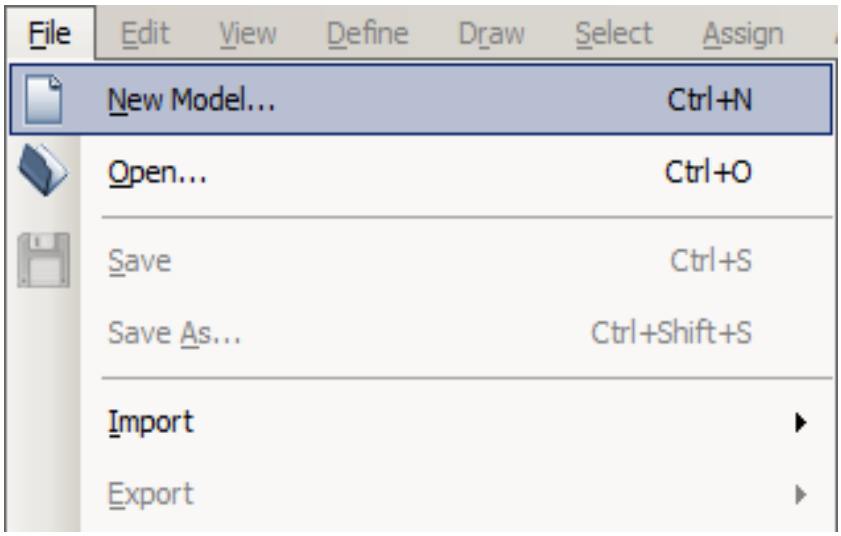
1-5 مقدمة:

برنامج ساب 2000 هو برنامج هندسي يستخدم في التحليل والتصميم الانشائي من انتاج شركة computer and structure incوالمعروفة اختصارا ب csi .

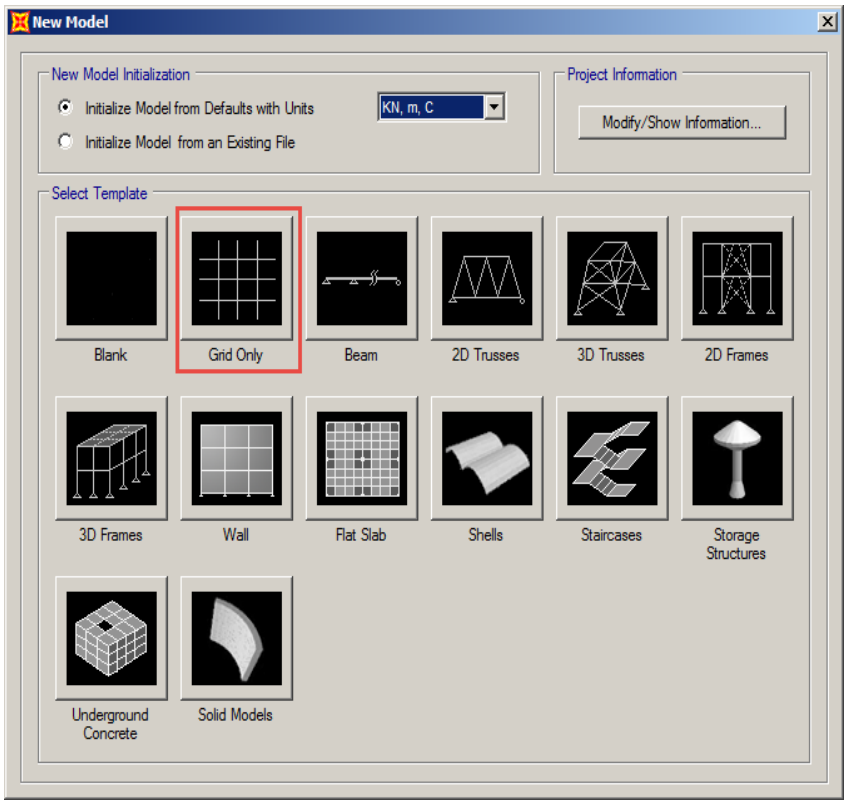
يعتمد البرنامج في التحليل علي نظرية العناصر المحدودة ويمكن عن طريق البرنامج تحليل و تصميم جميع انواع المنشات الهندسية البسيطة ومنها ذات الجمل الهندسية الفراغية وفي المنشات المعقدة من الابنية الطابقية والادراج والخزانات بانواعها والقشريات واي نظام انشائي عموما.

2-5- خطوات البرنامج

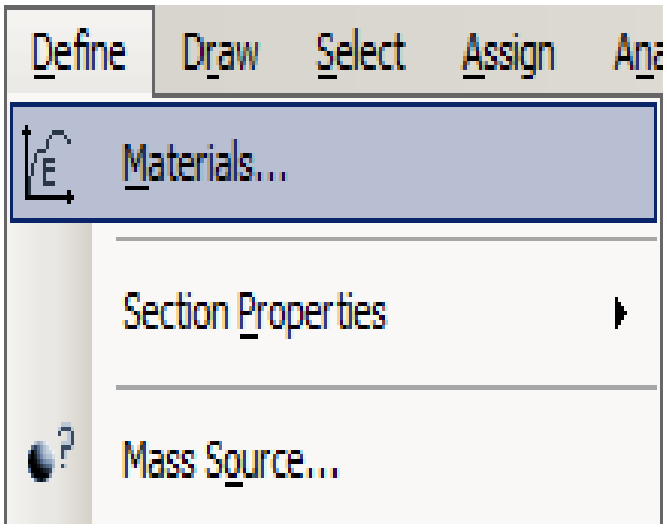
1. بدء نموذج جديد:

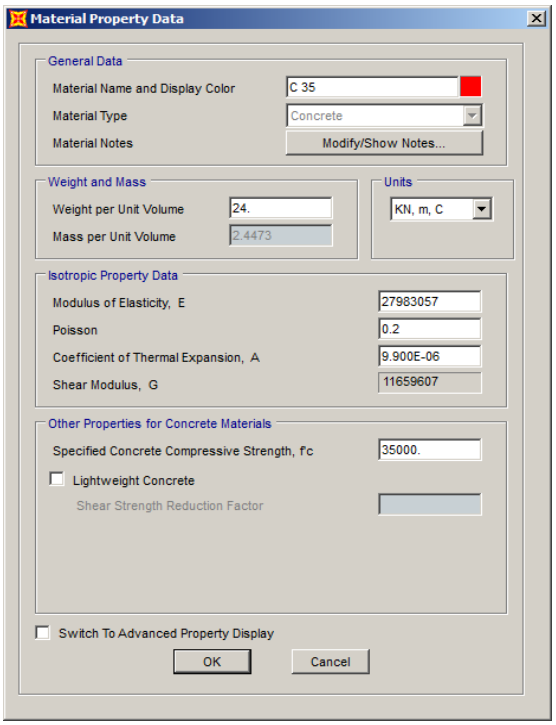


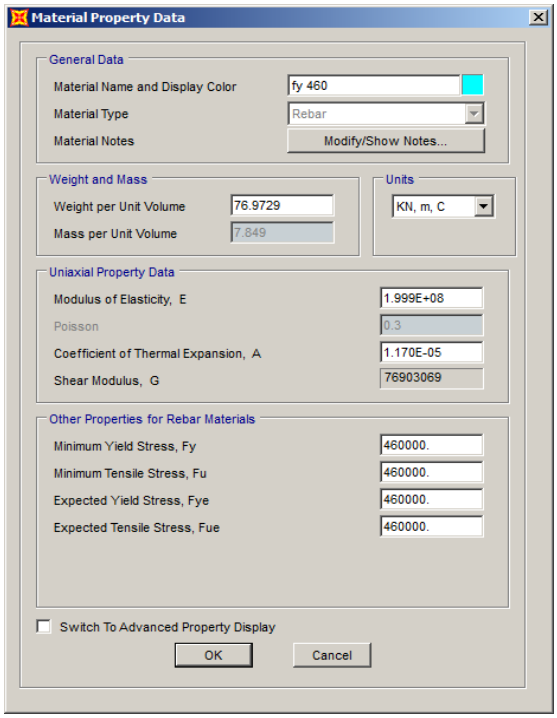
2. ضبط الوحدات وإدخال خطوط الشبكة (Grid Lines):



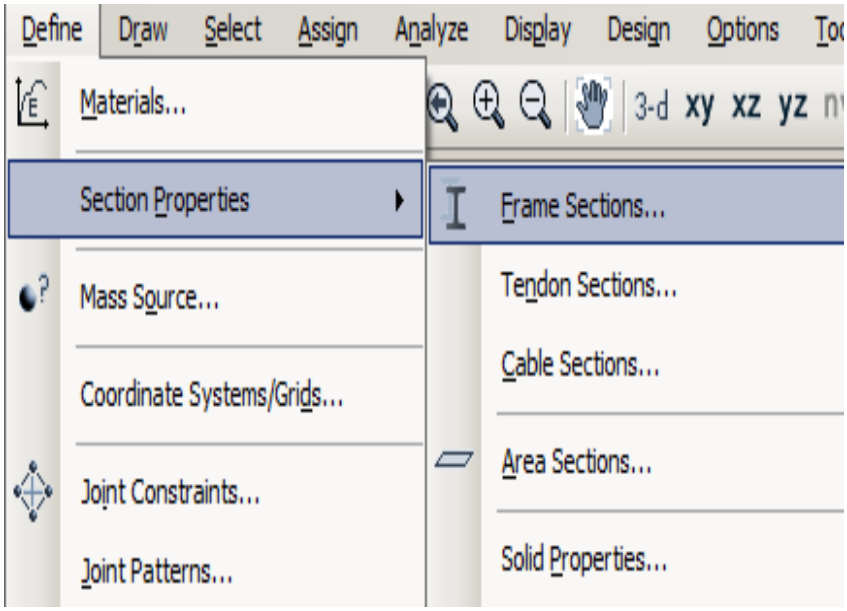
3. تعريف المواد (الخرسانة و حديد التسليح):

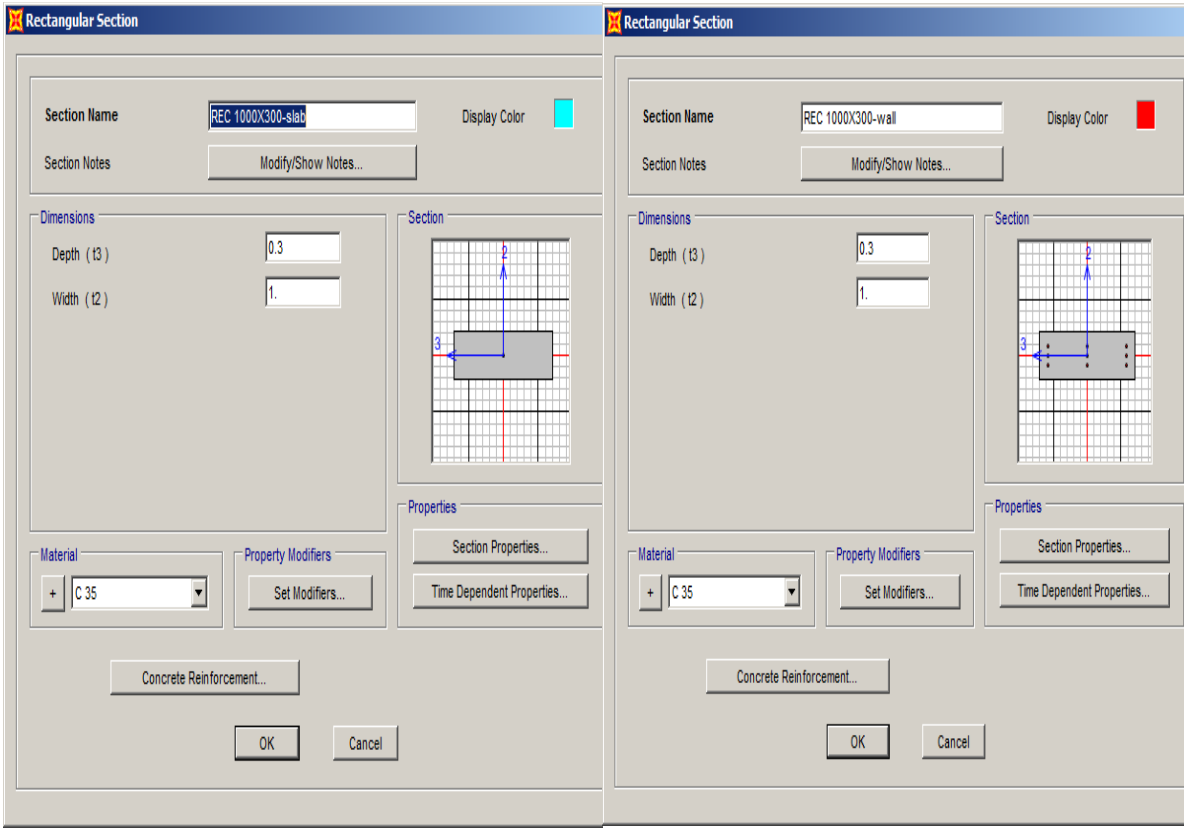




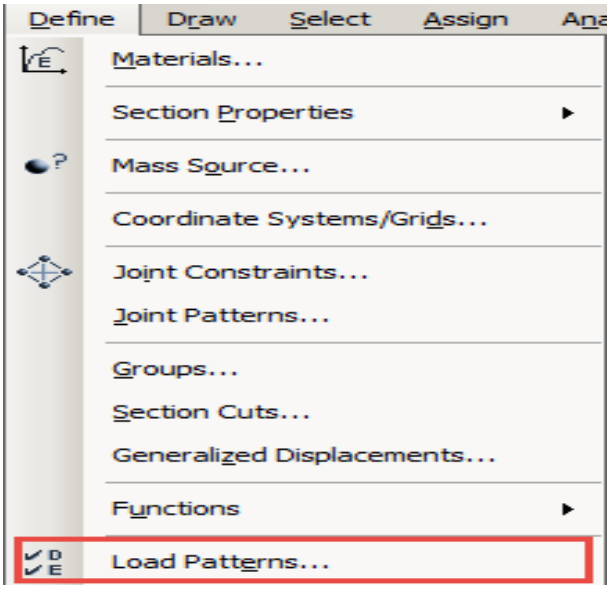


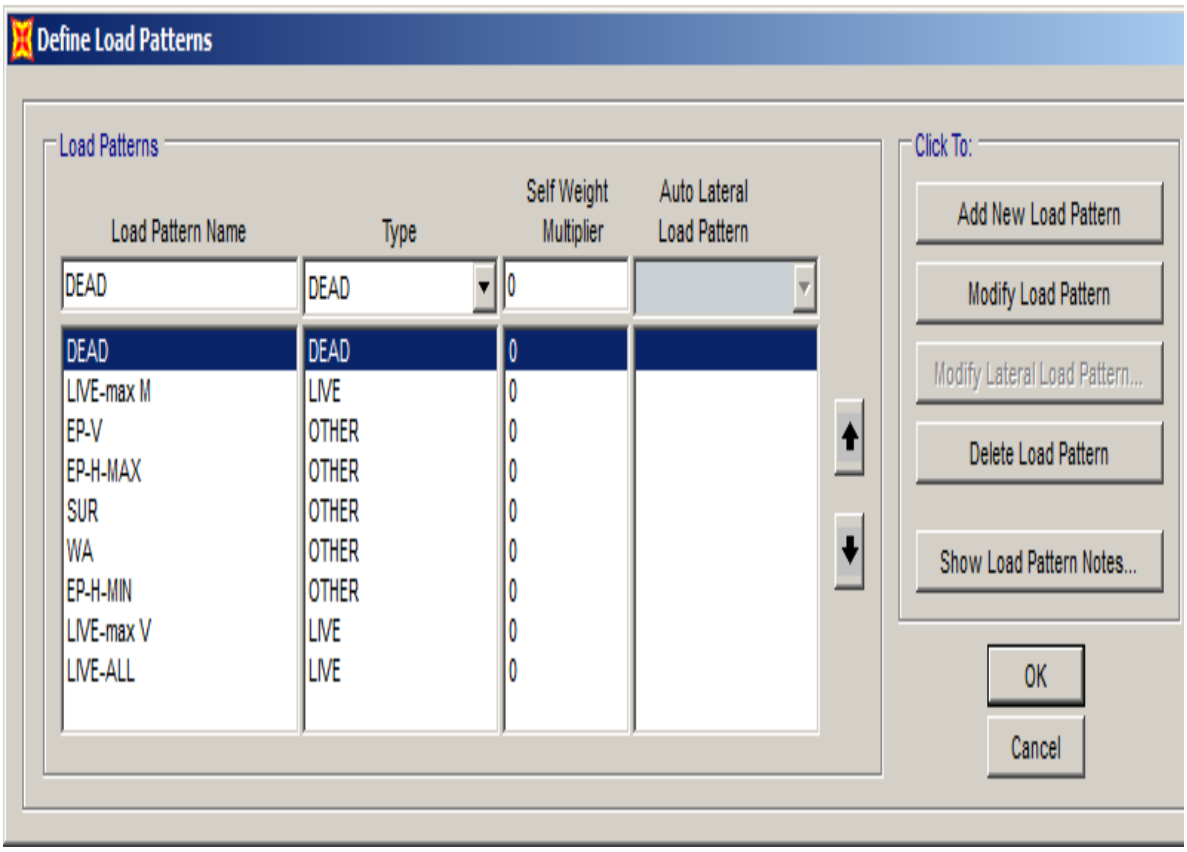
4. تعريف المقاطع المستخدمة:



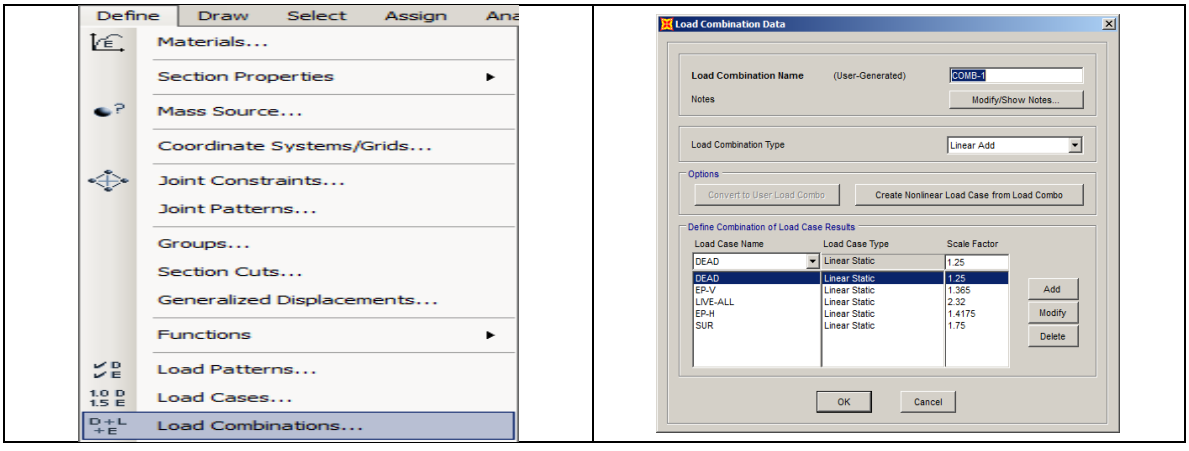


5. تعريف حالات التحميل:





6. تعريف تركيبات الأحمال:

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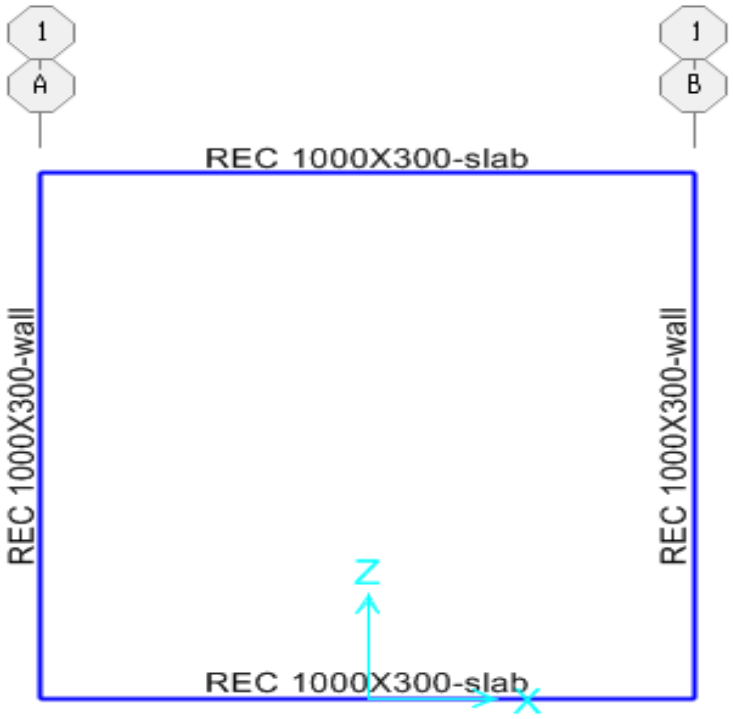
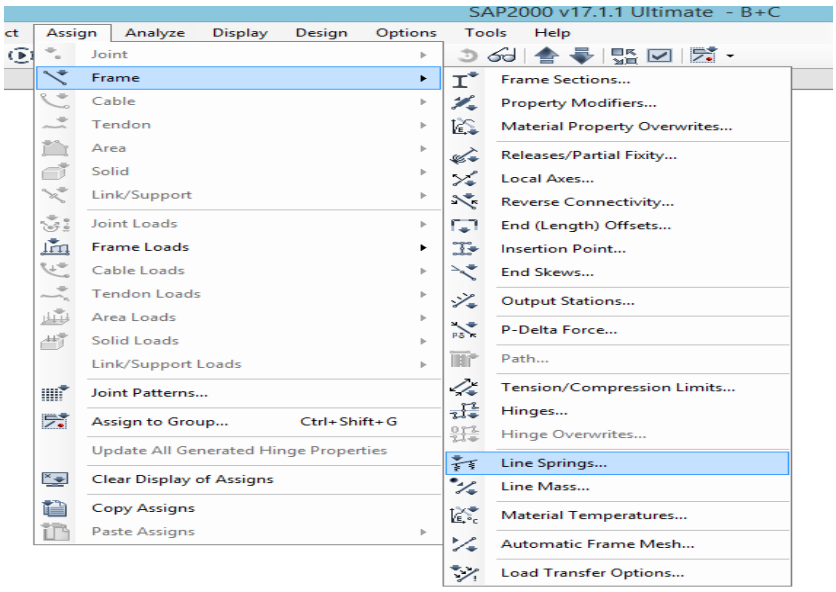
Load Combination Name (User-Generated) COMB-2
Notes Modify/Show Notes...
Load Combination Type Linear Add
Options
Convert to User Load Combo
Create Nonlinear Load Case from Load Combo
Define Combination of Load Case Results
Load Case Name Load Case Type Scale Factor
DEAD Linear Static 1.25
EP-V Linear Static 1.365
LIVE-ALL Linear Static 2.32
EP-H-MIN Linear Static 0.86
WA Linear Static 1.
Add
Modify
Delete
OK
Cancel
Load Combination Data
Load Combination Name (User-Generated) COMB-3
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
DEAD Linear Static 0.9
EP-V Linear Static 0.86
EP-H Linear Static 1.4175
SUR Linear Static 1.75
Add
Modify
Delete
OK
Cancel
Load Combination Data
Load Combination Name (User-Generated) COMB1-S-M-M
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
DEAD Linear Static 1.25
EP-V Linear Static 1.365
LIVE Linear Static 2.33
EP-H Linear Static 1.4175
SUR Linear Static 1.75
Add
Modify
Delete
OK
Cancel
Load Combination Data
Load Combination Name (User-Generated) COMB1-S-M-V
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
DEAD Linear Static 1.25
EP-V Linear Static 1.365
LIVE-max V Linear Static 2.32
EP-H Linear Static 1.4175
SUR Linear Static 1.75
Add
Modify
Delete
OK
Cancel
Load Combination Data
Load Combination Name (User-Generated) COMB-2-S-M-M
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
DEAD Linear Static 1.25
EP-V Linear Static 1.365
LIVE Linear Static 2.32
EP-H-MIN Linear Static 0.86
WA Linear Static 1.
Add
Modify
Delete
OK
Cancel
Load Combination Data
Load Combination Name (User-Generated) COMB-2-S-M-V
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
DEAD Linear Static 1.25
EP-V Linear Static 1.365
LIVE-max V Linear Static 2.32
EP-H-MIN Linear Static 0.86
WA Linear Static 1.
Add
Modify
Delete
OK
Cancel

7. رسم النموذج:

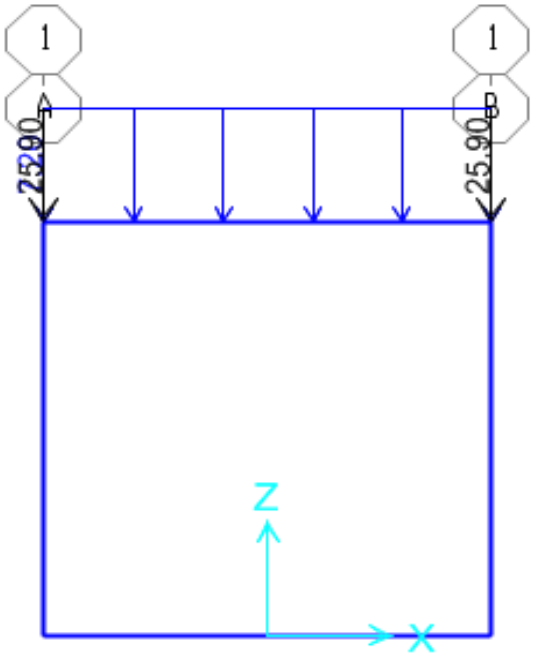


8. تعريف ضغط التربة:

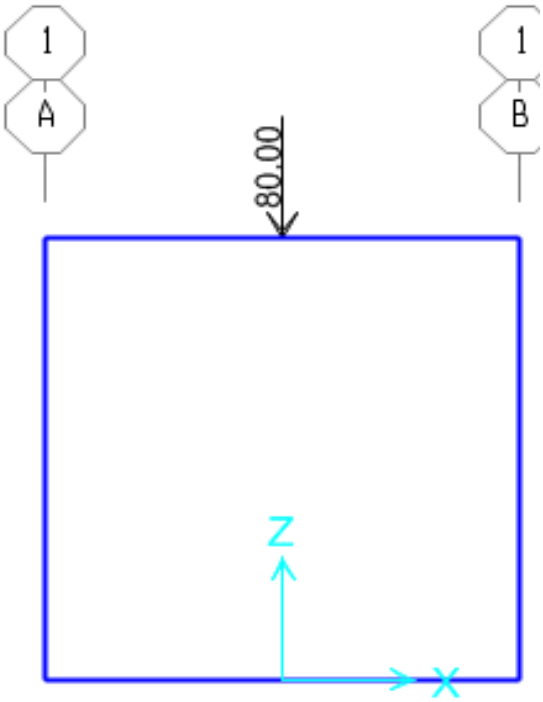


9. إدخال الأحمال على الأعضاء:

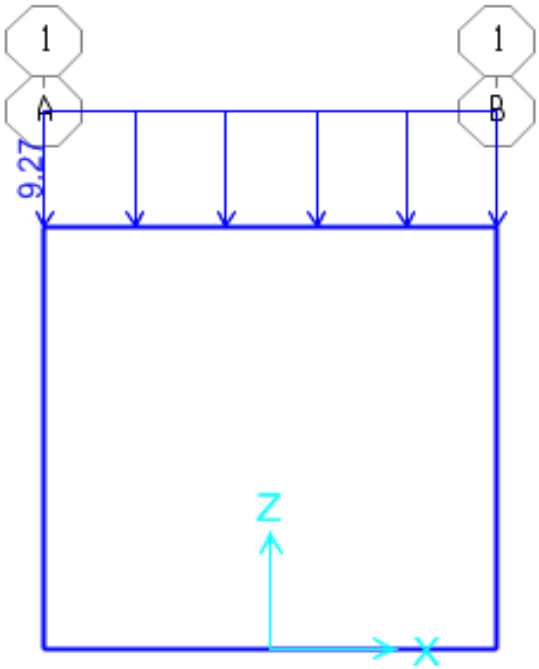
a) DEAD LOAD



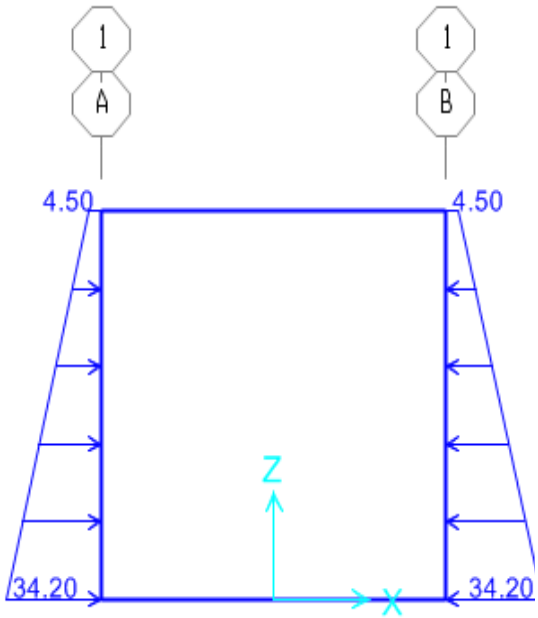
b) LIVE LOAD



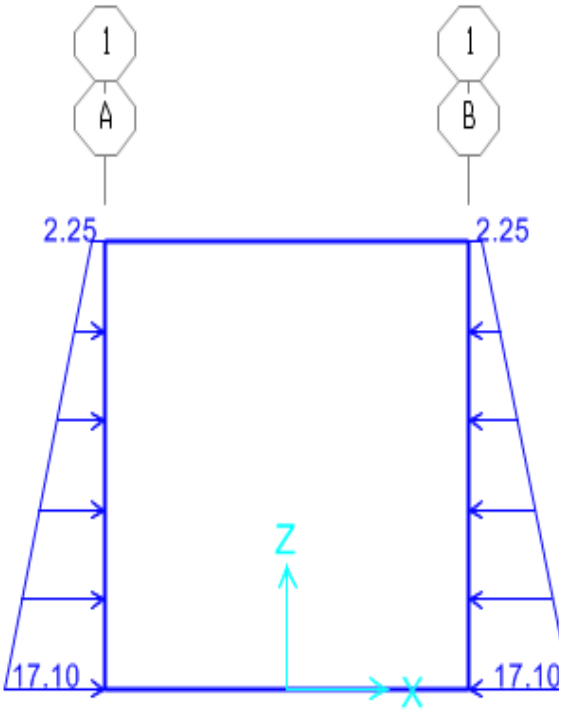
c) Earth Pressure-Vertical



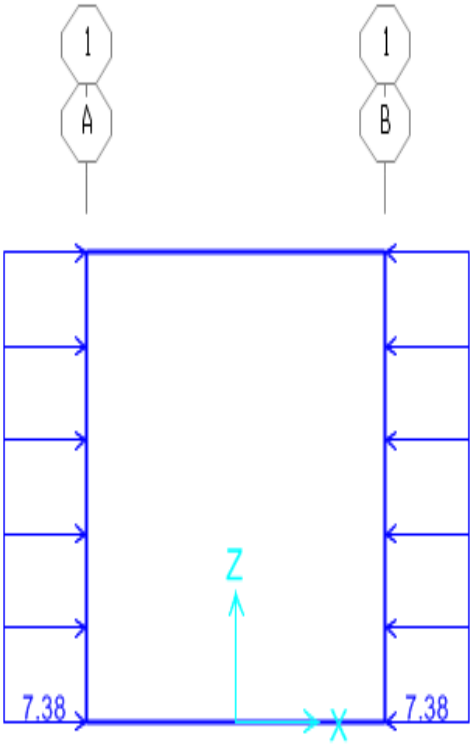
d) Earth Pressure-Horizental-max



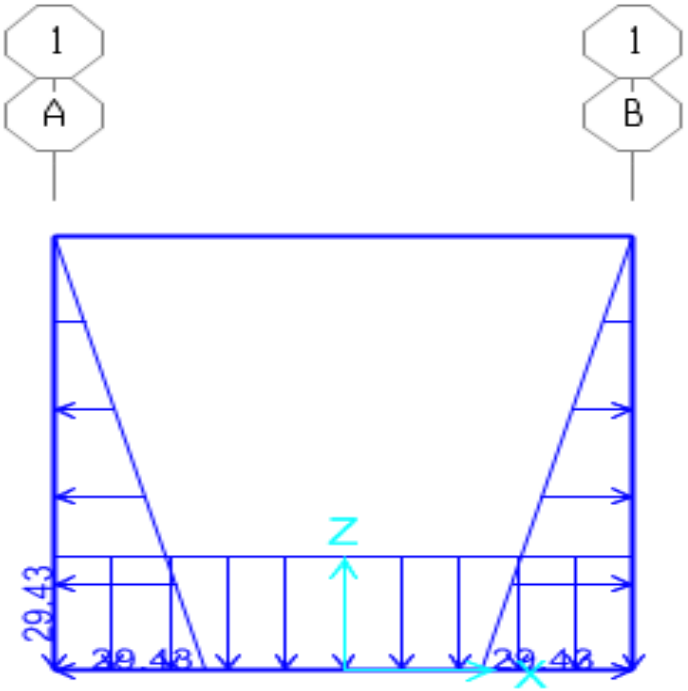
e) Earth Pressure- Horizental-min



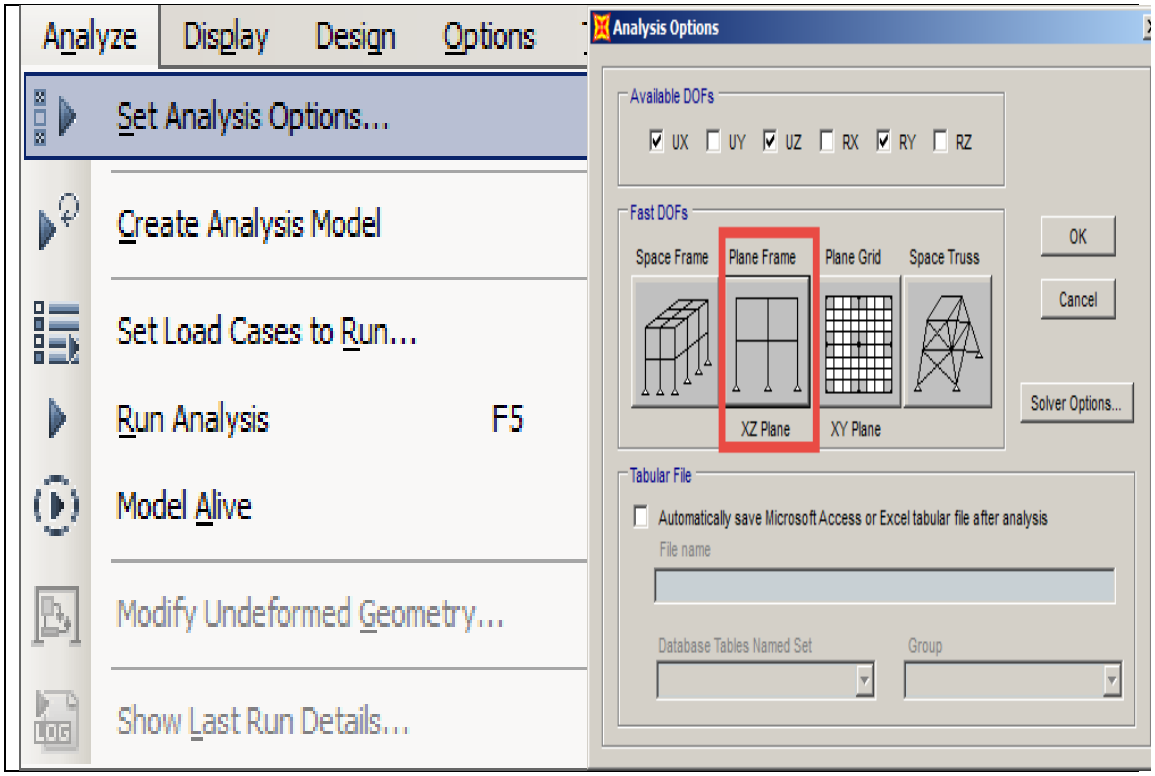
f) Surchage



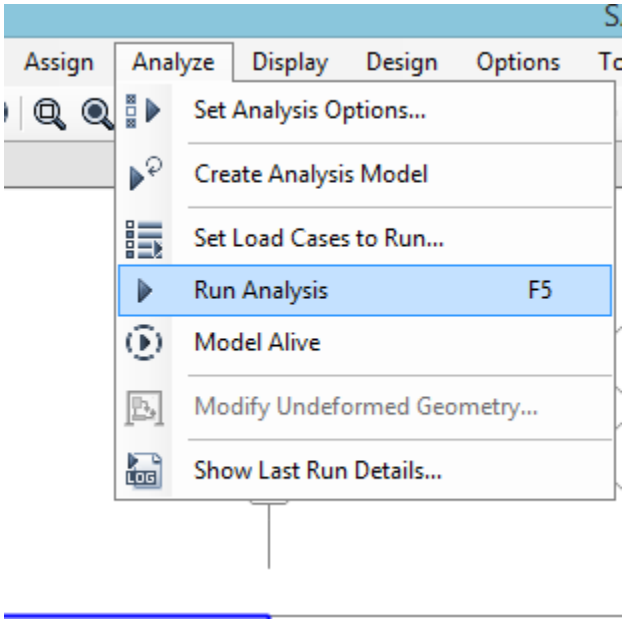
g) Water pressure



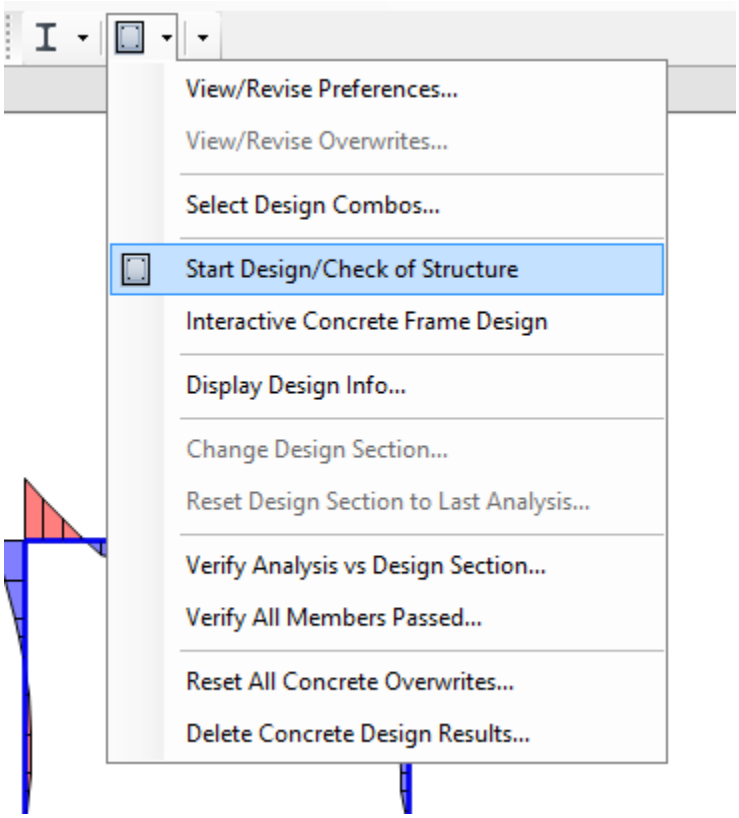
10.ضبط إعدادت التحليل:



11.قراءة نتائج التحليل .



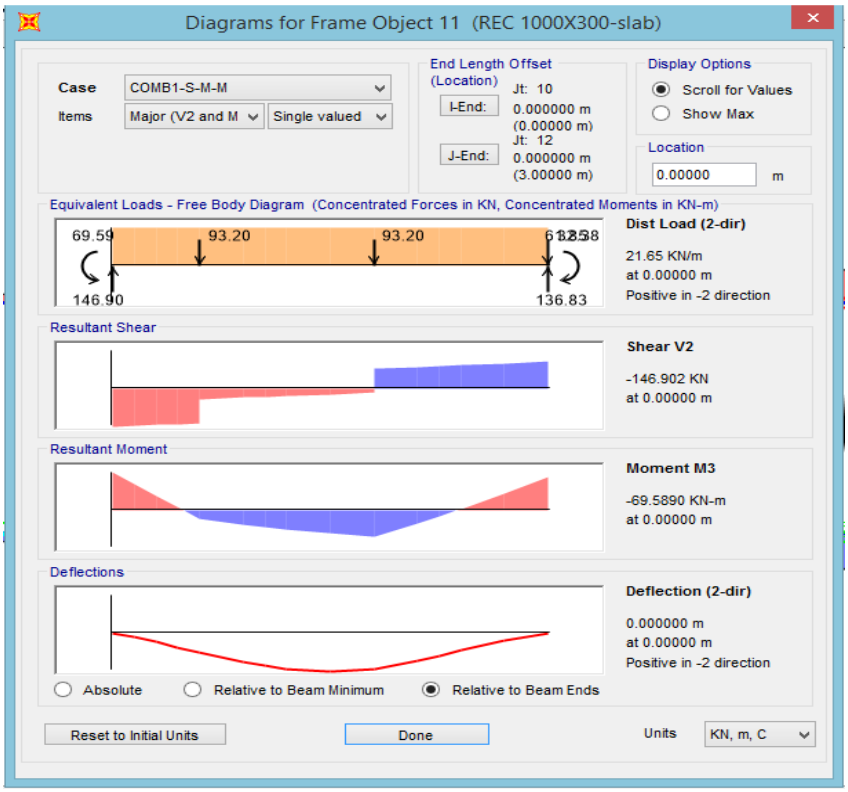
12.قراءة نتائج التصميم.



3-5- نتائج التحليل

Top Slab :-

Comb. 1 :-



- Max shear:-

V_{SAP} =146.9 Kn

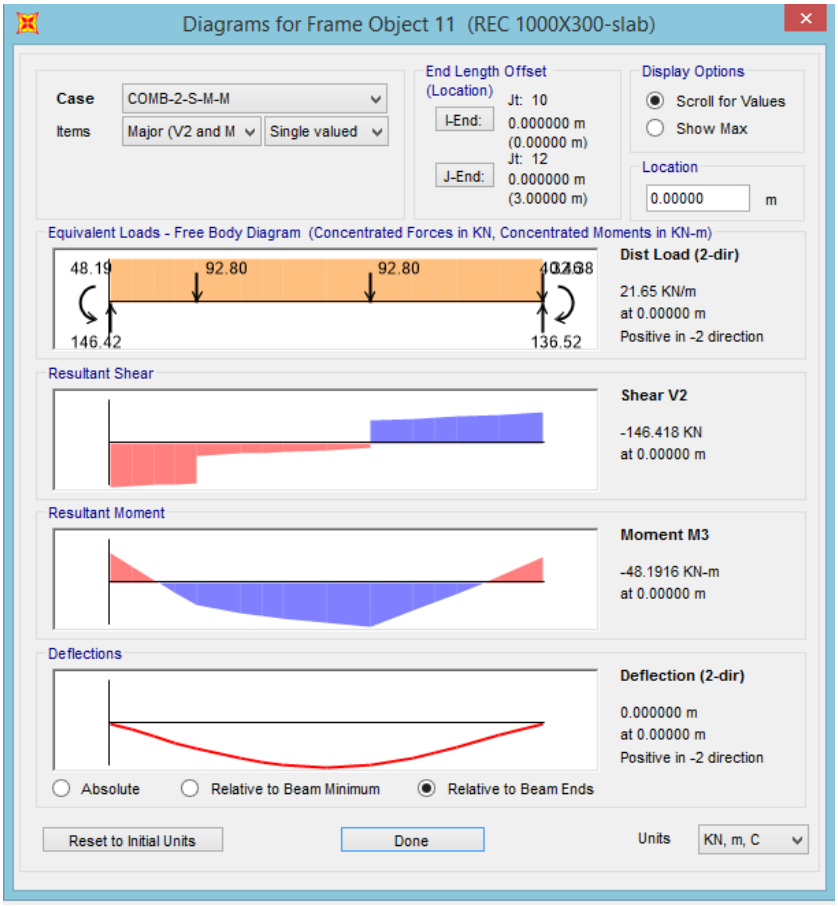
- Max negative moment :-

M_{SAP} =69.59 Kn.m

- Max positive moment :-

M_{SAP} =47.59 Kn.m

Comb. 2 :-



Max shear:-

V_{SAP} =146.11 Kn

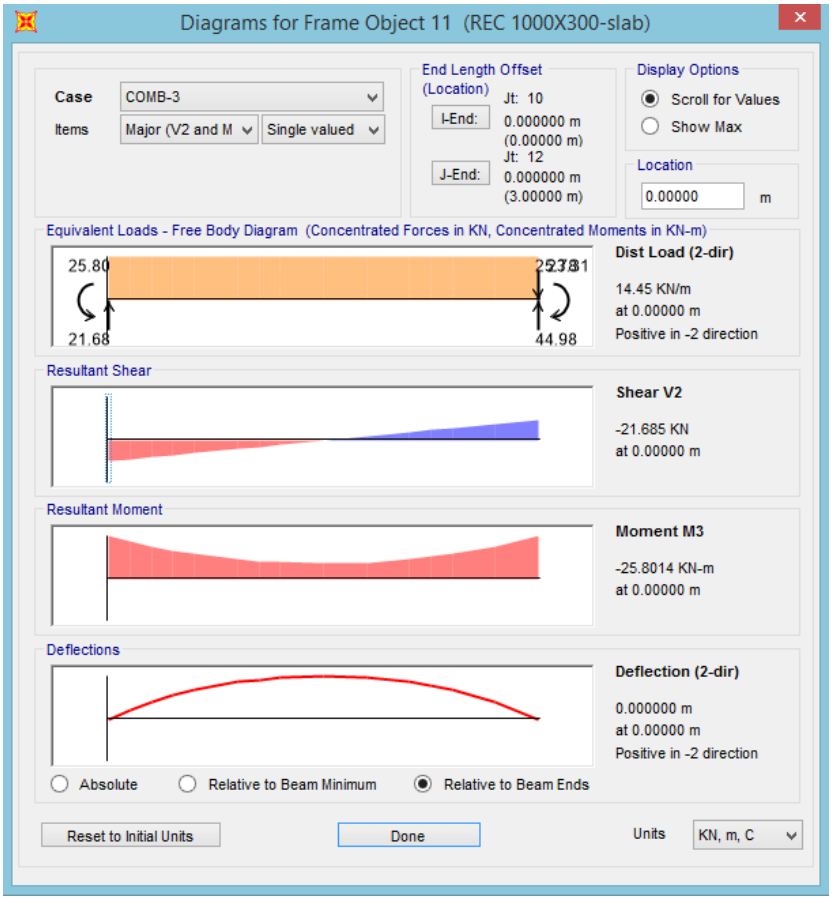
Max negative moment :-

M_{SAP} =48.19 Kn.m

Max positive moment :-

M_{SAP} =68.93 Kn.m

Comb 3 :-



Max shear:-

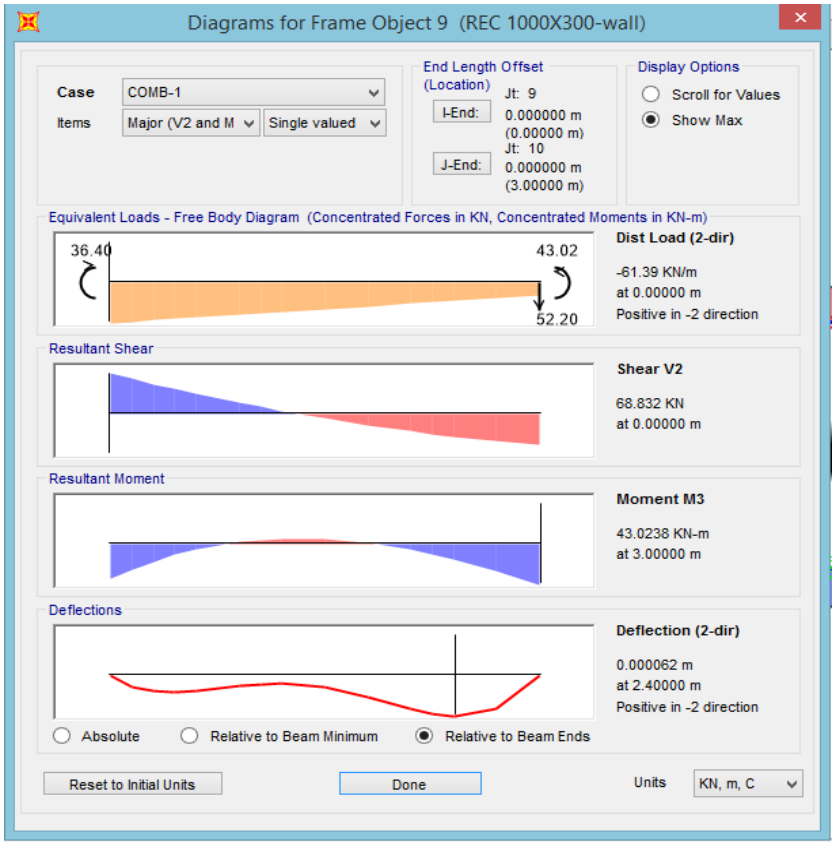
V_{SAP} =21.68 Kn

Max negative moment :-

M_{SAP} =25.8 Kn.m

Side wall :-

Comb. 1



Max shear:-

V_{SAP} =68.83 Kn

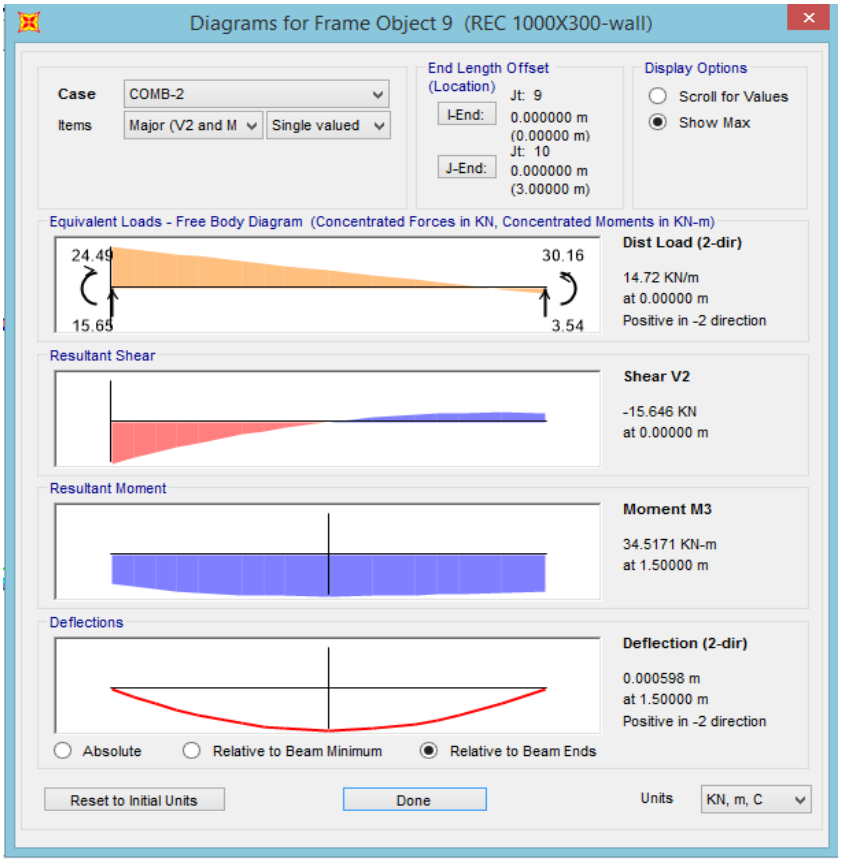
Max negative moment :-

M_{SAP} =43.02 Kn.m

Max positive moment :-

M_{SAP} =6.03 Kn.m

Comb. 2 :-



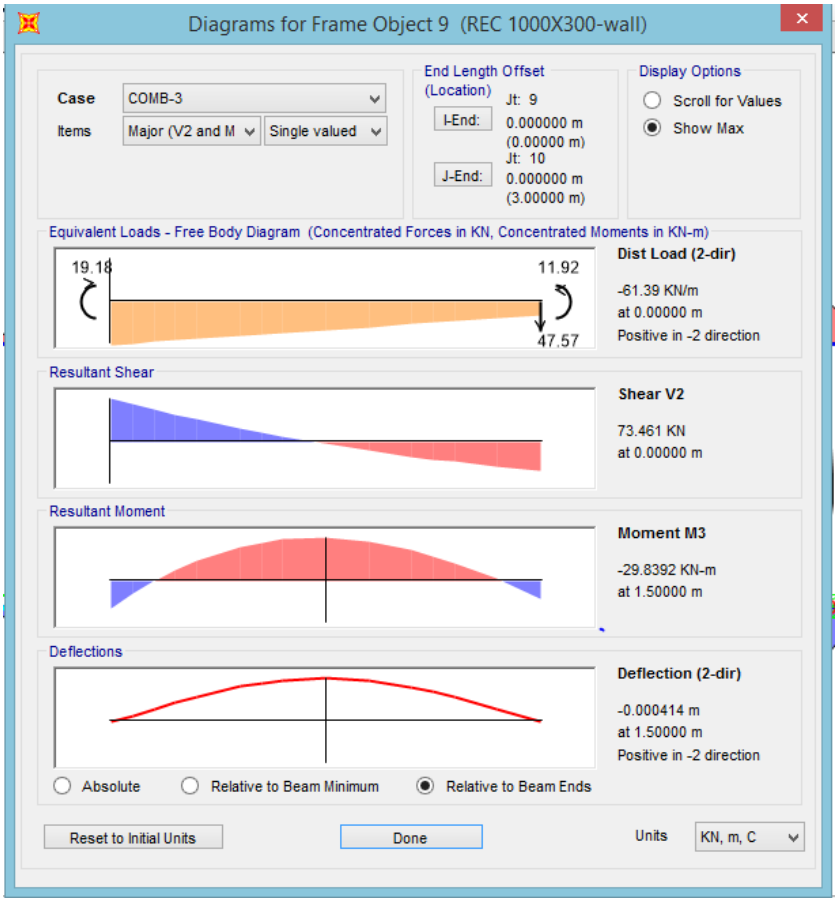
Max shear:-

V_{SAP} =15.65 Kn

Max negative moment :-

M_{SAP} =34.52 Kn.m

Comb. 3 :-



Max shear:-

V_{SAP} =73.46 Kn

Max negative moment :-

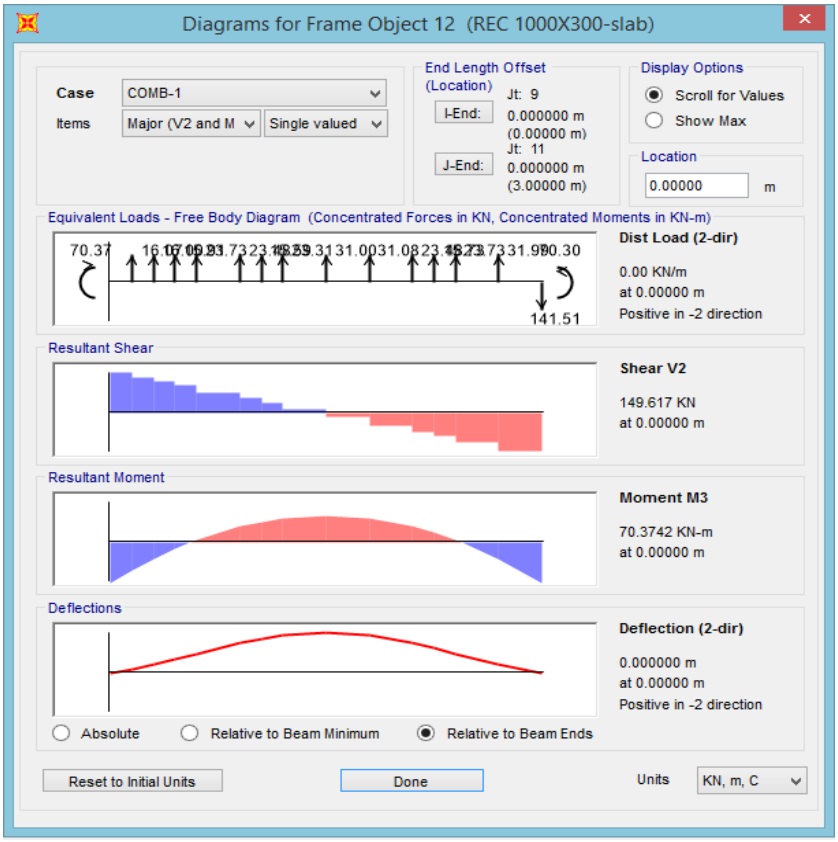
M_{SAP} =19.18 Kn.m

Max positive moment :-

M_{SAP} =29.84 Kn.m

Bottom slab :-

Comb. 1 :-



Max shear:-

V_{SAP} =149.62 Kn

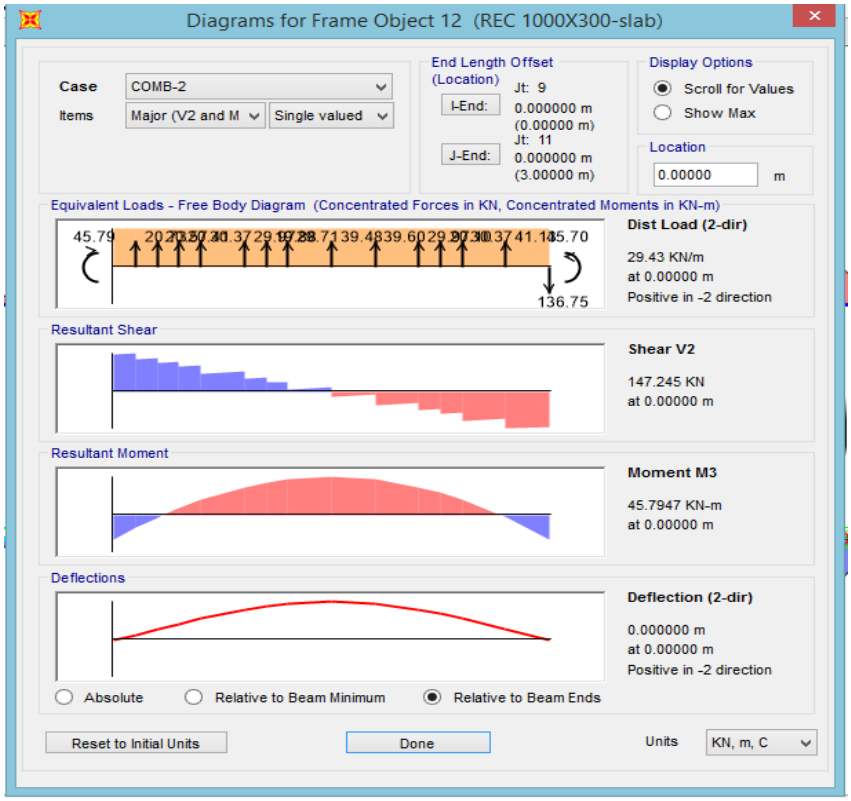
Max negative moment :-

M_{SAP} =70.37 Kn.m

Max positive moment :-

M_{SAP} =46.99 Kn.m

Comb. 2 :-



Max shear:-

V_{SAP} =147.245 Kn

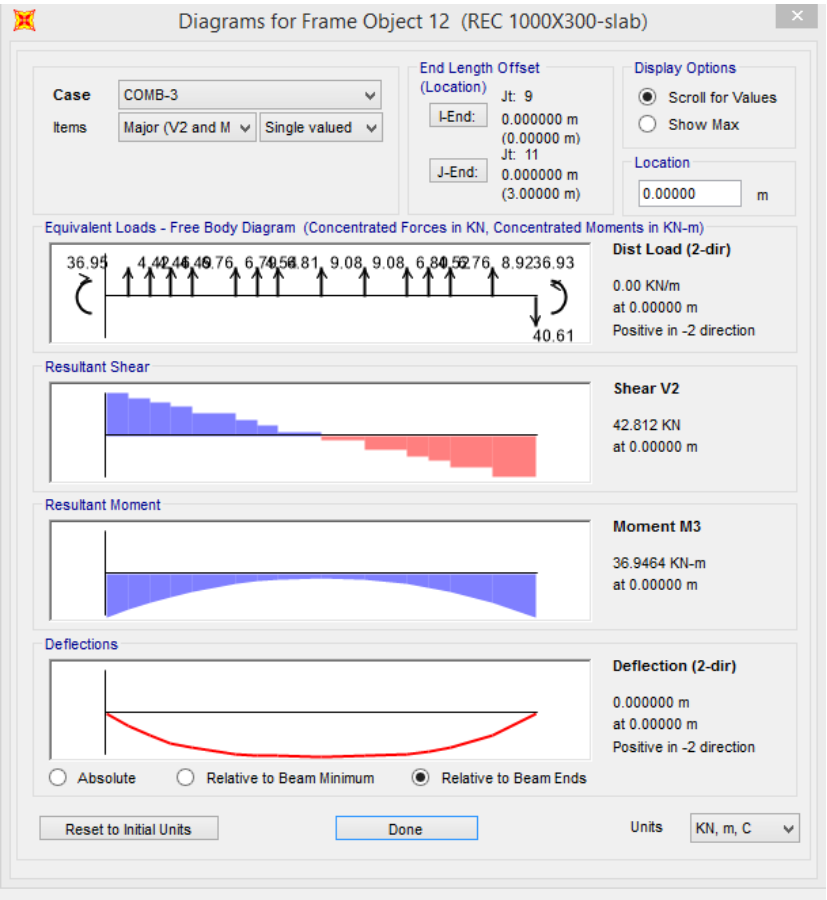
Max negative moment :-

M_{SAP} =45.79 Kn.m

Max positive moment :-

M_{SAP} =70.77 Kn.m

Comb. 3 :-



Max shear:-

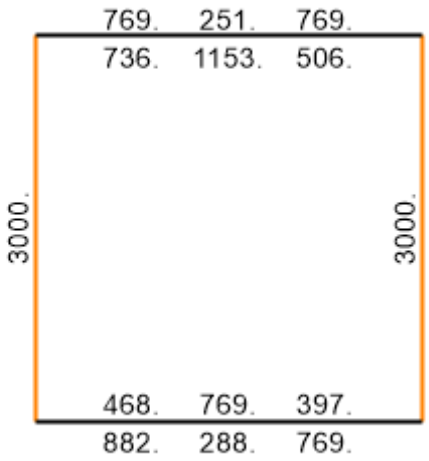
V_{SAP} =42.81 Kn

Max negative moment :-

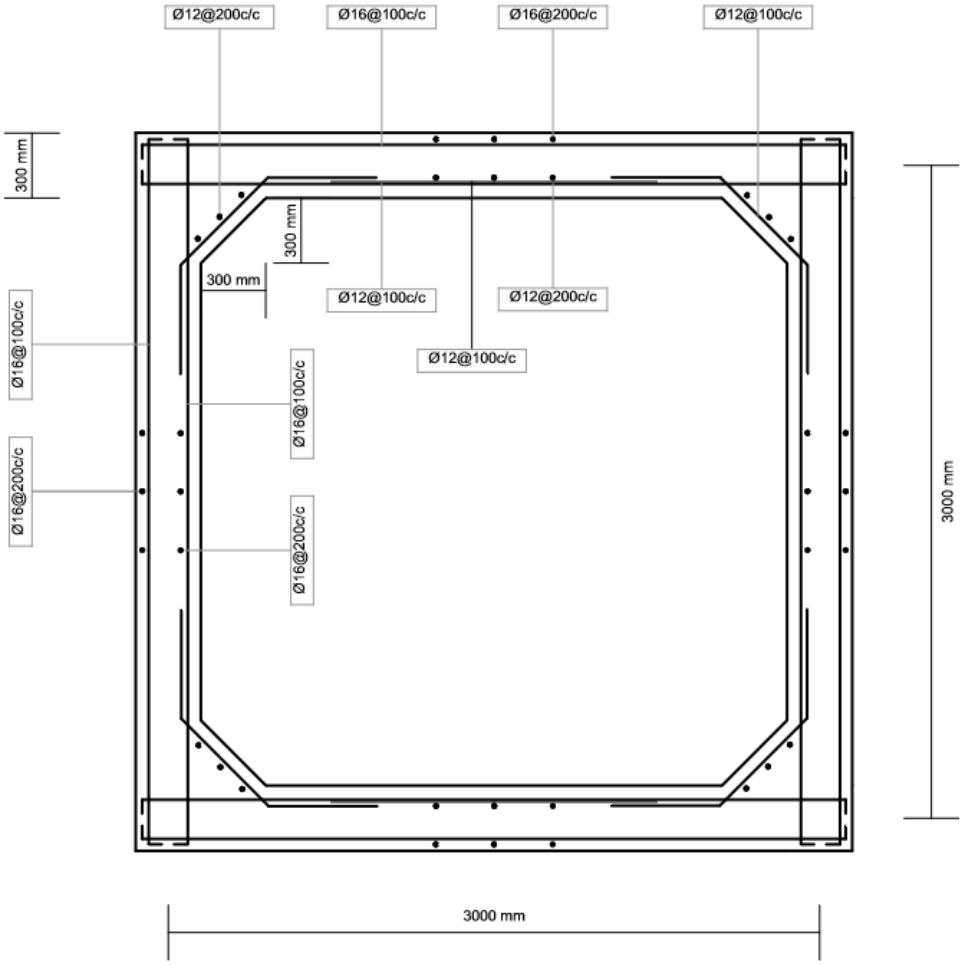
M_{SAP} =36.9 Kn.m

5-4- نتائج التصميم

الشكل التالي يوضح مساحة حديد التسليح في كل مقطع



شكل (5-1) نتائج التصميم


Ø12@200c/c
Ø16@100c/c
Ø16@200c/c
Ø12@100c/c
300 mm
300 mm
300 mm
Ø12@100c/c
Ø12@200c/c
Ø12@100c/c
Ø16@100c/c
Ø16@200c/c
Ø16@100c/c
Ø16@200c/c
3000 mm
3000 mm

شكل (2-5)

5-5- المقارنة بين التصميم اليدوي و التصميم بالحاسوب

Top Slab :-

Comb. 1 :-

Max shear:-

V_{SAP} =146.9 Kn

V_{Manual} =181.44 Kn

Max negative moment :-

M_{SAP} =69.59 Kn.m

M_{MANUAL} =58.59 Kn.m

Max positive moment :-

M_{SAP} =47.59 Kn.m

M_{MANUAL} =48.33 Kn.m

Comb. 2 :-

Max shear:-

V_{SAP} =146.11 Kn

V_{Manual} =181.44 Kn

Max negative moment :-

M_{SAP} =48.19 Kn.m

M_{MANUAL} =42 Kn.m

Max positive moment :-

M_{SAP} =68.93 Kn.m

M_{MANUAL} =47.12 Kn.m

Comb 3 :-

Max shear:-

V_{SAP} =21.68 Kn

V_{Manual} =21.64 Kn

Max negative moment :-

M_{SAP} =25.8 Kn.m

M_{MANUAL} =18.44 Kn.m

Side wall :-

Comb. 1

Max shear:-

V_{SAP} =68.83 Kn

V_{Manual} =50.01 Kn

Max negative moment :-

M_{SAP} =43.02 Kn.m

M_{MANUAL} =44.66 Kn.m

Max positive moment :-

M_{SAP} =6.03 Kn.m

M_{MANUAL} =10.61 Kn.m

Comb. 2 :-

Max shear:-

V_{SAP} =15.65 Kn

V_{Manual} =9.54 Kn

Max negative moment :-

M_{SAP} =34.52 Kn.m

M_{MANUAL} =46.32 Kn.m

Comb. 3 :-

Max shear:-

V_{SAP} =73.46 Kn

V_{Manual} =58.72 Kn

Max negative moment :-

M_{SAP} =19.18 Kn.m

M_{MANUAL} =18.44 Kn.m

Max positive moment :-

M_{SAP} =29.84 Kn.m

M_{MANUAL} =22.31 Kn.m

Bottom slab :-

Comb. 1 :-

Max shear:-

V_{SAP} =149.62 Kn

V_{Manual} =173.38 Kn

Max negative moment :-

M_{SAP} =70.37 Kn.m

M_{MANUAL} =58.48 Kn.m

Max positive moment :-

M_{SAP} =46.99 Kn.m

M_{MANUAL} =63.51 Kn.m

Comb. 2 :-

Max shear:-

V_{SAP} =147.245 Kn

V_{Manual} =184.59 Kn

Max negative moment :-

M_{SAP} =45.79 Kn.m

M_{MANUAL} =30.06 Kn.m

Max positive moment :-

M_{SAP} =70.77 Kn.m

M_{MANUAL} =82.23 Kn.m

Comb. 3 :-

Max shear:-

V_{SAP} =42.81 Kn

V_{Manual} =30.26 Kn

Max negative moment :-

M_{SAP} =36.9 Kn.m

M_{MANUAL} =28.71 Kn.m

من المقارنة وجد ان هنالك إختلافات بنسبة 0.2