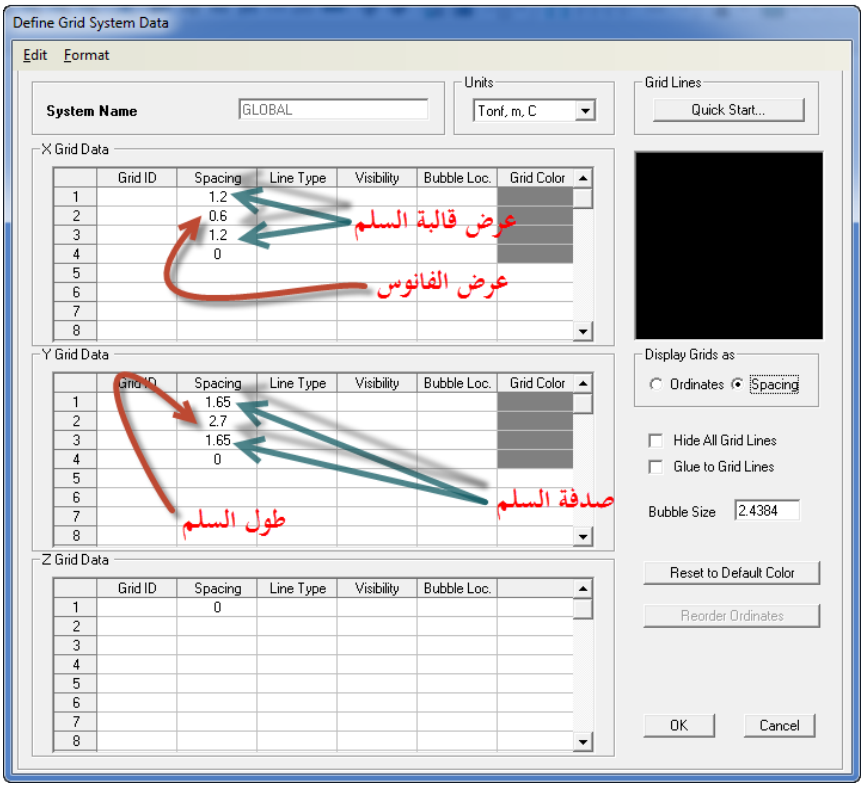

SAP2000 v15.0.1 Ultimate - (Untitled)
File
Edit
View
Define
Draw
Select
Assign
Analyze
X-Y Plane @ Z=0
لرسم البلاطات اختار

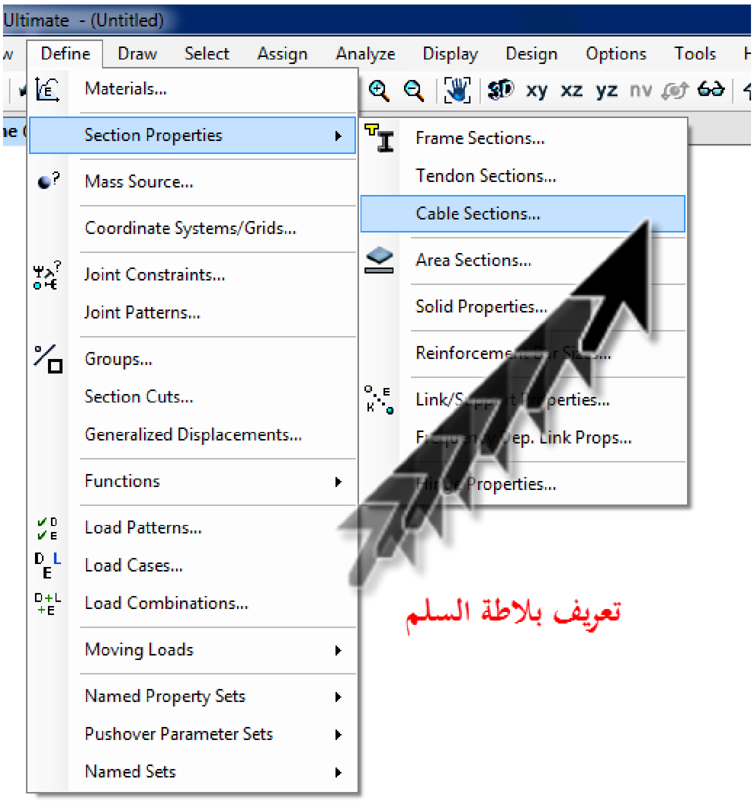

اختار قطاع البلاطه وابدأ بالرسم
Properties of Object
Section
SLAB 2

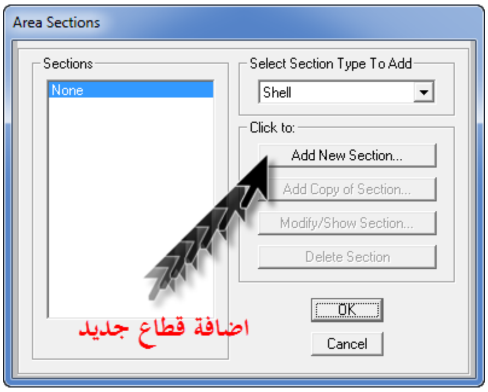

Assign
Analyze
Display
Design
Options
Tools
Help
لاظهار البلاطات اختار
Display Options For Active Window
Joints
Labels
Restraints
Springs
Local Axes
Invisible
Not in View
Frames/Cables/Tendons
Labels
Sections
Releases
Local Axes
Frames Not in View
Cables Not in View
Tendons Not in View
General
Shrink Objects
Extrude View
Fill Objects
Show Edges
Show Ref. Lines
Show Bounding Boxes
View by Colors of
Objects
Sections
Materials
Color Printer
White Background, Black Objects
Selected Groups
Select Groups...
احدد هنا
Areas
Labels
Sections
Local Axes
Not in View
Solids
Labels
Sections
Local Axes
Not in View
Links
Labels
Properties
Local Axes
Not in View
Miscellaneous
Show Analysis Model (If Available)
Show Joints Only For Objects In View
Apply to All Windows
OK
Cancel

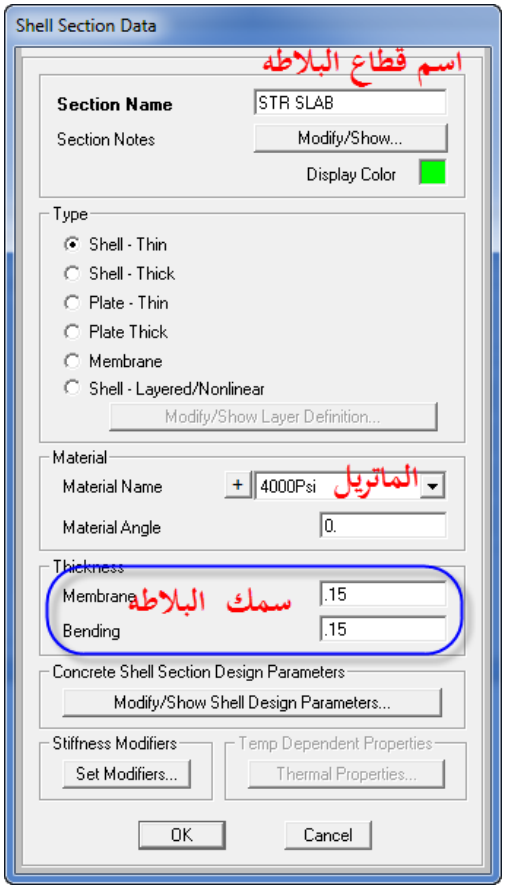

الشكل بعد اظهار البلاطات

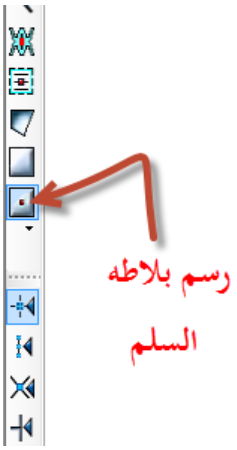
لرسم السلم فتح فايل ساب جديد وادخال شبكة مسافات جديده خاصه بالسلم

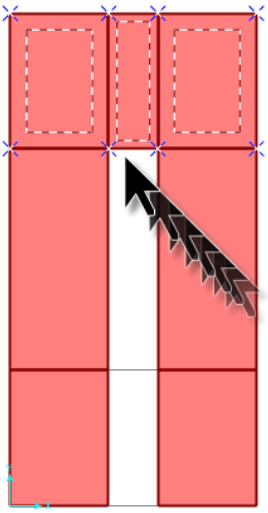



Ultimate - (Untitled)
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
Frame Sections...
Tendon Sections...
Cable Sections...
Area Sections...
Solid Properties...
Link/Support Properties...
تعريف بلاطة السلم

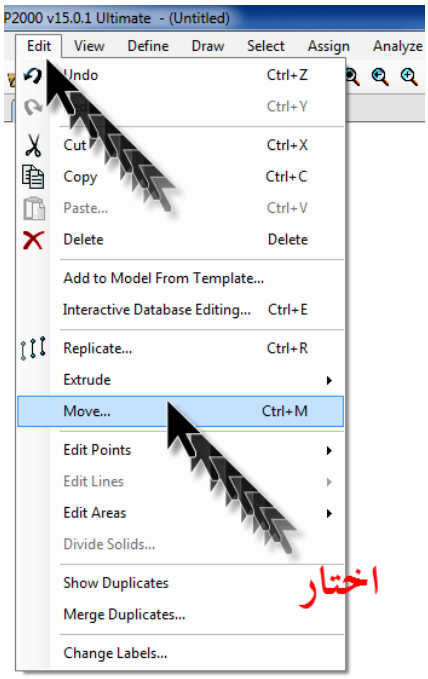

Area Sections
Sections
None
Select Section Type To Add
Shell
Click to:
Add New Section...
Add Copy of Section...
Modify/Show Section...
Delete Section
OK
Cancel
اضافة قطاع جديد


Shell Section Data
اسم قطاع البلاطه
Section Name
STR SLAB
Section Notes
Modify/Show...
Display Color
Type
Shell - Thin
Shell - Thick
Plate - Thin
Plate Thick
Membrane
Shell - Layered/Nonlinear
Modify/Show Layer Definition...
Material
Material Name
4000Psi
الماتريل
Material Angle
0.
Thickness
Membrane
سمك البلاطه
.15
Bending
.15
Concrete Shell Section Design Parameters
Modify/Show Shell Design Parameters...
Stiffness Modifiers
Set Modifiers...
Temp Dependent Properties
Thermal Properties...
OK
Cancel

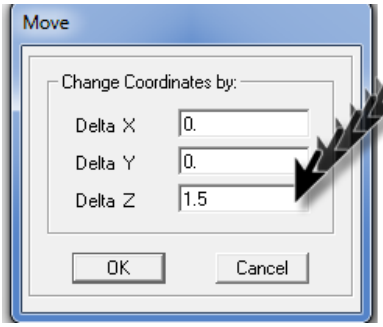

رسم بلاطه
السلم



احدد على الاجزاء الموضحه لتغيير منسوبها



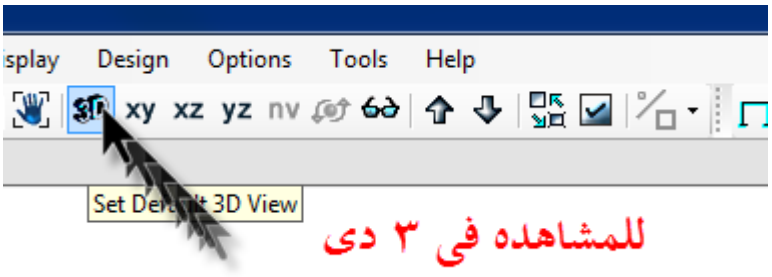
اختار



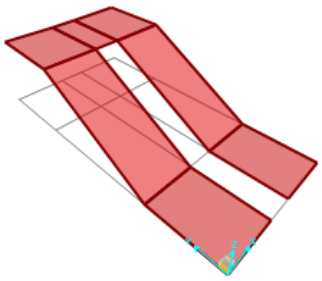
اعمل ازاحه بمقدار نص الدور فى اتجاه محور

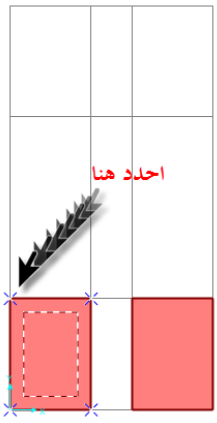
Z

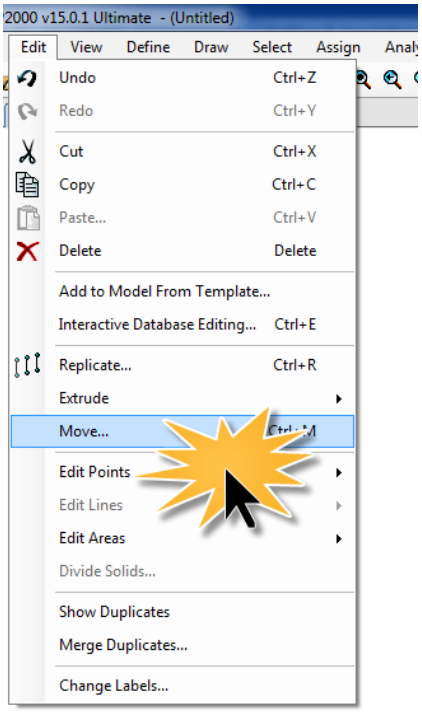

الشكل بعد عمل الازاحه
للمنسوب المطلوب

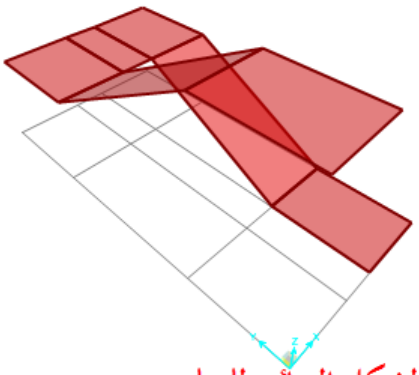

isplay
Design
Options
Tools
Help
xy
xz
yz
nv
للمشاهده فى ٣ دى

الشكل فى ٣دى

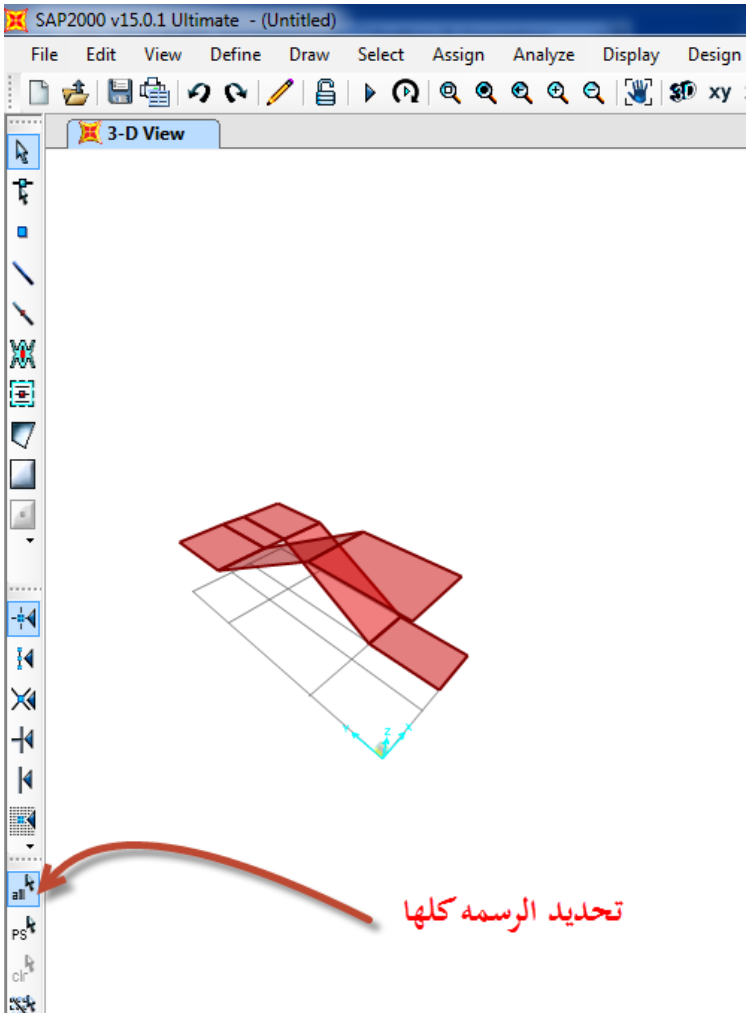



احدد هنا

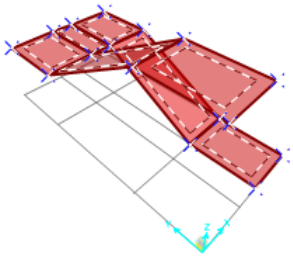


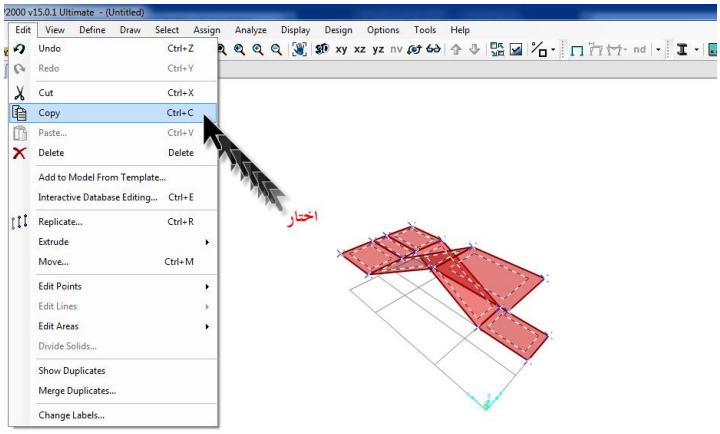


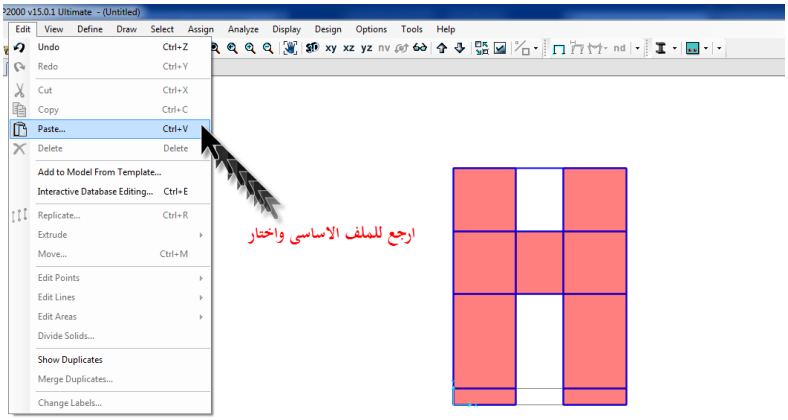
الشكل النهائى للسلم



الشكل بعد التحديد عليه



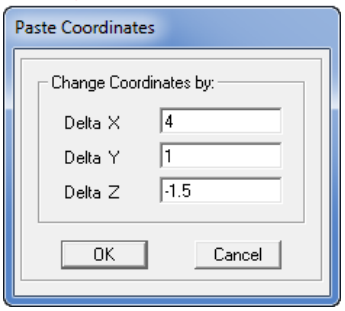


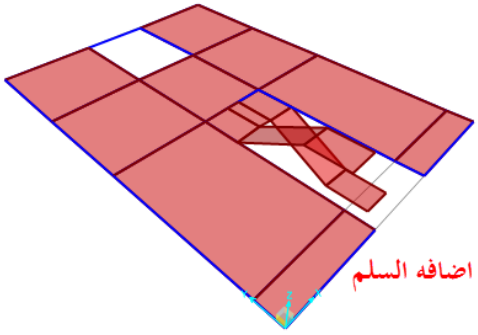


ادخل المسافات

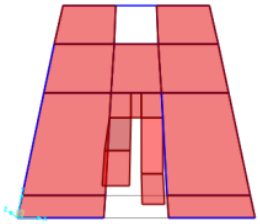
لوضع السلم فى

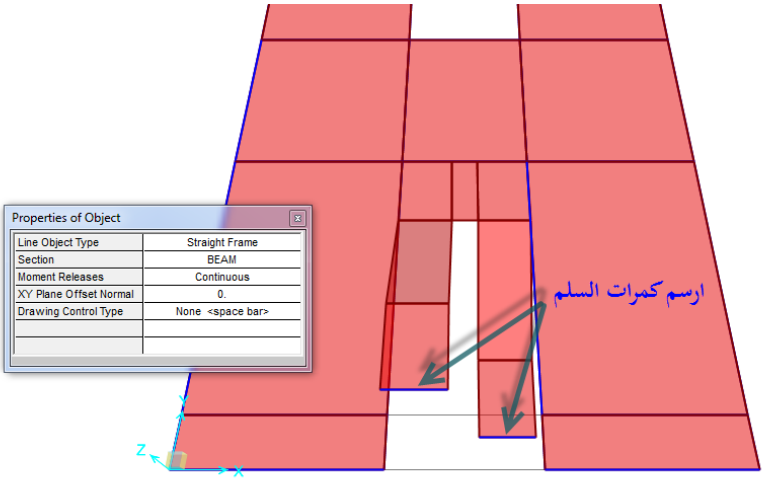
مكانه على الرسم

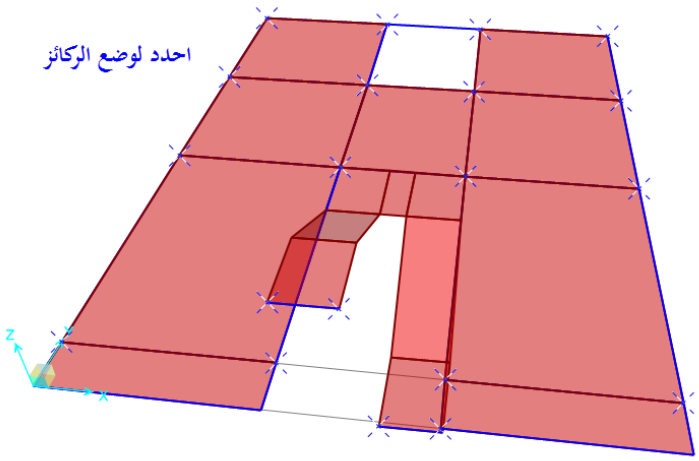


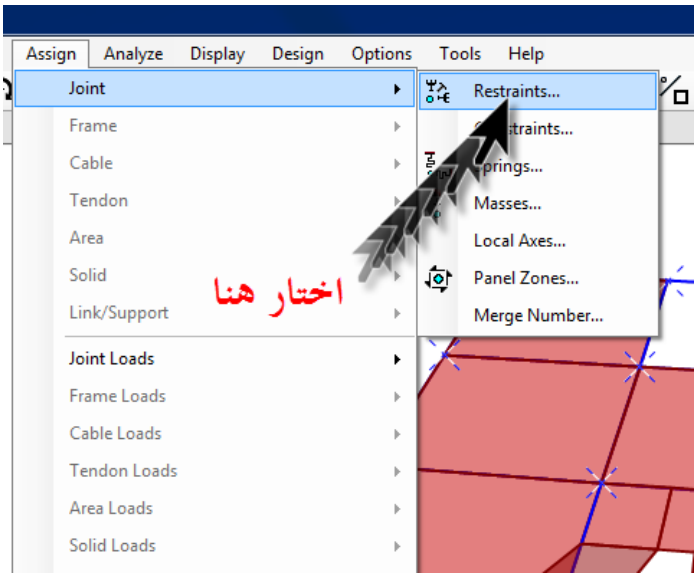


الشكل بعد اضافه السلم



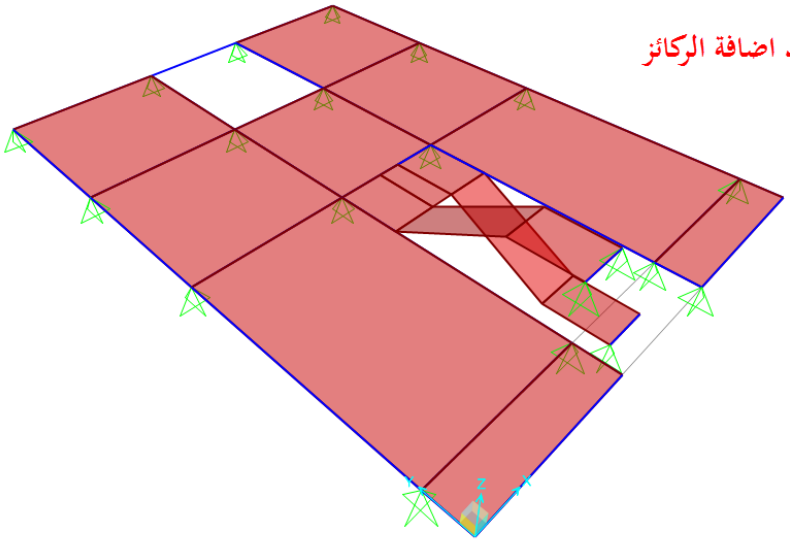


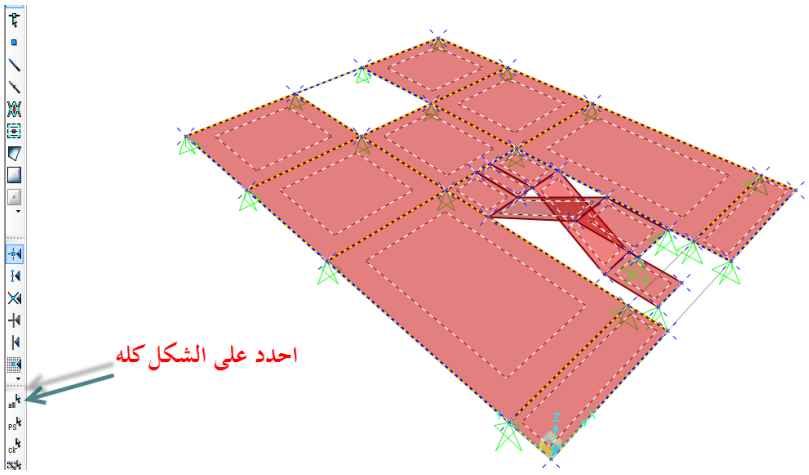

احدد لوضع الركائز

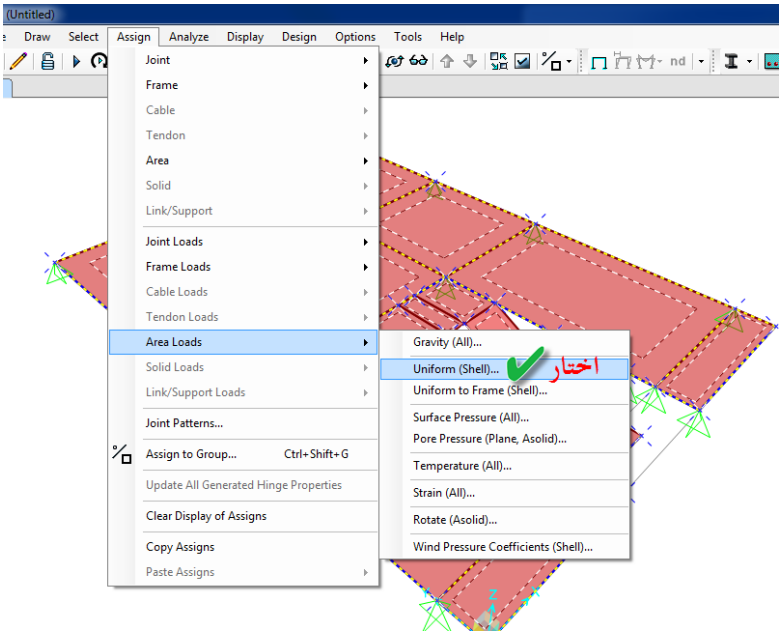

Assign
Analyze
Display
Design
Options
Tools
Help
Joint
Frame
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Restraints...
Masses...
Local Axes...
Panel Zones...
Merge Number...
اختار هنا


Joint Restraints
اختار نوع الركيزه
Restraints in Joint Local Directions
Translation 1
Translation 2
Translation 3
Rotation about 1
Rotation about 2
Rotation about 3
Fast Restraints
OK
Cancel

بعد اضافة الركائز

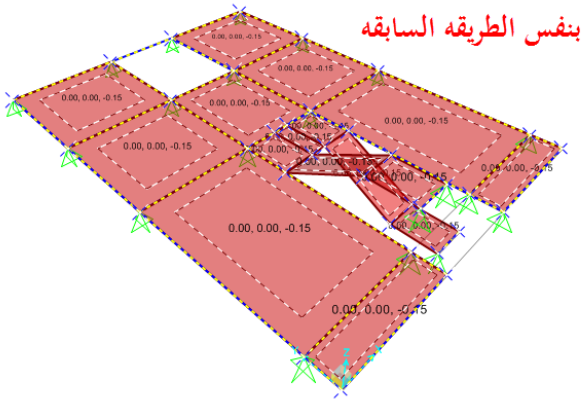


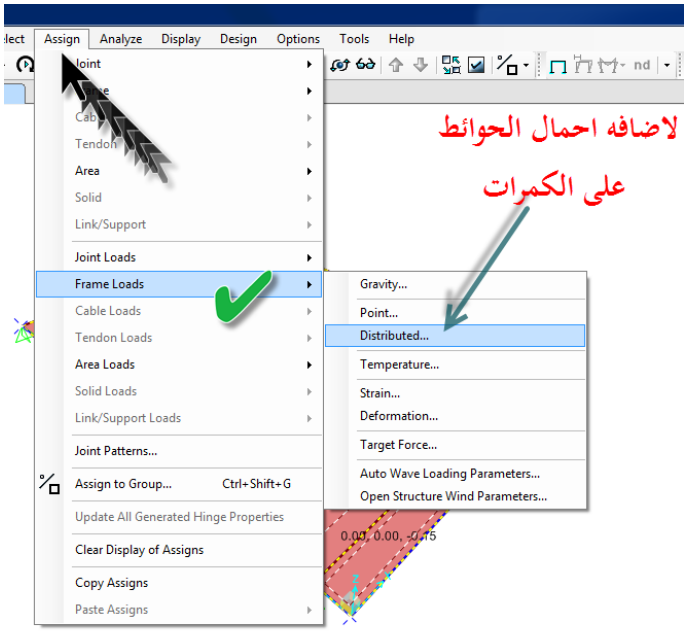


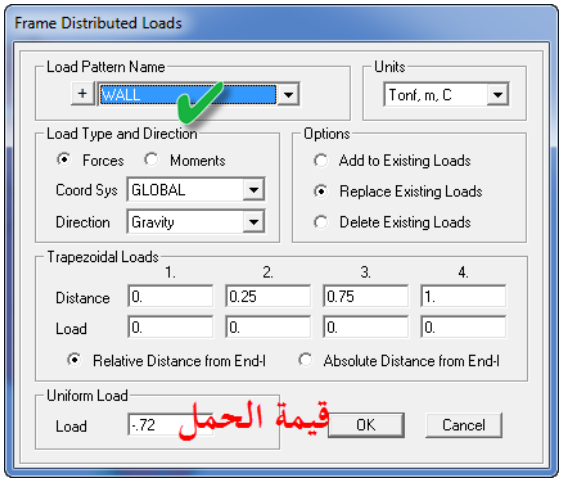


احدد الشكل مره اخرى واقوم باضافه

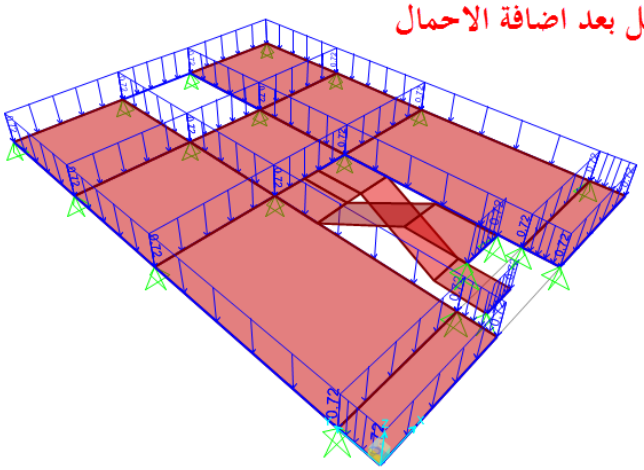
الاحمال الحيه بنفس الطريقه السابقه

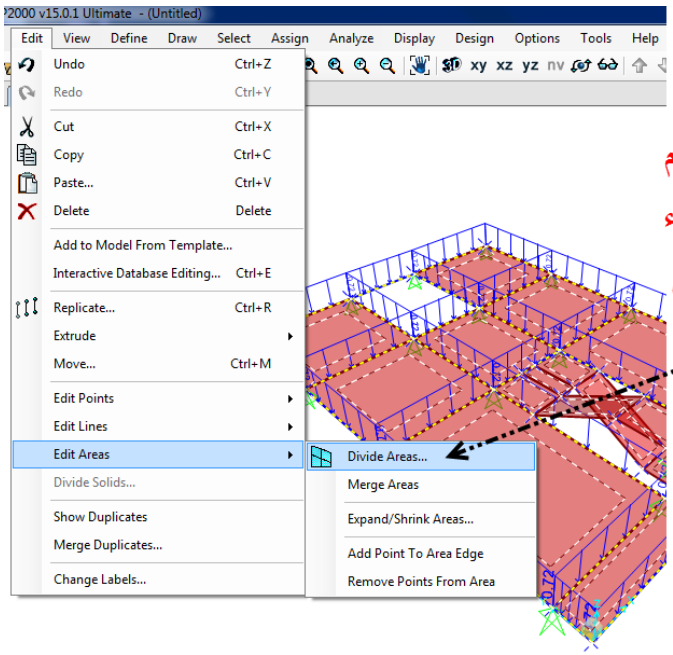




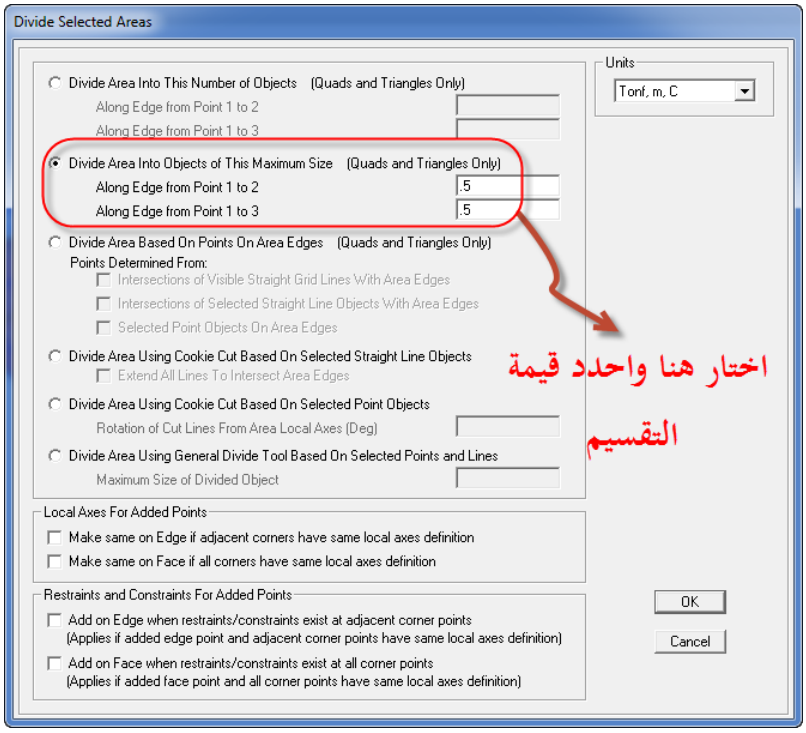


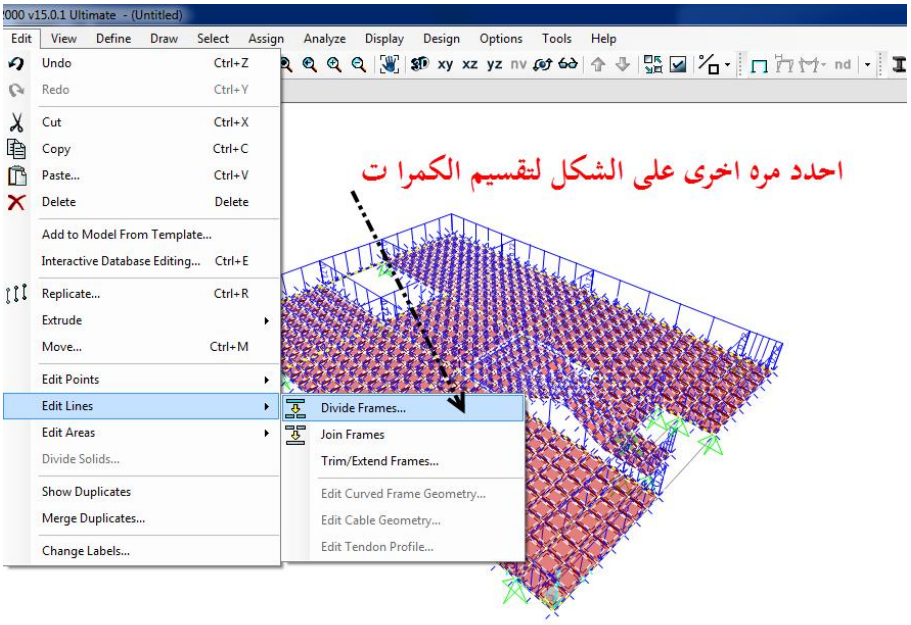
الشكل بعد اضافة الاحمال

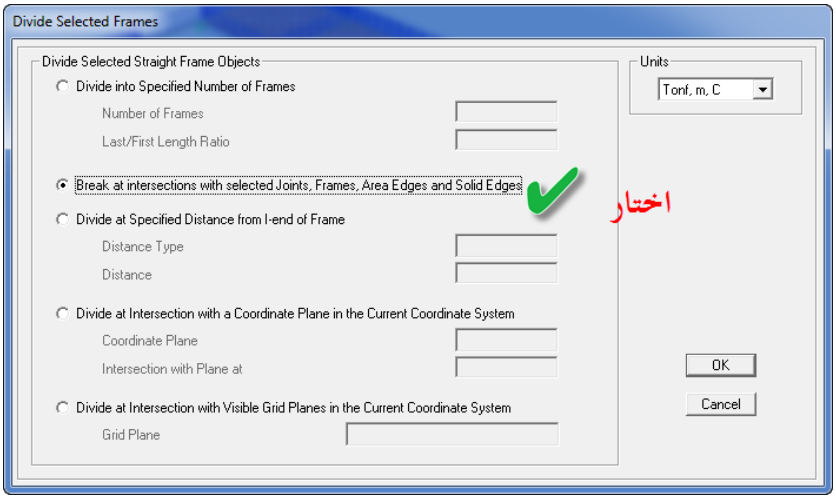


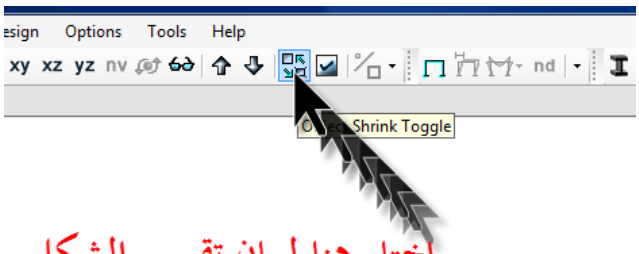


احدد على الشكل واقوم بتقسيم البلاطات لاجزاء صغير لضمان الدقه فى التحليل

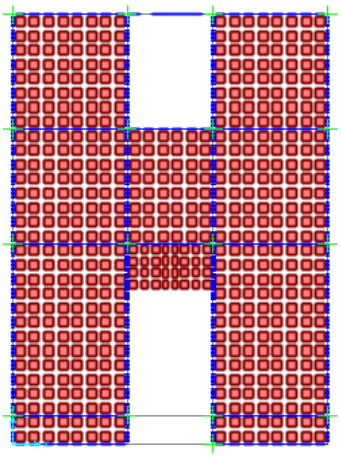

Divide Selected Areas
Units
Tonf, m, C
Divide Area Into This Number of Objects (Quads and Triangles Only)
Along Edge from Point 1 to 2
Along Edge from Point 1 to 3
Divide Area Into Objects of This Maximum Size (Quads and Triangles Only)
Along Edge from Point 1 to 2
.5
Along Edge from Point 1 to 3
.5
Divide Area Based On Points On Area Edges (Quads and Triangles Only)
Points Determined From:
Intersections of Visible Straight Grid Lines With Area Edges
Intersections of Selected Straight Line Objects With Area Edges
Selected Point Objects On Area Edges
Divide Area Using Cookie Cut Based On Selected Straight Line Objects
Extend All Lines To Intersect Area Edges
Divide Area Using Cookie Cut Based On Selected Point Objects
Rotation of Cut Lines From Area Local Axes (Deg)
Divide Area Using General Divide Tool Based On Selected Points and Lines
Maximum Size of Divided Object
Local Axes For Added Points
Make same on Edge if adjacent corners have same local axes definition
Make same on Face if all corners have same local axes definition
Restraints and Constraints For Added Points
Add on Edge when restraints/constraints exist at adjacent corner points
(Applies if added edge point and adjacent corner points have same local axes definition)
Add on Face when restraints/constraints exist at all corner points
(Applies if added face point and all corner points have same local axes definition)
OK
Cancel
اختار هنا واحدد قيمة
التقسيم

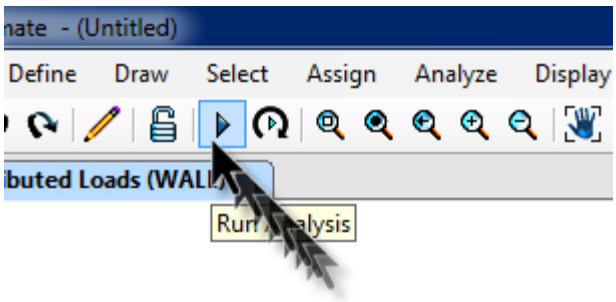

000 v15.0.1 Ultimate - (Untitled)
Edit View Define Draw Select Assign Analyze Display Design Options Tools Help
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste... Ctrl+V
Delete Delete
Add to Model From Template...
Interactive Database Editing... Ctrl+E
Replicate... Ctrl+R
Extrude
Move... Ctrl+M
Edit Points
Edit Lines
Edit Areas
Divide Solids...
Show Duplicates
Merge Duplicates...
Change Labels...
Divide Frames...
Join Frames
Trim/Extend Frames...
Edit Curved Frame Geometry...
Edit Cable Geometry...
Edit Tendon Profile...
احدد مره اخرى على الشكل لتقسيم الكمرا ت



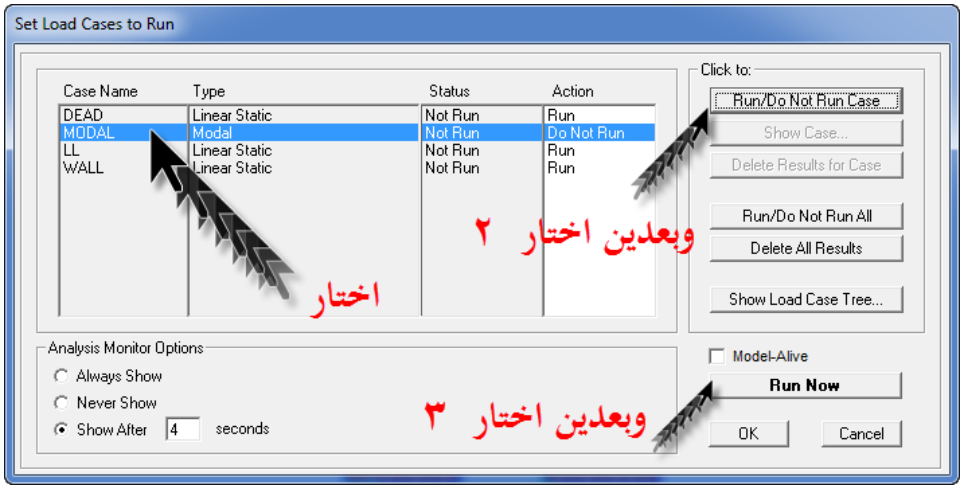


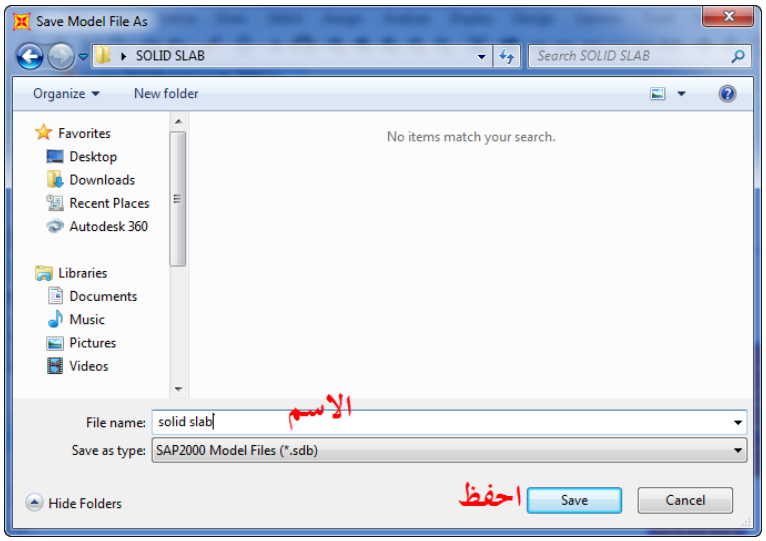
اختار هنا لبيان تقسيم الشكل



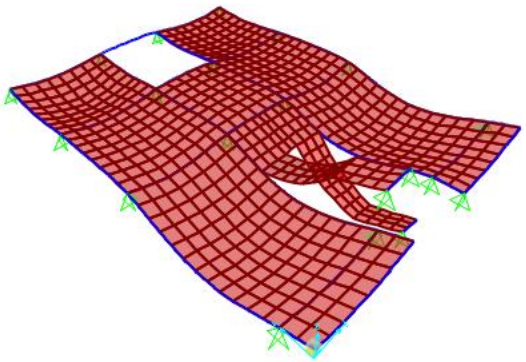


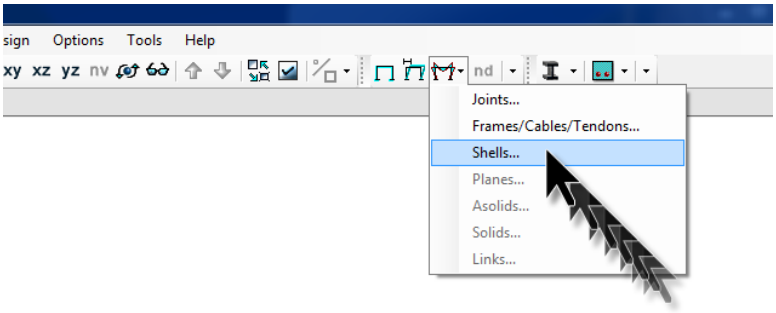
لبدء تحليل المنشأ اختار



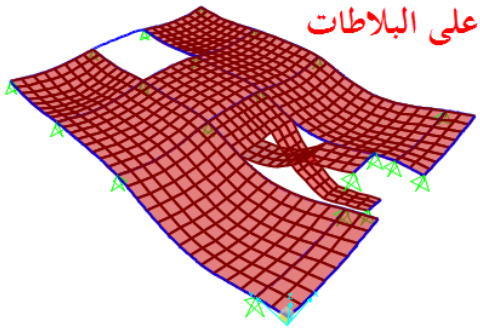


شكل المنشأ نتيجة الاحمال





لاظهار العزوم على البلاطات



افرض قيمة حديد التسليح

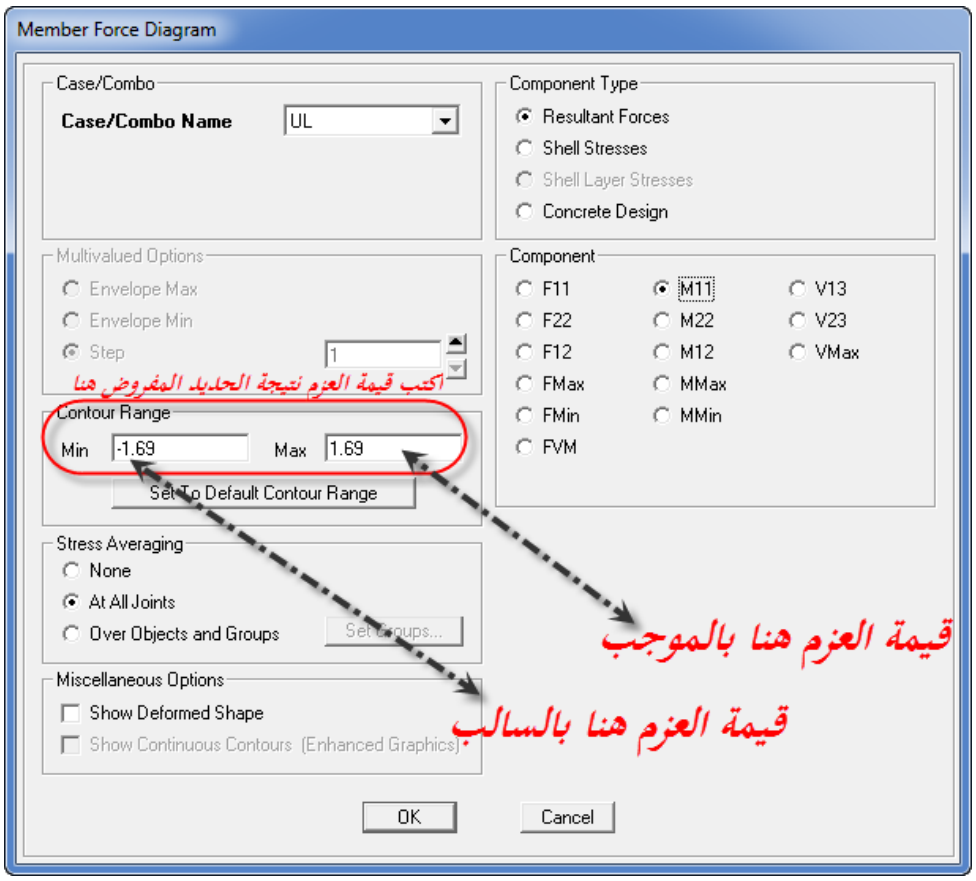
5ø10

وبالتعويض فى القانون

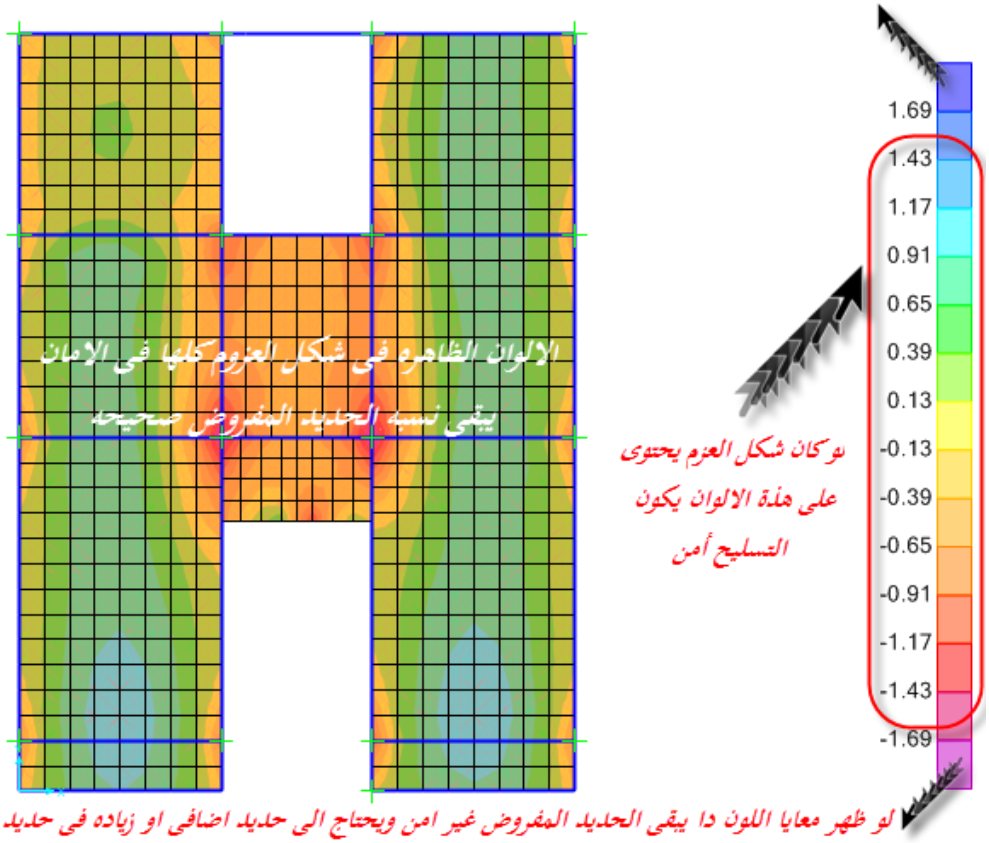
$$A_s = M_u / F_y * J * d$$

بفرض ان ناتج العزم

$$m_u = 1.69$$



لو ظهر معايا اللون دا يبقى الحديد المفروض غير امن ويحتاج الى حديد اضافى او زياده فى حديد التسليح



لو ظهر معايا اللون دا يبقى الحديد المفروض غير امن ويحتاج الى حديد اضافى او زياده فى حديد التسليح

مسائل محلوله على برنامج الساب

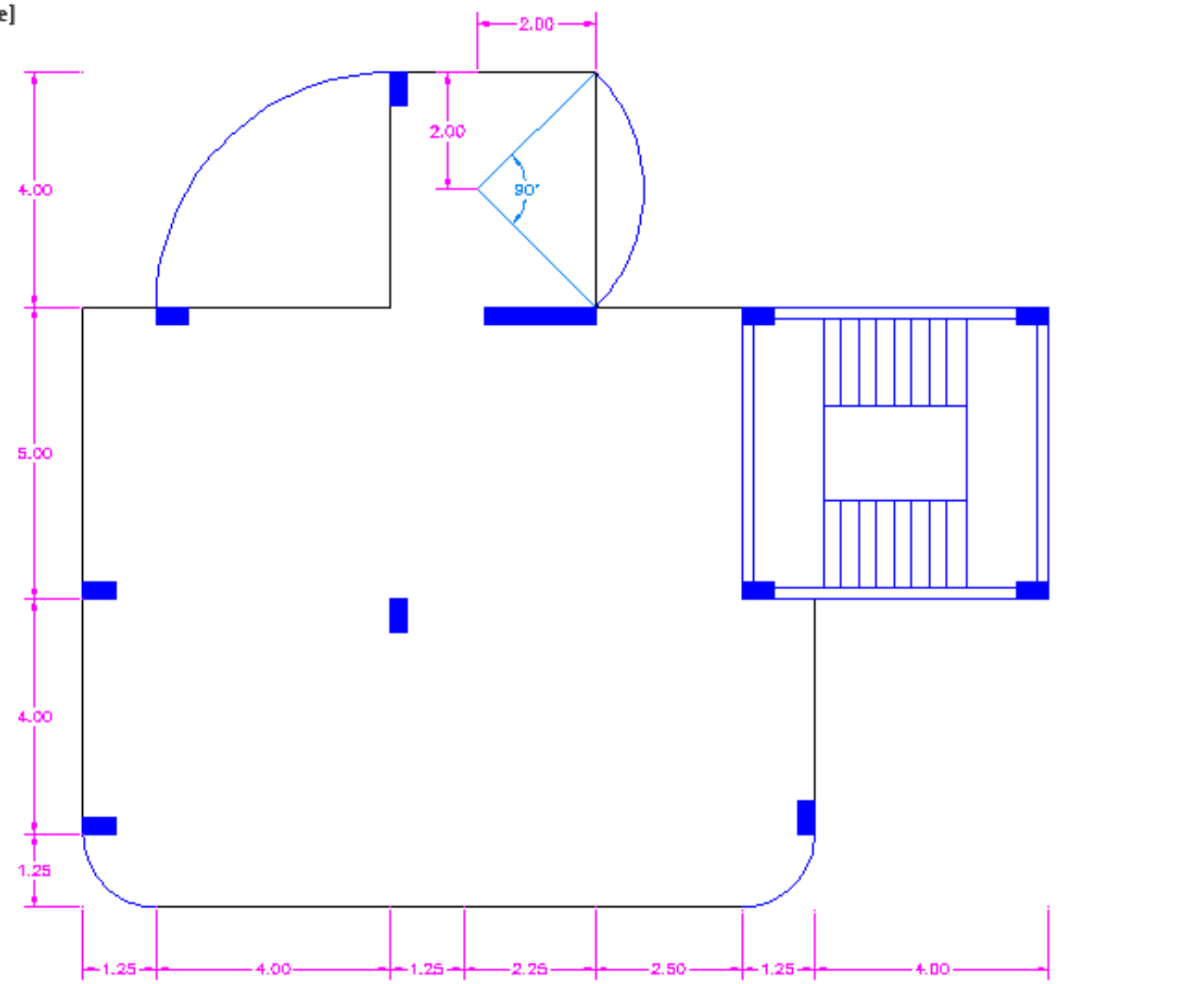
إعداد

Eng.kh_ahmed@yahoo.com

01063366722 Or 01140506722

www.facebook.com/Eng.Khaled.Abdelkarim

Flat Slab



floor hight = 3m

wall thickness = 12 cm

beam 1 = 70*25 cm2

beam2 = 60* 12 cm2

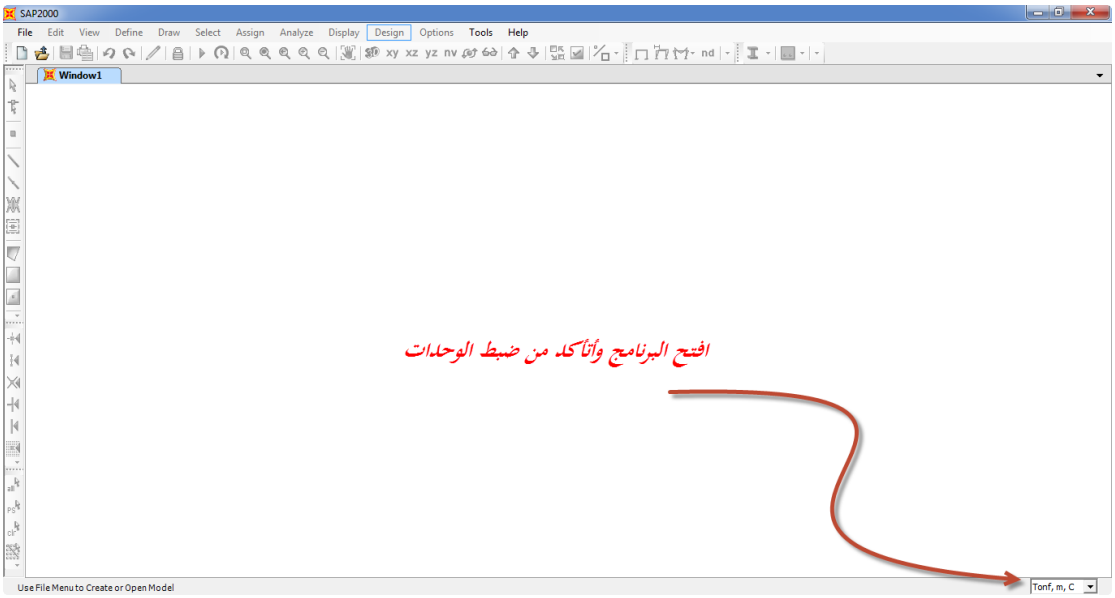
Ts = 20 cm

LL = 0.4 t/m2

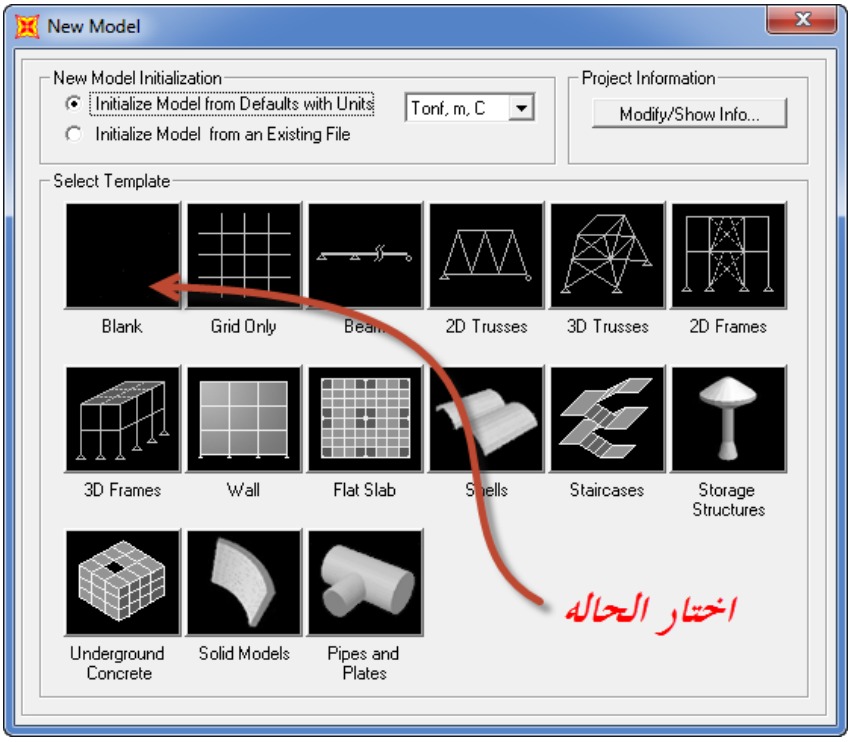
Floor cover =0.15 t/m2

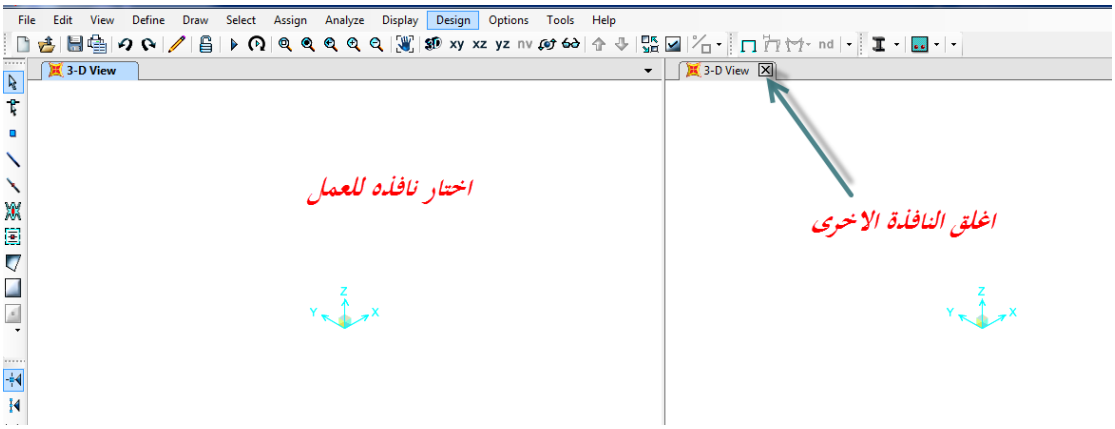
Eq loads on slabs =0.2 t/m2

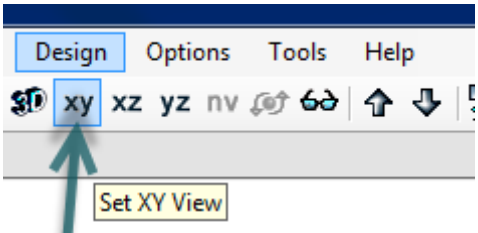
Solution


SAP2000
File Edit View Define Draw Select Assign Analyze Display Design Options Tools Help
Window1
افتح البرنامج وأتأكد من ضبط الوحدات
Use File Menu to Create or Open Model
Tonf, m, C


SAP2000 v15.0.1 Ultimate - (Untitled)
File Edit View Define Draw Sel
Window1
اختار موديل جديد

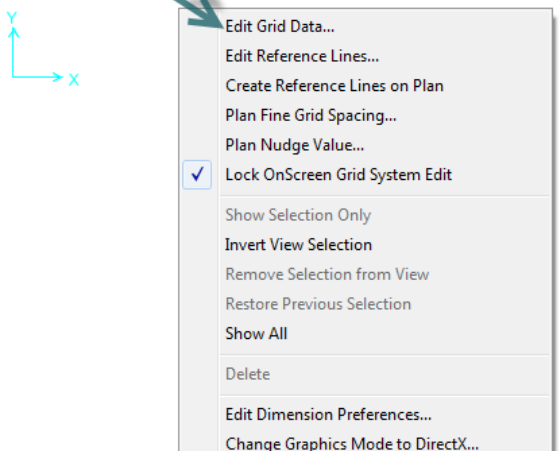


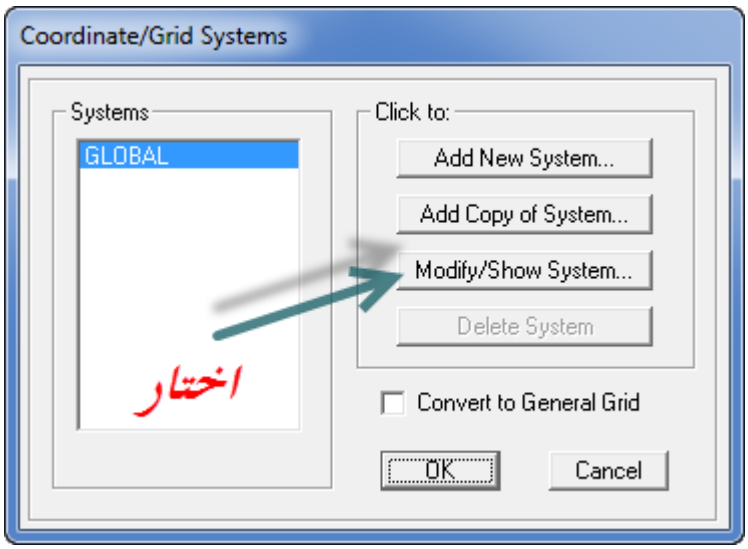


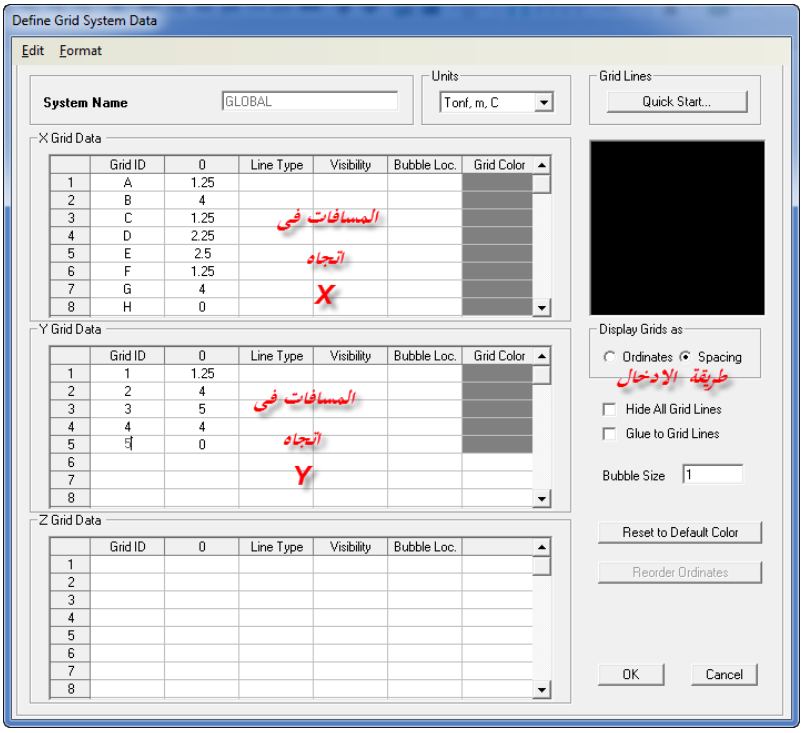


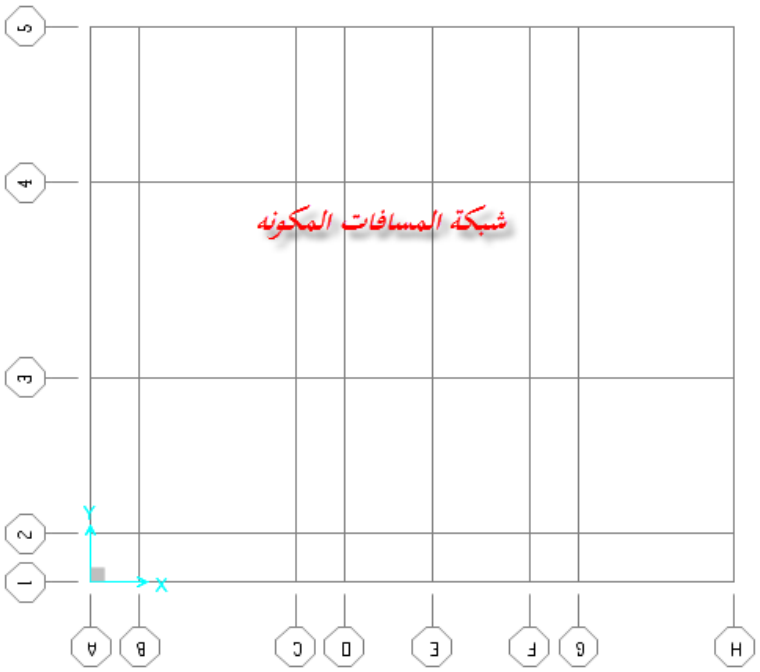
اختار مستوى العمل

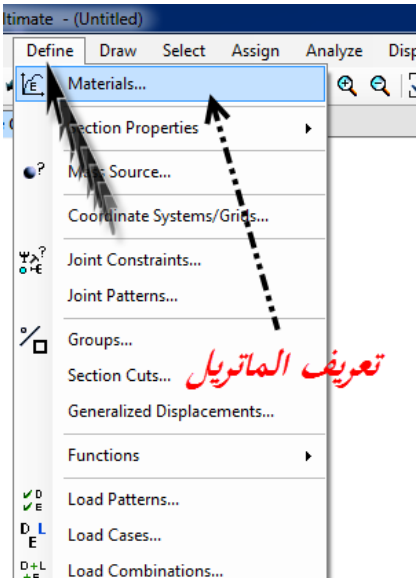
كليك يمين فى اى مكان على الشاشه واختار

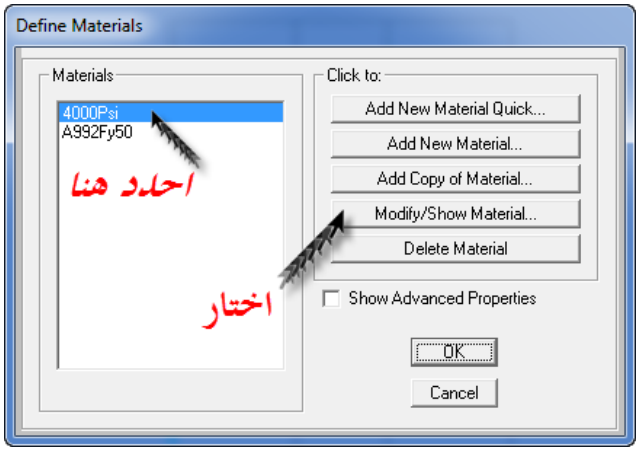


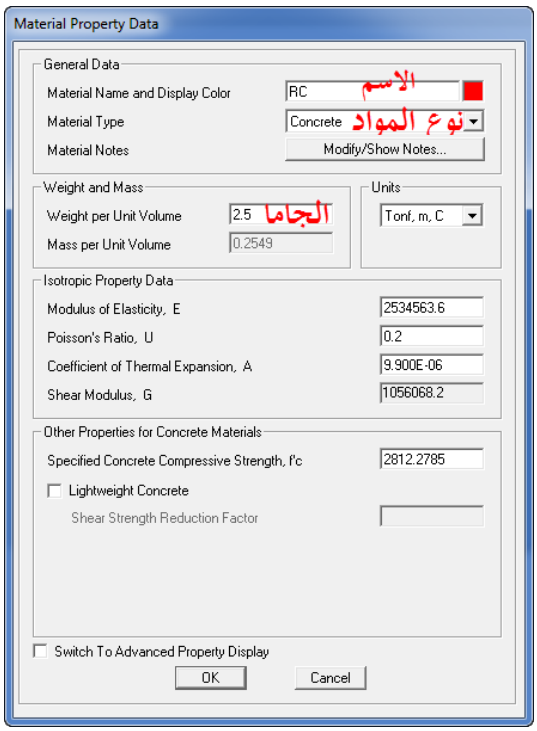


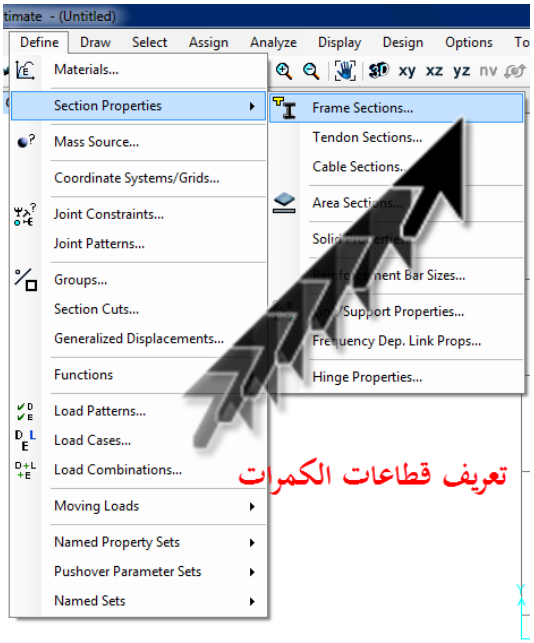

Define Grid System Data
Edit Format
System Name
GLOBAL
Units
Tonf, m, C
Grid Lines
Quick Start...
X Grid Data
Grid ID 0 Line Type Visibility Bubble Loc. Grid Color
1 A 1.25
2 B 4
3 C 1.25
4 D 2.25
5 E 2.5
6 F 1.25
7 G 4
8 H 0
المسافات في
اتجاه
X
Y Grid Data
Grid ID 0 Line Type Visibility Bubble Loc. Grid Color
1 1 1.25
2 2 4
3 3 5
4 4 4
5 5 0
المسافات في
اتجاه
Y
Z Grid Data
Grid ID 0 Line Type Visibility Bubble Loc.
Display Grids as
Ordinates Spacing
طريقة الادخال
Hide All Grid Lines
Glue to Grid Lines
Bubble Size 1
Reset to Default Color
Reorder Ordinates
OK
Cancel


شبكة المسافات المكونه
5
4
3
2
1
A
B
C
D
E
F
G
H
Y
X

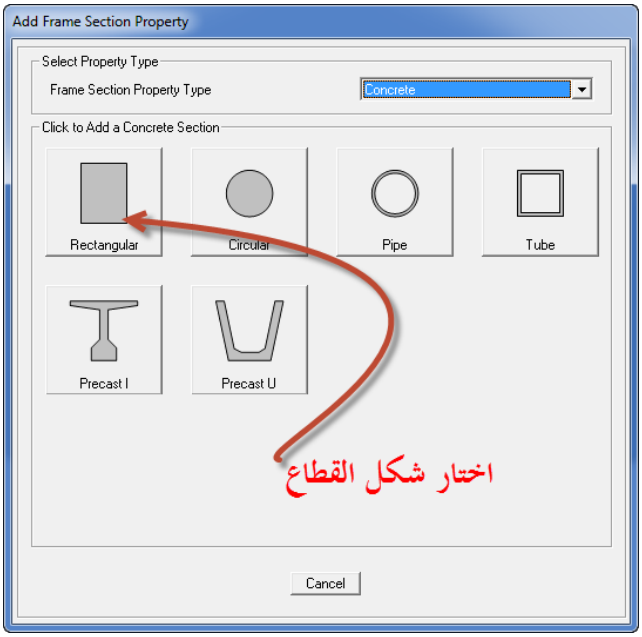

Define
Draw
Select
Assign
Analyze
Materials...
Section Properties
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
تعريف الماتريل

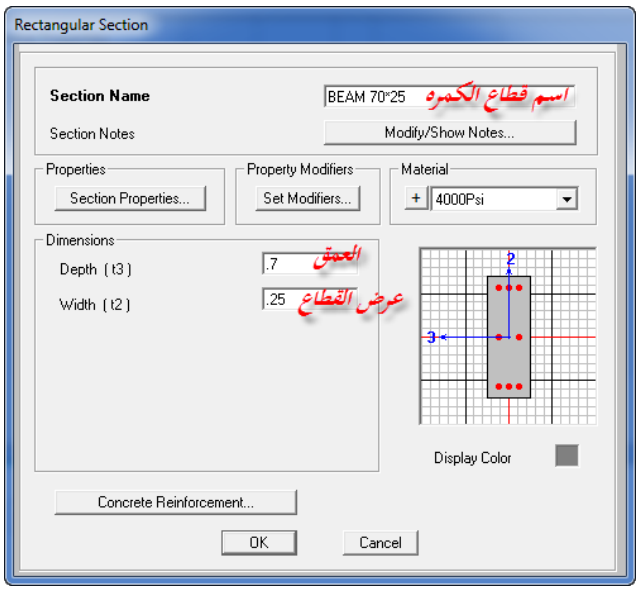

Define Materials
Materials
4000Psi
A992Fy50
احدد هنا
اختار
Click to:
Add New Material Quick...
Add New Material...
Add Copy of Material...
Modify/Show Material...
Delete Material
Show Advanced Properties
OK
Cancel

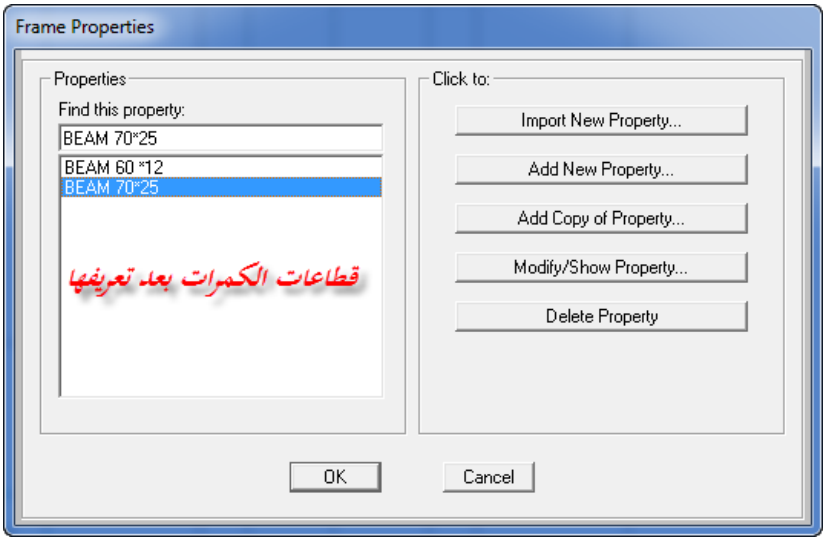

Material Property Data
General Data
Material Name and Display Color
RC
الاسم
Material Type
Concrete
نوع المواد
Material Notes
Modify/Show Notes...
Weight and Mass
Weight per Unit Volume
2.5
الجاما
Mass per Unit Volume
0.2549
Units
Tonf, m, C
Isotropic Property Data
Modulus of Elasticity, E
2534563.6
Poisson's Ratio, U
0.2
Coefficient of Thermal Expansion, A
9.900E-06
Shear Modulus, G
1056068.2
Other Properties for Concrete Materials
Specified Concrete Compressive Strength, f'c
2812.2785
Lightweight Concrete
Shear Strength Reduction Factor
Switch To Advanced Property Display
OK
Cancel

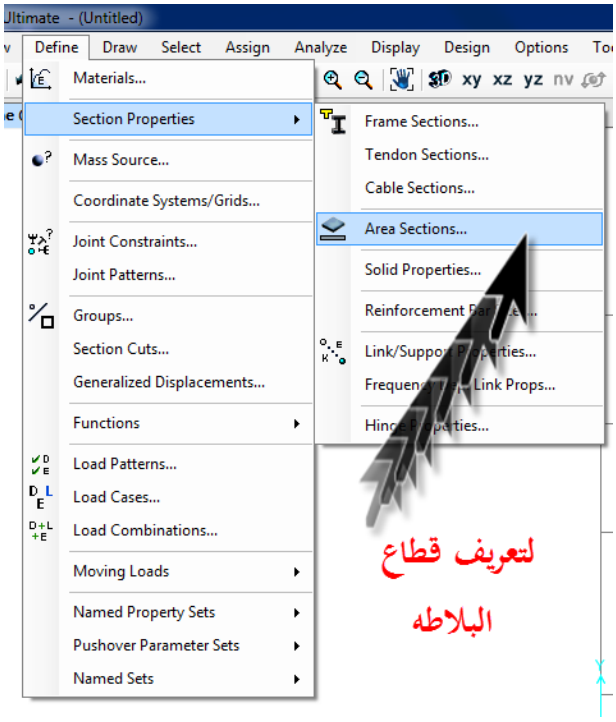

timate - (Untitled)
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
Frame Sections...
Tendon Sections...
Cable Sections...
Hinge Properties...
تعريف قطاعات الكمرات


Frame Properties
Properties
Find this property:
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
اضافه قطاع جديد
OK
Cancel

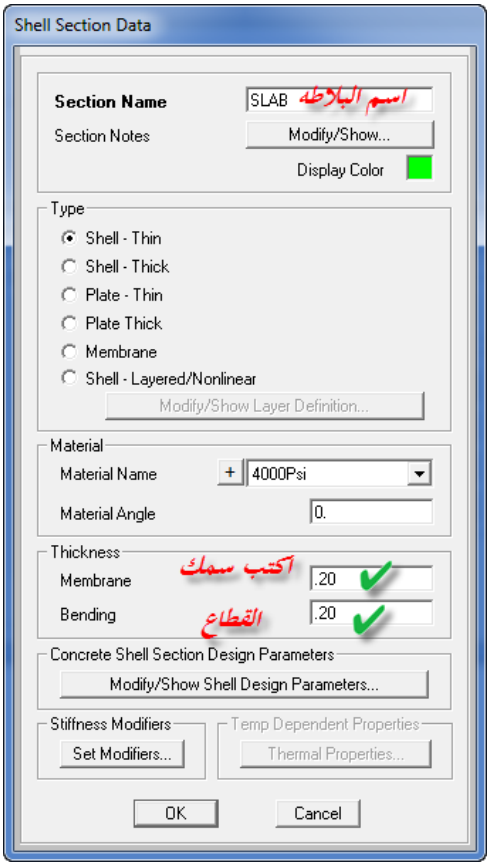

Add Frame Section Property
Select Property Type
Frame Section Property Type
Concrete
Click to Add a Concrete Section
Rectangular
Circular
Pipe
Tube
Precast I
Precast U
اختار شكل القطاع
Cancel

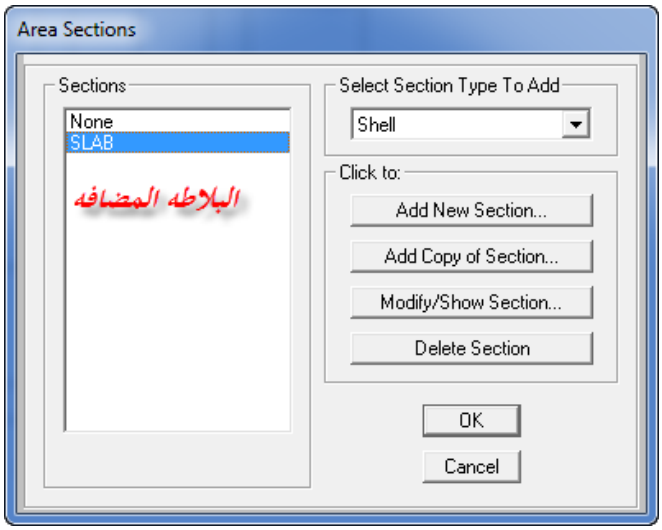

Rectangular Section
Section Name
BEAM 70*25
اسم قطاع الكمره
Section Notes
Modify/Show Notes...
Properties
Section Properties...
Property Modifiers
Set Modifiers...
Material
4000Psi
Dimensions
Depth (t3)
.7
العمق
Width (t2)
.25
عرض القطاع
Display Color
Concrete Reinforcement...
OK
Cancel

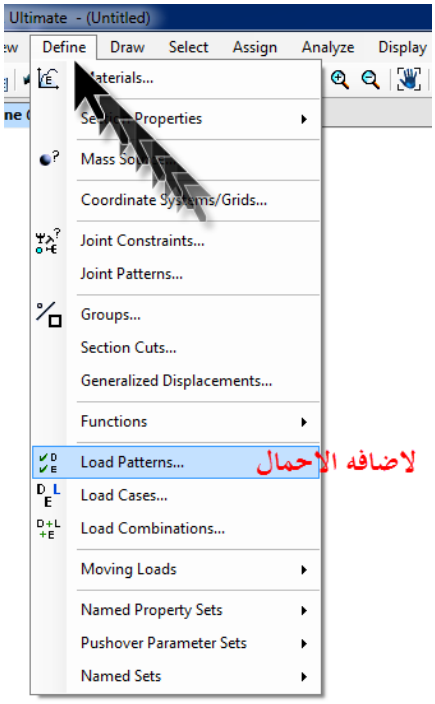

Frame Properties
Properties
Find this property:
BEAM 70*25
BEAM 60 *12
BEAM 70*25
قطاعات الكمرات بعد تعريفها
Click to:
Import New Property...
Add New Property...
Add Copy of Property...
Modify/Show Property...
Delete Property
OK
Cancel

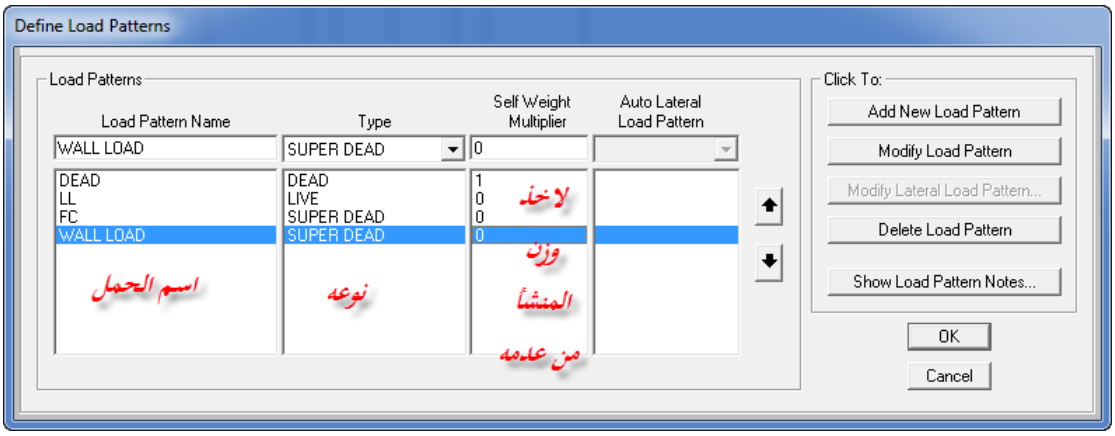

Ultimate - (Untitled)
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Materials...
Section Properties
Mass Source...
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets
Frame Sections...
Tendon Sections...
Cable Sections...
Area Sections...
Solid Properties...
لتعريف قطاع
البلاطه

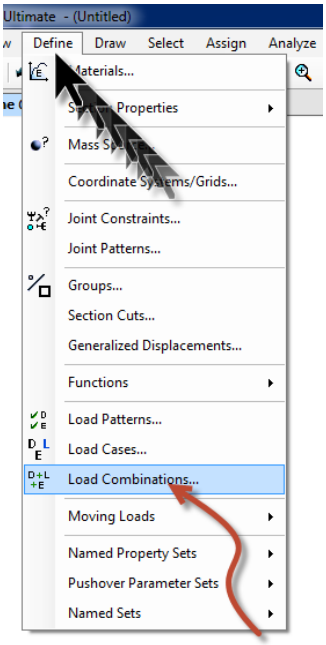

Area Sections
Sections
None
Select Section Type To Add
Shell
Click to:
Add New Section...
Add Copy of Section...
Modify/Show Section...
Delete Section
OK
Cancel
اضافة جديد


Shell Section Data
Section Name
SLAB
اسم البلاطه
Section Notes
Modify/Show...
Display Color
Type
Shell - Thin
Shell - Thick
Plate - Thin
Plate Thick
Membrane
Shell - Layered/Nonlinear
Modify/Show Layer Definition...
Material
Material Name
4000Psi
Material Angle
0.
Thickness
اكتب سمك
Membrane
.20
القطاع
Bending
.20
Concrete Shell Section Design Parameters
Modify/Show Shell Design Parameters...
Stiffness Modifiers
Set Modifiers...
Temp Dependent Properties
Thermal Properties...
OK
Cancel

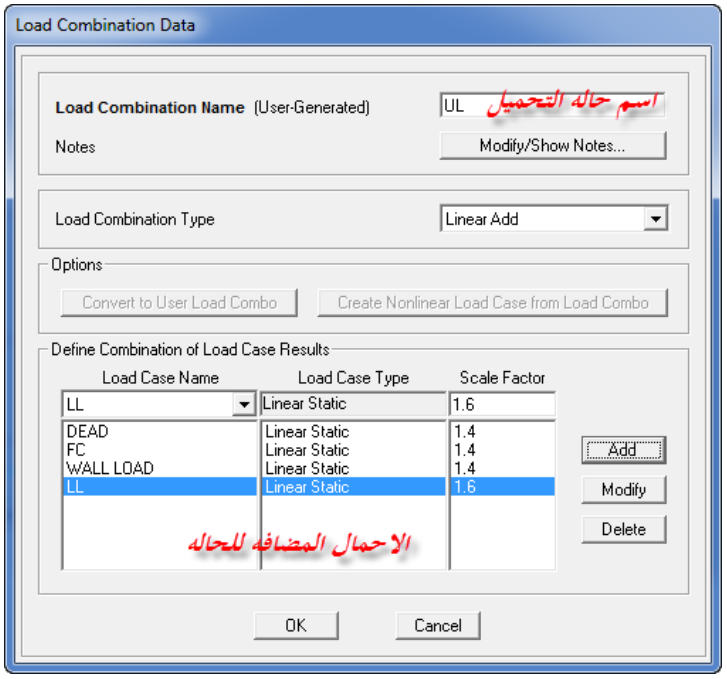

Area Sections
Sections
None
SLAB
البلاطه المضافه
Select Section Type To Add
Shell
Click to:
Add New Section...
Add Copy of Section...
Modify/Show Section...
Delete Section
OK
Cancel

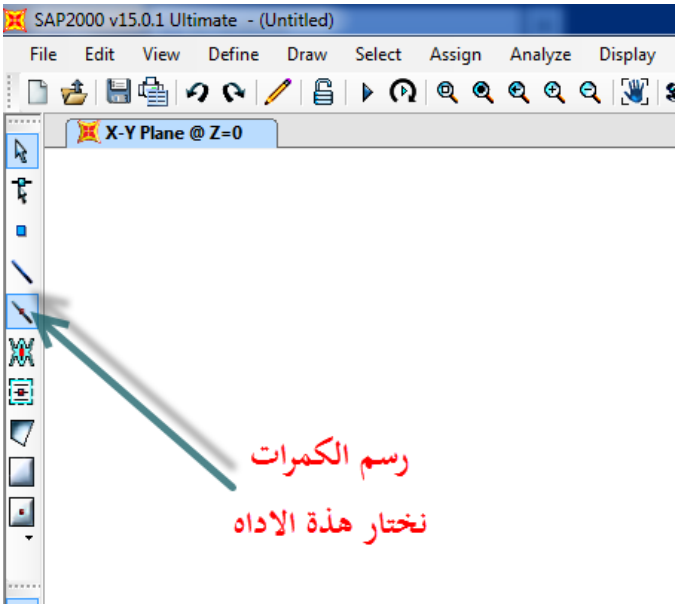

Ultimate - (Untitled)
Define
Draw
Select
Assign
Analyze
Display
Properties
Coordinate Systems/Grids...
Joint Constraints...
Joint Patterns...
Groups...
Section Cuts...
Generalized Displacements...
Functions
Load Patterns...
لاضافه الاحمال
Load Cases...
Load Combinations...
Moving Loads
Named Property Sets
Pushover Parameter Sets
Named Sets

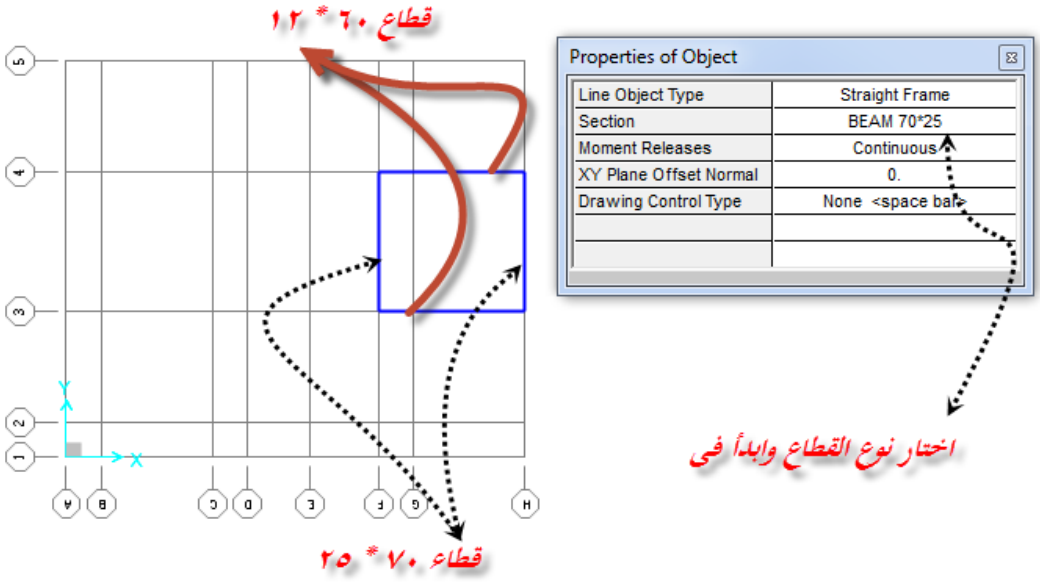

Define Load Patterns
Load Patterns
Load Pattern Name
Type
Self Weight Multiplier
Auto Lateral Load Pattern
WALL LOAD
SUPER DEAD
0
DEAD
LL
FC
WALL LOAD
DEAD
LIVE
SUPER DEAD
SUPER DEAD
1
0
0
0
لا خذ
وزن
المنشأ
من عدمه
اسم الحمل
نوعه
Click To:
Add New Load Pattern
Modify Load Pattern
Modify Lateral Load Pattern...
Delete Load Pattern
Show Load Pattern Notes...
OK
Cancel

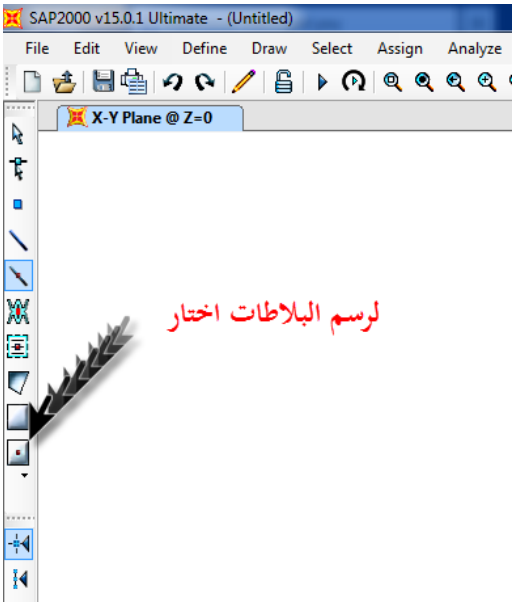


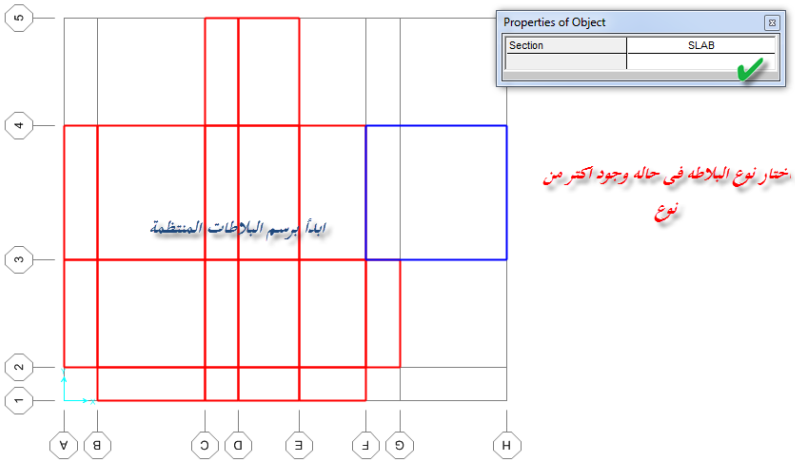
عمل حالات التحميل

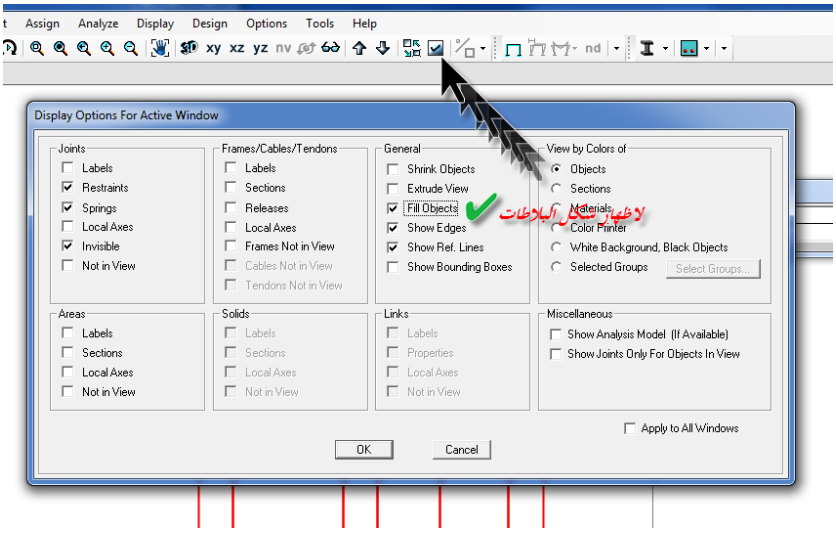

Load Combination Data
Load Combination Name (User-Generated)
UL
اسم حاله التحميل
Notes
Modify/Show Notes...
Load Combination Type
Linear Add
Options
Convert to User Load Combo
Create Nonlinear Load Case from Load Combo
Define Combination of Load Case Results
Load Case Name
Load Case Type
Scale Factor
LL
Linear Static
1.6
DEAD
Linear Static
1.4
FC
Linear Static
1.4
WALL LOAD
Linear Static
1.4
LL
Linear Static
1.6
الاحمال المضافه للحاله
Add
Modify
Delete
OK
Cancel

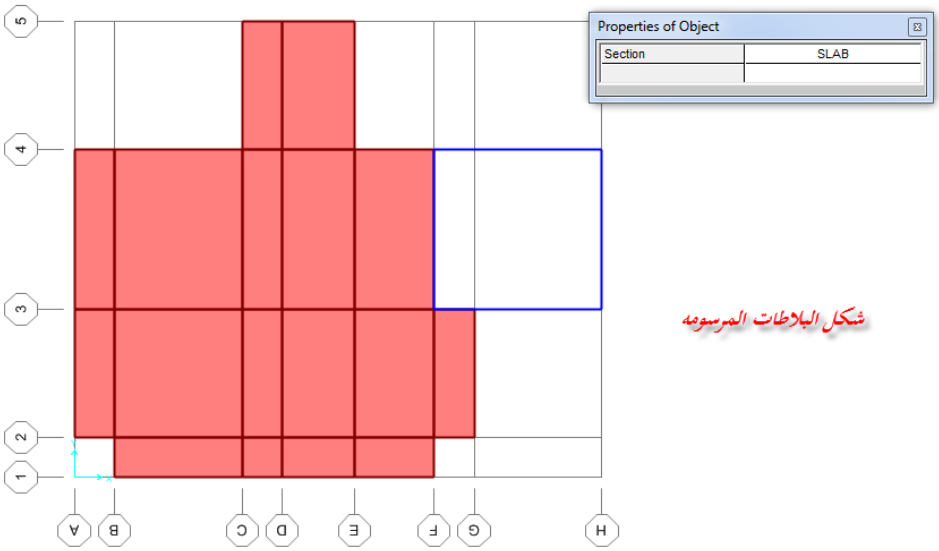

SAP2000 v15.0.1 Ultimate - (Untitled)
File Edit View Define Draw Select Assign Analyze Display
X-Y Plane @ Z=0
رسم الكمرات
نختار هذة الاداه

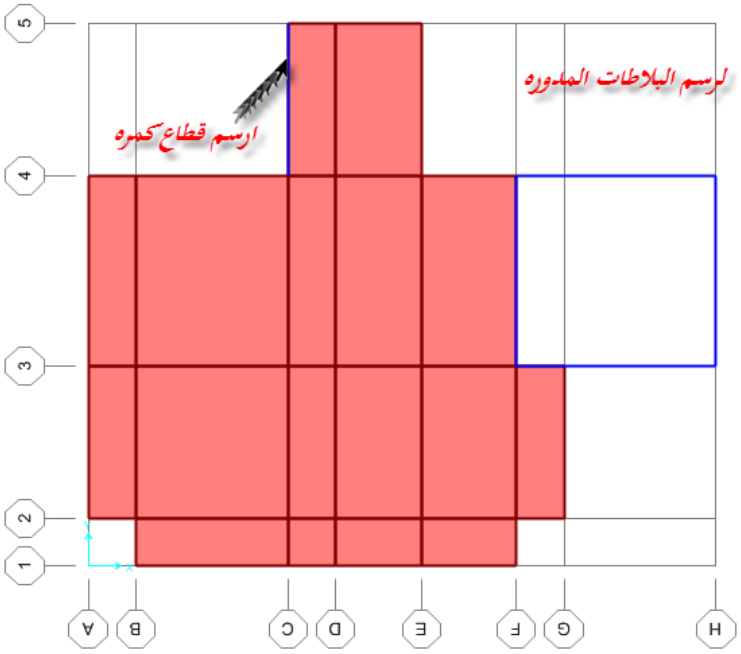

قطاع ٦٠ * ١٢
Properties of Object
Line Object Type
Straight Frame
Section
BEAM 70*25
Moment Releases
Continuous
XY Plane Offset Normal
0.
Drawing Control Type
None <space bar>
اختار نوع القطاع وابدأ في
قطاع ٧٠ * ٢٥

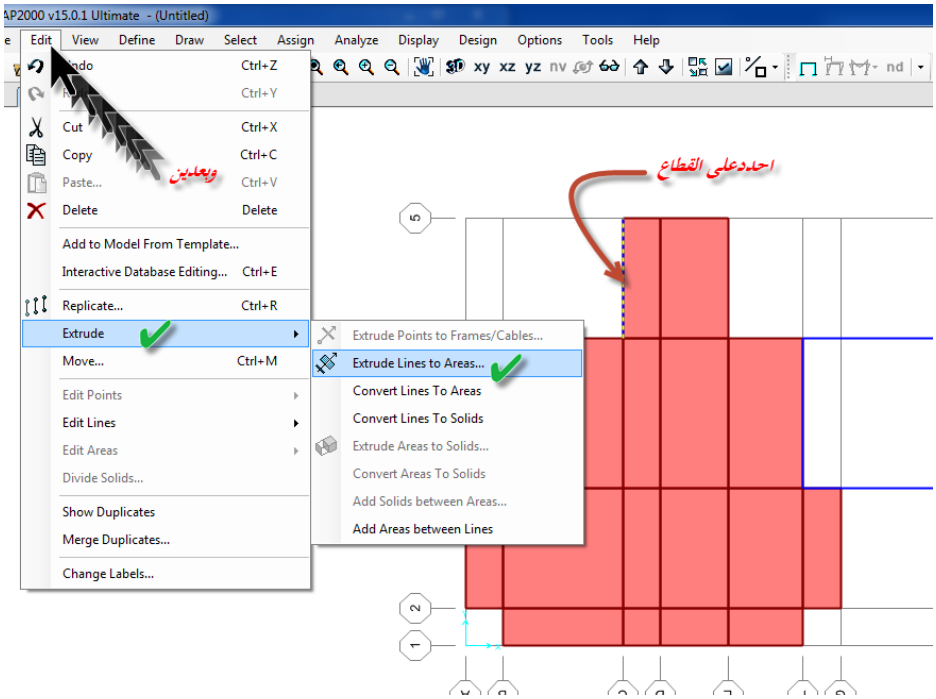

SAP2000 v15.0.1 Ultimate - (Untitled)
File Edit View Define Draw Select Assign Analyze
X-Y Plane @ Z=0
لرسم البلاطات اختار

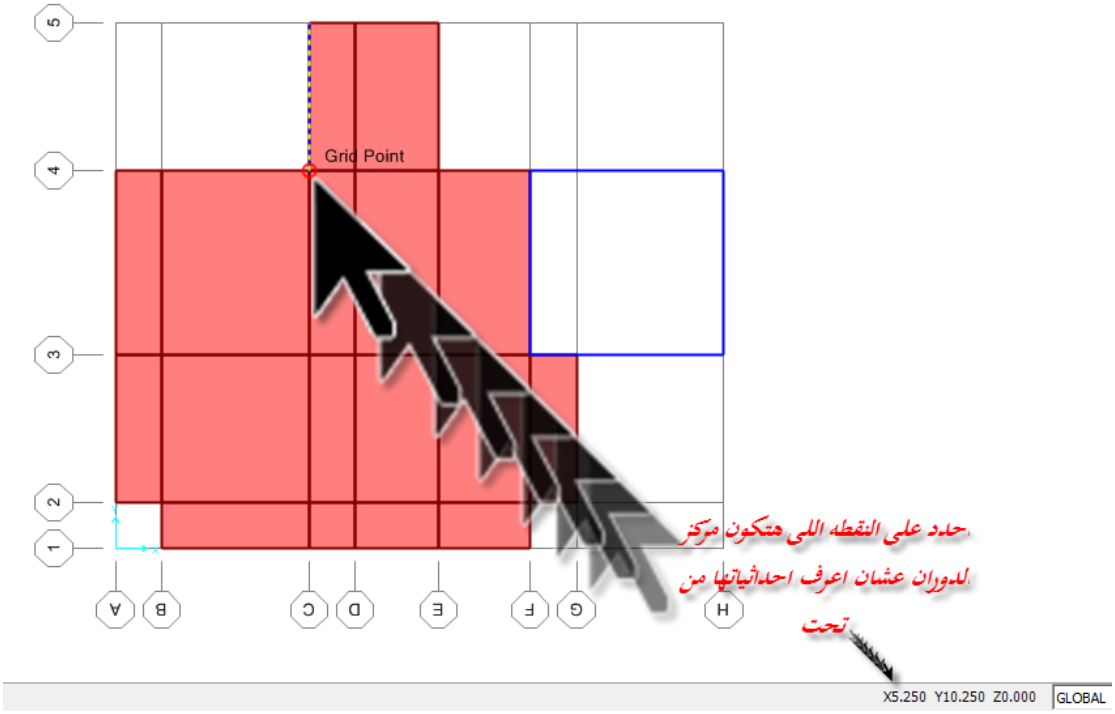

Properties of Object
Section
SLAB
ابدأ برسم البلاطات المنتظمة
اختار نوع البلاطه في حاله وجود أكثر من نوع

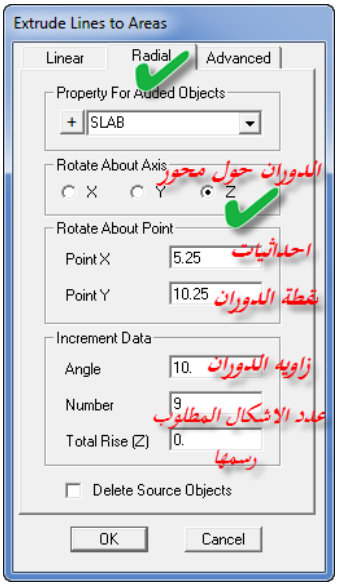

Assign
Analyze
Display
Design
Options
Tools
Help
Display Options For Active Window
Joints
Labels
Restraints
Springs
Local Axes
Invisible
Not in View
Frames/Cables/Tendons
Labels
Sections
Releases
Local Axes
Frames Not in View
Cables Not in View
Tendons Not in View
General
Shrink Objects
Extrude View
Fill Objects
Show Edges
Show Ref. Lines
Show Bounding Boxes
View by Colors of
Objects
Sections
Materials
Color Printer
White Background, Black Objects
Selected Groups
Select Groups...
Areas
Labels
Sections
Local Axes
Not in View
Solids
Labels
Sections
Local Axes
Not in View
Links
Labels
Properties
Local Axes
Not in View
Miscellaneous
Show Analysis Model (If Available)
Show Joints Only For Objects In View
Apply to All Windows
OK
Cancel
لاظهار شكل البلاطات

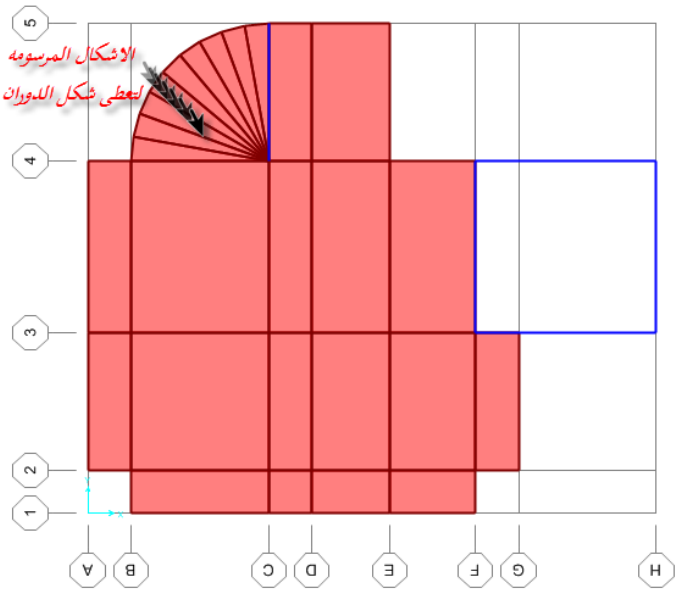

Properties of Object
Section
SLAB
شكل البلاطات المرسومه

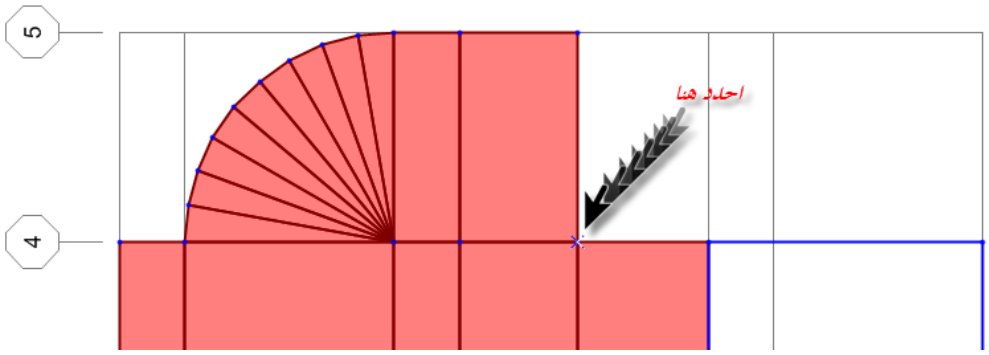

لرسم البلاطات المدوره
ارسم قطاع كمره
5
4
3
2
1
A
B
C
D
E
F
G
H

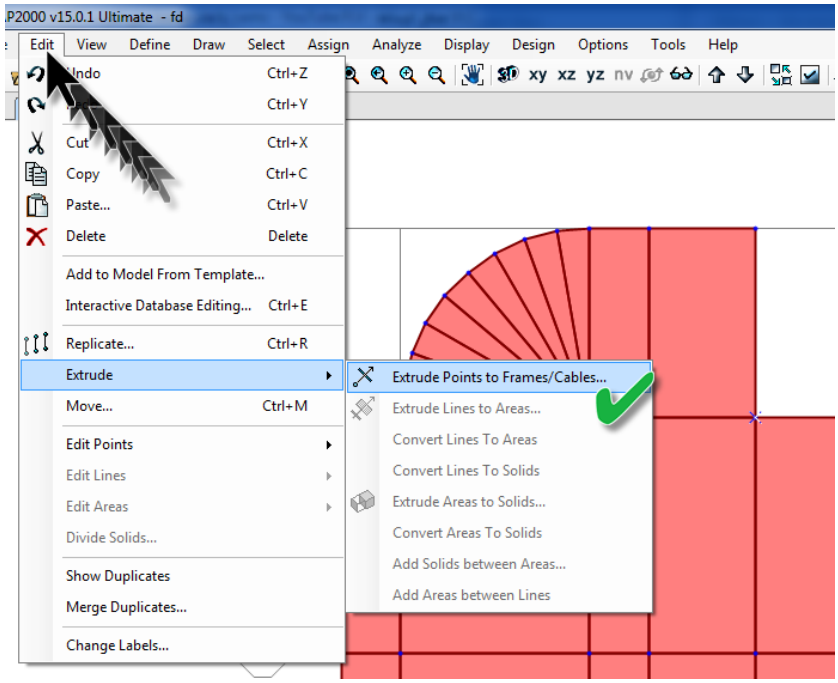

AP2000 v15.0.1 Ultimate - (Untitled)
Edit
View
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Help
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste... Ctrl+V
Delete Delete
Add to Model From Template...
Interactive Database Editing... Ctrl+E
Replicate... Ctrl+R
Extrude
Move... Ctrl+M
Edit Points
Edit Lines
Edit Areas
Divide Solids...
Show Duplicates
Merge Duplicates...
Change Labels...
Extrude Points to Frames/Cables...
Extrude Lines to Areas...
Convert Lines To Areas
Convert Lines To Solids
Extrude Areas to Solids...
Convert Areas To Solids
Add Solids between Areas...
Add Areas between Lines
ويعدين
احددعلى القطاع

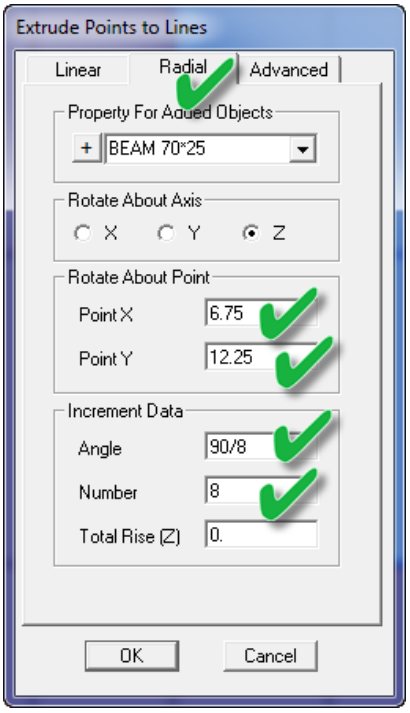

Grid Point
حدد على النقطه اللى هتكون مركز
للدوران عشان اعرف احداثياتها من
تحت
X5.250 Y10.250 Z0.000
GLOBAL

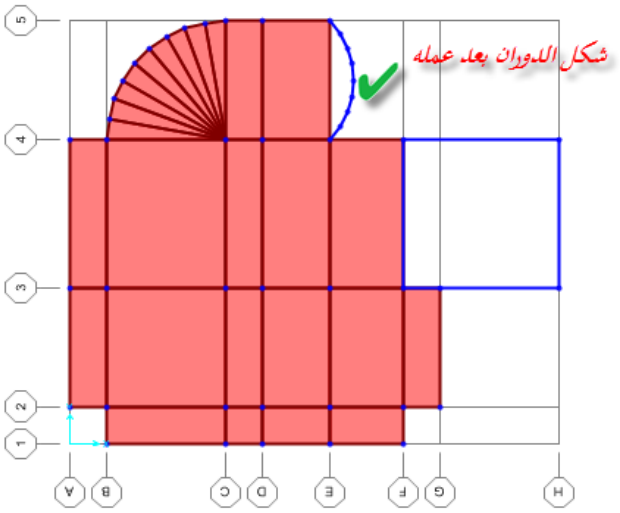

Extrude Lines to Areas
Linear
Radial
Advanced
Property For Added Objects
SLAB
Rotate About Axis
X
Y
Z
الدوران حول محور
Rotate About Point
Point X
5.25
احداثيات
Point Y
10.25
نقطة الدوران
Increment Data
Angle
10.
زاويه الدوران
Number
9
عدد الاشكال المطلوب
رسمها
Total Rise (Z)
0.
Delete Source Objects
OK
Cancel

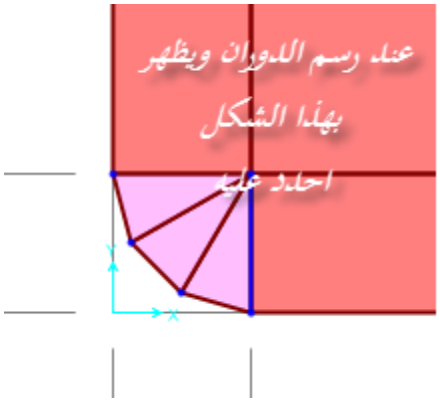

الاشكال المرسومه
لتعطى شكل الدوران
5
4
3
2
1
A
B
C
D
E
F
G
H

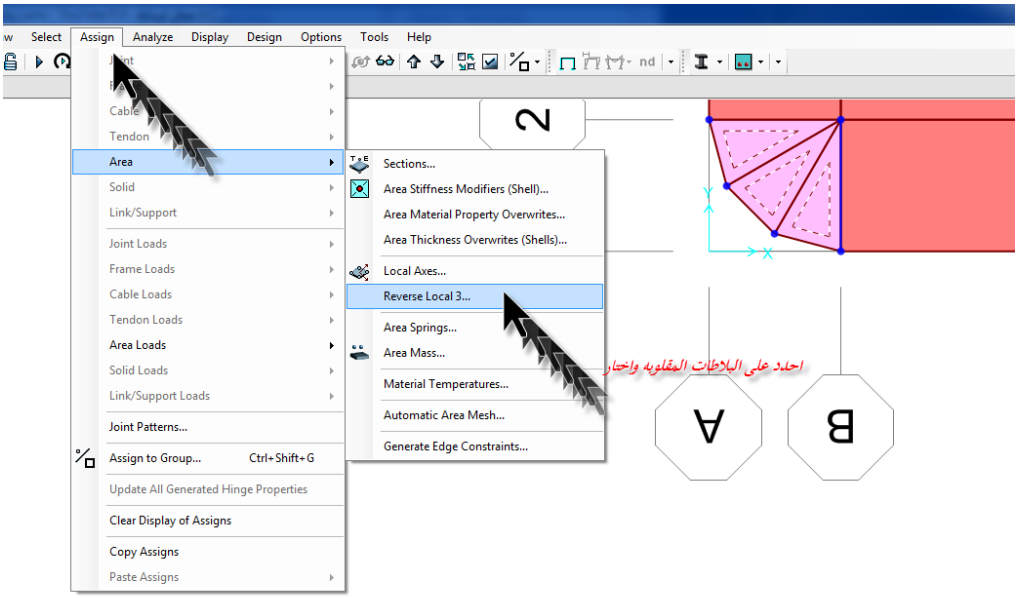

5
4
احدد هنا

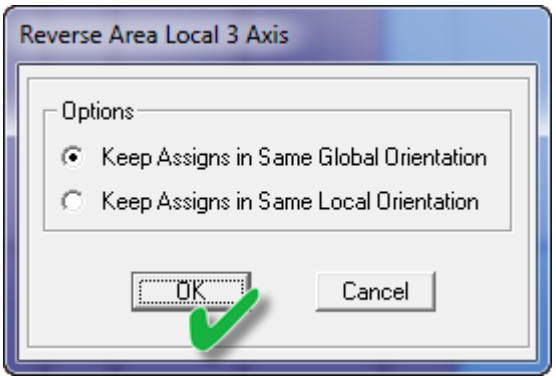

P2000 v15.0.1 Ultimate - fd
Edit
View
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Help
Undo Ctrl+Z
Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste... Ctrl+V
Delete Delete
Add to Model From Template...
Interactive Database Editing... Ctrl+E
Replicate... Ctrl+R
Extrude
Move... Ctrl+M
Edit Points
Edit Lines
Edit Areas
Divide Solids...
Show Duplicates
Merge Duplicates...
Change Labels...
Extrude Points to Frames/Cables...
Extrude Lines to Areas...
Convert Lines To Areas
Convert Lines To Solids
Extrude Areas to Solids...
Convert Areas To Solids
Add Solids between Areas...
Add Areas between Lines

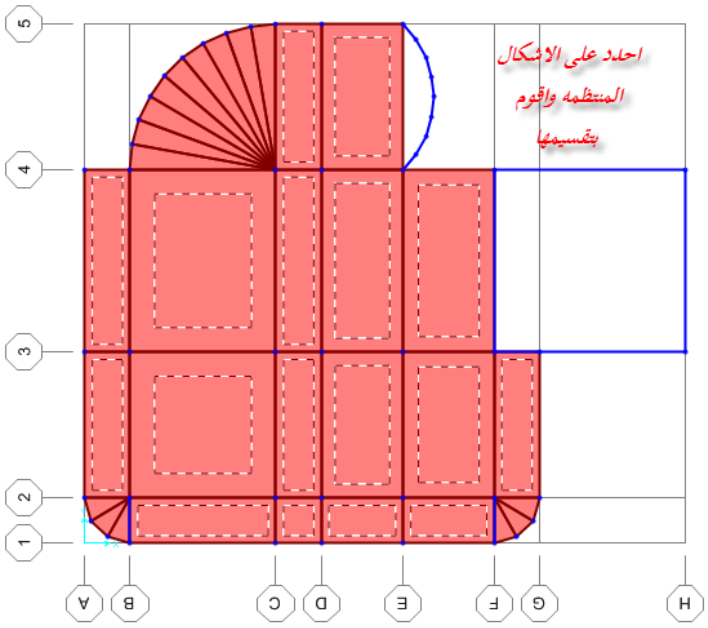

Extrude Points to Lines
Linear
Radial
Advanced
Property For Added Objects
BEAM 70*25
Rotate About Axis
X
Y
Z
Rotate About Point
Point X
6.75
Point Y
12.25
Increment Data
Angle
90/8
Number
8
Total Rise (Z)
0.
OK
Cancel

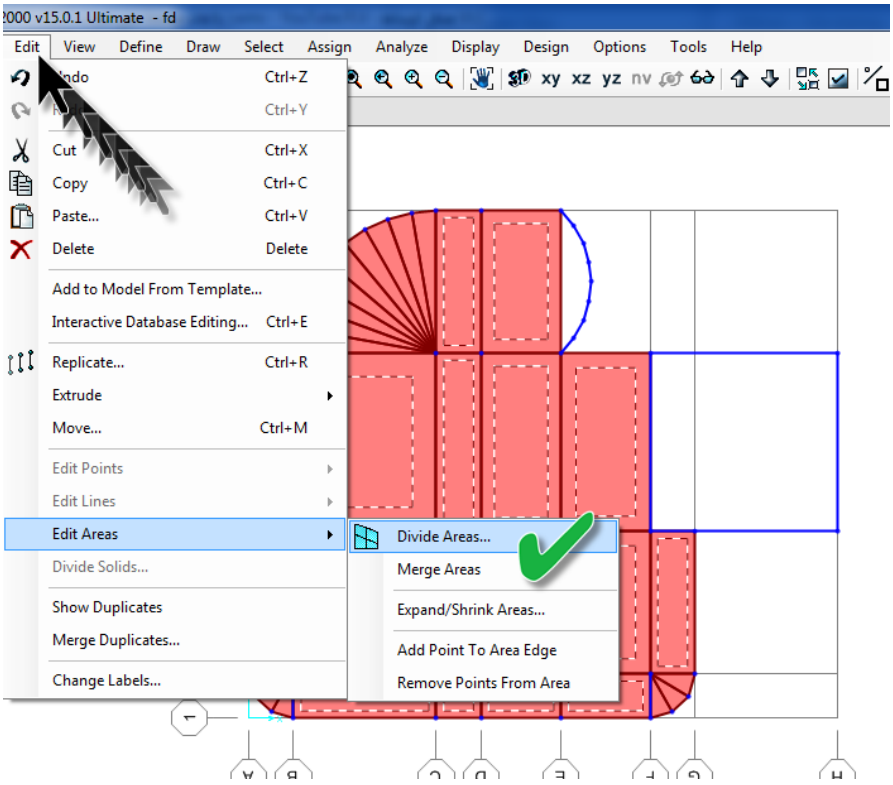

شكل الدوران بعد عمله

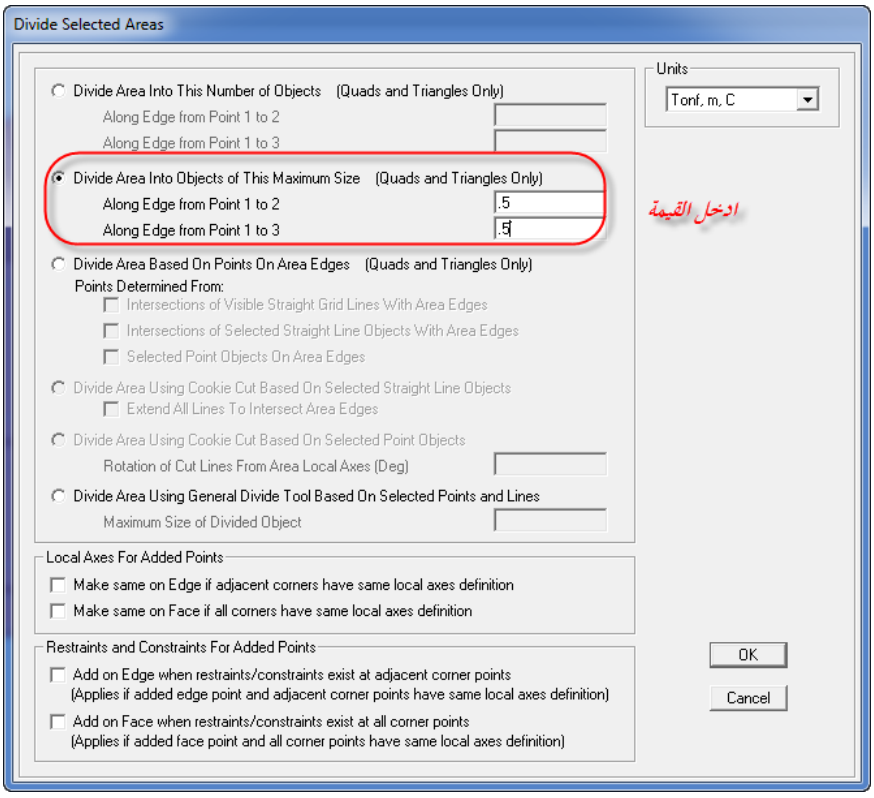

عند رسم الدوران ويظهر
بهذا الشكل
احدد عليه

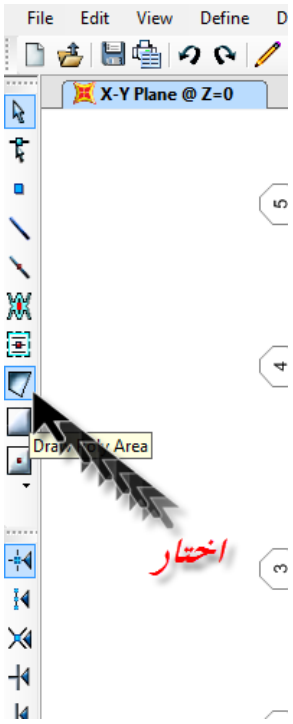

Select
Assign
Analyze
Display
Design
Options
Tools
Help
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Joint Patterns...
Assign to Group... Ctrl+Shift+G
Update All Generated Hinge Properties
Clear Display of Assigns
Copy Assigns
Paste Assigns
Sections...
Area Stiffness Modifiers (Shell)...
Area Material Property Overwrites...
Area Thickness Overwrites (Shells)...
Local Axes...
Reverse Local 3...
Area Springs...
Area Mass...
Material Temperatures...
Automatic Area Mesh...
Generate Edge Constraints...
احدد على البلاطات المقلوبه واختار
2
A
B

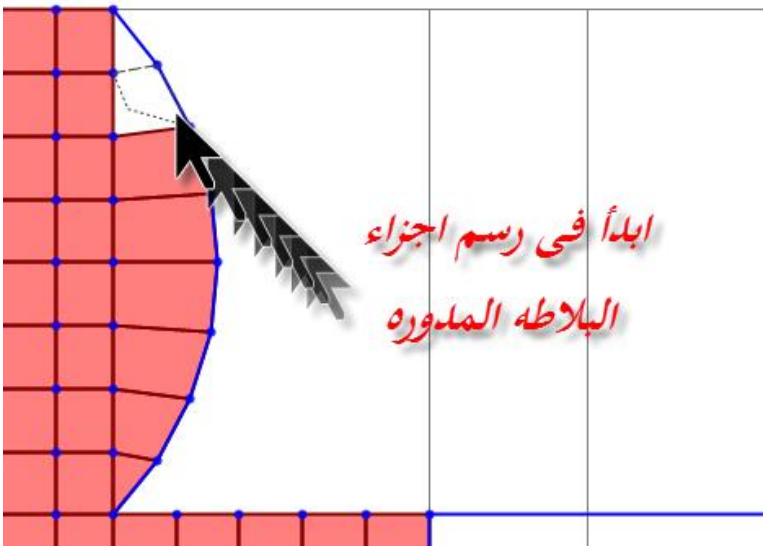

Reverse Area Local 3 Axis
Options
Keep Assigns in Same Global Orientation
Keep Assigns in Same Local Orientation
OK
Cancel

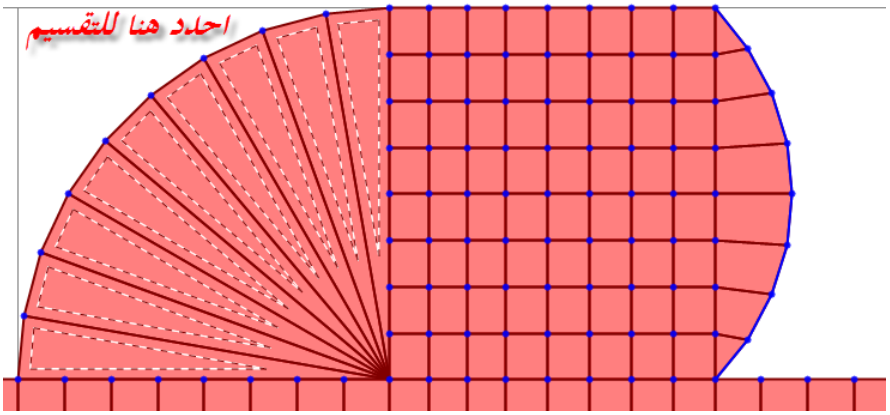

احدد على الاشكال
المنتظمه واقوم
بتقسيمها
5
4
3
2
1
A
B
C
D
E
F
G
H

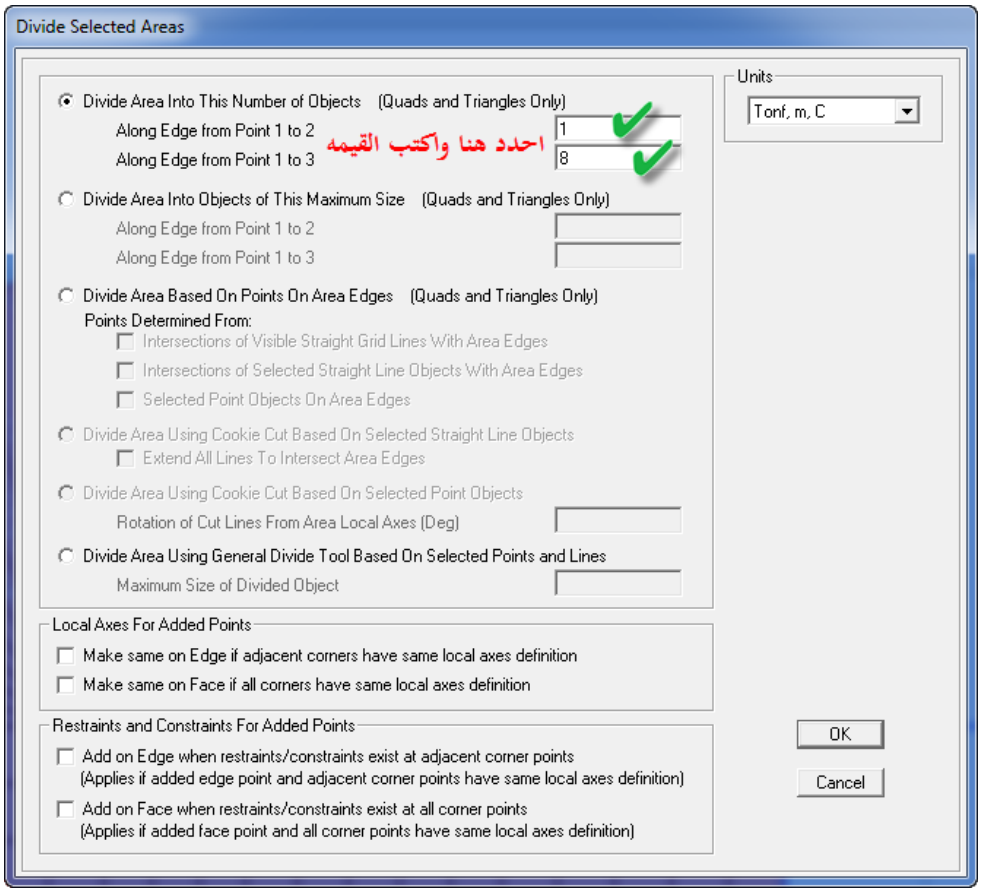

2000 v15.0.1 Ultimate - fd
Edit
View
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Help
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste... Ctrl+V
Delete Delete
Add to Model From Template...
Interactive Database Editing... Ctrl+E
Replicate... Ctrl+R
Extrude
Move... Ctrl+M
Edit Points
Edit Lines
Edit Areas
Divide Solids...
Show Duplicates
Merge Duplicates...
Change Labels...
Divide Areas...
Merge Areas
Expand/Shrink Areas...
Add Point To Area Edge
Remove Points From Area


Divide Selected Areas
Divide Area Into This Number of Objects (Quads and Triangles Only)
Along Edge from Point 1 to 2
Along Edge from Point 1 to 3
Divide Area Into Objects of This Maximum Size (Quads and Triangles Only)
Along Edge from Point 1 to 2 .5
Along Edge from Point 1 to 3 .5
ادخل القيمة
Divide Area Based On Points On Area Edges (Quads and Triangles Only)
Points Determined From:
Intersections of Visible Straight Grid Lines With Area Edges
Intersections of Selected Straight Line Objects With Area Edges
Selected Point Objects On Area Edges
Divide Area Using Cookie Cut Based On Selected Straight Line Objects
Extend All Lines To Intersect Area Edges
Divide Area Using Cookie Cut Based On Selected Point Objects
Rotation of Cut Lines From Area Local Axes (Deg)
Divide Area Using General Divide Tool Based On Selected Points and Lines
Maximum Size of Divided Object
Units
Tonf, m, C
Local Axes For Added Points
Make same on Edge if adjacent corners have same local axes definition
Make same on Face if all corners have same local axes definition
Restraints and Constraints For Added Points
Add on Edge when restraints/constraints exist at adjacent corner points
(Applies if added edge point and adjacent corner points have same local axes definition)
Add on Face when restraints/constraints exist at all corner points
(Applies if added face point and all corner points have same local axes definition)
OK
Cancel

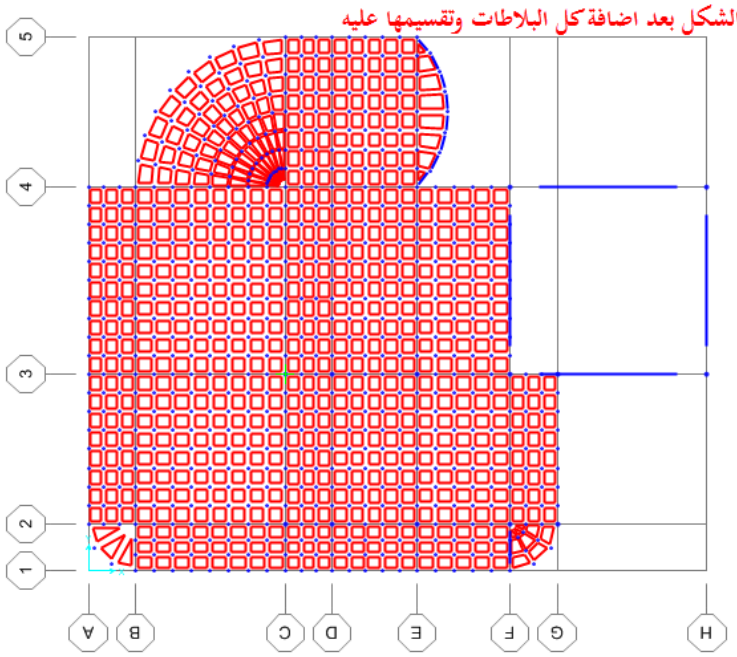

File
Edit
View
Define
X-Y Plane @ Z=0
اختار


ابدأ فى رسم اجزاء
البلاطه المدوره

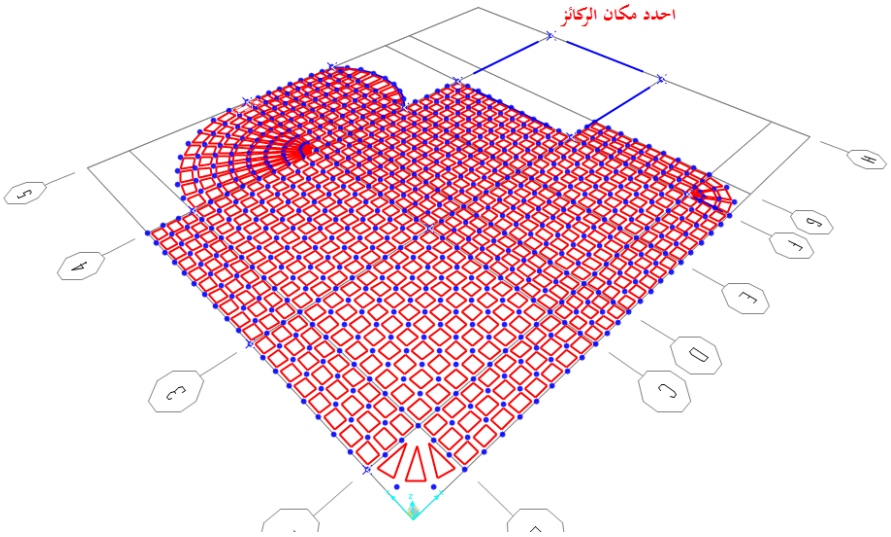

احدد هنا للتقسيم

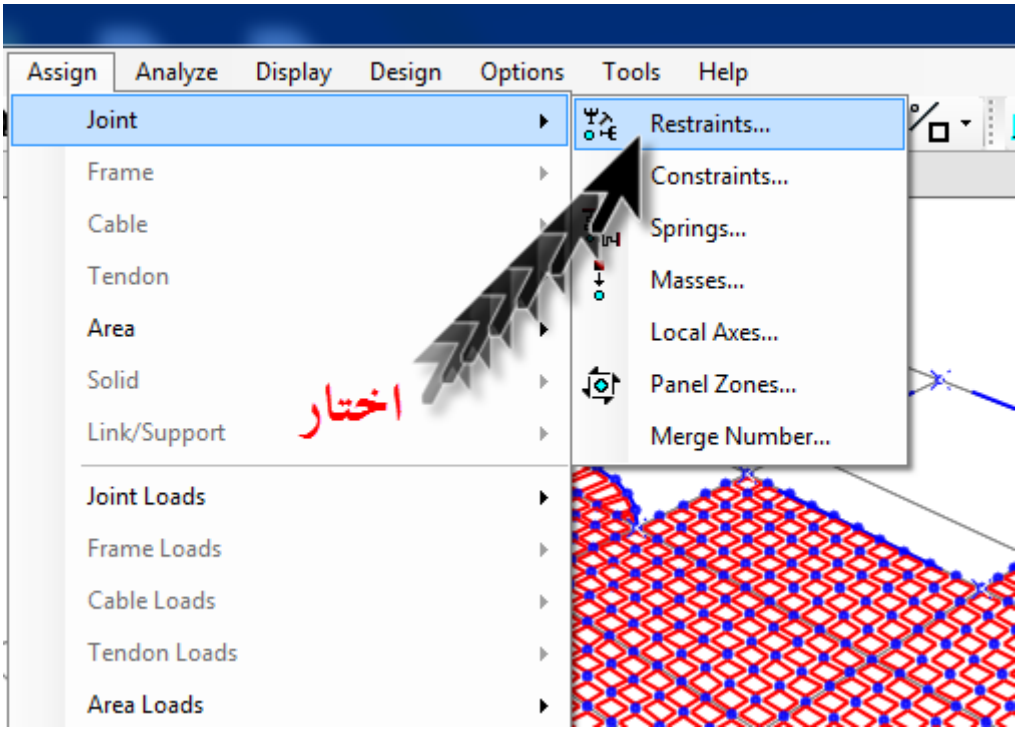

Divide Selected Areas
Divide Area Into This Number of Objects (Quads and Triangles Only)
Along Edge from Point 1 to 2
Along Edge from Point 1 to 3
احدد هنا واكتب القيمه
1
8
Divide Area Into Objects of This Maximum Size (Quads and Triangles Only)
Along Edge from Point 1 to 2
Along Edge from Point 1 to 3
Divide Area Based On Points On Area Edges (Quads and Triangles Only)
Points Determined From:
Intersections of Visible Straight Grid Lines With Area Edges
Intersections of Selected Straight Line Objects With Area Edges
Selected Point Objects On Area Edges
Divide Area Using Cookie Cut Based On Selected Straight Line Objects
Extend All Lines To Intersect Area Edges
Divide Area Using Cookie Cut Based On Selected Point Objects
Rotation of Cut Lines From Area Local Axes (Deg)
Divide Area Using General Divide Tool Based On Selected Points and Lines
Maximum Size of Divided Object
Units
Tonf, m, C
Local Axes For Added Points
Make same on Edge if adjacent corners have same local axes definition
Make same on Face if all corners have same local axes definition
Restraints and Constraints For Added Points
Add on Edge when restraints/constraints exist at adjacent corner points
(Applies if added edge point and adjacent corner points have same local axes definition)
Add on Face when restraints/constraints exist at all corner points
(Applies if added face point and all corner points have same local axes definition)
OK
Cancel

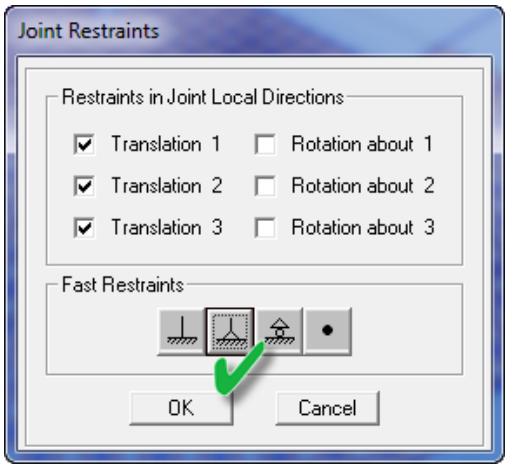
الشكل بعد اضافة كل البلاطات وتقسيمها عليه

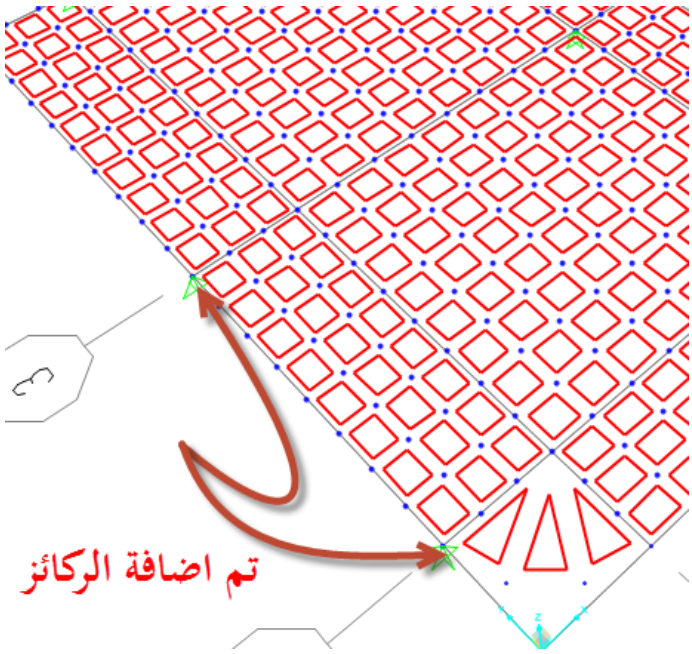


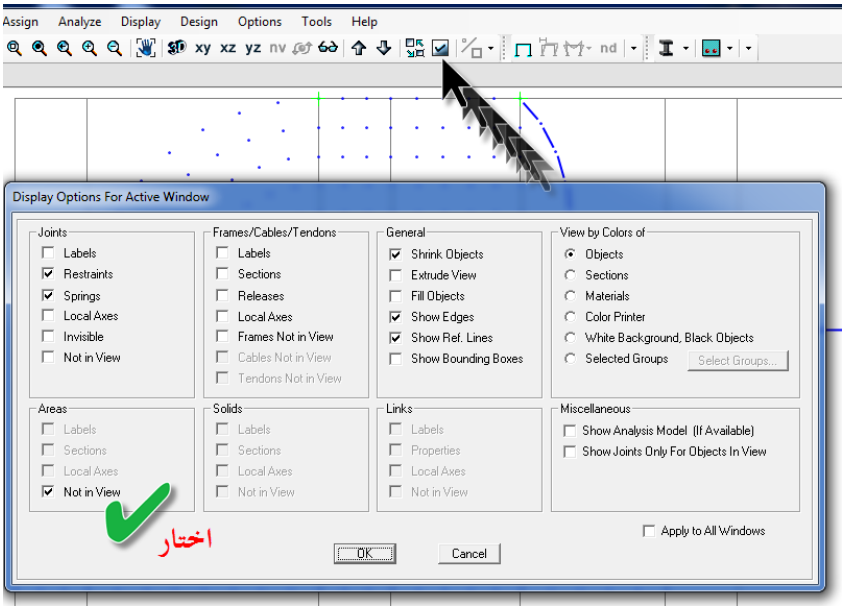
احدد مكان الركائز




Assign
Analyze
Display
Design
Options
Tools
Help
Joint
Frame
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Restraints...
Constraints...
Springs...
Masses...
Local Axes...
Panel Zones...
Merge Number...
اختار


Joint Restraints
Restraints in Joint Local Directions
Translation 1
Translation 2
Translation 3
Rotation about 1
Rotation about 2
Rotation about 3
Fast Restraints
OK
Cancel


تم اضافة الركائز

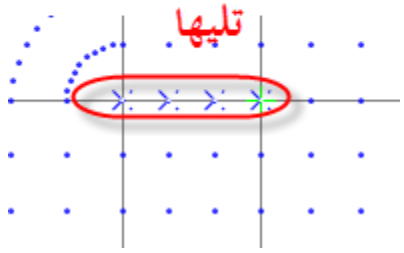

Assign
Analyze
Display
Design
Options
Tools
Help
Display Options For Active Window
Joints
Labels
Restraints
Springs
Local Axes
Invisible
Not in View
Frames/Cables/Tendons
Labels
Sections
Releases
Local Axes
Frames Not in View
Cables Not in View
Tendons Not in View
General
Shrink Objects
Extrude View
Fill Objects
Show Edges
Show Ref. Lines
Show Bounding Boxes
View by Colors of
Objects
Sections
Materials
Color Printer
White Background, Black Objects
Selected Groups
Select Groups...
Areas
Labels
Sections
Local Axes
Not in View
Solids
Labels
Sections
Local Axes
Not in View
Links
Labels
Properties
Local Axes
Not in View
Miscellaneous
Show Analysis Model (If Available)
Show Joints Only For Objects In View
Apply to All Windows
اختار
OK
Cancel

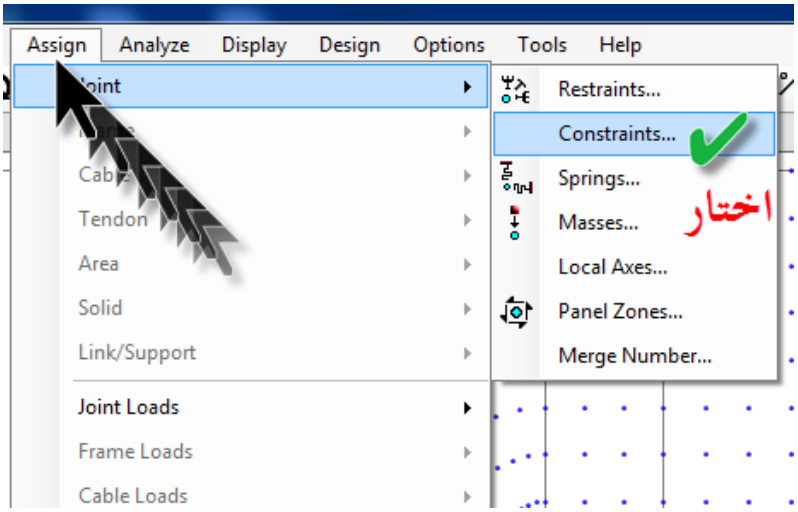
احدد لعمل الشير

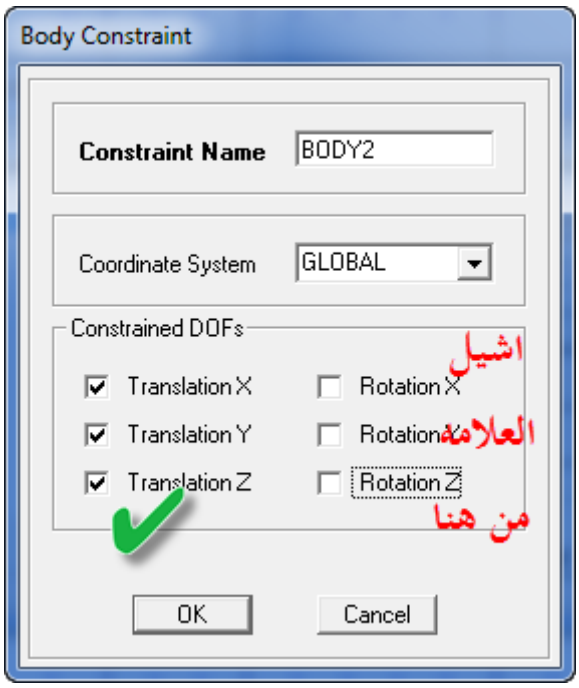
وول على الركيزه

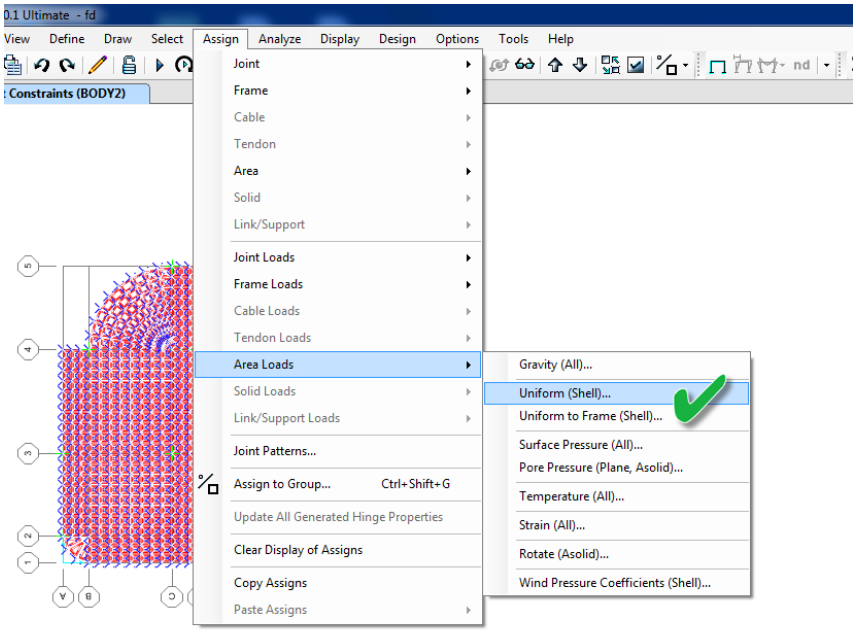
مع عده نقاط

تليها

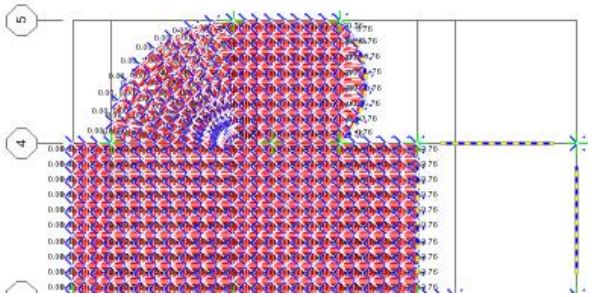


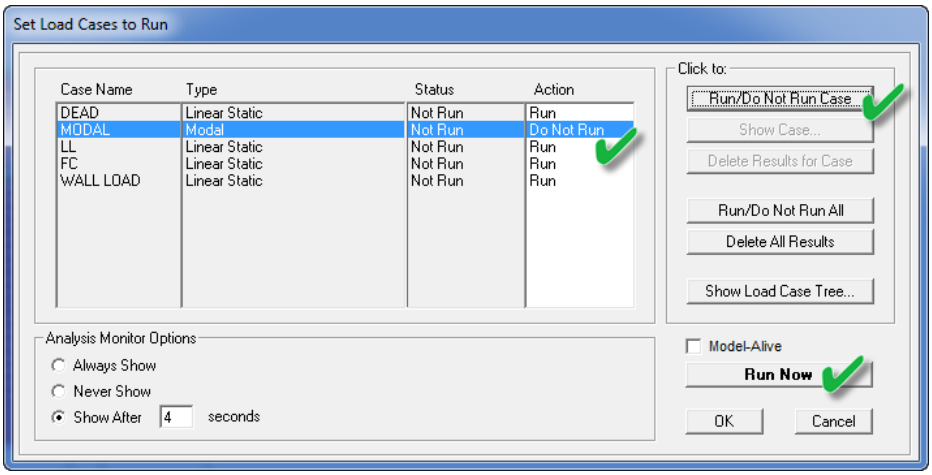


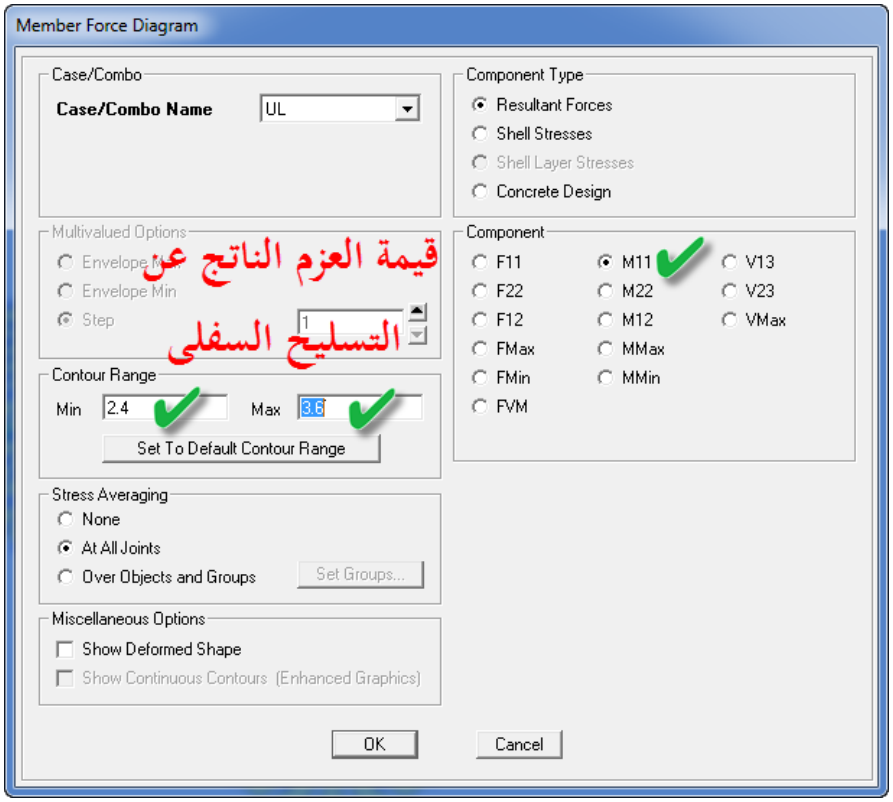

Body Constraint
Constraint Name
BODY2
Coordinate System
GLOBAL
Constrained DOFs
Translation X
Translation Y
Translation Z
Rotation X
Rotation Y
Rotation Z
اشيل
العلامة
من هنا
OK
Cancel

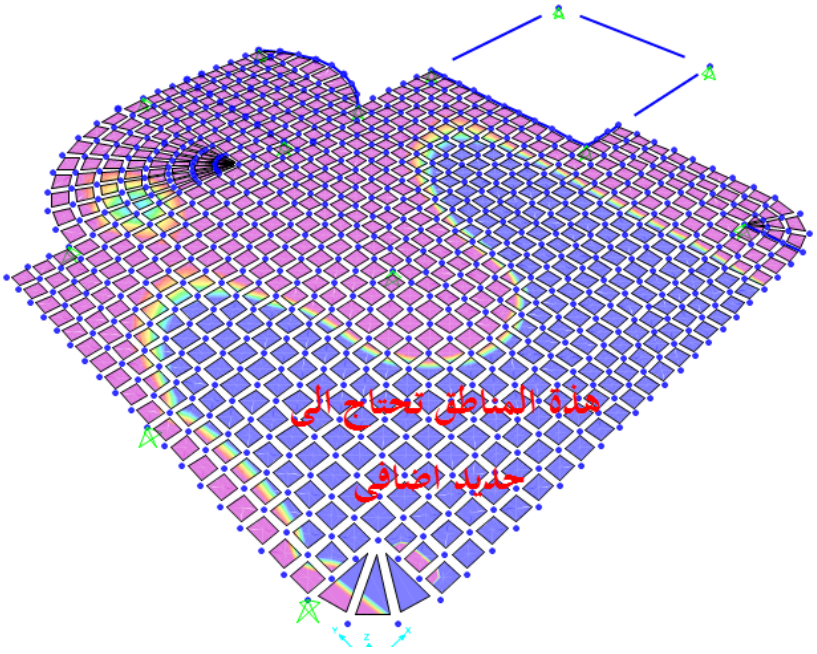

View
Define
Draw
Select
Assign
Analyze
Display
Design
Options
Tools
Help
Constraints (BODY2)
Joint
Frame
Cable
Tendon
Area
Solid
Link/Support
Joint Loads
Frame Loads
Cable Loads
Tendon Loads
Area Loads
Solid Loads
Link/Support Loads
Joint Patterns...
Assign to Group... Ctrl+Shift+G
Update All Generated Hinge Properties
Clear Display of Assigns
Copy Assigns
Paste Assigns
Gravity (All)...
Uniform (Shell)...
Uniform to Frame (Shell)...
Surface Pressure (All)...
Pore Pressure (Plane, Asolid)...
Temperature (All)...
Strain (All)...
Rotate (Asolid)...
Wind Pressure Coefficients (Shell)...

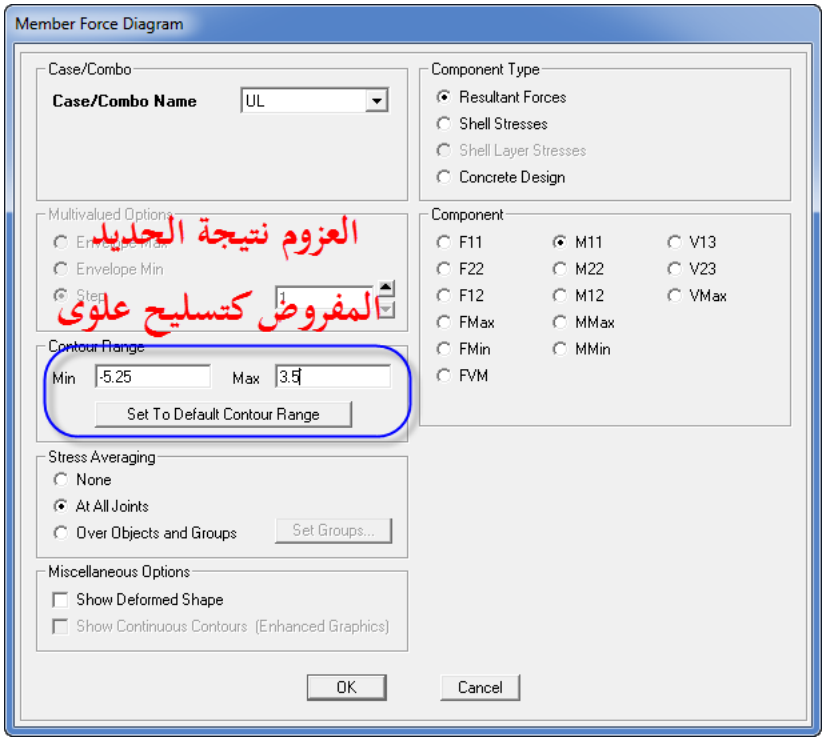
وبالمثل اضافة باقي الاحمال

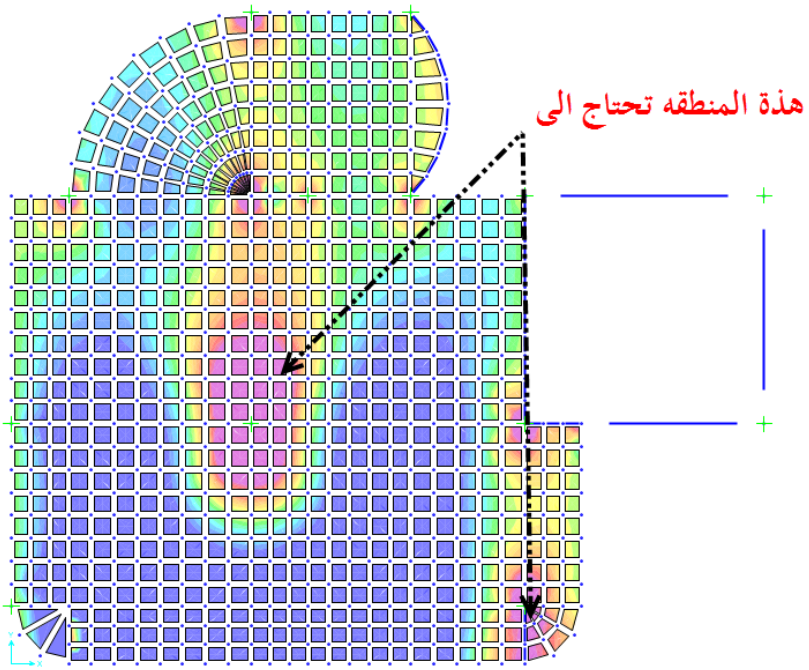





Member Force Diagram
Case/Combo
Case/Combo Name
UL
Component Type
Resultant Forces
Shell Stresses
Shell Layer Stresses
Concrete Design
Multivalued Options
Envelope Max
Envelope Min
Step
1
قيمة العزم الناتج عن
التسليح السفلى
Component
F11
F22
F12
FMax
FMin
FVM
M11
M22
M12
MMax
MMin
V13
V23
VMax
Contour Range
Min
2.4
Max
3.6
Set To Default Contour Range
Stress Averaging
None
At All Joints
Over Objects and Groups
Set Groups...
Miscellaneous Options
Show Deformed Shape
Show Continuous Contours (Enhanced Graphics)
OK
Cancel


هذة المناطق تحتاج الى
حديد اضافى





تم بحمد الله

مهندس : خالد عبدالكريم