JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF PUBLIC WORKS
THE REPUBLIC OF CHILE

THE REHABILITATION AND CONSERVATION PROGRAM ON THE BRIDGES IN THE REPUBLIC OF CHILE (PHASE 2)

FINAL REPORT

STANDARD BRIDGE CADD PROGRAM OPERATION MANUALS

(VOLUME 7/8)

JULY 1998

PACIFIC CONSULTANTS INTERNATIONAL

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Sistema CADD de Puente Estándar

Operation Manual

<English edition>

CONTENTS

1. Outline of CADD Program

The Standard Bridge CADD Program works on the Windows 95 O.S. (operating system).

Microsoft Word is used for the View, Edit, Print of the calculation result, Excel for the quantity generalization table, and AutoCAD is used for the drawings.

This composition is shown in Figure 1.1.

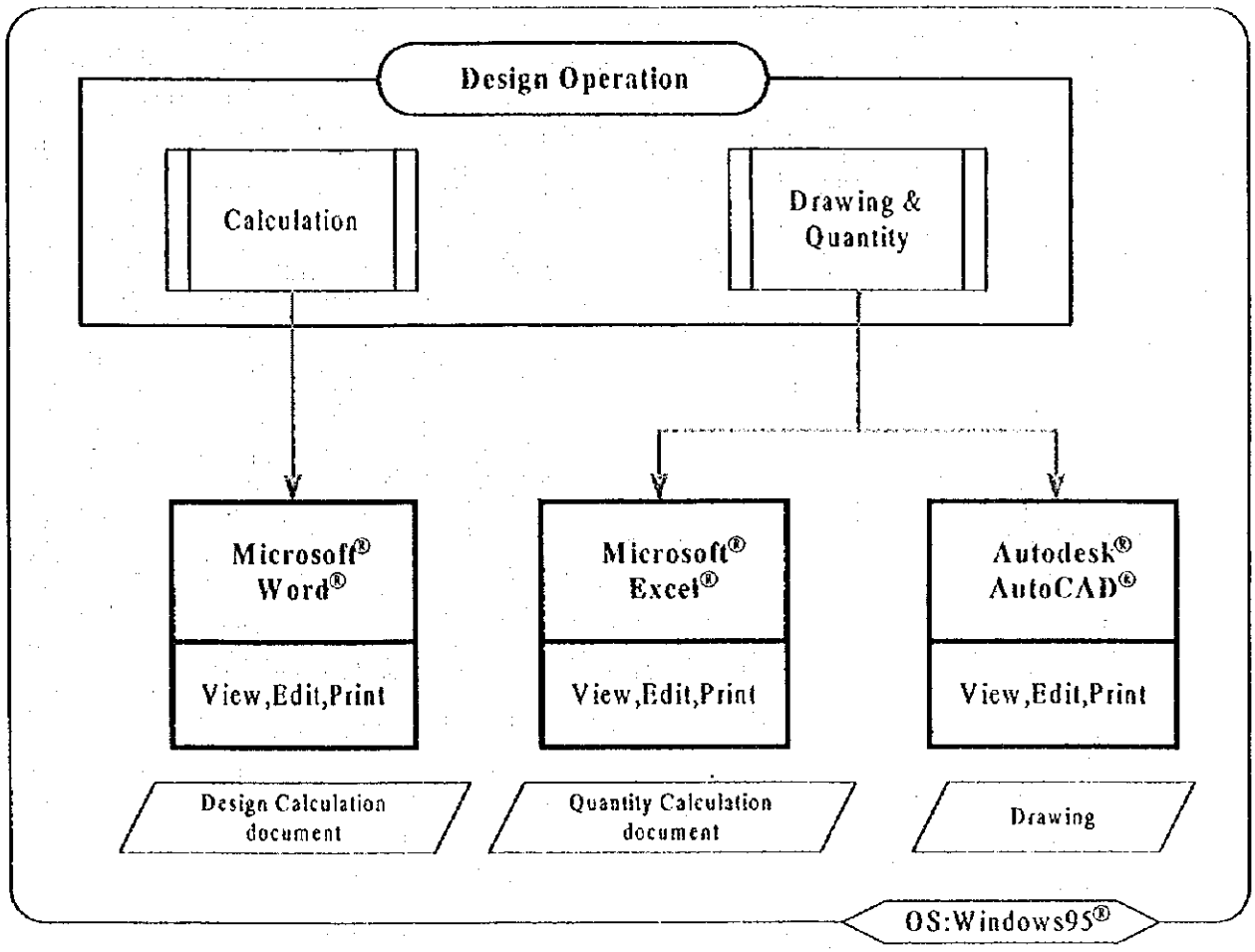


Figure 1.1 Composition of Program

2. Specification

(1) Geometry : Right angle, straight and level.

(2) Number of Lanes : 1 or 2 lanes with sidewalks both side.

(3) Width : Symmetrical composition.

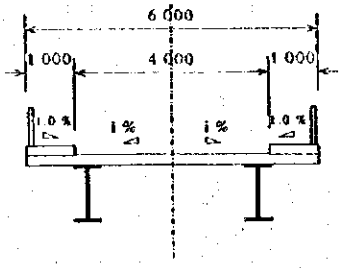
Roadway width : From 3.000m to 6.000m for 1 lane.

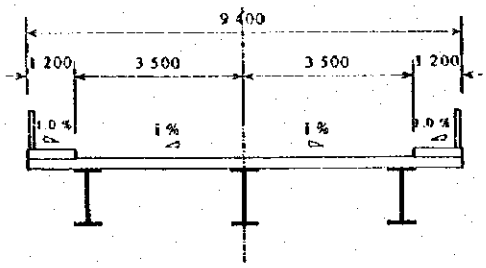
From 6.000m to 10.000m for 2 lane.

Sidewalk width : From 0.400m to 1.200m.

Standard width is shown as follows.

1 Lane	2 Lanes
1.000 + 4.000 + 1.000 = 6.000 m	1.200 + 7.000 + 1.200 = 9.400 m





Cross-fall i = 1.5 % : I ~ VII Regions

i = 2.0 % : VIII ~ XII Regions

(4) Pavement and Railing

1) Curb : Height 250mm and width 200mm is standard.

2) Railing : Standard height is 1.100m.

3) Pavement : Roadway: 1.5 or 2.0%

Sidewaek: 1.0%

(5) Design Standard : AASHTO 1992.

(6) Design Method : Service load(allowable working stress) design.

(7) Load

1) Dead Load : Plain Concrete :$W_C = 2.30\ t/m^3$

Reinforced Concrete : $\gamma_C = 2.50\ t/m^3$

Steel : $\gamma = 7.85\ t/m^3$ (fix)

Pavement : $\gamma = 2.30\ t/m^3$

Soil : $\gamma_S = 1.80\ t/m^3$

2) Railing : AASHTO(3.14.2, 3.14.3)

Vertical : $W_B = 0.050\ t/m$,

Horizontal : $W_L = 0.020\ t/m$ is standard.

3) Sidewalk Live Load : by AASHTO(3.14.1)

$Lc \le 7.6\ m \rightarrow W_P = 0.415\ t/m^2$ Lc ; Span Length

$7.6\ m < Lc \le 30.5m \rightarrow W_P = 0.293\ t/m^2$

$30.5\ m < Lc$

$$Wp = \left(147 + \frac{4464}{Lc}\right) \times \left(\frac{16.76 - (Sw - 0.25)}{15.24}\right) \times \frac{1}{1000}$$

※ In case of $W_p > 0.293 \rightarrow W_P = 0.293\ t/m^2$ Sw ; Sidewalk width

4) Vehicle Loads: 100% of HS20-44 by AASHTO(3.7)

5) Wind : $W_V = 0.244\ t/m^2$ is standard by AASHTO(3.15)

6) Earthquake: Acceleration coefficient A= 0.15, Category B by AASHTO(3.21)

(8) Materials

1) Concrete :

H-5, H-10, H-15, H-20, H-25, H-30, H-40

2) Reinforcement Bar : Select from the next.

A63-42H, A44-28H

The standard size and section parameter of Deformed Reinforcement Bar are indicated in the following table.

Nominal Diameter (mm)	Nominal Section Area (cm^2)	Nominal Perimeter (cm)	Nominal Weight (kg/m)
6	0.283	1.89	0.222
8	0.503	2.51	0.395
10	0.785	3.14	0.617
12	1.131	3.77	0.888
16	2.011	5.03	1.578
18	2.545	5.66	1.998
22	3.801	6.91	2.984
25	4.909	7.85	3.853
28	6.158	8.80	4.834
32	8.043	10.05	6.313
36	10.179	11.31	7.990

3)Structural Steel : Select from A52-34ES, A42-27ES, A37-24ES.

Size of shape steel is selected from the following table.

Angle

Dimension (mm) A×B×t	Unit Weight (kg/m)	Section Area (cm^2)	Inertia (cm)
65×65×6	5.86	7.52	1.97
65×65×8	7.74	9.85	1.95
65×65×10	9.42	12.10	1.93
80×80×6	7.28	9.30	2.44
80×80×8	9.76	12.30	2.42
80×80×10	11.90	15.10	2.41
80×80×12	14.10	17.90	2.39
100×100×8	12.20	15.50	3.06
100×100×10	15.00	19.20	3.04
100×100×12	17.80	22.70	3.02

Channel

Dimension mm A×B×t	Unit Weight kg/m
300×50×2	6.18
300×50×3	9.19
300×50×4	12.10
300×50×5	15.10
300×75×2	6.96
300×75×3	10.40
300×75×4	13.70
300×75×5	17.00
300×75×6	20.30
300×75×8	26.60
300×100×3	11.50
300×100×4	15.30
300×100×5	19.00
300×100×7	22.60
300×100×8	29.70
300×100×10	36.70
300×100×12	43.40

Pipe

Dia. (inch)	Unit Weight (kg/m)	Dia. (mm)	Thick (mm)	Area (cm^2)	Inertia (cm^4)
2	3.54	50.8	3	4.51	12.9
2 3/8	4.24	60.3	3	5.40	22.3
2 1/2	4.48	63.5	3	5.70	26.2
3	5.42	76.2	3	6.90	46.3
3 1/2	6.36	88.9	3	8.10	74.8
4	7.29	102.0	3	9.29	113.0
4 1/2	8.23	114.0	3	10.50	163.0
5	9.17	127.0	3	11.70	225.0

High - Tension Bolt : ASTM

Diameter (mm)	Length min.(mm)	Length max.(mm)	Unit weight min. (g)	Unit weight max. (g)	Additional length (mm)
16	35	100	185	287	25
20	40	130	318	549	30
22	45	140	449	733	35
24	50	160	619	1009	40

4) PC-Cable : Select from the following table.

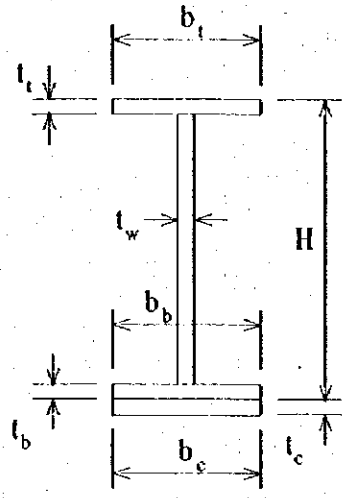
ASTM A490

	Tendon Type		Section of Tendon	Weight of Tendon	Sheathing		Tendon Capacity
	(")	(mm)	(cm^2)	(kg/m)	Ω (mm)	ϕ (mm)	fpu (t)
Pretension (Bond control)	1/0.5	1-12.7	0.987	0.775			18.7
	1/0.6	1-15.24	1.400	1.102			26.6
Post-tension (Bend up)	7/0.5	7-12.7	6.910	5.43	51	51	131
	7/0.6	7-15.24	9.800	7.71	63	63	186
	12/0.5	12-12.7	11.850	9.30	75	63	225
	12/0.6	12-15.24	16.800	13.22	81	75	319

(9) Cross - section of Superstructure

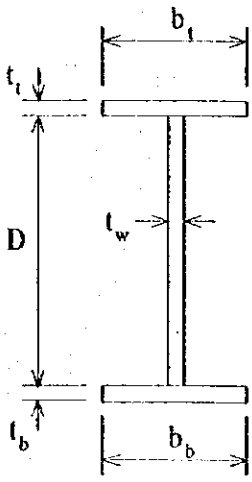
Steel Girder

Rolled-H Beam



Adjust by cover plate

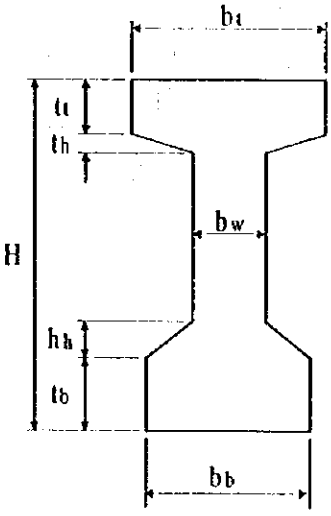
Plate Girder



Adjust by flange plate

P C-Beam

Pre./ Post-Tensioned



(10) Height and Type of Substructure

1) Abutment : Cantilever-type Abutment(Spread foundation), from 5m to 12m height.

2) Pier : Wall-type Pier(Spread foundation), from 5m to 15m height.

-The outline of the whole CADD program system is illustrated in Figure 1.2.

-The outline of each CADD program for superstructure (steel beam and PC beam) and substructure (abutment and pier) are shown in Figure 1.3 through Figure 1.6.

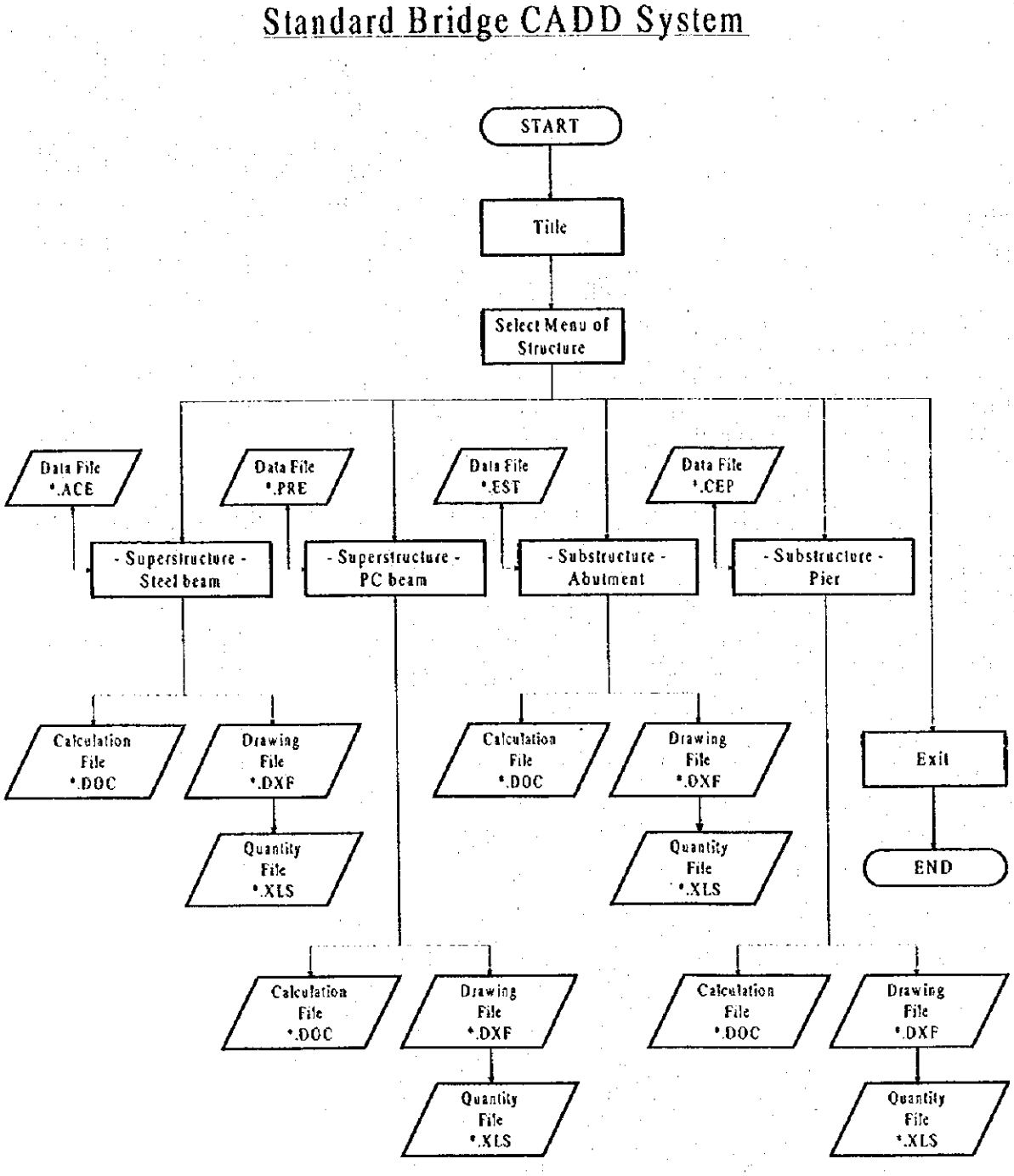


Figure 1.2 Outline of Whole CADD Program System

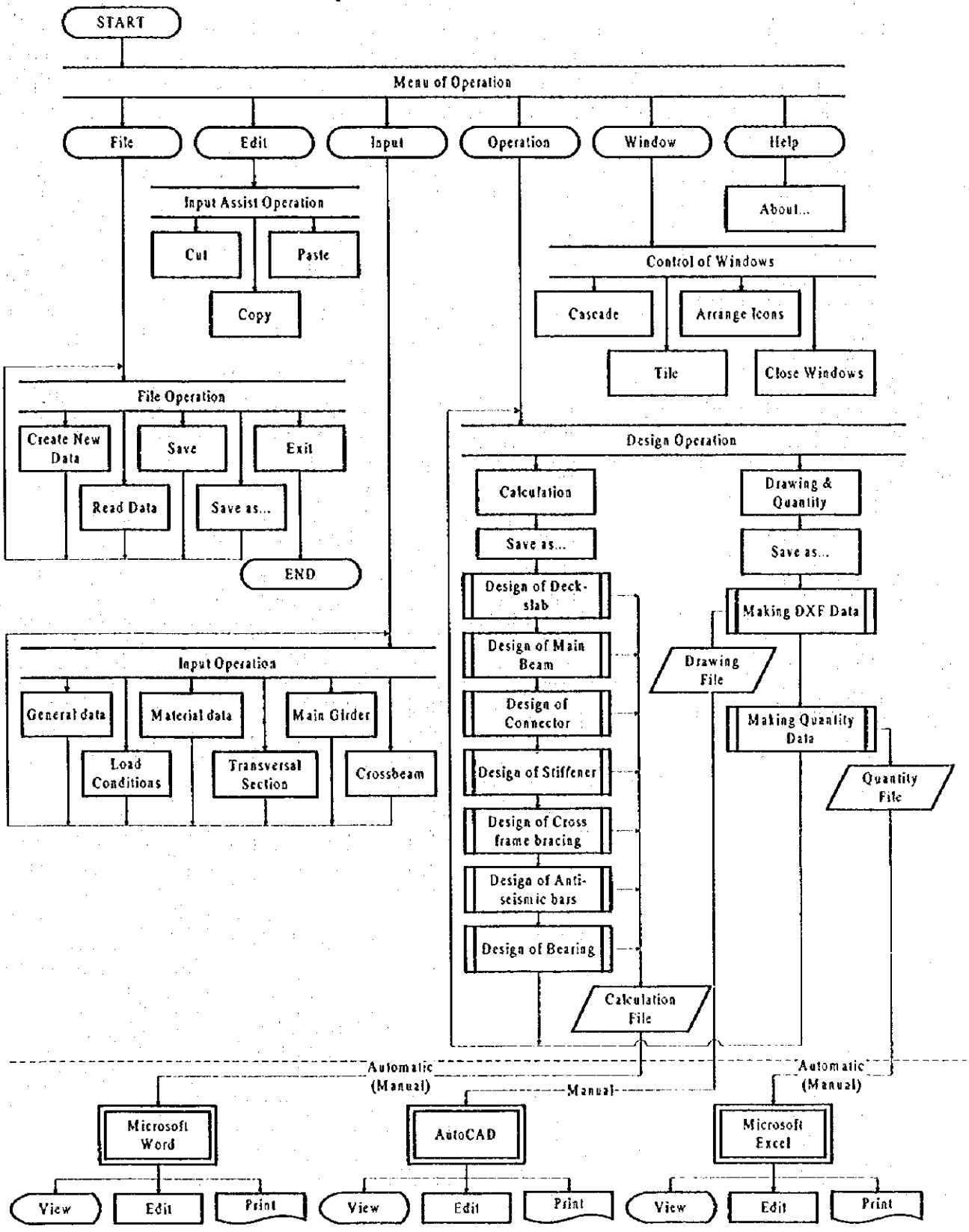


Figure 1.3 Outline of CADD Program (Steel Beam)

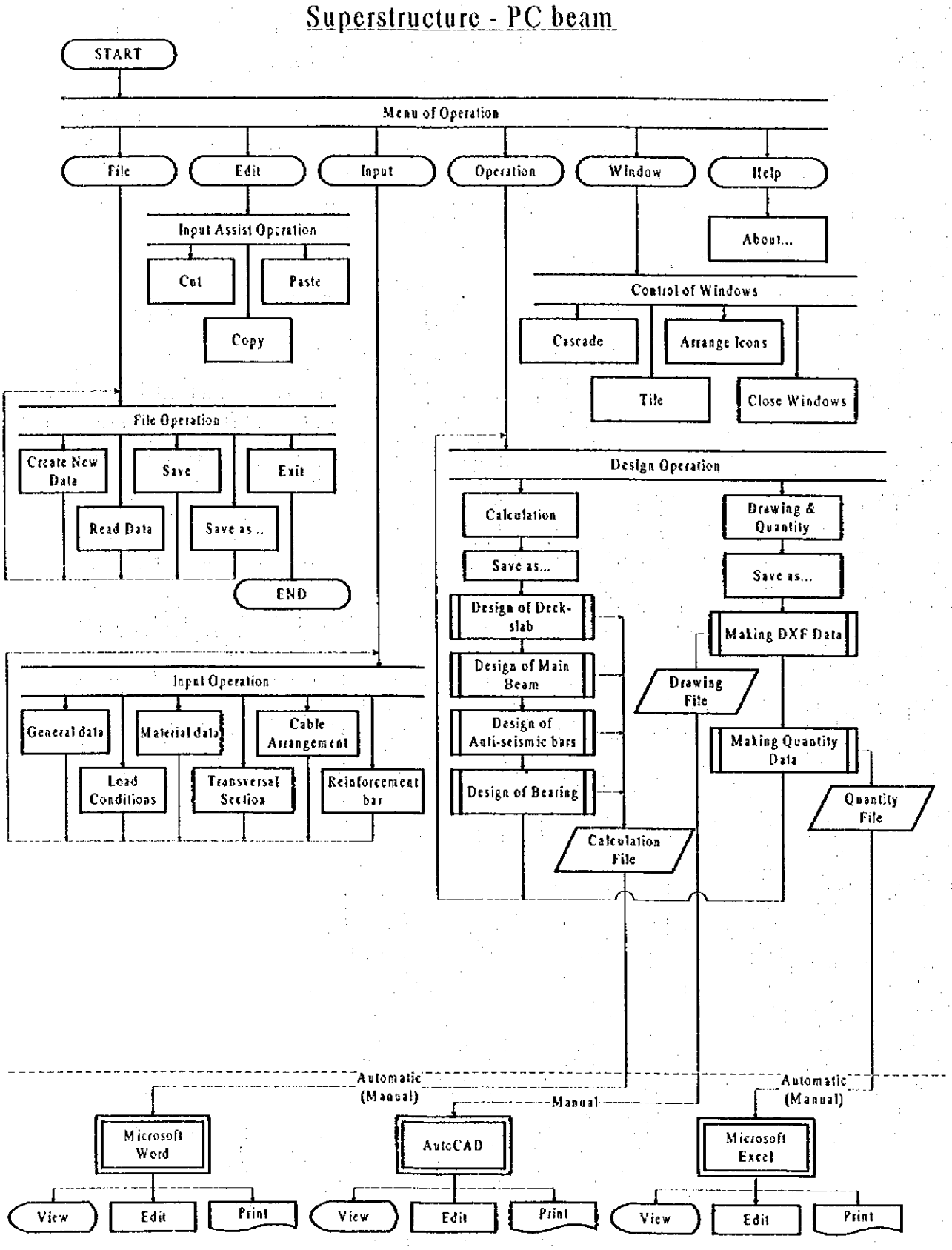


Figure 1.4 Outline of CADD Program (PC Beam)

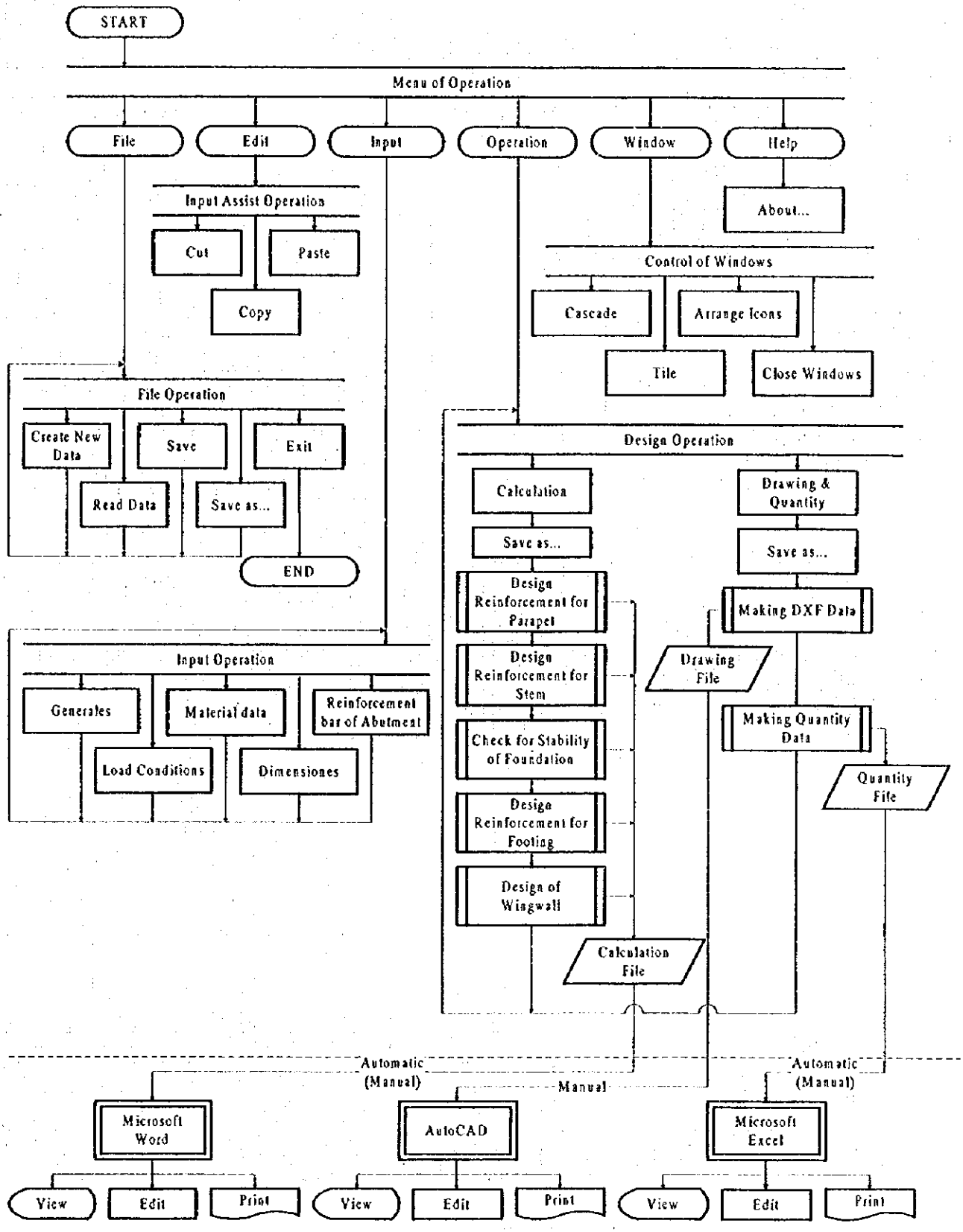


Figure 1.5 Outline of CADD Program (Abutment)

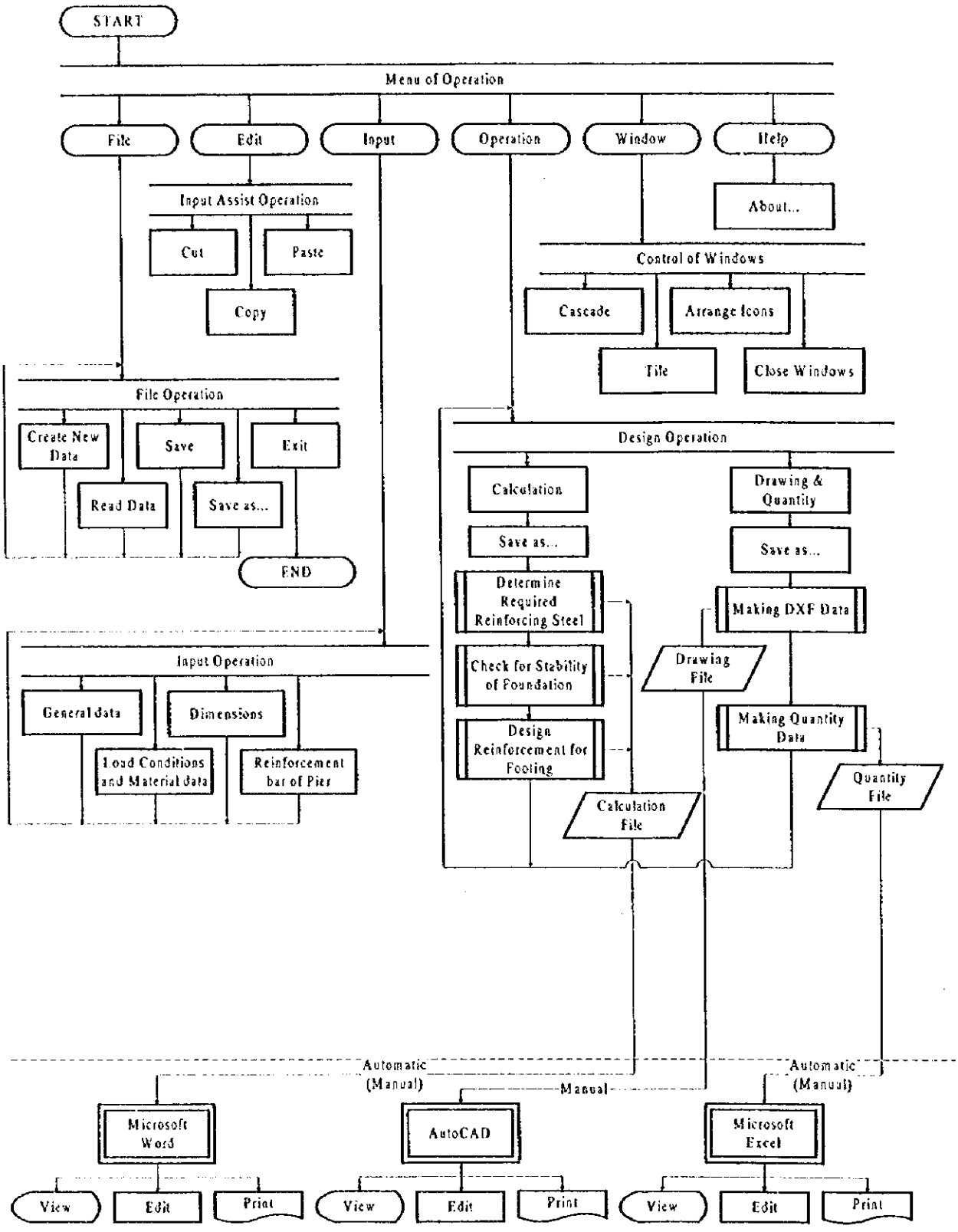
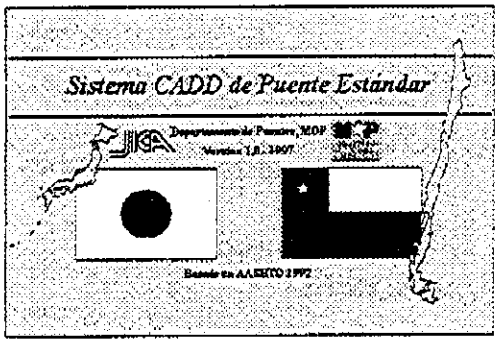


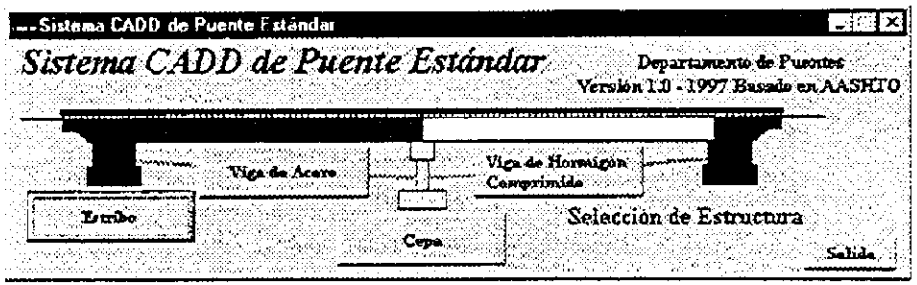
Figure 1.6 Outline of CADD Program (Pier)

3. Outline of CADD Operating Procedure explained by the Steel Beam Program (1/5)

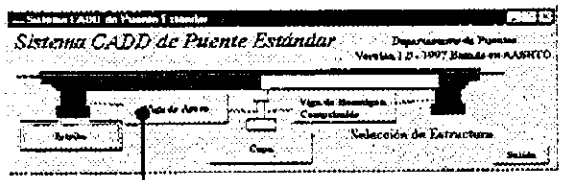
(1) The system starts by double-clicking the start icon.



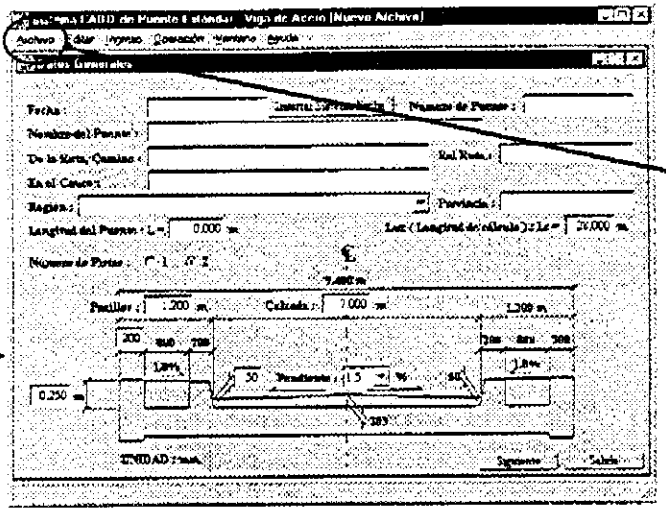
(2) The title of system is shown for several seconds, and the main menu follows.



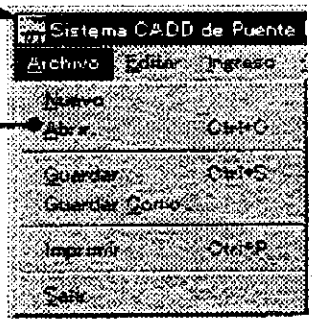
(3) main menu.



(4) Choose a program which you select by clicking a button among the four programs.

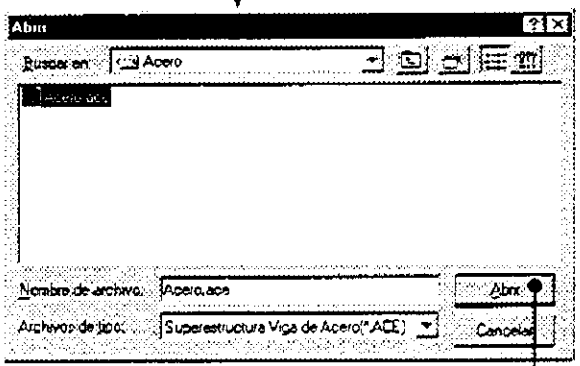


(5) Default input data are shown on the first screen.

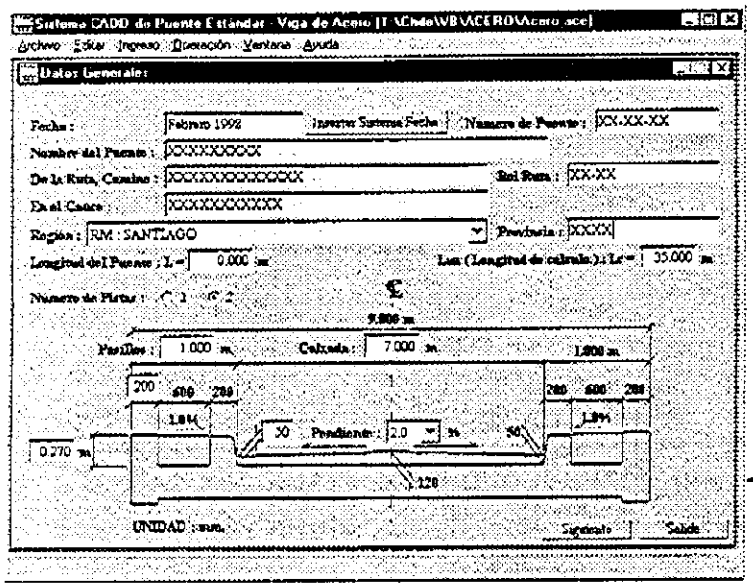


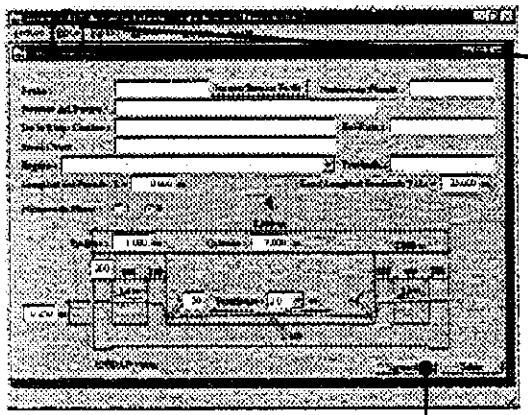
File
New
Open
Save
Save as
Print
Exit

(6) Select File[Archivo] and then Open[Abrir] the existing file.



(7) Open the existing file.

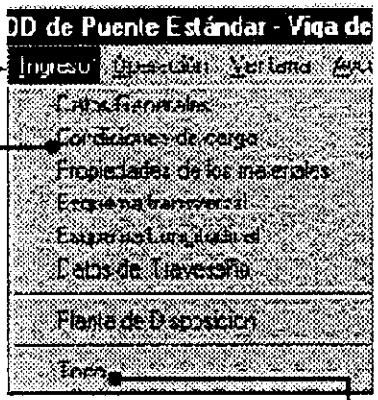




"The first input sheet"

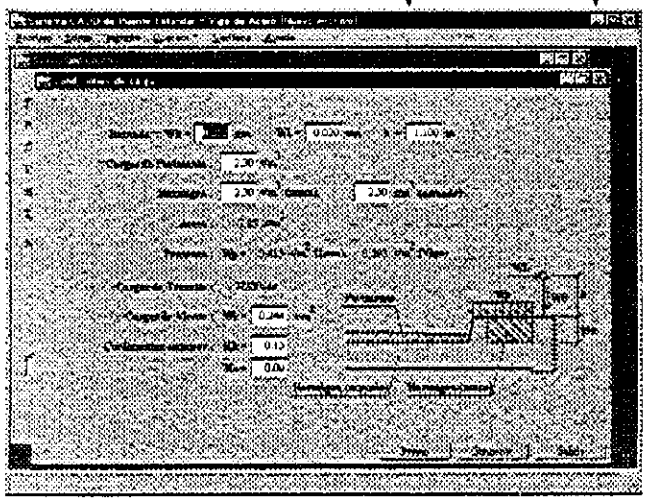
Next

Select a sheet.

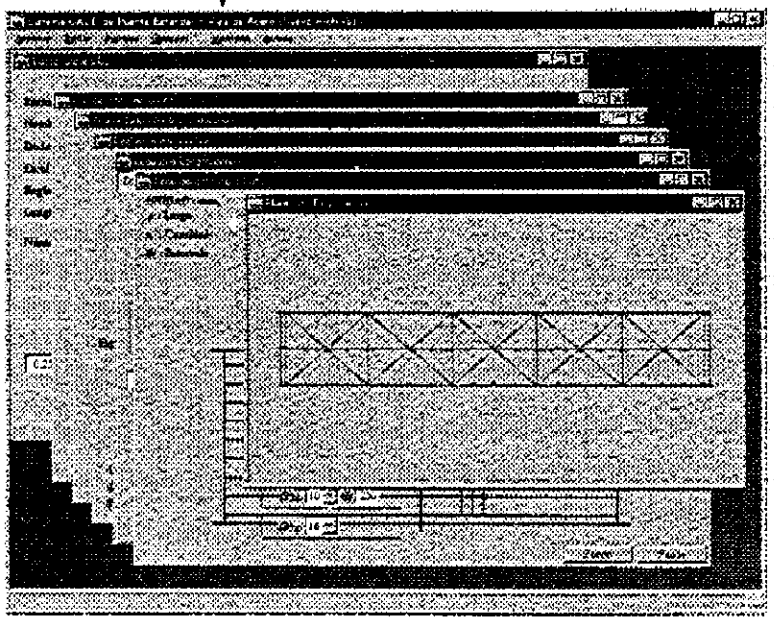


(8) Select Input[Ingreso], there are in total six sheets in case of steel beam.

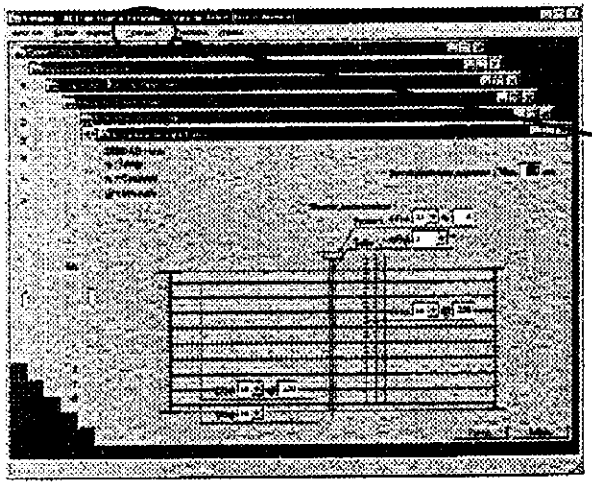
Select all six sheets.



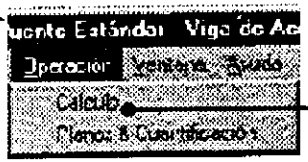
(9)-1 The next input sheet is shown.



(9)-2 All the six input sheets of the steel beam are opened.

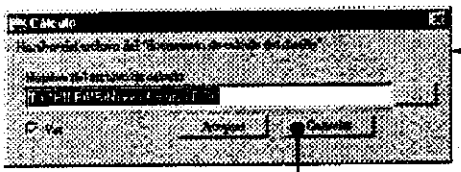


Return

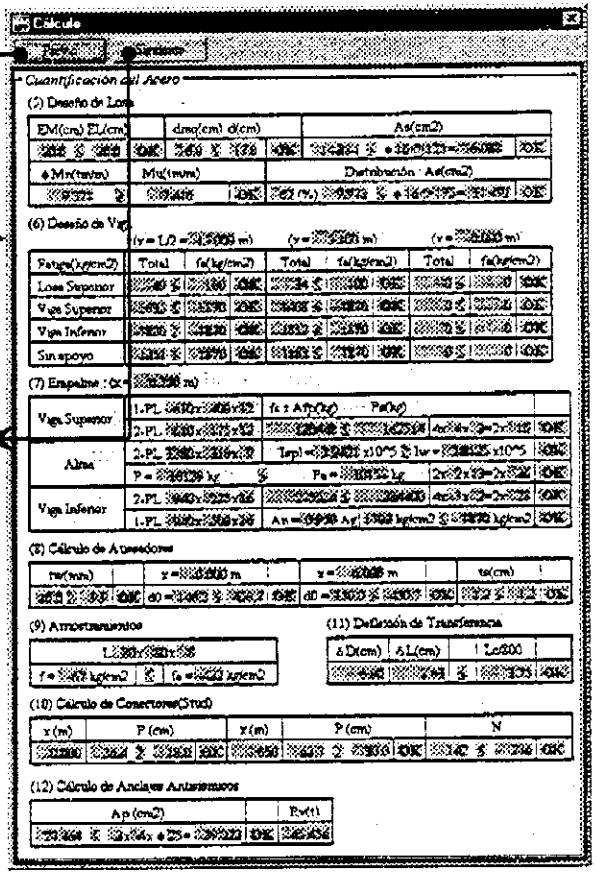


Calculation

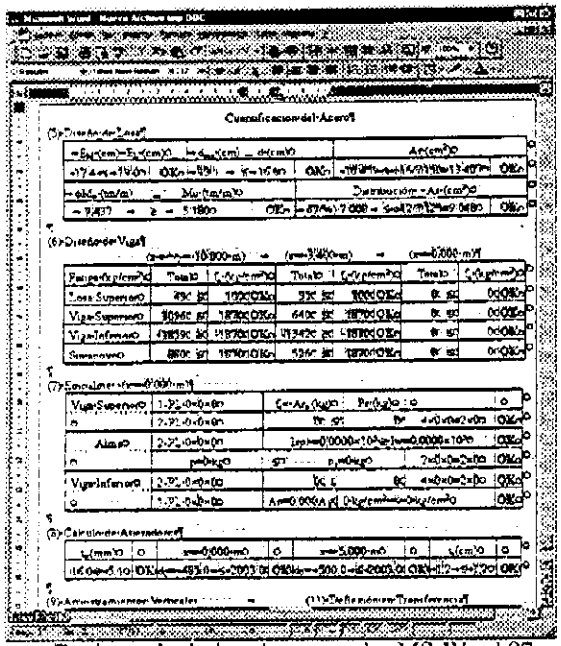
(10) Select [Calculo] for design.



(12) Fill in the file name of design calculation document.
Here, mark "Ver(View)", and click [Aceptar].



(11) A preview of summary.

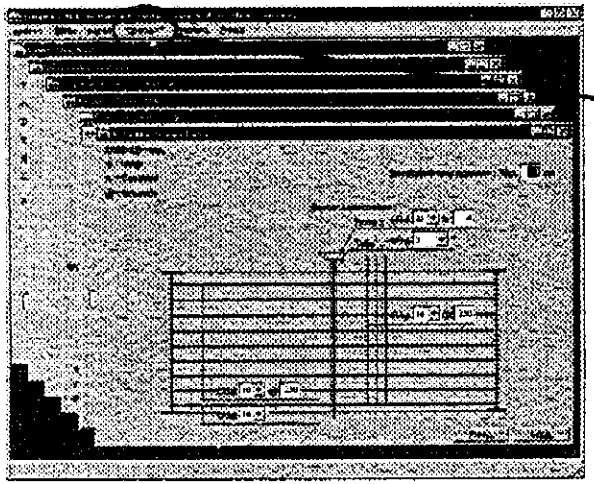


Design calculation document by MS-Word 97.

Treatment (Calculation)

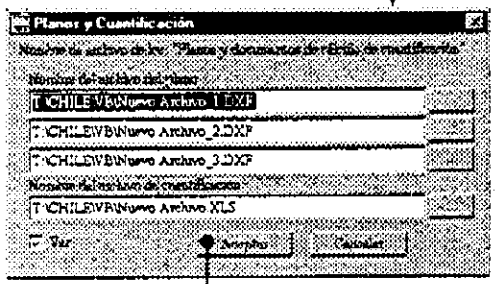
(13) When design (calculation) is finished,
design calculation document is prepared by MS-Word 97.

Drawing and Quantity (5/5)

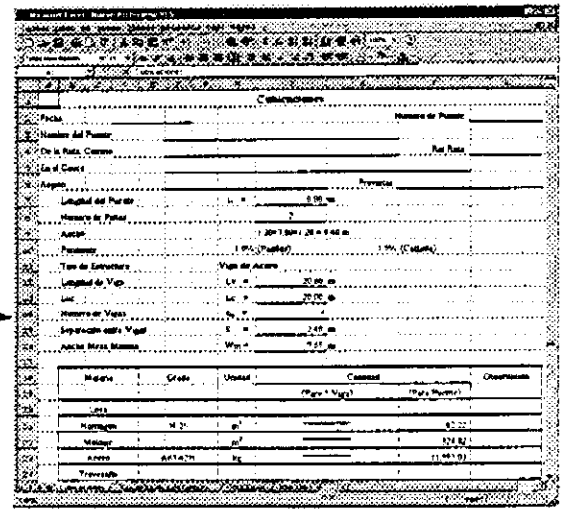


(14) Select [Planos & Quantificacion]
for drawing and quantity preparation.

(16) Drawing data [*.dxf]
These data are read,
edited and output by AutoCAD.



Treatment
(Calculation)



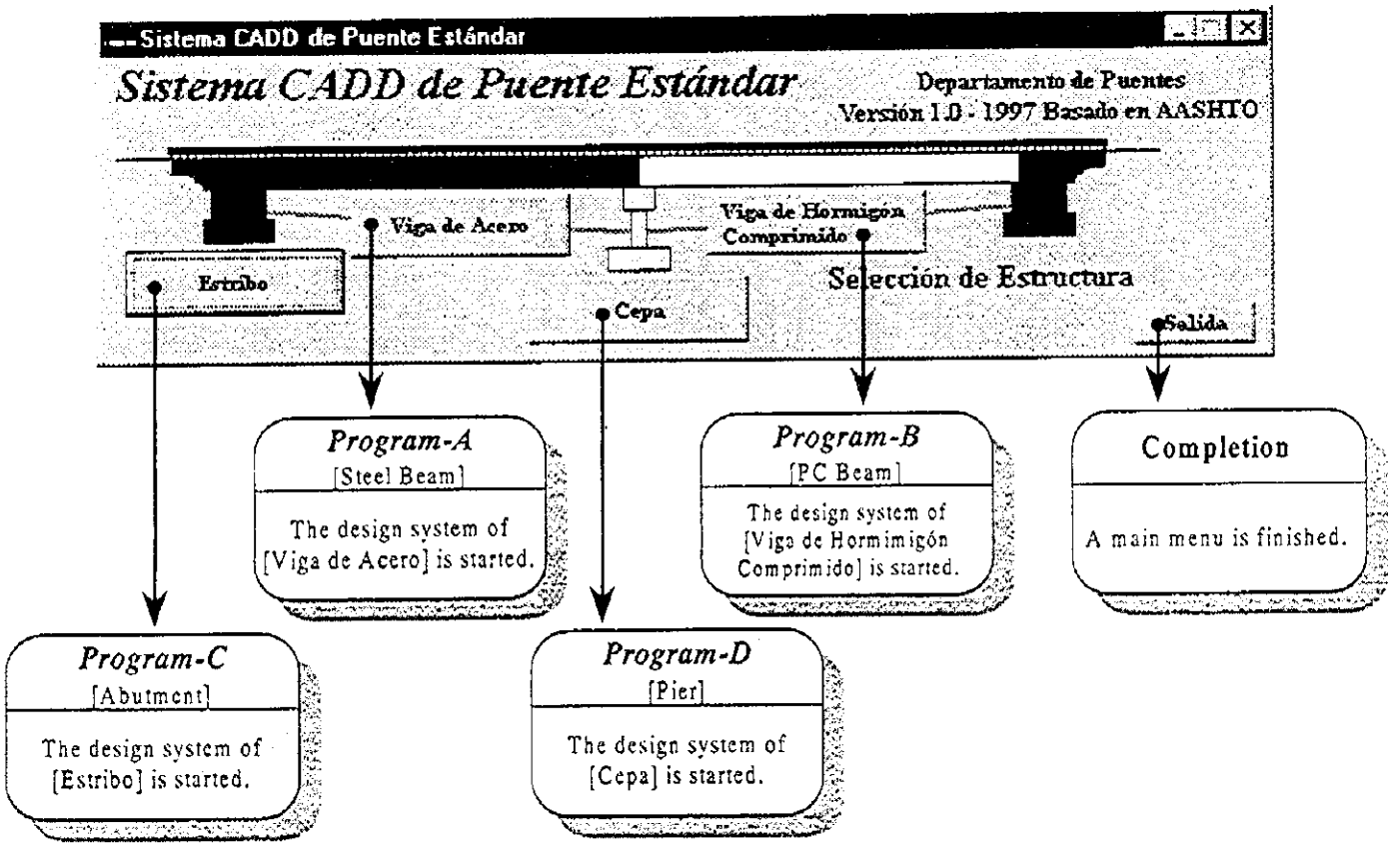
(15) Fill in the file name drawing and quantity.
Then click [Aceptar].

(17) When quantity calculation is finished,
quantity calculation document is prepared by MS-Excel 97.

4-1 Common operation

[Steel Beam] is explained as an example for all the four programs.

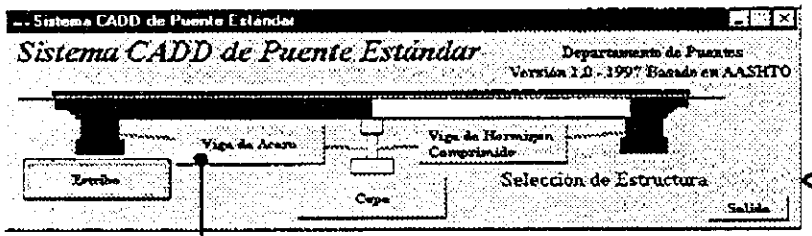
*After the system starts, the title screen is shown for several seconds, and the program menu is comes out.



Choose a Program by clicking a button among the four programs.

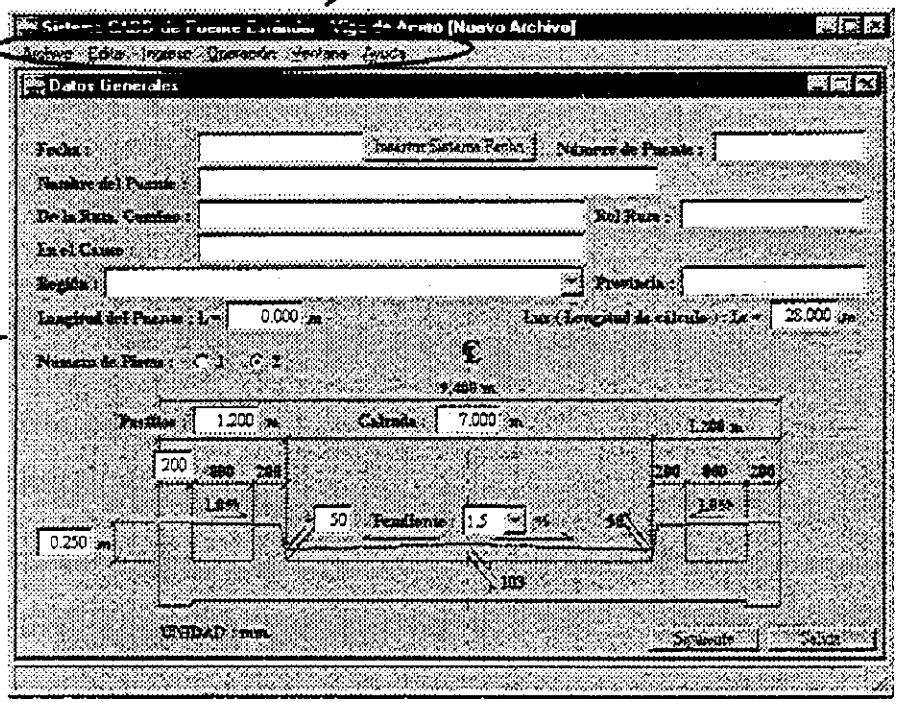
Input Screen Menu Bar [1/4]

Program menu



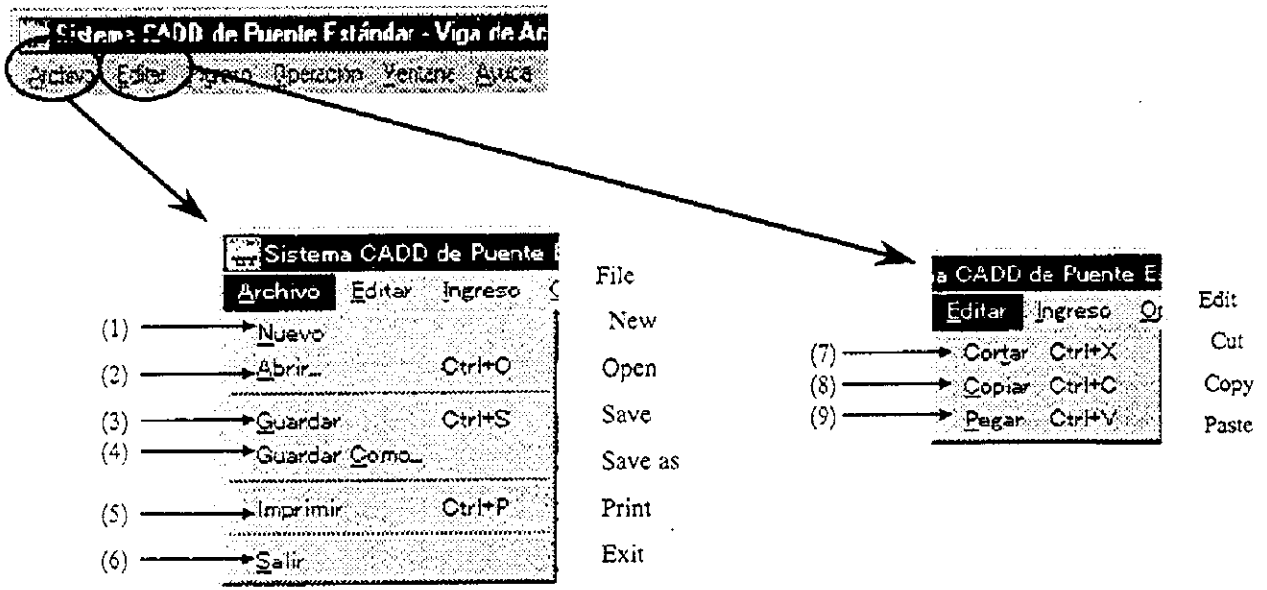
Menu Bar

*Input screen



Default input data are shown on the first screen.
There are six input screens in case of Steel Beam.

Input Screen Menu Bar [2/4]



[Archivo] : File.

(1) Nuevo New
To return to the default data.

(2) Abrir Open
To open the existing input data file.

(3) Guardar Save
To save the file in opening .

(4) Guardar Como Save as
To save as another file.

(5) Imprimir Print
To print the present data.

(6) Salir Exit
To finish the present program.

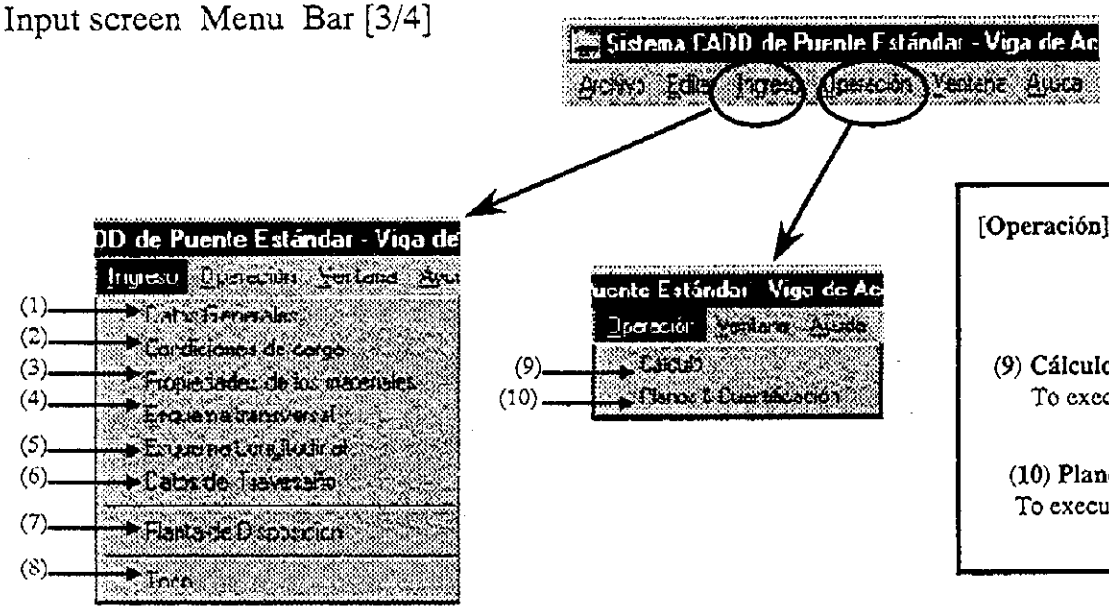
[Editar] : Edit

(7) Cortar Cut
To cut the specified input data.

(8) Copiar Copy
To copy the specified input data.

(9) Pegar Paste
To paste the data cut or copied.

Input screen Menu Bar [3/4]



[Operación] : Operation.

(9) Cálculo Calculation
To execute design calculation.

(10) Planos & Cuantificación Drawing & quantity
To execute drawing & quantity calculation.

[Ingreso] Input

(1) Datos Generales
To open General Data window.

(2) Condiciones de carga
To open Load Condition window.

(3)Propiedades de los materiales
To open Material Property window.

(4) Esquema transversal
To open Transverse Plan window.

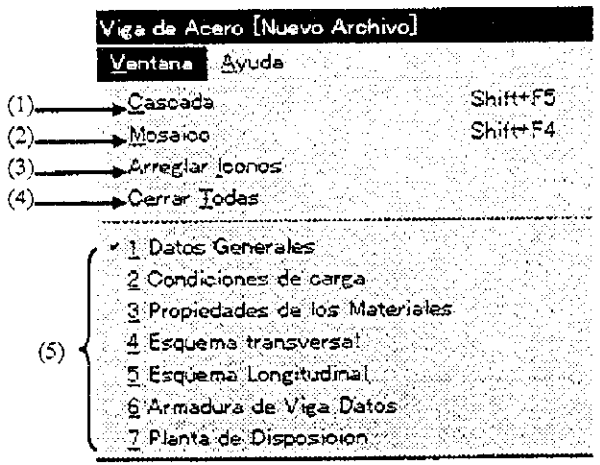
(5) Esquema Longitudinal
To open Longitudinal Plan window.

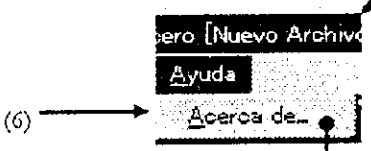
(6) Datos del Travesaño
To open Cross-frame Data window.

(7) Planta de Disposioion
To open Disposition Plan window.

(8) Todo
To open all of input windows.

Input screen Menu Bar [4/4]





[Ayuda] : Help

(6) Acerca de...
The version of this program is shown.

[Ventana] : Window

(1) Cascada Pile up
More than one windows are piled up in layers.

(2) Mosaico Mosaic
More than one windows are arranged in one layer.

(3) Arreglar Iconos Arrange Icons
To arrange icons at the bottom of window.

(4) Cerrar Todas Close all
To close all opened windows.

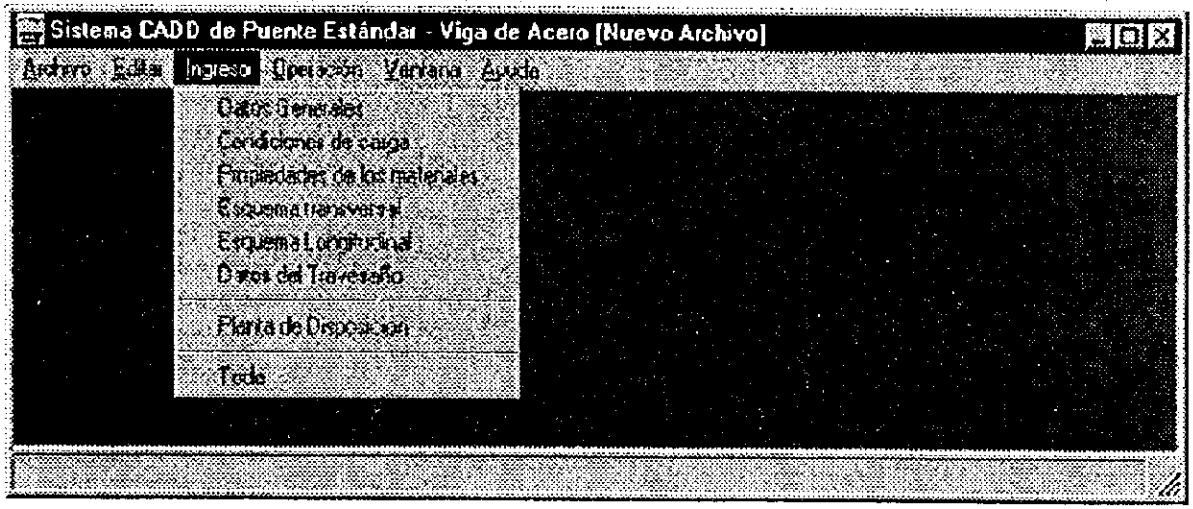
(5) To switch the active window.

*Version of the program is shown.

4-2 Input items

1) Program-A : Steel Beam

Input section of Steel Beam consists of the following 6 sheets.



Datos Generales : General data

Condiciones de carga : Load Conditions

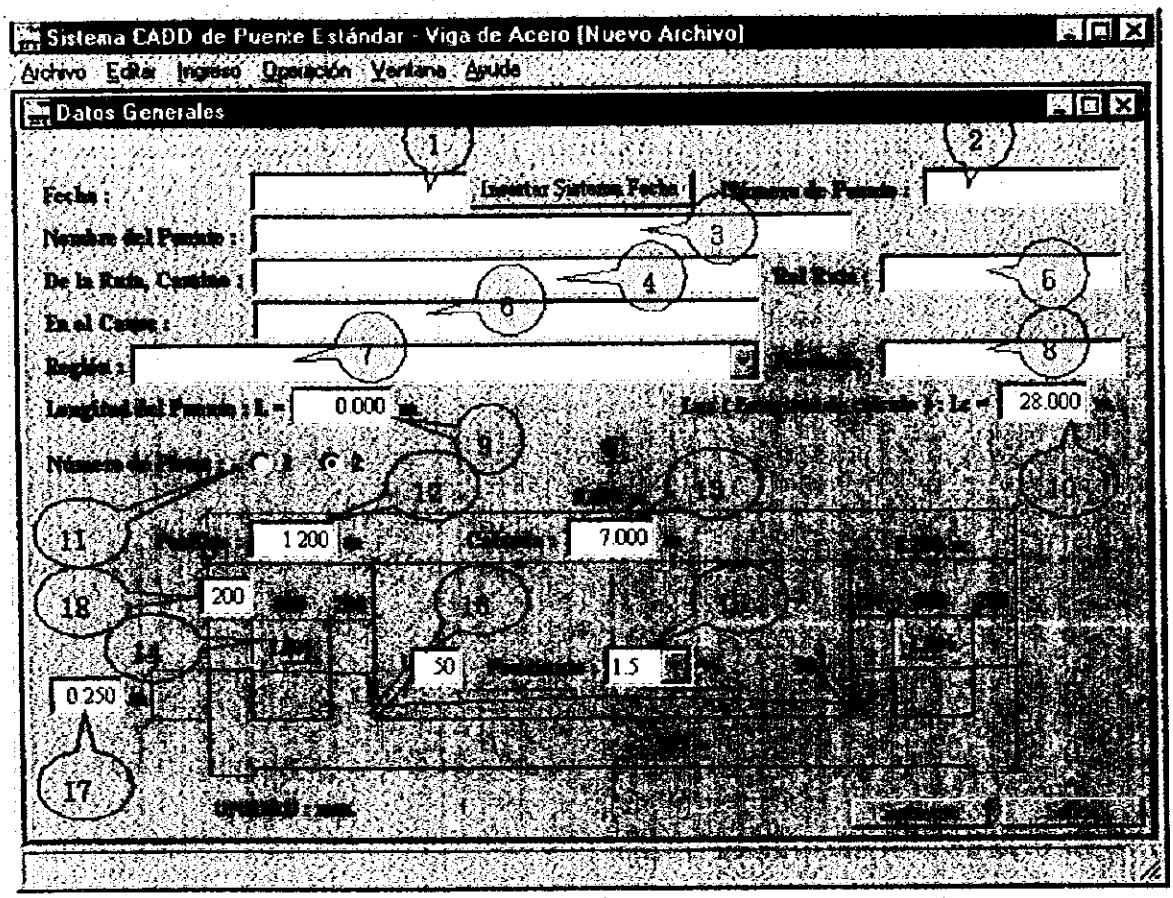
Propiedades de los materiales : Material data

Esquema transversal : Transversal Section

Esquema Longitudinal : Main Girder

Datos del Travesaño : Crossbeam

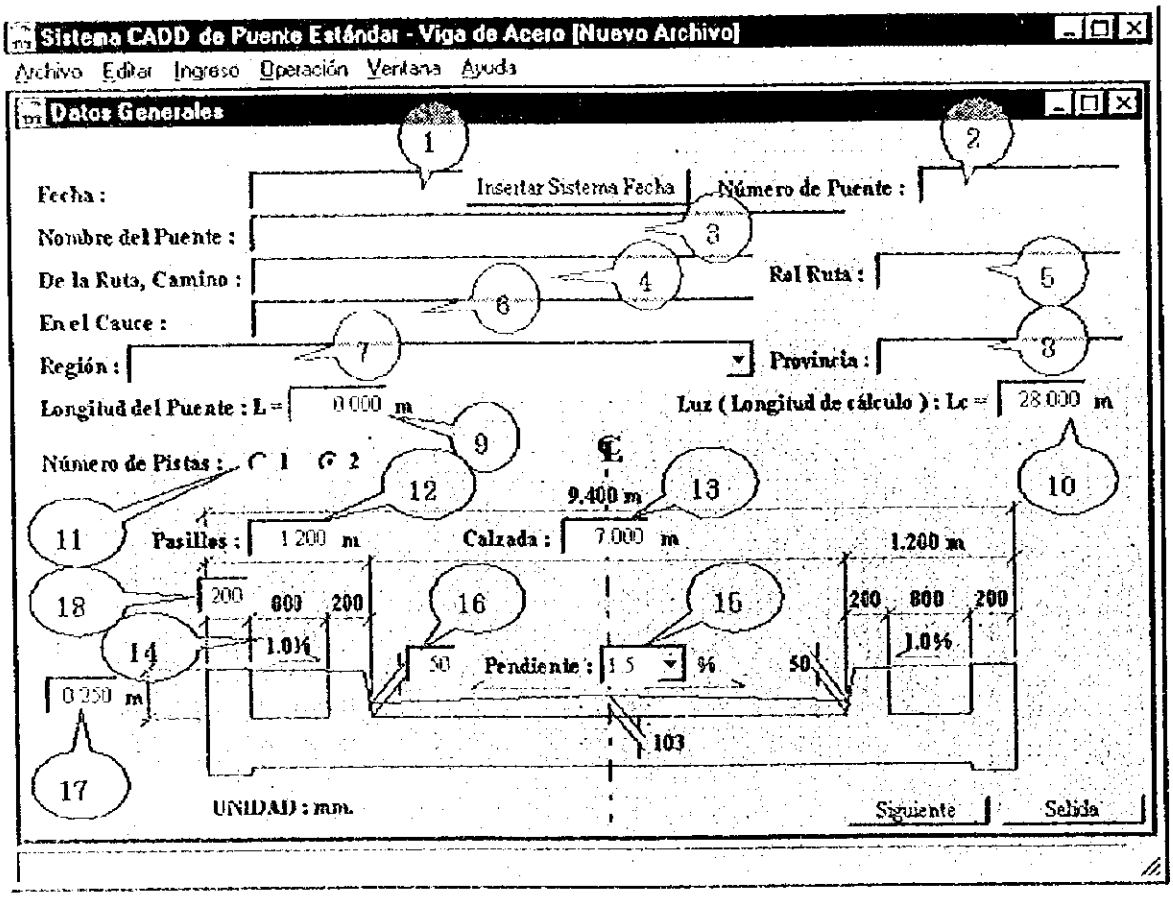
Datos Generales [General Data]



1. Date : Input or System Date for automation setting (within 20 characters)
2. Number of Bridge : Input (within 10 characters)
3. Bridge Name : Input (within 50 characters)
4. Road Name : Input (within 40 characters)
5. Distance : Input (within 10 characters)
6. River Name : Input (within 40 characters)
7. Region : The selecting for Number and Name of Region is shown.
8. Name of Province : Input (within 20 characters)
9. Bridge Length : Input (from 10.000 to 999.999 m)
10. Span Length : Input (from 10.000 to 40.000 m)
11. Numbers of Lane : Select 1 or 2 Lanes.
    When numbers of Lane is changed, Road Width is shown automatically.
12. Side-walk Width : Input (from 0.400, to 1.200 m)
13. Lane Width : Input (1 Lane : from 3.000 to 6.000 m, 2 Lanes : from 6.000 to 10.000 m)
14. Cross-fall of Side-walk : Fixed value (1%)
15. Cross-fall of Lane : Select (1.5% or 2.0%)
16. Minimum thickness of Pavement : Input (from 0 to 100 mm)
    When the minimum thickness is input, the maximum thickness of Road Center is shown.
17. Curb Height : Input (from 0.004 to 0.999 m)
18. Curb Width : Input (from 1 to 999 mm)

Where the value shown in the screen is default value.

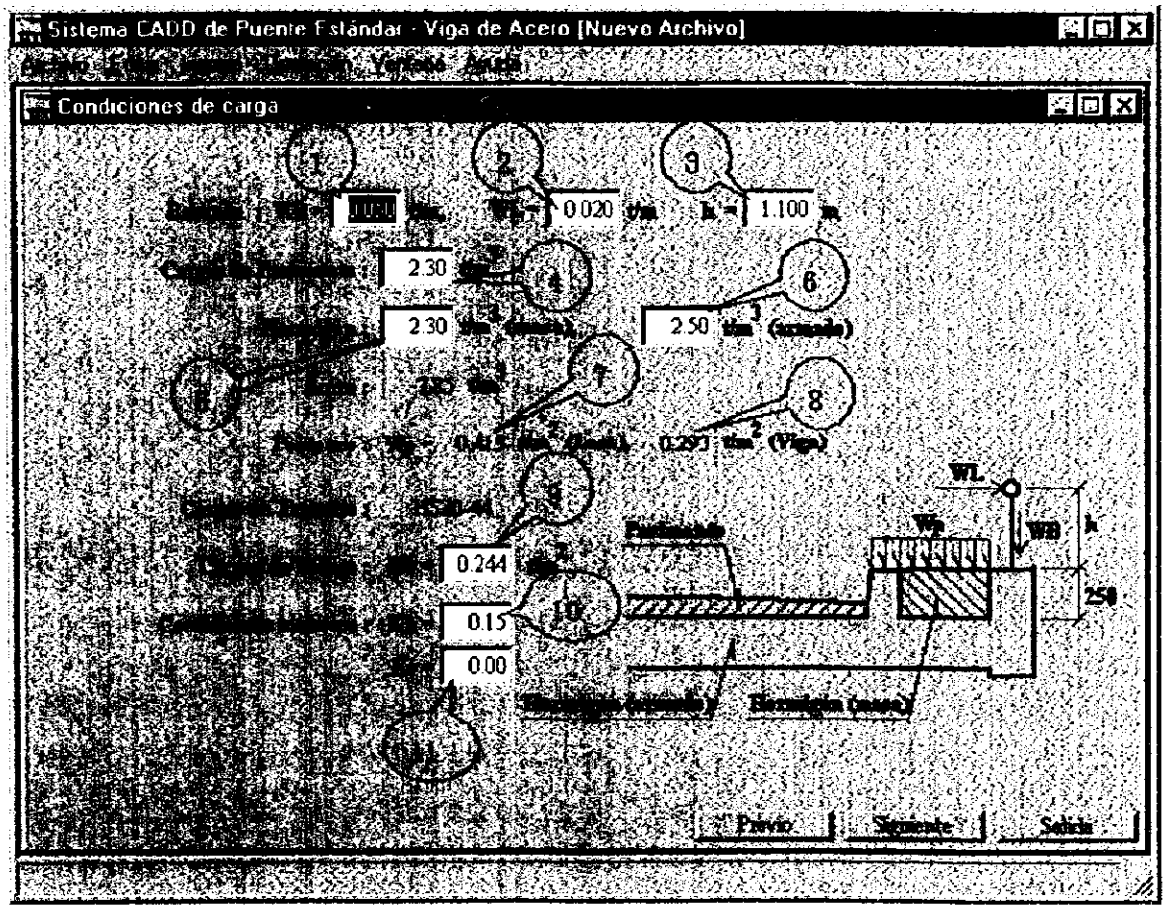
Datos Generales | General Data |



1 Date : Input or System Date for automation setting (within 20 characters)
2 Number of Bridge : Input (within 10 characters)
3 Bridge Name : Input (within 50 characters)
4 Road Name : Input (within 40 characters)
5 Distance : Input (within 10 characters)
6 River Name : Input (within 40 characters)
7 Region : The selecting for Number and Name of Region is shown.
8 Name of Province : Input (within 20 characters)
9 Bridge Length : Input (from 10.000 to 999.999 m)
10 Span Length : Input (from 10.000 to 40.000 m)
11 Numbers of Lane : Select 1 or 2 Lanes.
When numbers of Lane is changed, Road Width is shown automatically.
12 Side-walk Width : Input (from 0.400 to 1.200 m)
13 Lane Width : Input (1 Lane : from 3.000 to 6.000 m, 2 Lanes : from 6.000 to 10.000 m)
14 Cross-fall of Side-walk : Fixed value (1%)
15 Cross-fall of Lane : Select (1.5% or 2.0%)
16 Minimum thickness of Pavement : Input (from 0 to 100 mm)
When the minimum thickness is input, the maximum thickness of Road Center is shown
17 Curb Height : Input (from 0.001 to 0.999 m)
18 Curb Width : Input (from 1 to 999 mm)

Where the value shown in the screen is default value.

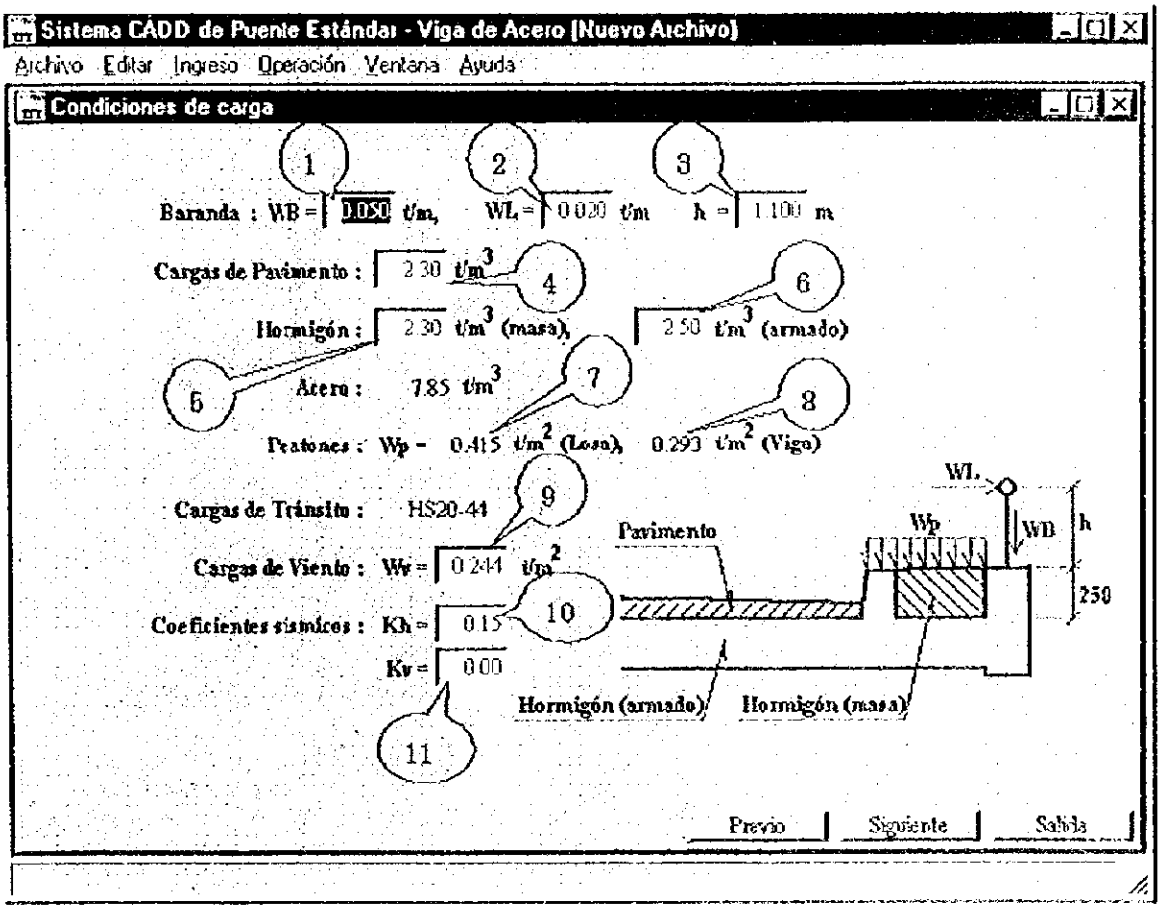
Condiciones de carga | Load Condition |



1. Railing Load : Input (from 0.000 to 9.999 t/m)
2. Railing Pushing Force : Input (from 0.000 to 9.999 t/m)
3. Railing Height : Input (from 0.000 to 9.999 m)
4. Unit weight of Pavement: Input (from 0.00 to 9.99 t/m^3)
5. Unit weight of concrete: Input (from 0.00 to 9.99 t/m^3)
6. Unit weight of reinforced concrete : Input (from 0.00 to 9.99 t/m^3)
7. Sidewalk Loading of Slab : Fixed (0.415 t/m^2)
8. Sidewalk Loading of Main Girder : (automation by AASHTO 3.14.1.1)
9. Wind Load : Input (from 0.000 to 9.999 t/m^2)
10. Horizontal Seismic Coefficient of deign : Input (from 0.00 to 1.00)
11. Vertical Seismic Coefficient of deign : Input (from 0.00 to 1.00)

Where the value shown in the screen is default value.

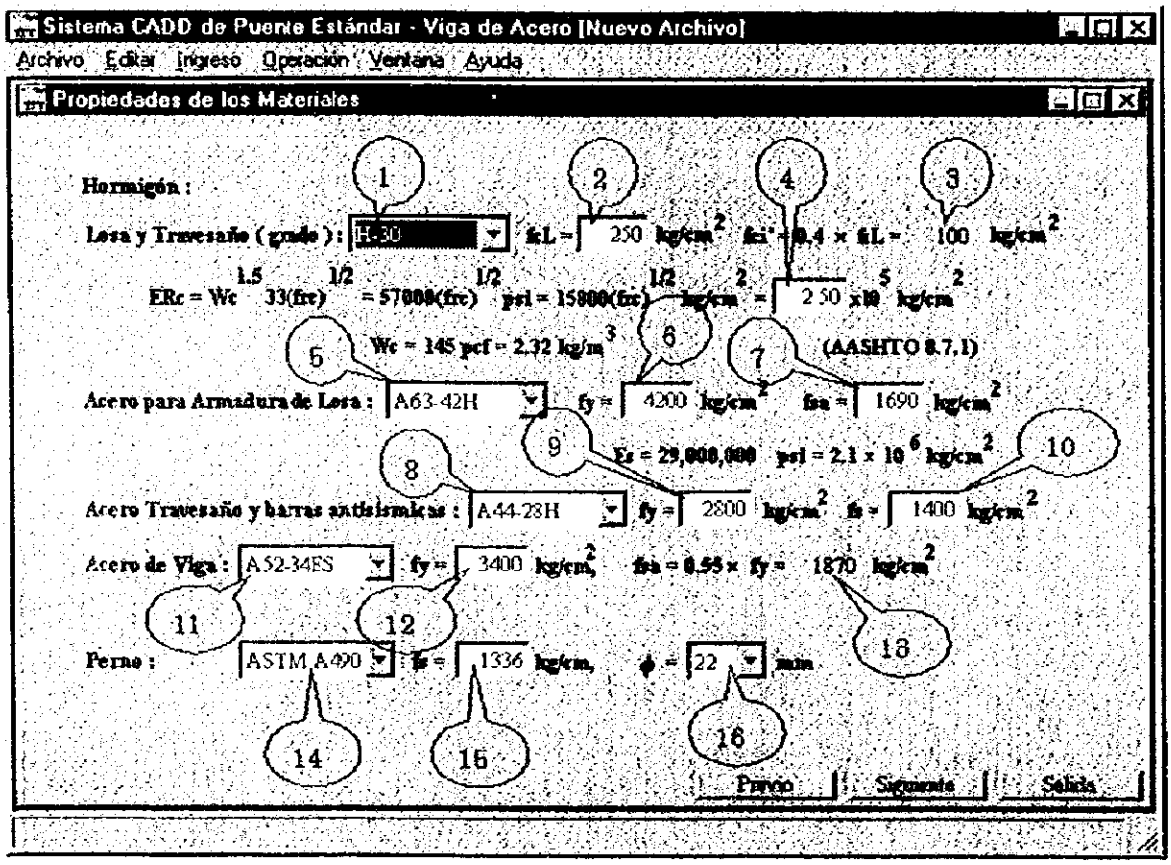
Condiciones de carga | Load Condition |



1. Railing Load : Input (from 0.000 to 9.999 t/m)
2. Railing Pushing Force : Input (from 0.000 to 9.999 t/m)
3. Railing Height : Input (from 0.000 to 9.999 m)
4. Unit weight of Pavement: Input (from 0.00 to 9.99 t/m^3)
5. Unit weight of concrete: Input (from 0.00 to 9.99 t/m^3)
6. Unit weight of reinforced concrete : Input (from 0.00 to 9.99 t/m^3)
7. Sidewalk Loading of Slab : Fixed (0.415 t/m^2)
8. Sidewalk Loading of Main Girder : (automation by AASHTO 3.14.1.1)
9. Wind Load : Input (from 0.000 to 9.999 t/m^2)
10. Horizontal Seismic Coefficient of deign : Input (from 0.00 to 1.00)
11. Vertical Seismic Coefficient of deign : Input (from 0.00 to 1.00)

Where the value shown in the screen is default value.

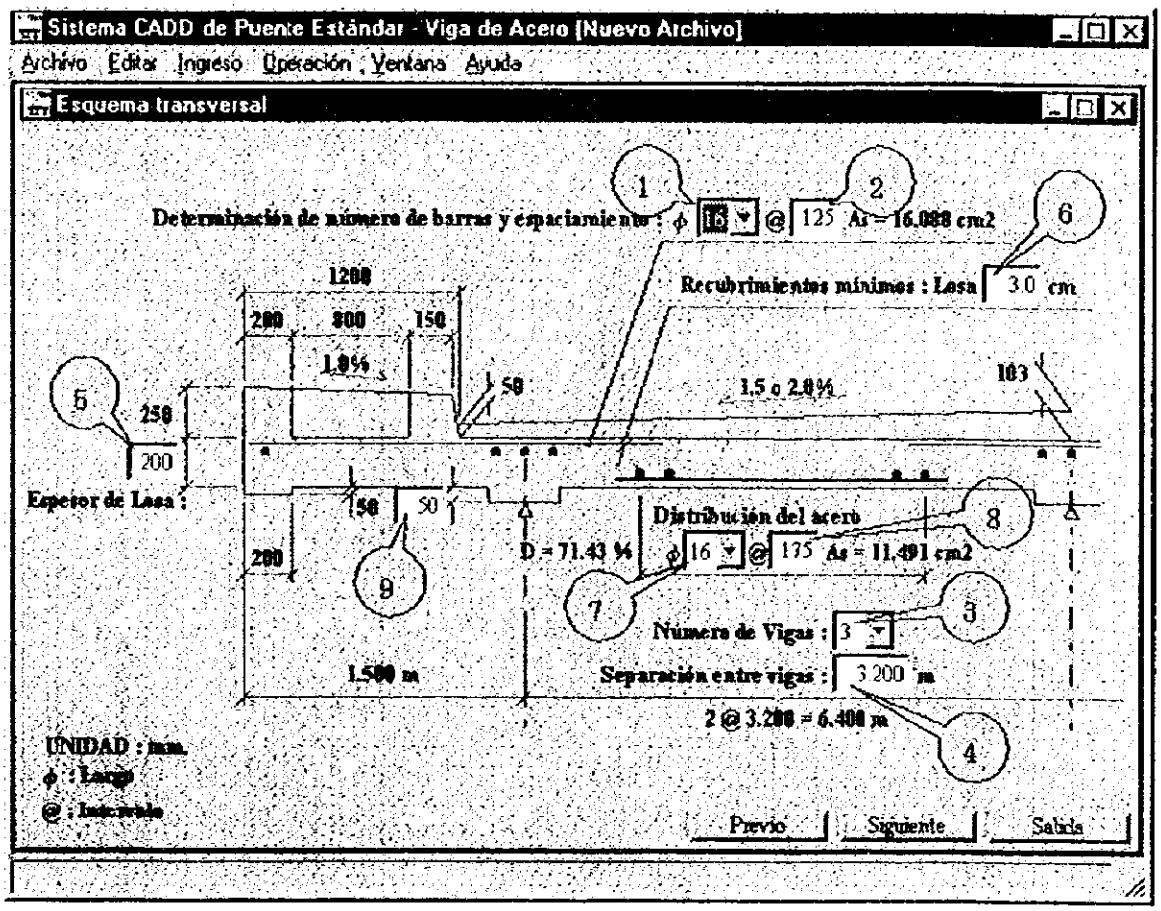
Propiedades de los materiales [Material data]



1. Kinds of concrete for Deck Slab and Crossbeam : Select
   (H-5, H-10, H-15, H-20, H-25, H-30, H-40)
2. Concrete Strength at 28 days : Input (from 1 to 999 kg/cm^2)
3. Allowable Stress of Concrete: Automation (0.4xConcrete Strength kg/cm^2)
4. Young's Modulus of Concrete: Input (from 0.01 to 9.99 x10^5 kg/cm^2)
5. Kinds of Slab Reinforcement bar : Select (A63-42H, A44-28H)
6. Yield Strength of Slab Reinforcement bar : Input (from 1 to 9999 kg/cm^2)
7. Allowable Strength of Slab Reinforcement bar : Input (from 1 to 9999 kg/cm^2)
8. Kinds of Crossbeam Reinforcement bar and Anti-seismic-bar : Select (A63,42H, A44-28H)
9. Yield Strength of Crossbeam Reinforcement bar and Anti-seismic-bar :
10. Allowable Stress of Anti-seismic-bar Reinforcement bar : Input (from 1 to 9999 kg/cm^2)
11. Structure Steel : Select (A37-24ES, A42-27ES, A52-34ES)
12. Yield Strength of Steel : Input (from 1 to 9999 kg/cm^2)
13. Allowable Stress of Steel : Automation (0.55xYield Strength of steel kg/cm^2)
14. Kinds of Bolt : Select (ASTM A490)
15. Strength of Bolt : Input (from 1 to 9999 kg/cm^2)
16. Diameter of Bolt : Select (ϕ16, ϕ20, ϕ22, ϕ24)

Where the value shown in the screen is default value.

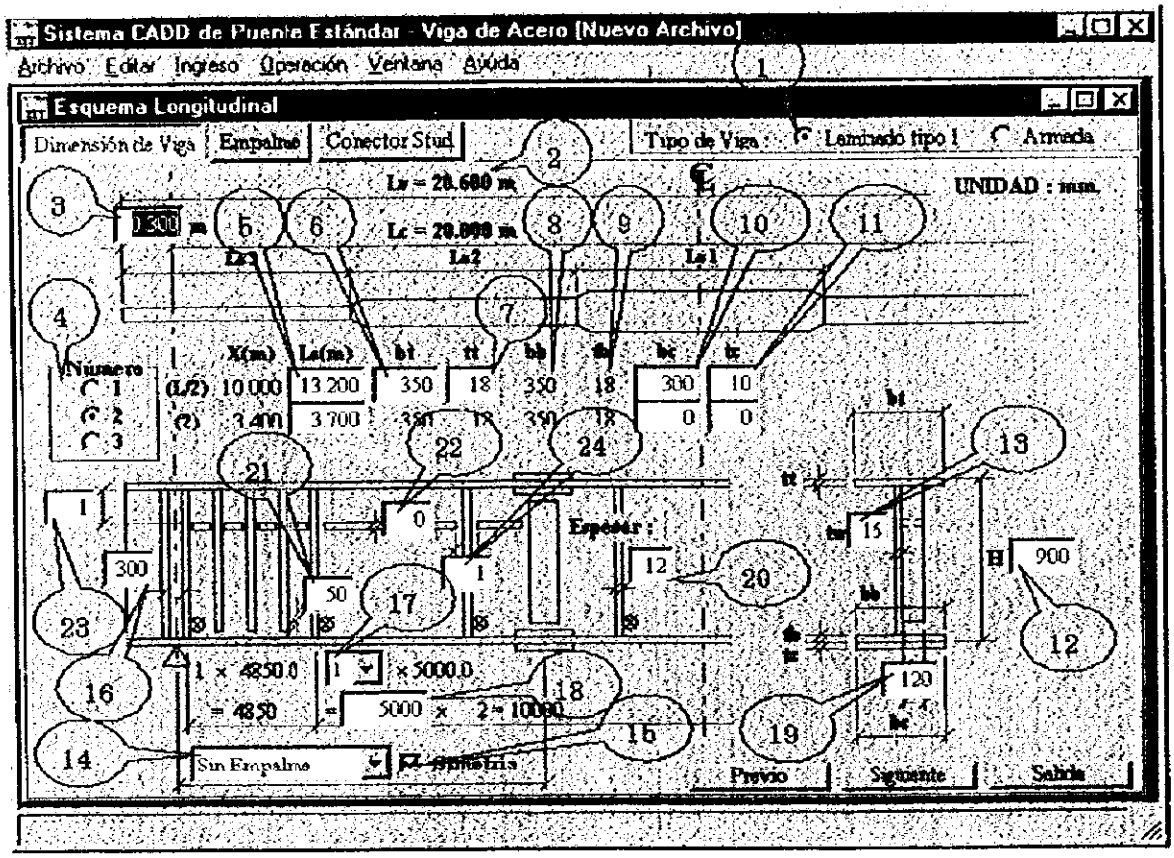
Esquema transversal [Transversal Section]



1. Diameter of Main Reinforcement bar: Select
   (ϕ6, ϕ8, ϕ10, ϕ12, ϕ16, ϕ18, ϕ22, ϕ25, ϕ28, ϕ32, ϕ36)
2. Spacing between Main Reinforcement bars : Input (from 1 to 999 mm)
   When the Diameter and spacing are input, the Area is shown.
3. Number of Main Girder : Select (from 2 to 6 Girders)
4. Spacing between Main Girders : Input (from 0.001 to 9.999 m)
5. Slab thickness : Input (from 1 to 999 mm)
6. Slab Covering : Input (from 0.1 to 99.9 cm)
7. Diameter of Distribution Reinforcement : Select
   (ϕ6, ϕ8, ϕ10, ϕ12, ϕ16, ϕ18, ϕ22, ϕ25, ϕ28, ϕ32, ϕ36)
8. Spacing between Distribution Reinforcement bars : Input (from 1 to 999 mm).
   When the Diameter and spacing are input, the Area is shown.
9. Haunch Height : Input (from 1 to 999 mm).

Where the value shown in the screen is default value.

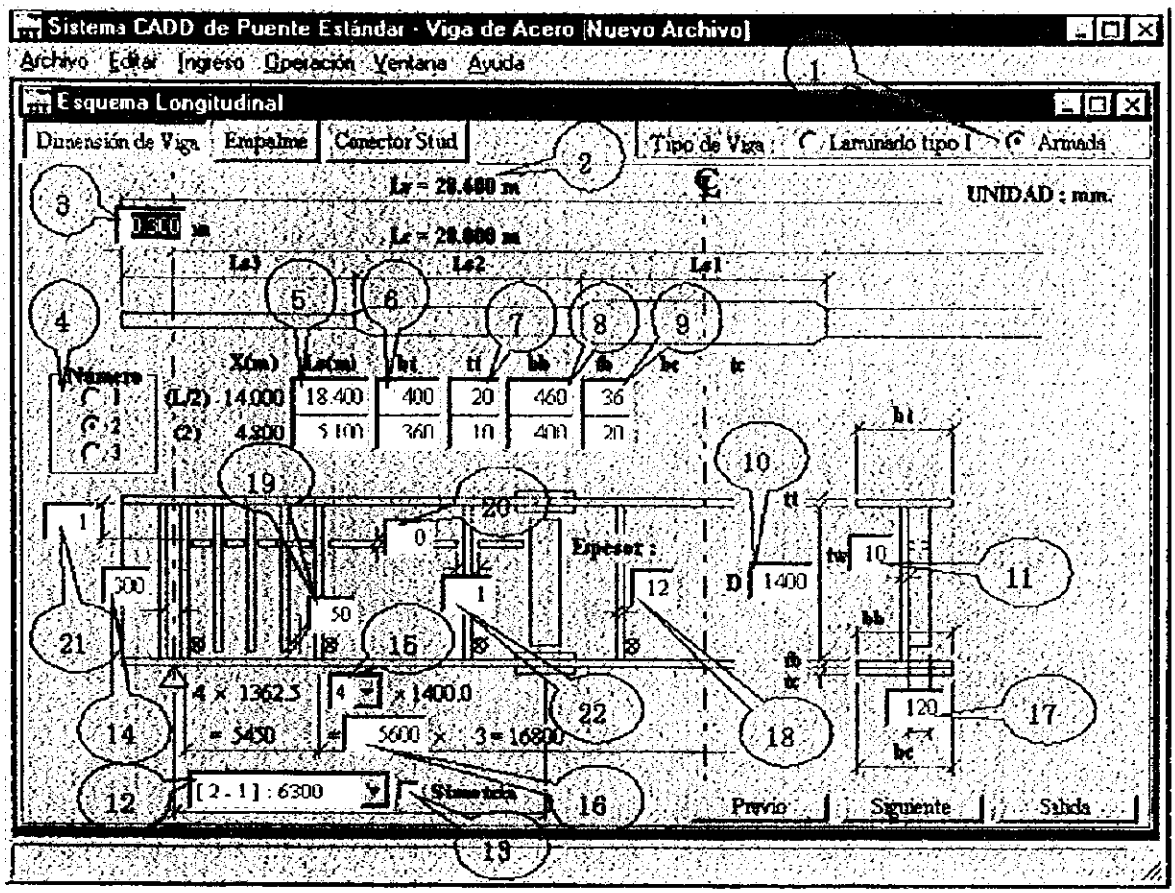
Esquema Longitudinal (Rolled H-Beam)



1. Type of Main Girder : Select (Rolled-H, Built-I)
2. Length of Girder : Automatically Displayed
3. End length of Girder : Input (from 0.001 to 1.000 m)
4. Number of Section change : Select (from 1 to 3)
5. Length of Section (from 0.100 to 41.000 m)
6. Width of Upper Flange : Input (from 1 to 999 mm)
7. Thickness of Upper Flange : Input (from 1 to 99 mm)
8. Width of Lower Flange : Automation (same as Upper Flange)
9. Thickness of Lower Flange : Automation (same as Upper Flange)
10. Width of Cover plate : Input (from 1 to 999 mm)
11. Thickness of Cover plate : Input (from 1 to 20 mm)
12. Girder Height : Input (from 500 to 9999 mm)
13. Thickness of Web plate : Input (from 8 to 99 mm)
14. Splice point : Select (The candidate of the choice is computed automatically and indicated.)
15. Symmetry : Check ( )
16. Spacing of Vertical Stiffeners : Input (from 1 to 999 mm)
17. Number of Vertical stiffener : Select (1)
18. Spacing of Vertical Stiffeners : Input (from 3000 to 7500 mm)
19. Width of Vertical Stiffener : Input (from 1 to 999 mm)
20. Thickness of Vertical Stiffener : Input (from 1 to 99 mm)
21. Spacing of Vertical Stiffeners to Lower flange plate : Input (from 1 to 999)
22. Thickness of Horizontal Stiffener : Input (from 1 to 99 mm)
23. Spacing of Horizontal Stiffener to Upper flange plate : Input (from 1 to 999)
24. Spacing of Horizontal Stiffeners : Input (from 1 to 999 mm)

Where the value shown in the screen is default value.

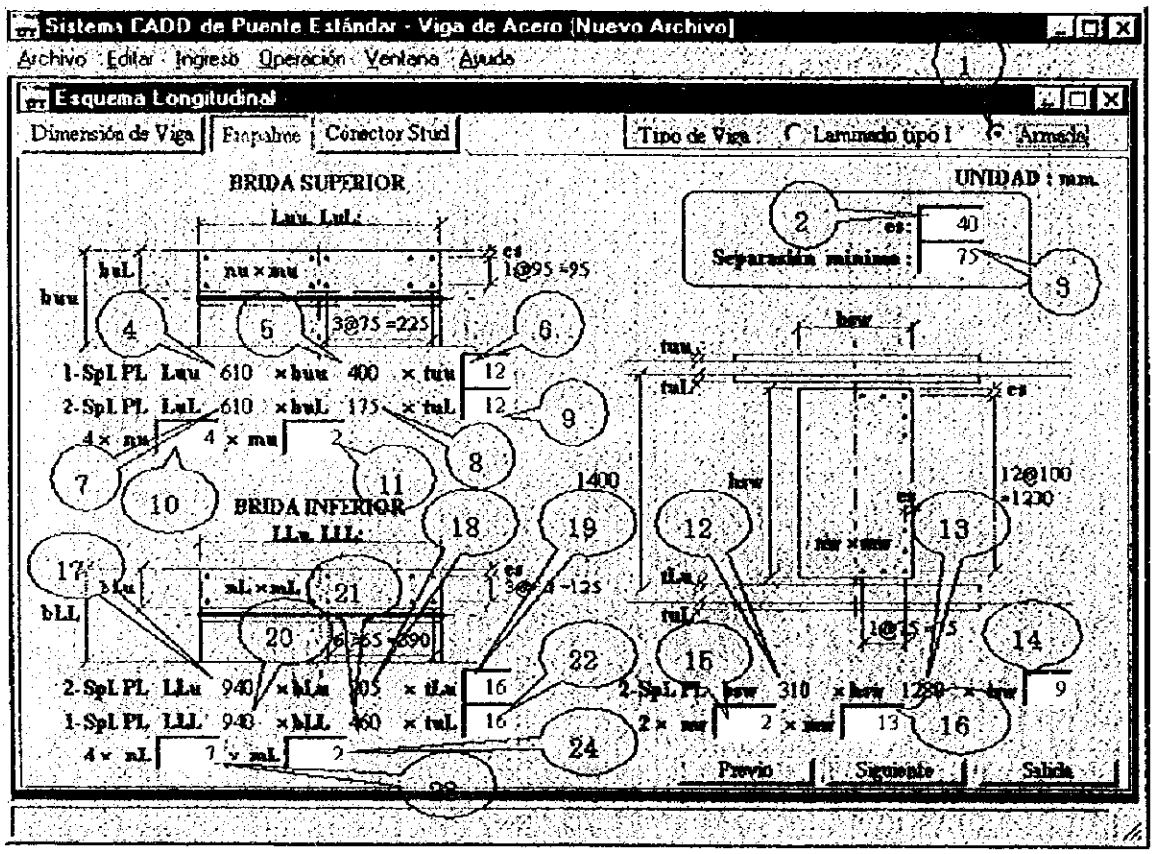
Esquema Longitudinal(Steel Plate I-Beam)



1. Type of Main Girder : Select (Rolled-H, Built-I)
2. Length of Girder : Automatically Displayed.
3. End length of Girder : Input (from 0.001 to 1.000 m)
4. Number of Section change : Select (from 1 to 3)
5. Length of Section (from 0.100 to 41.000 m)
6. Width of Upper Flange : Input (from 1 to 999 mm)
7. Thickness of Upper Flange : Input (from 1 to 99 mm)
8. Width of Lower Flange : Input (from 1 to 999 mm)
9. Thickness of Lower Flange : Input (from 1 to 99 mm)
10. Girder Height : Input (from 500 to 9999 mm)
11. Thickness of Web plate : Input (from 8 to 99 mm)
12. Splice point : Select (The candidate of the choice is computed automatically and indicated.)
13. Symmetry : Check
14. Spacing of Vertical Stiffeners : Input (from 1 to 999 mm)
15. Number of Vertical stiffener : Select (4 or 6)
16. Spacing of Vertical Stiffeners : Input (from 3000 to 7500 mm)
17. Width of Vertical Stiffener : Input (from 1 to 999 mm)
18. Thickness of Vertical Stiffener : Input (from 1 to 99 mm)
19. Spacing of Vertical Stiffener to Lower flange plate surface : Input (from 1 to 999 mm)
20. Thickness of Horizontal Stiffener : Input (from 1 to 99 mm)
21. Spacing of Horizontal Stiffener to Upper flange plate bottom : Input (from 1 to 999 mm)
22. Spacing of Horizontal Stiffeners : Input (from 1 to 999 mm)

Where the value shown in the screen is default value.

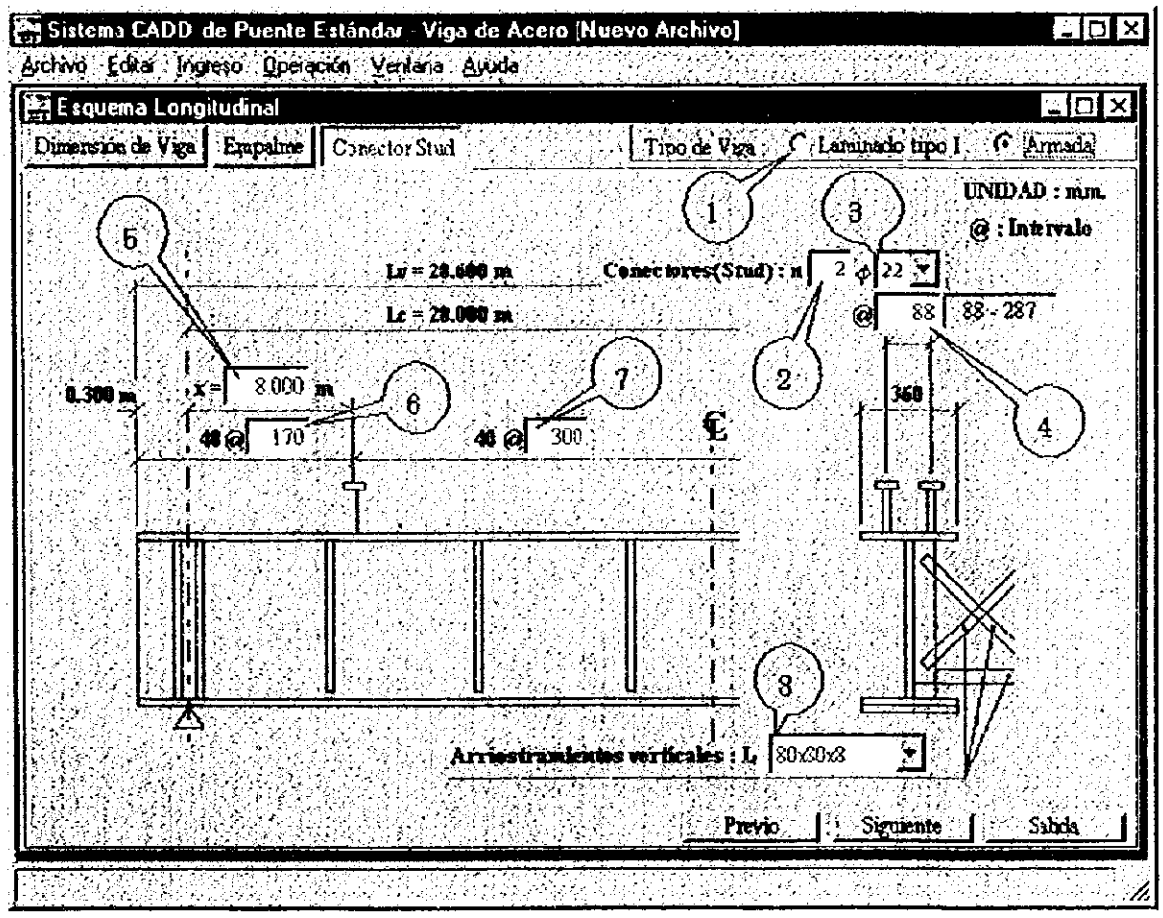
Esquema Longitudinal | Splice |



1. Type of Main Girder : Select (Rolled-H, Built-I)
2. Distance of Bolt to the End of Plate : Input (within 32 to 50 mm)
3. Minimum spacing of Bolt : Input (from 66 to 999 mm)
4. Length of Upper Splice Surface Plate : Automatically filling.
5. Width of Upper Splice Surface Plate : Automatically (Upper Flange Width)
6. Thickness of Upper Splice Plate : Input (from 8 to Upper Flange Thickness)
7. Length of Upper Splice Bottom Plate : Automatically (Length of Surface Splice)
8. Width of Upper Splice Bottom Plate : Automatically filling.
9. Thickness of Upper splice Plate : Input (from 8 to Upper Flange Thickness)
10. Number of Longitudinal Rows of Bolts for Top Flange : Input (from 2 to 99)
11. Number of Transversal Rows of Bolts for Top Flange : Input (from 1 to 9)
12. Width of Web Splice plate : Automatically filling.
    (Owned by Number of Longitudinal Rows of Bolts for Web Plate)
13. Height of Web Splice plate : Automatically filling.
14. Thickness of Web Splice Plate : Input (within 8 to Web thickness)
15. Number of Longitudinal Rows of Bolts for Web Plate : Input (from 1 to 99)
16. Number of Longitudinal Rows of Bolts for Web Plate : Input (from 1 to 99)
17. Length of Lower Splice Surface Plate : Automatically filling.
18. Width of Lower Splice Surface Plate : Automatically filling.
19. Thickness of Lower Splice Surface Plate : Input (from 8 to Bottom Flange Plate Thickness)
20. Length of Lower Bottom Splice Plate : Automatically filling. (Length of Surface Splice Plate)
21. Width of Lower Bottom Splice Plate : Automatically filling. (Bottom Flange Width)
22. Thickness of Lower Bottom Splice Plate : Input (from 8 to Bottom Flange Plate Thickness)
23. Number of Longitudinal Rows of Bolts for Bottom Flange : Input (from 2 to 99)
24. Number of Transversal Rows of Bolts for Bottom Flange : Input (from 2 to 99)

Where the value shown in the screen is default value.

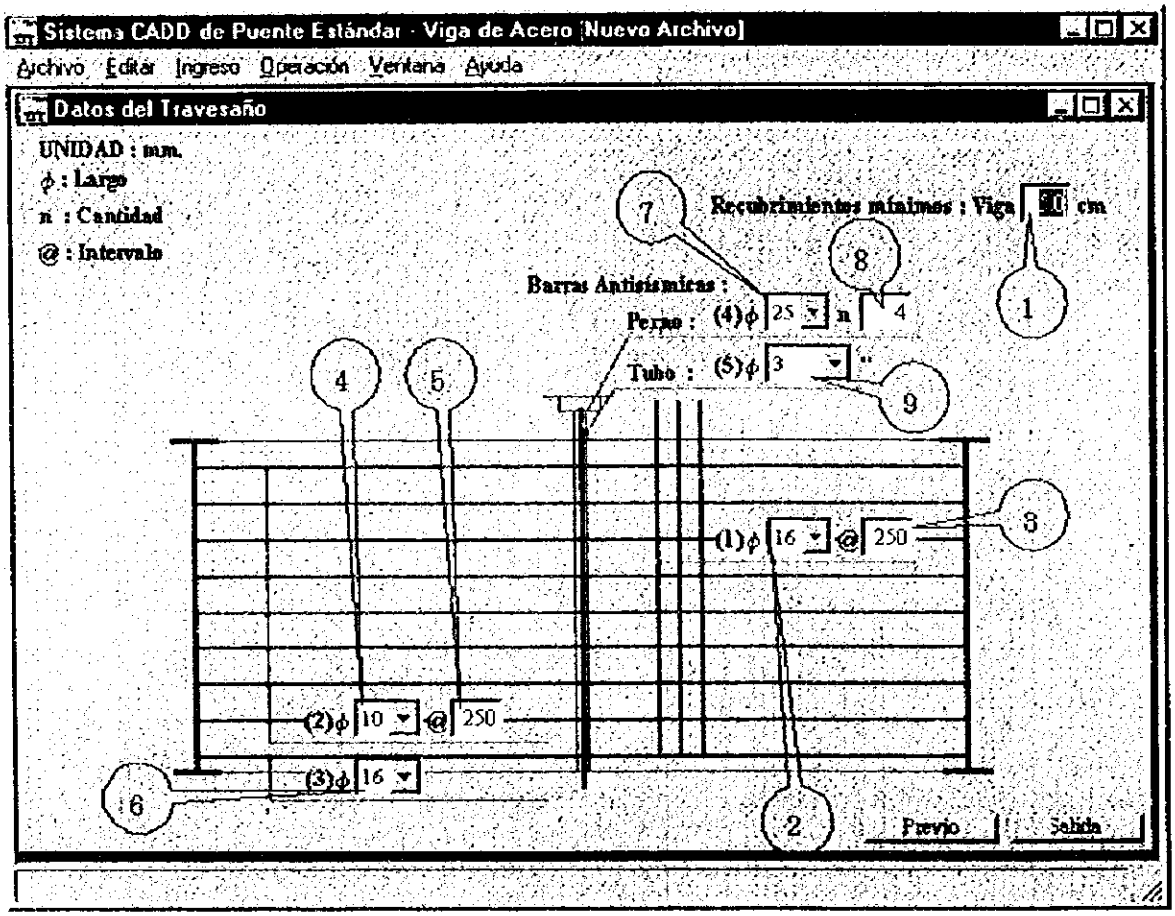
Esquema Longitudinal | Stud Connector |



1. Type of Main Girder : Select (Rolled-H, Built-I)
2. Number of Rows of Stud bolt : Input (from 2 to 999)
3. Diameter of Stud bolt : Select (ϕ6, ϕ8, ϕ10, ϕ12, ϕ16, ϕ18, ϕ22, ϕ25, ϕ28, ϕ32, ϕ36)
4. Spacing of Stud bolt for transversal : Input (from 1 to 999)
5. Distance to the change point of pitch : Corrected automatically (within Lv m)
6. Pitch of Stud bolt at End of Beam : Input (from 1 to 600 mm)
7. Pitch of Stud bolt at Beam center : Input (from 1 to 600 mm)
8. Steel Shape of Cross frame (WidthxHeightxThickness) : Select
   65x65x6, 65x65x8, 65x65x10
   80x80x6, 80x80x8, 80x80x10, 80x80x12
   100x100x8, 100x100x8, 100x100x12

Where the value shown in the screen is default value.

Datos del Travesaño | Cross Beam |



1. Minimum cover of crossbeam : Input (from 0.1 to 9.9 cm)
2. Diameter of Reinforcement bar of Crossbeam Vertical No.(1): Select
   (ϕ6, ϕ8, ϕ10, ϕ12, ϕ16, ϕ18, ϕ22, ϕ25, ϕ28, ϕ32, ϕ36)
3. Pitch of Reinforcement bar of Crossbeam Vertical No.(1) : Input (from 1 to 999 mm)
4. Diameter of Reinforcement bar of Crossbeam Horizontal No.(2): Select
   (ϕ6, ϕ8, ϕ10, ϕ12, ϕ16, ϕ18, ϕ22, ϕ25, ϕ28, ϕ32, ϕ36)
5. Pitch of Reinforcement bar of Crossbeam Horizontal No.(2): Input (from 1 to 999 mm)
6. Diameter of Reinforcement bar of Crossbeam Bottom No.(3): Select
   (ϕ6, ϕ8, ϕ10, ϕ12, ϕ16, ϕ18, ϕ22, ϕ25, ϕ28, ϕ32, ϕ36)
7. Diameter of Anti-seismic-bar : Select(ϕ6, ϕ8, ϕ10, ϕ12, ϕ16, ϕ18, ϕ22, ϕ25, ϕ28, ϕ32, ϕ36)
8. Number of Anti-seismic-bar : Input (from 1 to 999)
9. Diameter of Anti-seismic-bar : Select (2, 2 3/8, 2 1/2, 3, 3 1/2, 4, 4 1/2, 5)

Where the value shown in the screen is default value.