Open frame bridge

Table of content

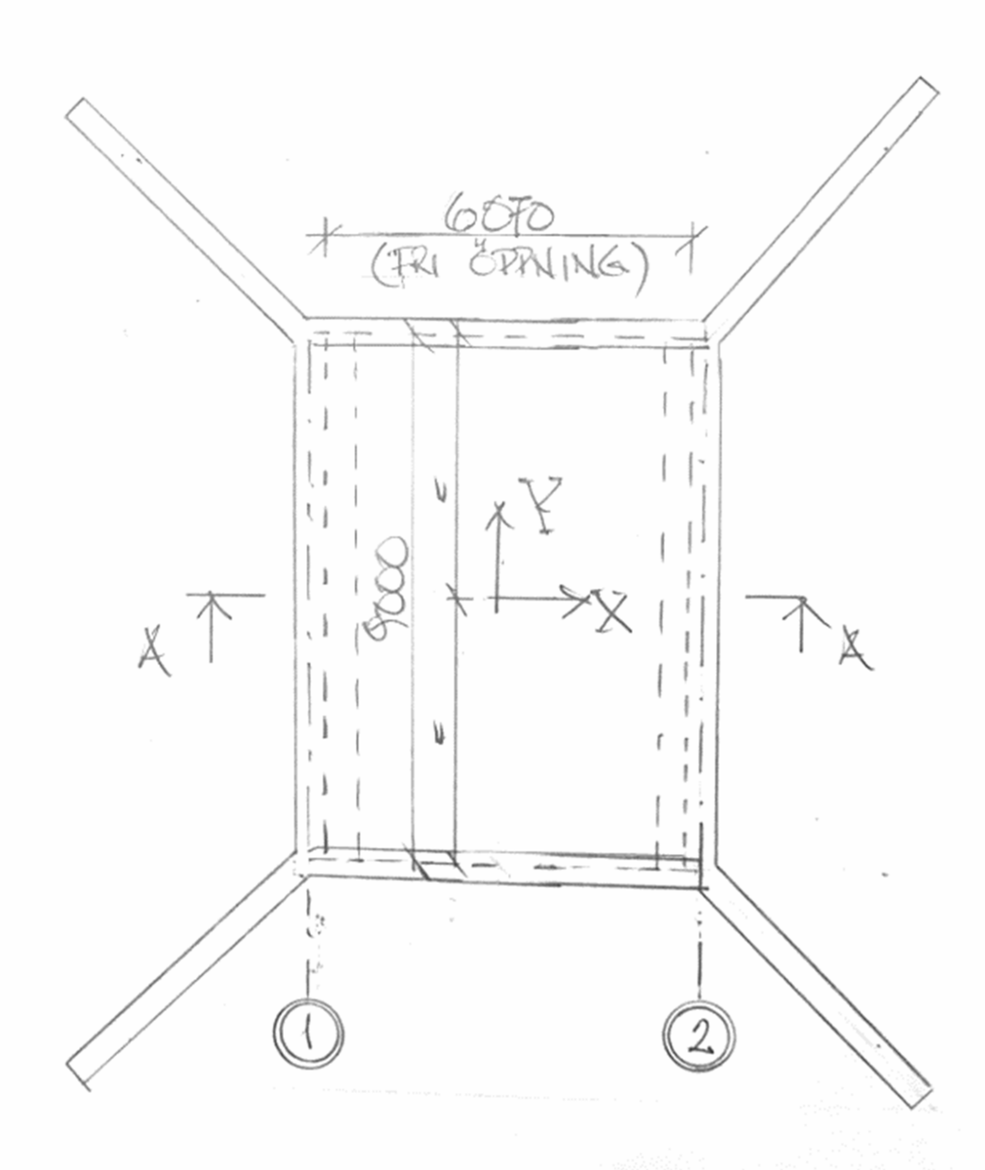
1. GENERAL / MEASUREMENT

1.1 CONCRETE TYPE

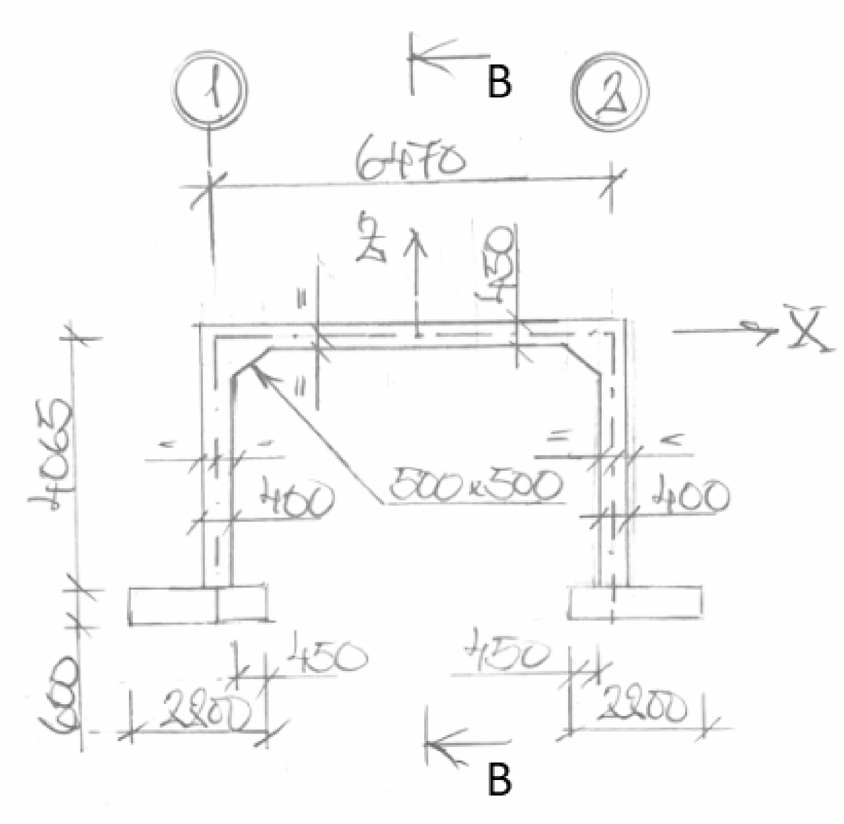
Open frame constructed using reinforced contrete.

Foundation on compacted gravel.

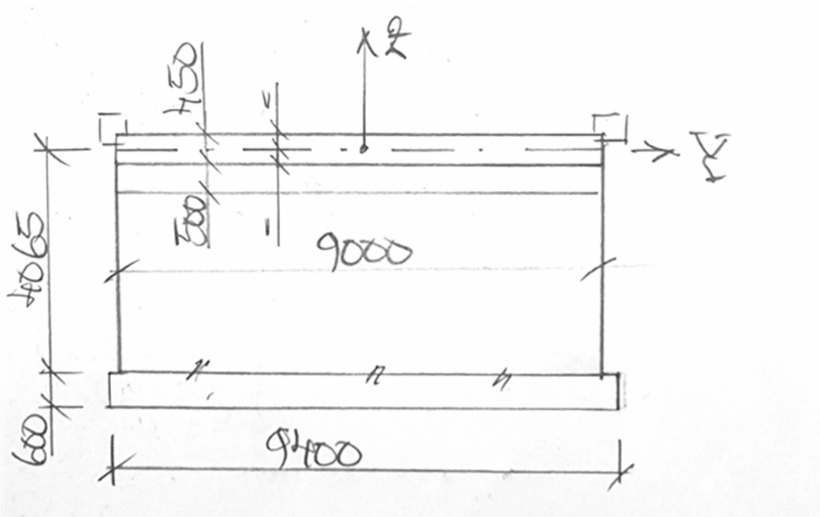
1.2 MEASURMENT



PLAN



SECTION A-A



SECTION B-B

1.3 FOUNDATION

Both bottom slabs are founded on 0.3 m compacted gravel on rock.

-

1.4 CODE OCH TENDER DOCUMENTS

- Krav Brobyggande (TDOK 2016:0204 version 3.0) betecknas KBB i detta dokument
- Råd Brobyggande (TDOK 2016:0203 version 3.0) betecknas RBB i detta dokument
- Europastandarder SS-EN 1990 tom SS-EN 1999 enligt KBB avsnitt A.1.2.3.2
- Transportstyrelsen författningssamling (TSFS 2018:57)
- AMA Anläggning 17
- Trafikverkets ändring och tillägg till AMA Anläggning 17 (TDOK 2017:0441)
- TK Geo 13 (TDOK 2013:0667 version 2.0)
- TR Geo 13 (TDOK 2013:0668 version 2.0)

1.5 TECHNICAL SERVICE LIFE

Technical life span 120 years (L100).

1.6 ENVIRONMENT

Pedestrian environment is assumed for the underlying pedestrical road.

Road traffic enviroment is assumed for the overlying traffic road.

1.7 MATERIAL

Concrete : C30/37(CEM I 42.5 N, Anläggningscement klass N)

Reinforcement : B500B

Filling abutement : ”Förtärkningslagermaterial” according to AMA CEB.52

Surfacing : See document ”OTB/bro”

1.8 GEOTECHNICAL CLASS

Geotechnical class GK2

1.9 SAFETY CLASS

Geotechnical resistance: safety class 2

Brigde structure : safety class 2

1.10 CONCRETE COVER AND CRACK CRITERIA

Class identification bridge components :

Bridge components	Exposure class	Life spann	max vct_{ekv}	ζ
Substructure :				
▫ Wingwall to filling	XD1/XF4	L100	0.40	1.5
▫ Wingwall from filling	XD1/XF4	L100	0.40	1.5
▫ Abutement under ground	XC2/XF3	L100	0.50	1.0
▫ Abutement over ground	XC4/XF3	L100	0.50	1.2
▫ Bottom slab to foundation	XC2/XF3	L100	0.50	1.0
▫ Bottom slab remaing parts	XC2/XF3	L100	0.50	1.0
Superstructure :				
▫ Edge beam	XD3/XF4	L100	0.40	1.8
▫ Top bridge deck	XD1/XF4	L100	0.40	1.5
▫ Bottom bridge deck	XD3/XF4	L100	0.40	1.8

Design parameters reinforced concrete:

$c_{min} = \max(c_{min.b}; c_{min.dur})$

$c_{nom} = c_{\min} + \Delta c_{dev}$

Bridge components	$c_{min.dur}$	$c_{min.b}$	c_{min}	Δc_{dev}	c_{nom}	$w_{k,till}$
Substructure :						
▫ Wingwall to filling	30	25	30	10	40	0.20
▫ Wingwall from filling	30	25	30	10	40	0.20
▫ Abutement under ground	15	25	25	10	35	0.40
▫ Abutement over ground	20	25	25	10	35	0.30
▫ Bottom slab to foundation	15	16	16	75 [4.)]	91 [5.)]	0.40
▫ Bottom slab remaing parts	15	25	25	10	35	0.40
Superstructure :						
▫ Edge beam	45	25	45	10	55	0.15
▫ Top bridge deck	25	25	25	10	35	0.20
▫ Bottom bridge deck	45	25	45	10	55	0.15
-	mm	mm	mm	mm	mm	mm

2. SYSTEM ANALYSIS

2.1 GENERAL

The bridge is built using reinforced concrete.

The bridge is designed as frame bridge.

Abutments are defined by using shell elements applied to nodal surface in abutments.

Superstructure is defined by using shell elements applied to nodal surface in superstructure.

Entire structure is modelled using isotropic material.

Bridge foundation consists of compacted gravel.

System analysis is performed using 3D FEM program.

Wingwalls are not modelled statically since considered inactive in vertical direction. This is due cracking and the use of only minimal reinforcement in this direction.

Edge beams are not modelled statically since considered inactive. This assumption is considered on safe side. The assumption will facilitate future replacement of edge beams.

Bottom of abutments will be connected to fictive rigid beams using rigid constrains (= Tied Mesh). The rigid beams will have infinite stiffness in all directions apart from axial. In this direction stiffness will be negligible.

A foundation super node will be connected to centre of rigid beam at bottom of abutments. This connection will be rigid using a point joint element (= JSH4). The location of super nodes corresponds to centre of each bottom slab. This is also where foundation stiffness is determined.

Attachments:

Attachment	Name
1	Input receipt
2	Results reactions
3	Results abutments
4	Results bridge deck

2.2 SKETCH SYSTEM ANALYSIS

2.2.1 Geometry

To describe geometry first define POINTS.

Beam elements are defined by applying attributes to LINES.

Shell elements are defined by applying attributes to SURFACES.

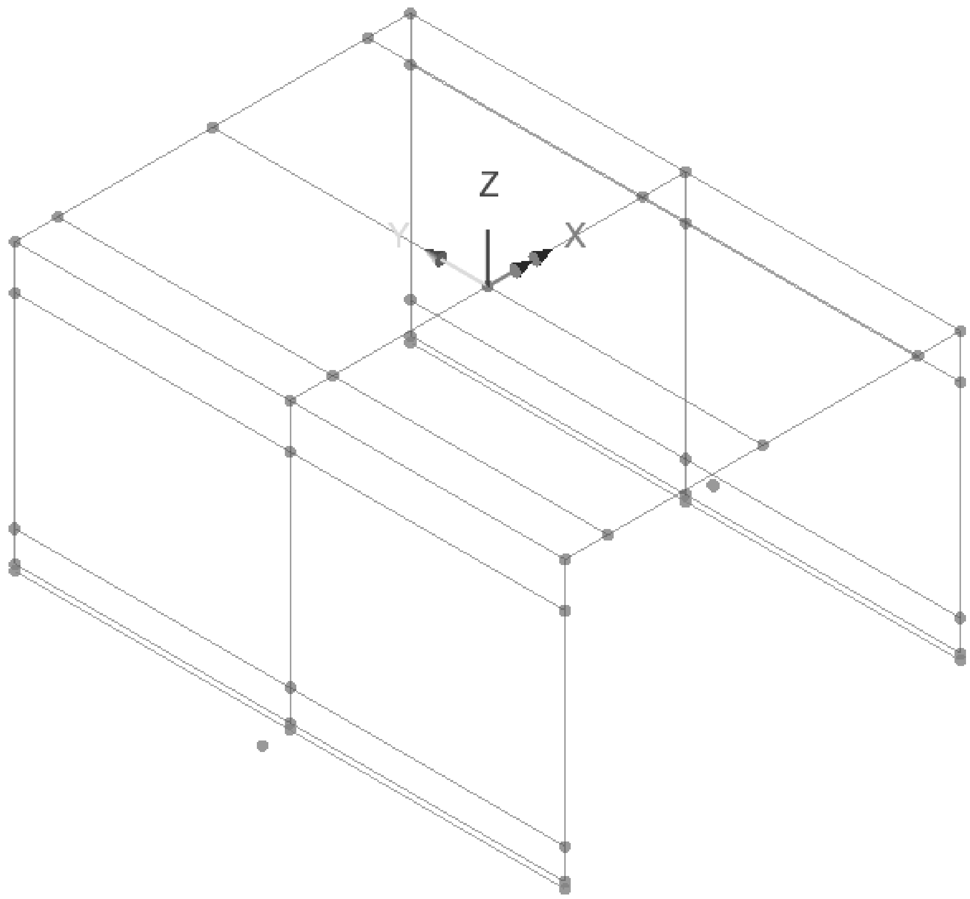
Attached pictures are retrieved from graphical sketches generated of POINTS, LINES and SURFACES.

All coordinates needed to describe POINTS are found in attachment 1.

All POINTS needed to describe LINES are found in attachment 1.

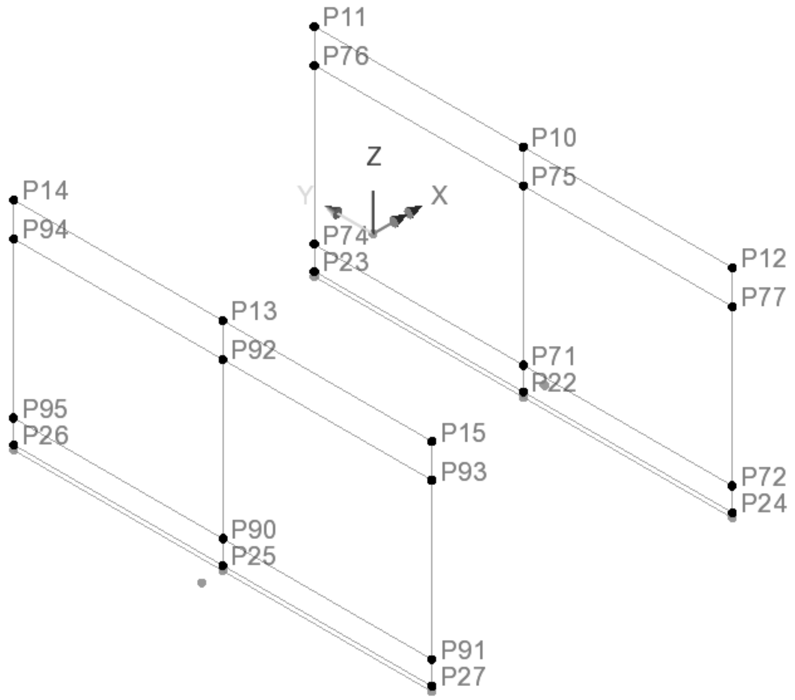
All LINES need to describe SURFACE are found in attachment 1.

Overview :

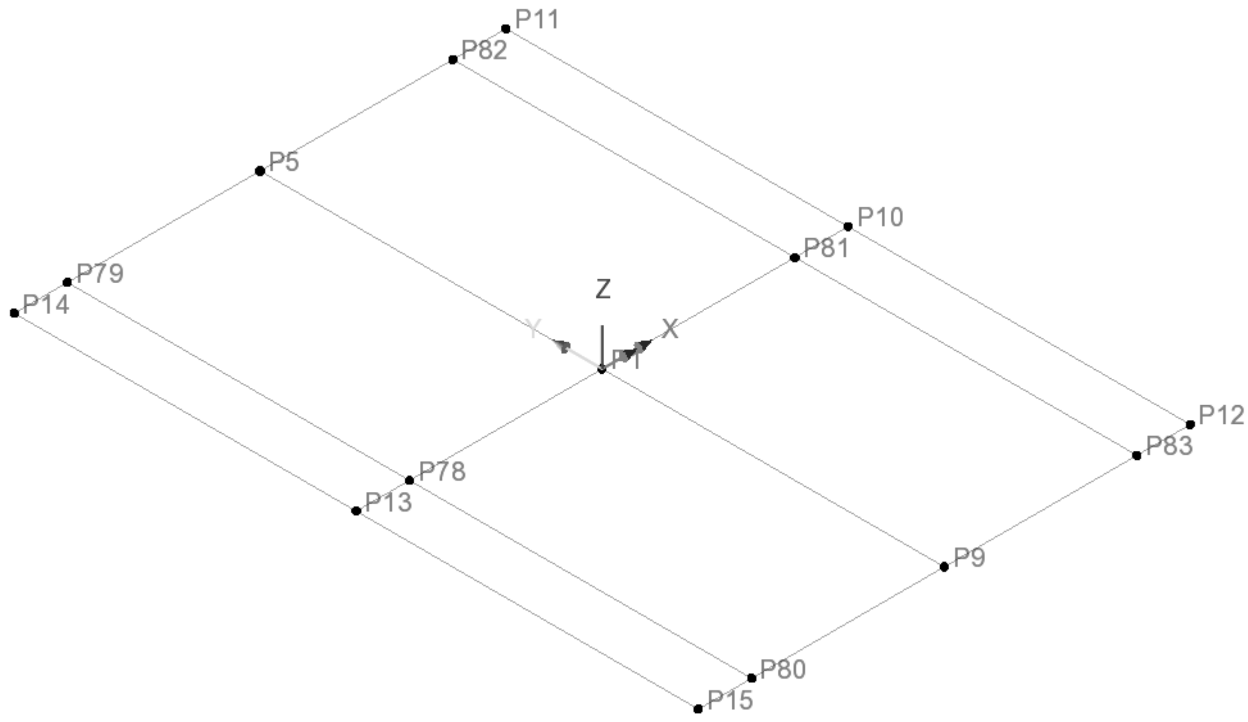


2.2.1.1 Geometri : POINTS

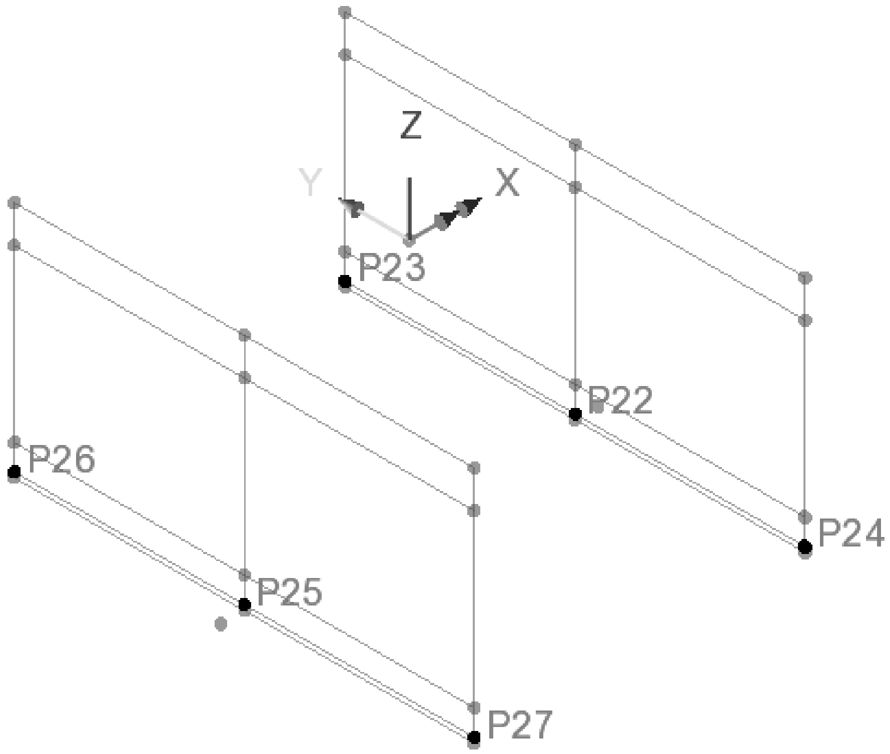
Abutement 1/2 :



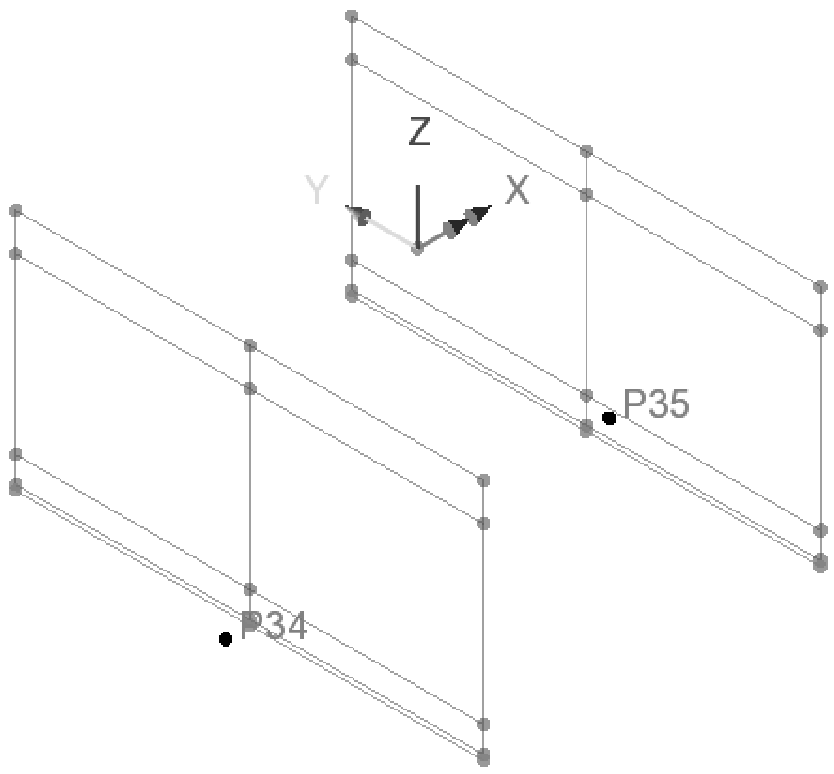
Superstructure :



Rigid support beams :

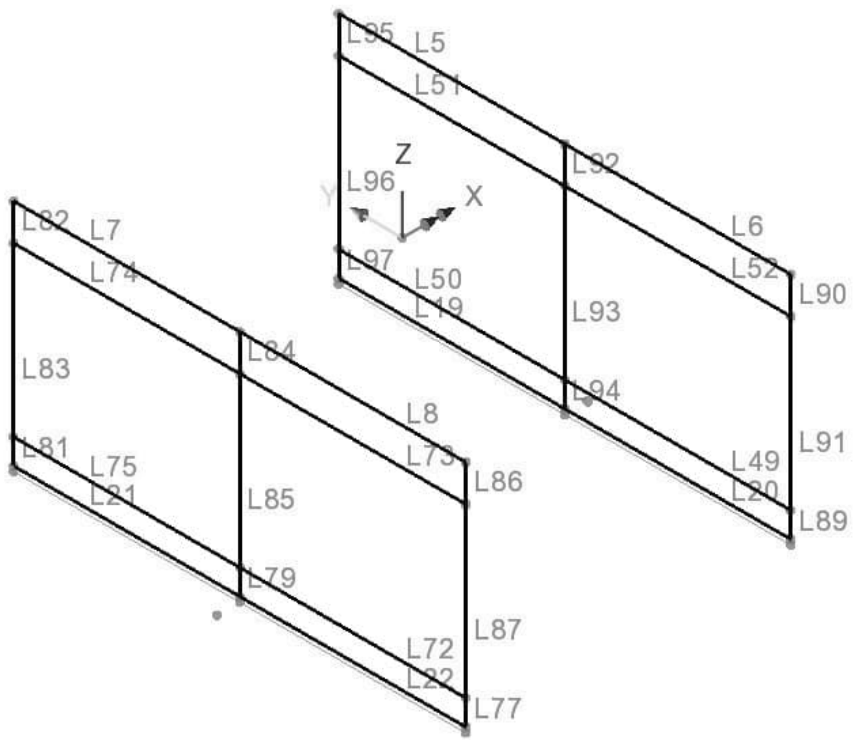


Boundary conditions – foundation :

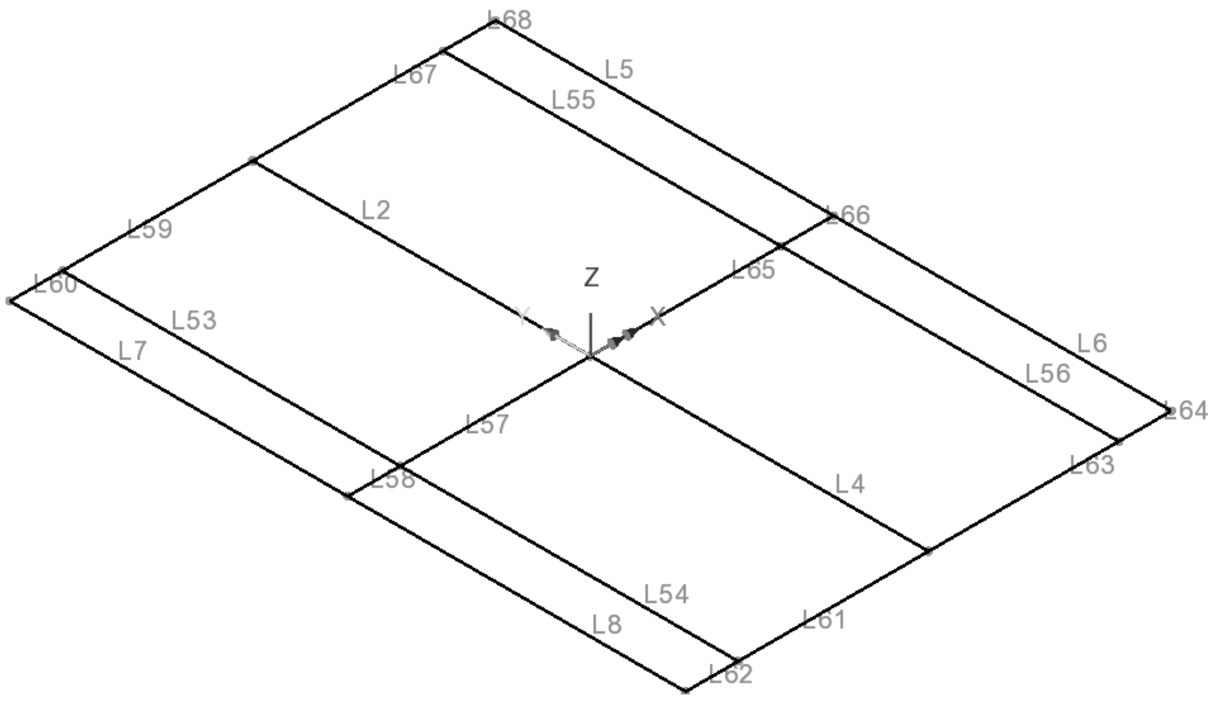


2.2.1.2 Geometry : LINES

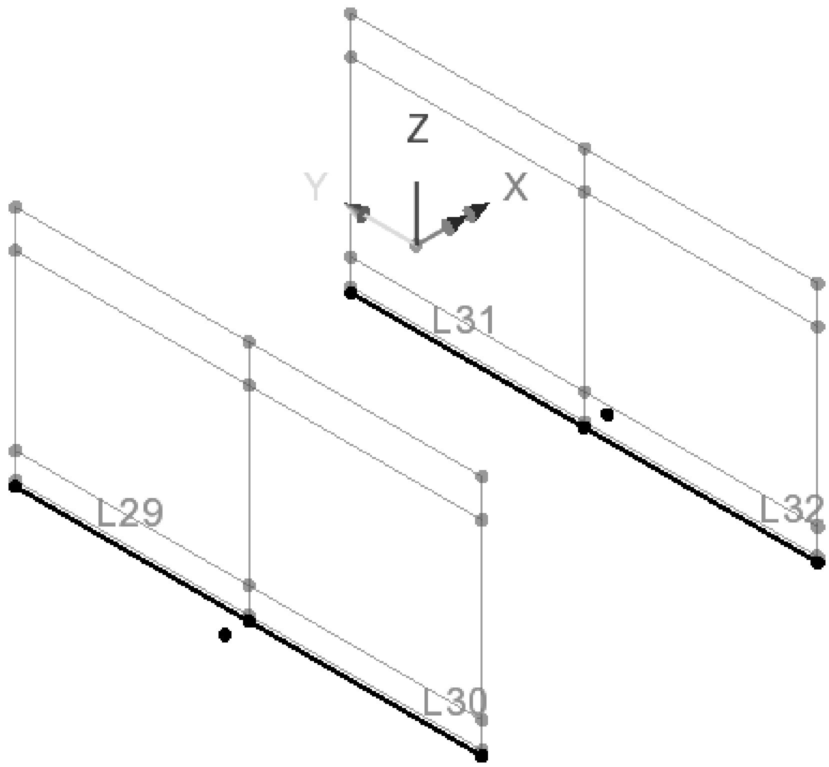
Abutement 1/2 :



Superstructure :



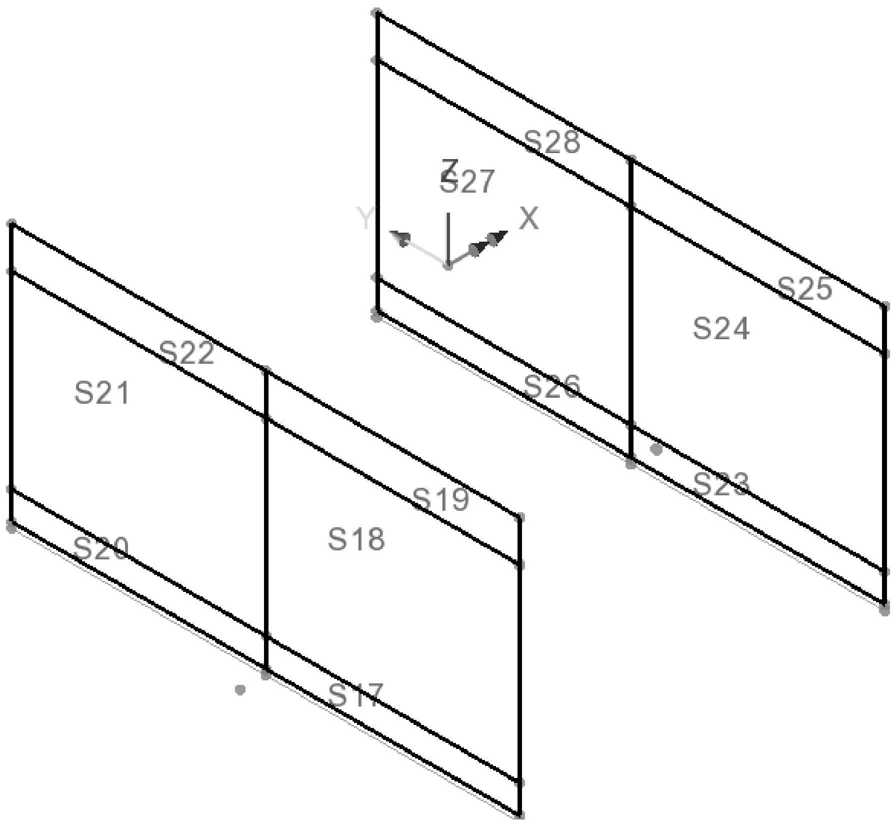
Rigid support beams :



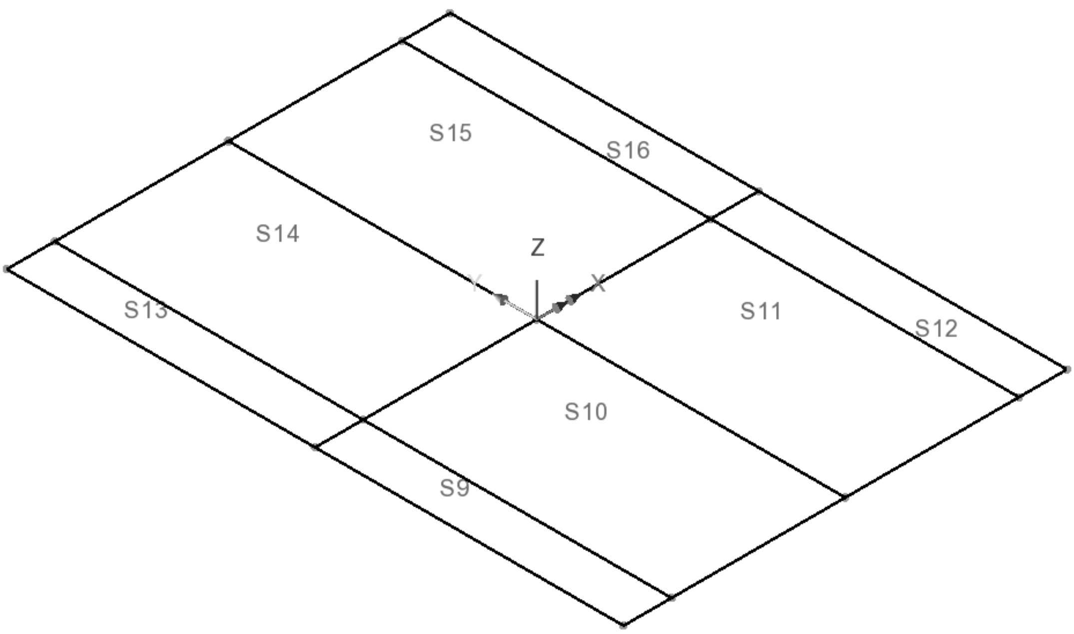
-

2.2.1.3 Geometry : SURFACES

Abutement 1/2 :



Superstructure :



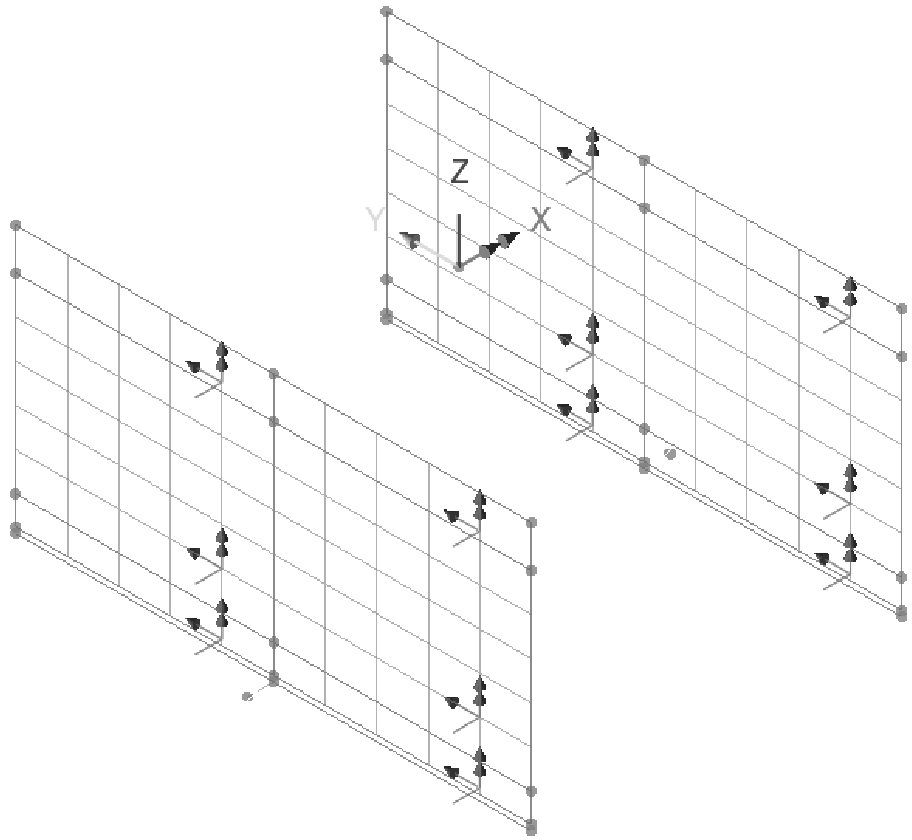
2.2.1.4 MESH

The previous defined SURFACES are attributed in order to create a MESH.

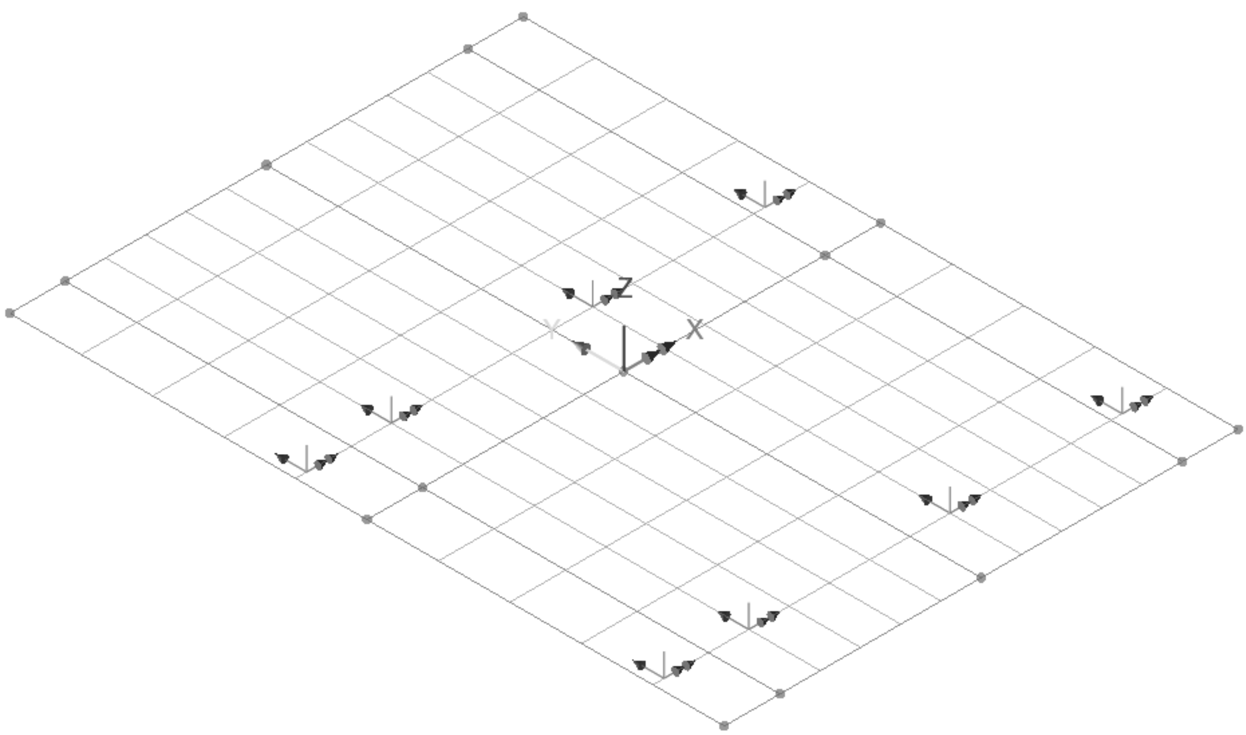
When creating a MESH automatically ELEMENTS and NODES.

Studied bridge is modelled using shell elements (”Thick shell” / QTS4).

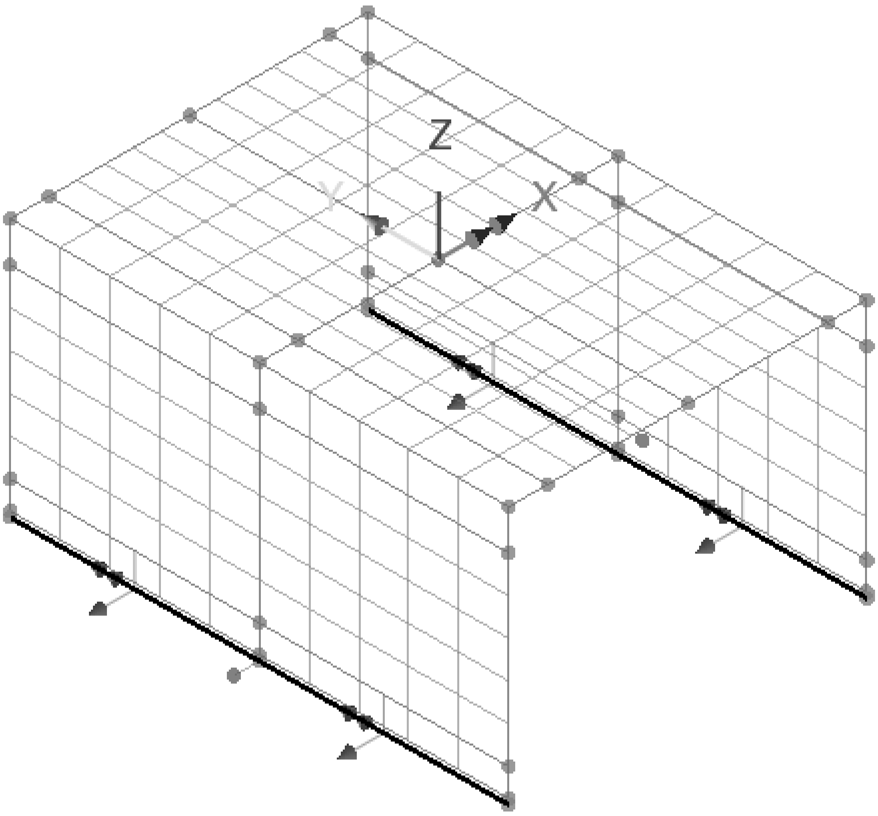
Abutements 1/2 :



Supertructure :

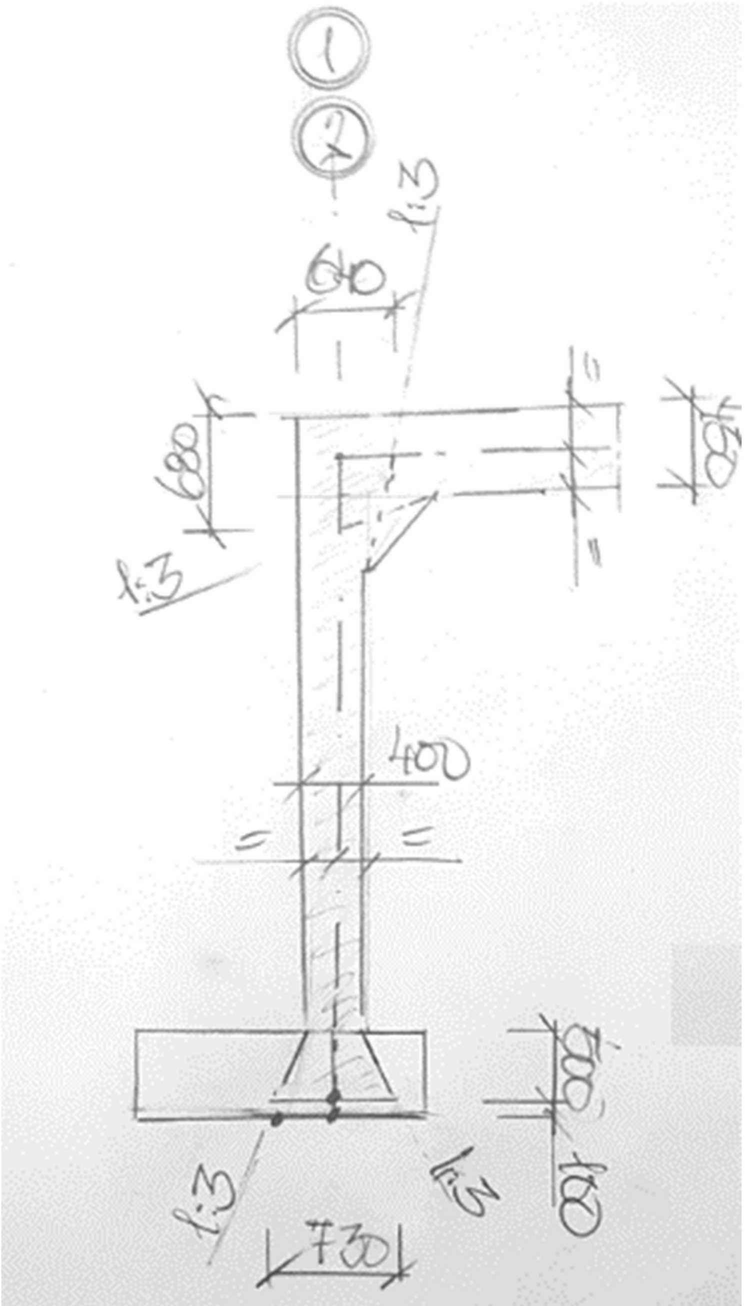


Rigid support beams :



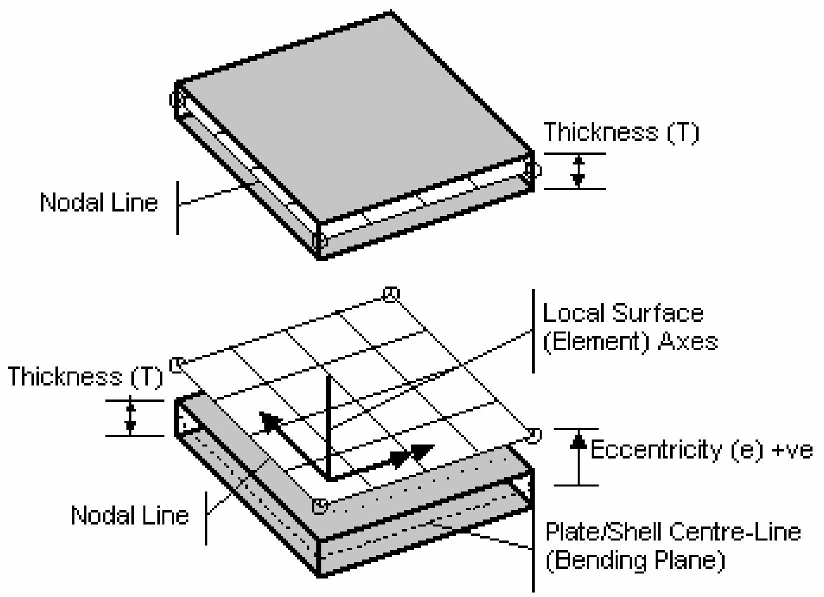
2.3 CROSS SECTION PROPERTIES

By experience stiffness increases by 1:3 at all joints as seen below.

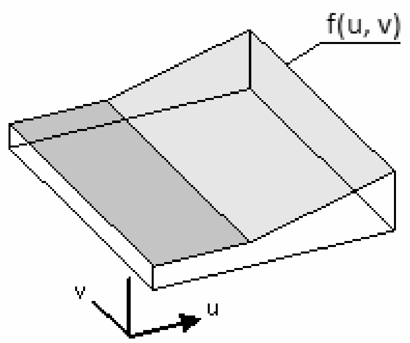


2.3.1 Shell element

Principle figures of geometry associated to shell elements (”Thick shell” / QTS4) are seen below.



Varying thickness in shell element is handled using ”Function variation”. This makes it possible to create a function f(u,v) as seen below.



Surface function thickness :

Variation	Funktion(u,v)	Anm.
t1	0.73-0.33·u	Underkant ramben 1
t1	0.73-0.33·u	Underkant ramben 2
t2	0.40+0.24·u	Överkant ramben 1
t2	0.40+0.24·u	Överkant ramben 2
t3	0.68-0.23·u	Vot brobana ramben 1
t4	0.45+0.23·u	Vot brobana ramben 2
-	m	-

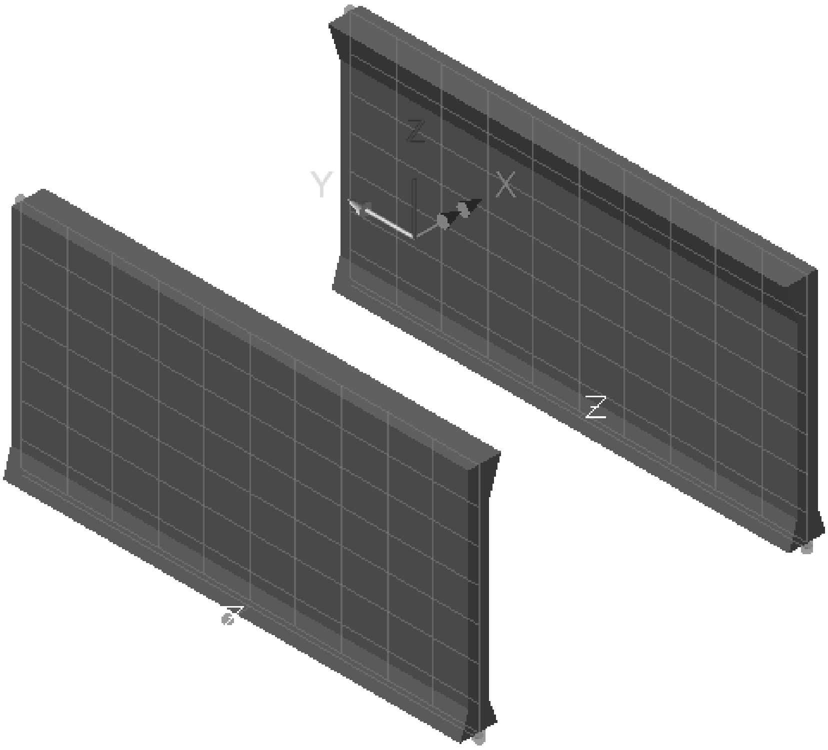
Surface function excentrisitet :

Variation	Funktion(u,v)	Anm.
e1	0.120·u	Överkant ramben 1
-e1	-0.120·u	Överkant ramben 2
e2	0.115-0.115·u	Vot brobana ramben 1
e3	0.115·u	Vot brobana ramben 2
-	m	-

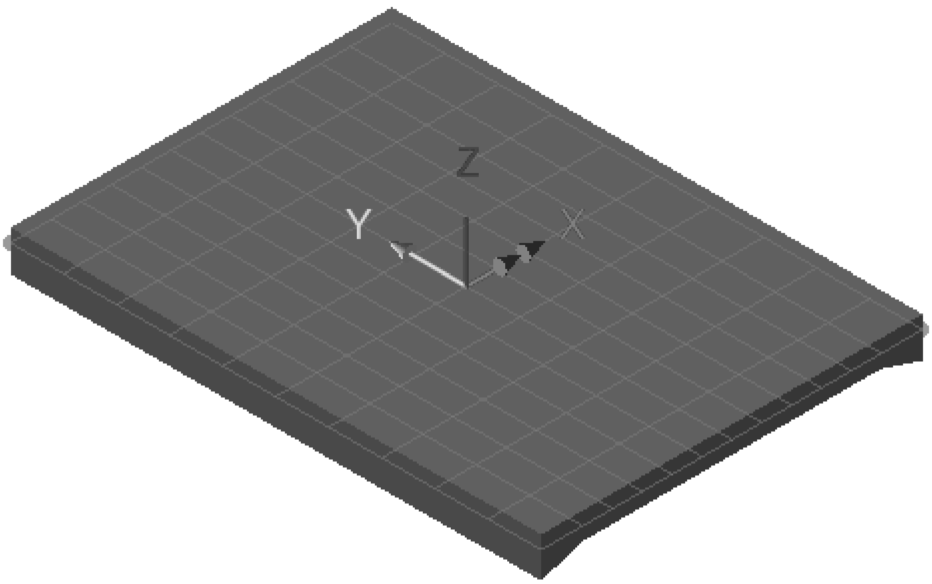
Surface geometry :

Attribute	t	ez	Anm.
t = 450 mm	0.45	0	Brobana
t = 400 mm	0.40	0	Ramben
Bottenplatta 1	*t1*	0	Underkant ramben 1
Bottenplatta 2	*t1*	0	Underkant ramben 2
Vot ramben 1	*t2*	*e1*	Överkant ramben 1
Vot ramben 2	*t2*	*-e1*	Överkant ramben 2
Vot farbana 1	*t3*	*e2*	Vot brobana ramben 1
Vot farbana 2	*t4*	*e3*	Vot brobana ramben 2
-	m	m	-

Abutement 1/2 :

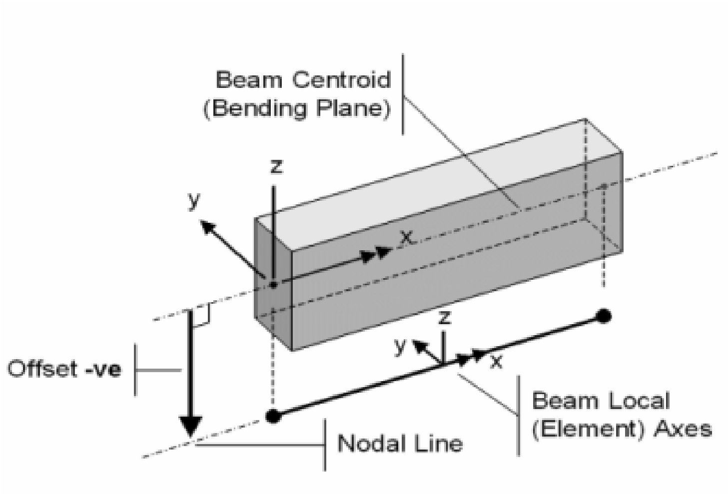


Superstructure :

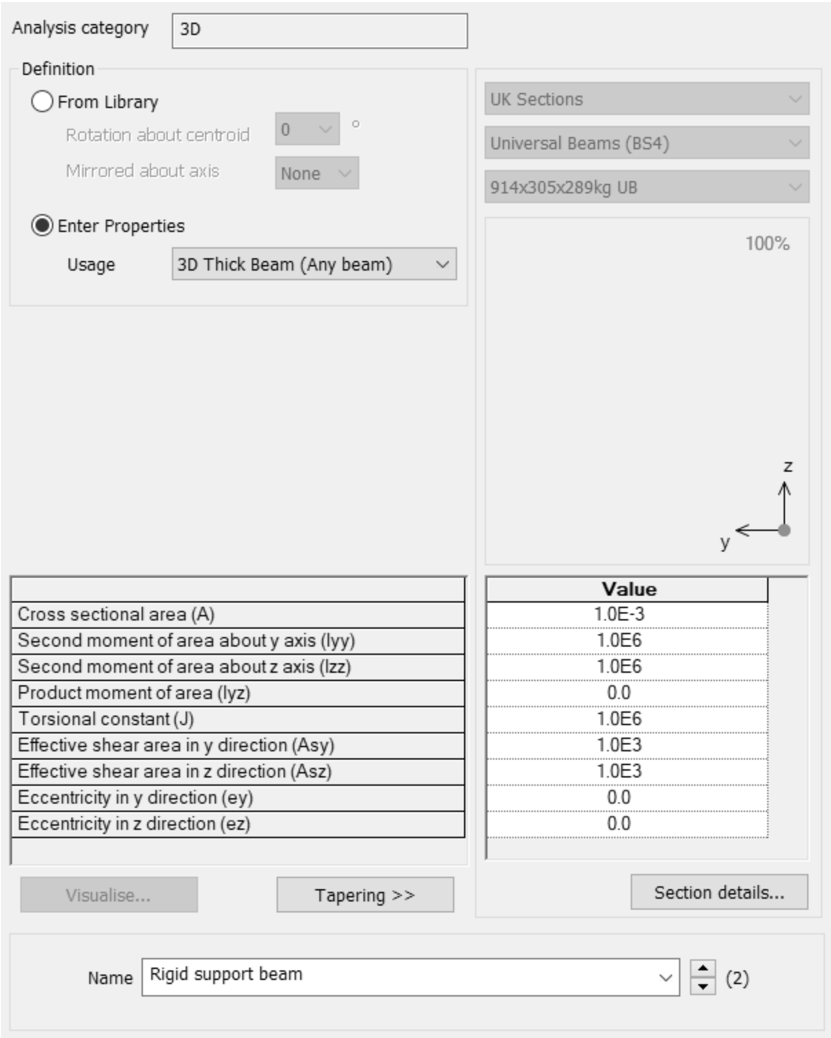


2.3.2 3D-beams (”Thick beam” / BMS3)

Principal sketch of cross sections associated to beam elements (”Thick beam” BMS3) are shown below.



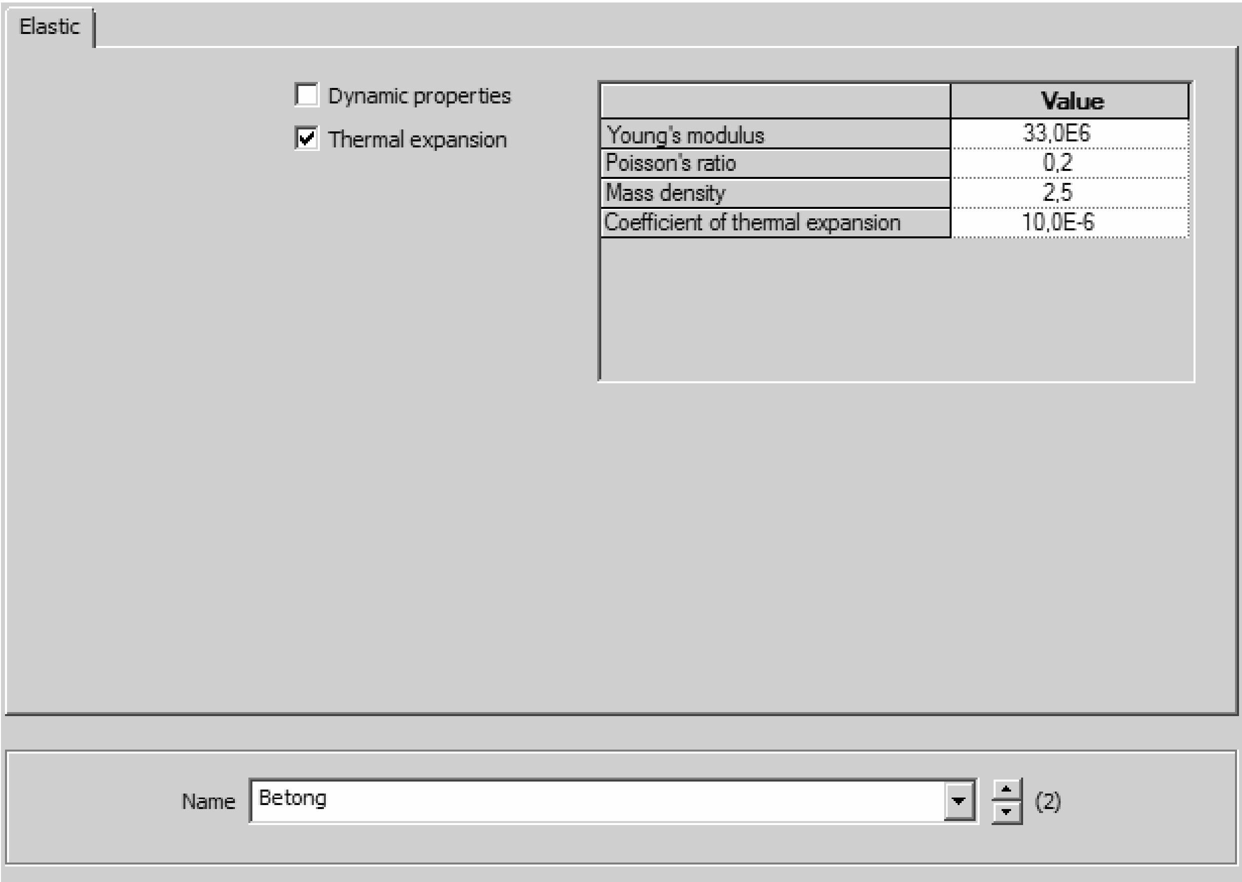
A fictive rigid support beam is introduced at bottom of abatement. The fictive support beam is defined with infinite stiffness in all directions except axial direction.



2.4 MATERIAL

Material properties seen below are to be used.

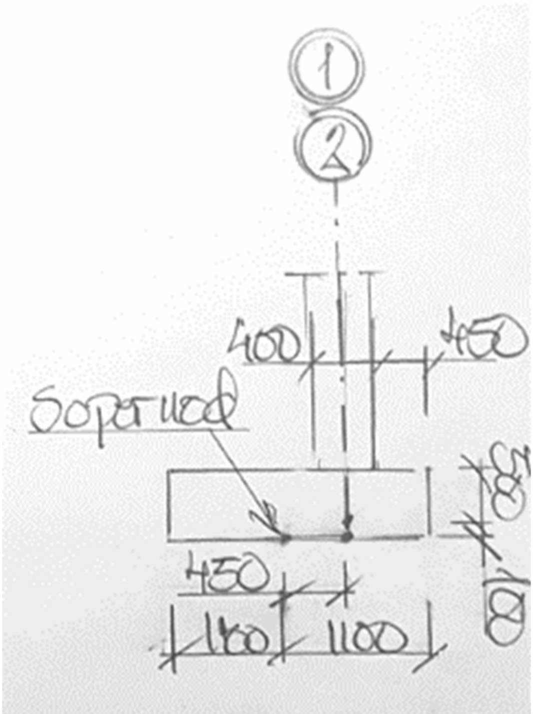
Concrete C30/37 : E_{cm} = 33 GPa

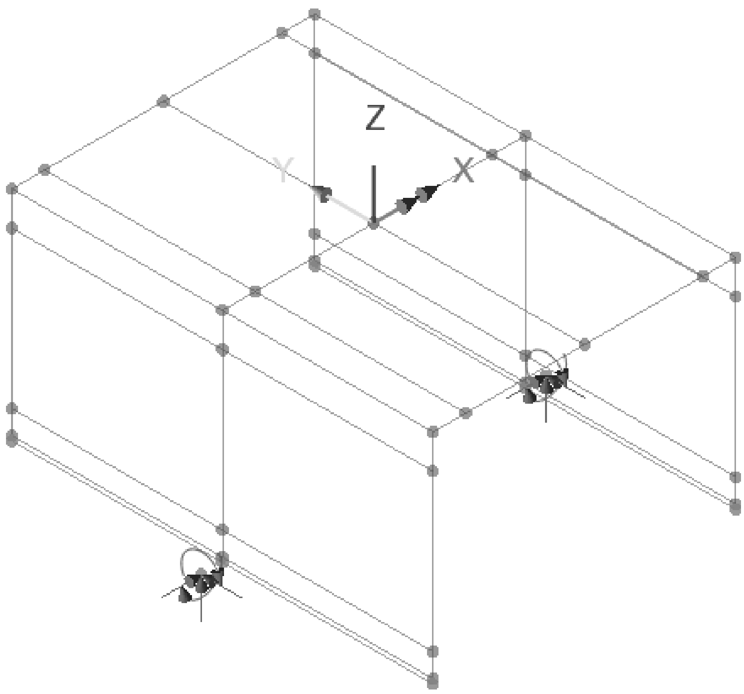


2.5 BOUNDARY CONDITIONS

Boundary conditions for each support is modelled using super nodes.

The super nodes are location at centre of bottom slabs, see sketch below.





Översikt 3D

Rotational stiffness of foundation is determined using PROG G3.005 performed in Mathcad. All formulas and partial results are shown.

Stiffness transversal direction (Rotation X-X) :

$K_{Rx} = 1289 \frac{MNm}{rad}$: page A2:27

Stiffness longitudinal direction (Rotation Y-Y) :

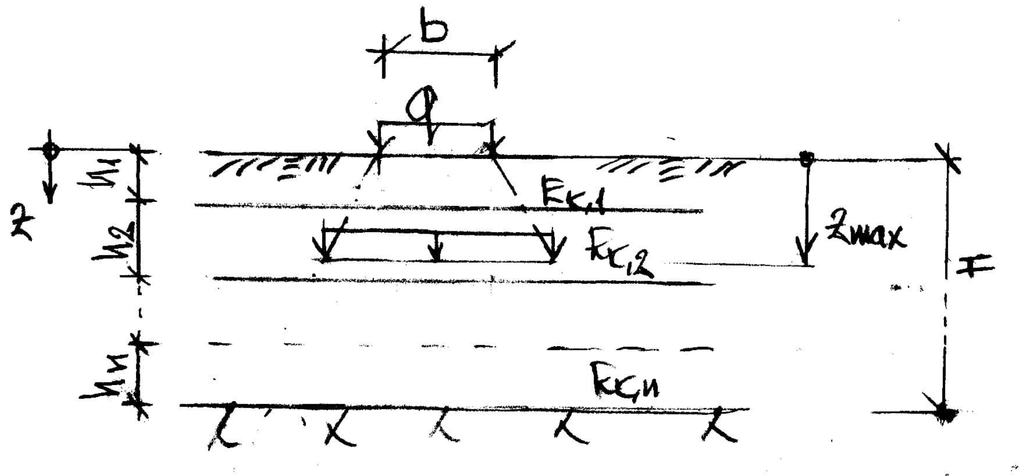
$K_{Ry} = 91 \frac{MNm}{rad}$: page A2:27

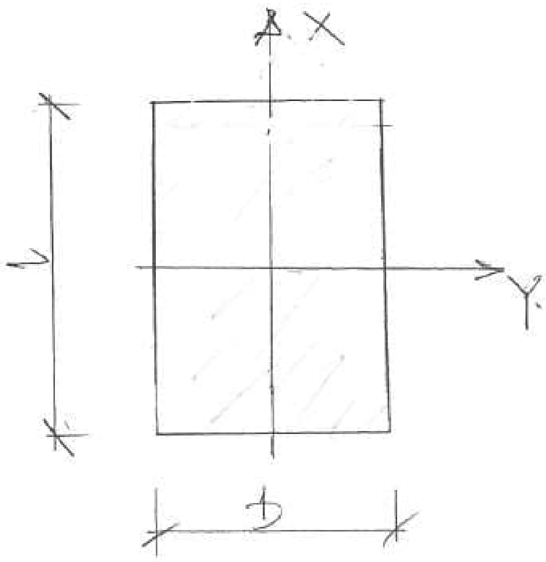
Objekt : Bridge nr 1

PRINCIPFIGUR

Geometri och undergrund

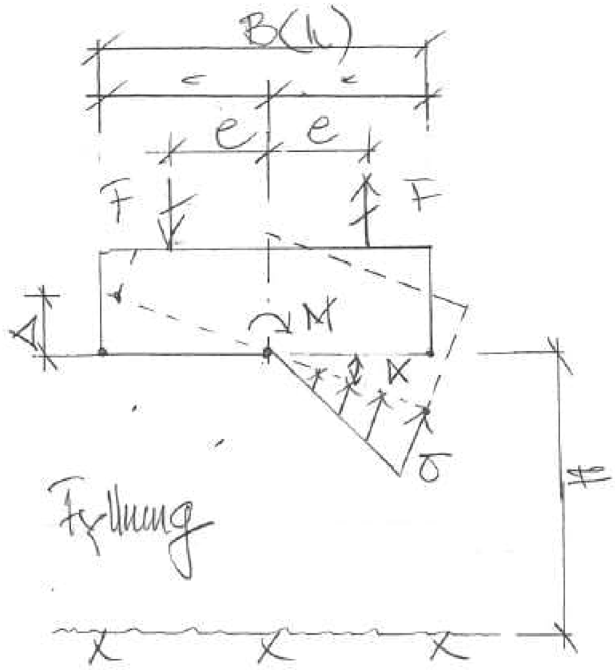
Beräkningen av ekivalent styvhet i grund är utförd enligt Råd Brobyggande bilaga 106. Den ekvivalenta E-modulen förutsätter lastspridning 2:1. Bestämningen har skett för en fiktiv lasten motsvarande q (= 100 kPa) .





TEORI

Styvheten i undergrunden är utförd enligt härledning nedan.



$$\Delta = \alpha \cdot \frac{B}{2} \;; \qquad \varepsilon = \frac{\Delta}{H} = \frac{\alpha \cdot \frac{B}{2}}{H}$$

$$\sigma = \varepsilon \cdot E'_k = \frac{E'_k \cdot \alpha \cdot B}{2 \cdot H}$$

$$F = \sigma \cdot \frac{B}{2} \cdot \frac{1}{2} \cdot L = \frac{E'_k \cdot \alpha \cdot B}{2 \cdot H} \cdot \frac{B \cdot L}{4} = \frac{E'_k \cdot \alpha \cdot B^2 \cdot L}{8 \cdot H}$$

$$M = F \cdot 2e \;; \qquad e = \frac{B}{3} \;;$$

$$M = F \cdot \frac{2 \cdot B}{3} = \alpha \cdot \frac{L \cdot B^3 \cdot E'_k}{12 \cdot H}$$

$$\Rightarrow \frac{\alpha}{M} = \frac{12 \cdot H}{L \cdot B^3 \cdot E'_k}$$

INDATA

Geometri

Bottenplatta : $b = 2.5m$ $l = 9.4m$

Underliggande jordmaterial

Antal skikt (minst 2 skickt erfordras): $n = 2st$

Skikt	E_k	h
1	50	1,50
2	30	3,50
-	MPa	m

BERÄKNINGAR

Total skikttjocklek

$$H = \sum_{i=1}^{n} h_i$$

$$H = 5\,m$$

Sättningsområde

$$z_{max} = \min(2 \cdot b, H)$$

$$z_{max} = 5\,m$$

Nivåer för respektive skikt

$$z_s = \left| \begin{array}{l} \text{for } i \in 1..n \\ \quad \left| \begin{array}{l} z_{2 \cdot i} \leftarrow z_{2 \cdot i-1} + h_i - 1mm \\ z_{2 \cdot i+1} \leftarrow z_{2 \cdot i} + 1mm \end{array} \right. \\ z \end{array} \right.$$

$$z_s^T = (0.000 \quad 1.500 \quad 1.501 \quad 5.000 \quad 5.001)\,m$$

Funktion för sättningsmodul

$$E_{sk} := \left| \begin{array}{l} \text{for } i \in 1..n-1 \\ \quad \left| \begin{array}{l} E_{2\cdot i} \leftarrow E_{k_i} \\ E_{2\cdot i+1} \leftarrow E_{k_{i+1}} \end{array} \right. \\ E \end{array} \right.$$

$$E_{sk}^T = (50 \quad 50 \quad 30 \quad 30 \quad 1000)\cdot MPa$$

$$E_k := \mathrm{linterp}(z_s, E_{sk}, z)$$

Påkänningar enligt 2:1

$$q = 100kPa$$

$$\Delta\sigma_v = q\cdot\frac{b\cdot l}{(b+z)\cdot(l+z)}$$

Karakteristisk sättning

$$s_k = \int_{0m}^{H} \frac{\Delta\sigma_v}{E_k}\,dz \qquad s_k = 6.1\cdot mm$$

Ekvivalent sättningsmodul

$$E'_k = \frac{\int_{0m}^{z_{max}} \Delta\sigma_v\,dz}{s_k} \qquad E'_k = 37\cdot MPa$$

<u>Funktion för styvhet grunden</u>
(Se härledning avsnitt TEORI)

$$k_{\theta k}(B,L) = \frac{L \cdot B^3 \cdot E'_k}{12H}$$

<u>Rotation kring plattans korta riktning (x-x riktning)</u>

$$k_{\theta k}(b,l) = 91 \cdot \frac{MNm}{rad}$$

$$C_\phi = \frac{1}{k_{\theta k}(b,l)} \qquad 10^9 \cdot C_\phi = 10971.421 \cdot \frac{rad}{kNm}$$

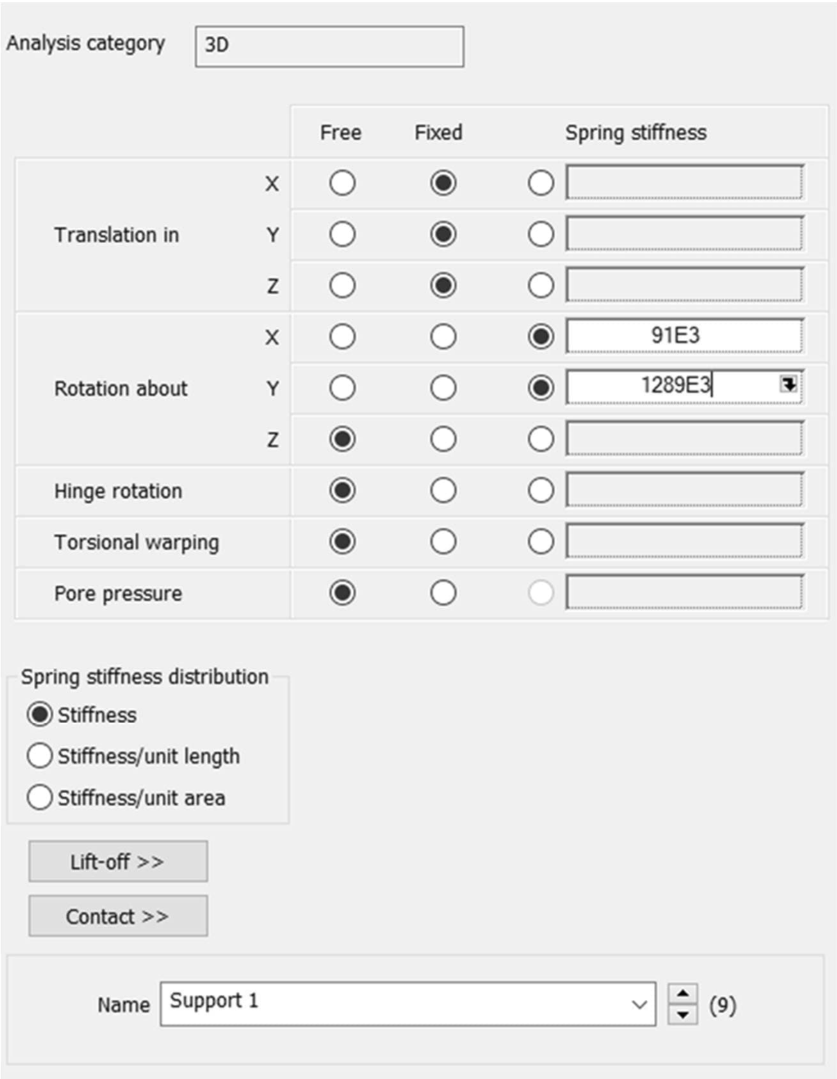
<u>Rotation kring plattans långa riktning (y-y riktning)</u>

$$k_{\theta k}(l,b) = 1289 \cdot \frac{MNm}{rad}$$

$$C_\eta = \frac{1}{k_{\theta k}(l,b)} \qquad 10^9 \cdot C_\eta = 776.046 \cdot \frac{rad}{kNm}$$

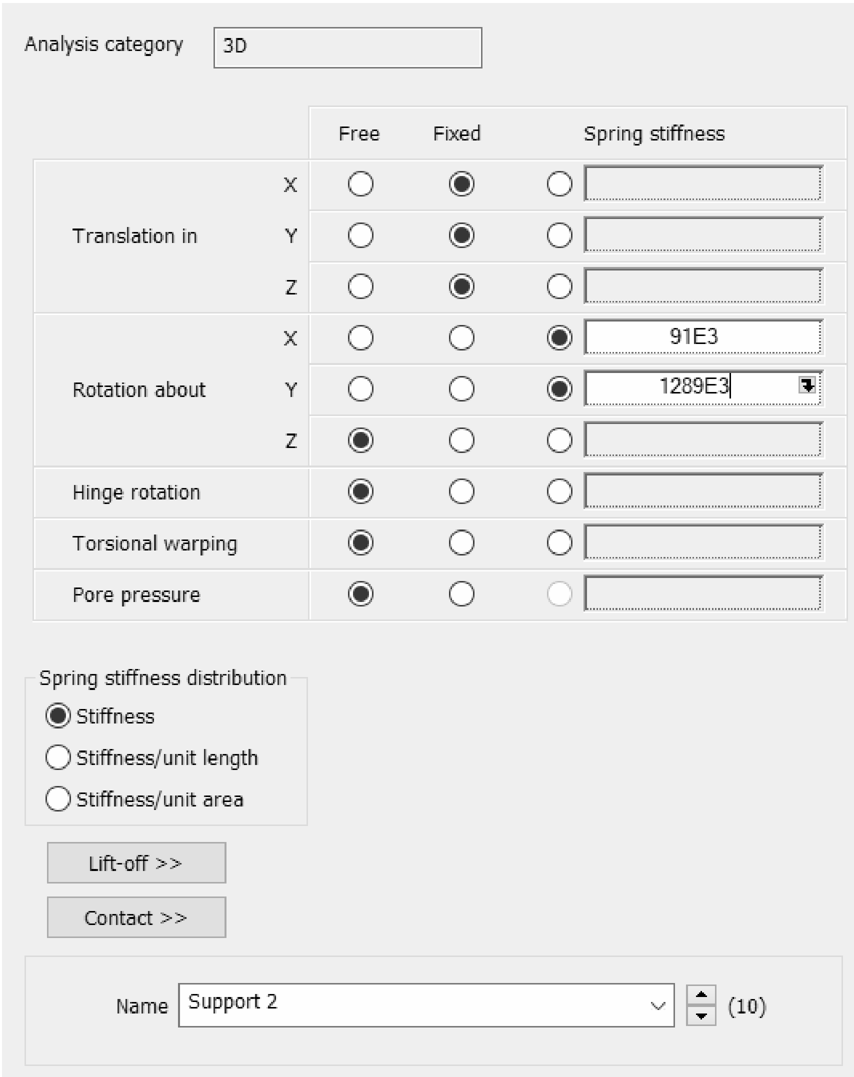
2.5.1 Boundary support 1

Super node at support 1 is modelled as seen below. This super node is termed point P34 in model of system analysis.



2.5.2 Boundary support 2

Super node at support 2 is modelled as seen below. This super node is termed point P35 in model of system analysis.



-

2.6 MESH

2.6.1 Shell element (QTS4): linear

Bridge deck is model using shell elements.

Shell elements are modelled with various subdivisions as seen below.

Typ	x-divisions	y-divisions
Element 1 x 5	1	5
Element 5 x 5	5	5

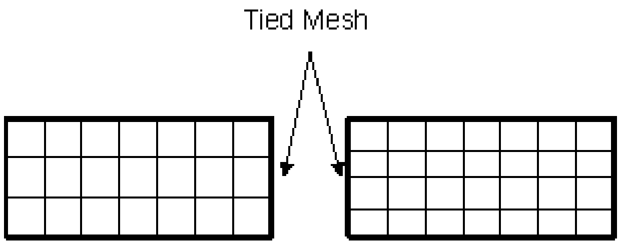
2.6.2 Balklelement (BMI21) : linear

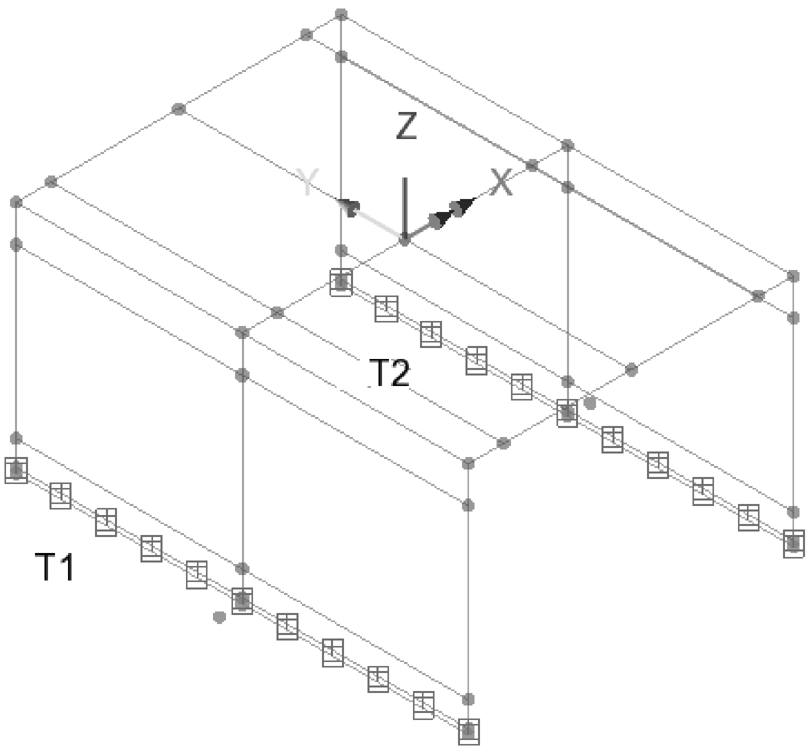
Typ	Divisions	End release: Start	End release: End	Component
Element 5	5	None	None	Rigid support beam

2.6.3 Rigid connections (Tied Mesh)

Tied mesh are used to two different locations.

Connection Tied Mesh: Rigid constraint

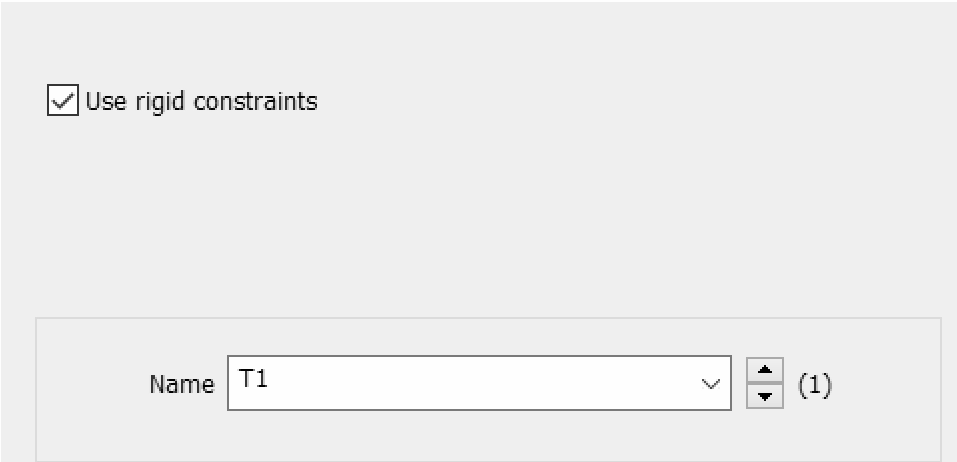




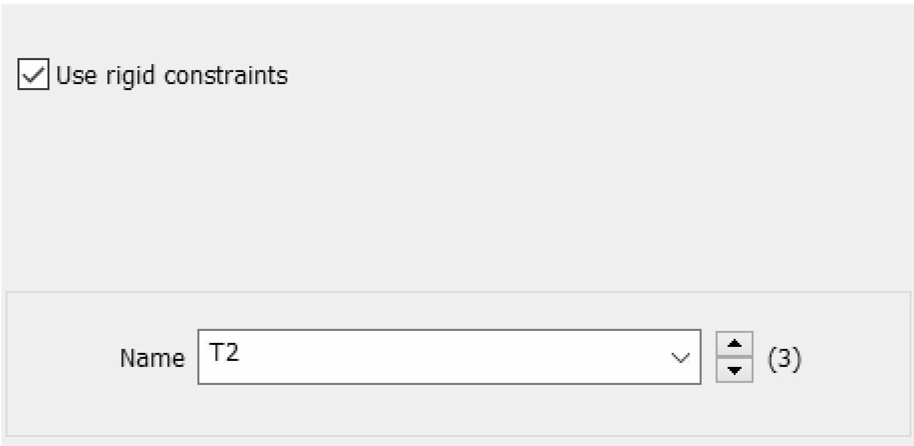
Type of node at bottom of abutments: Slave

Type of node at rigid beams: Master

Abutement 1:



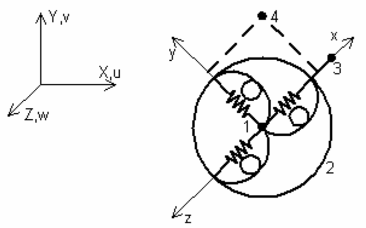
Abutement 2:



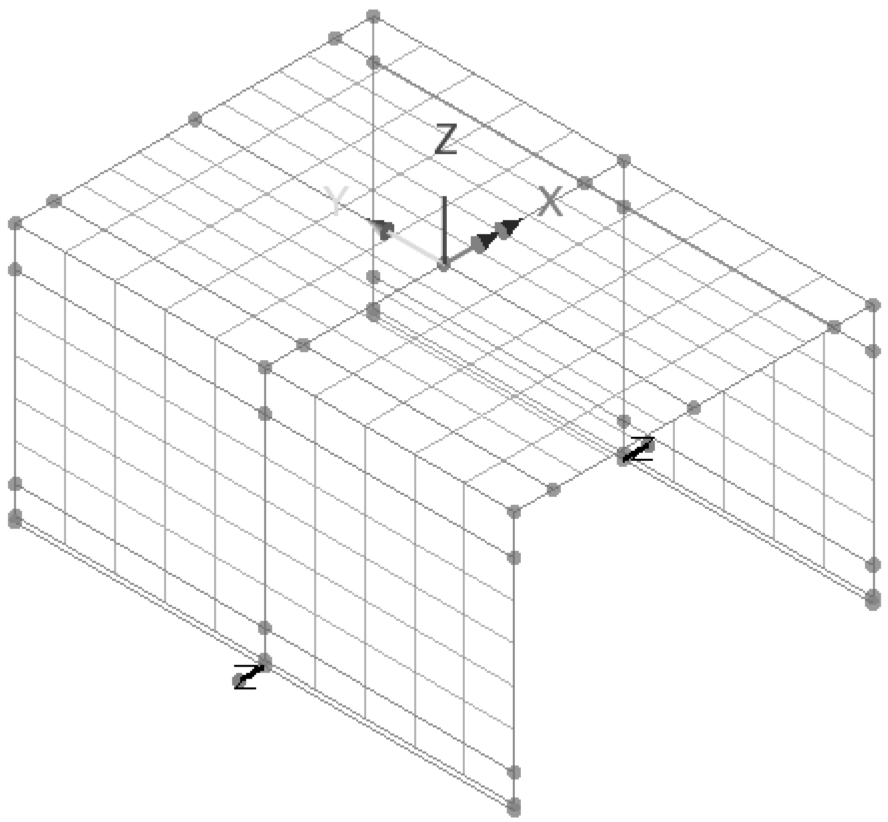
2.6.4 Joint element for beams (JSH4) : linear

Connection of super nodes to centre of rigid beams at bottom of every abutment is of type type point joint element, see presentation below.

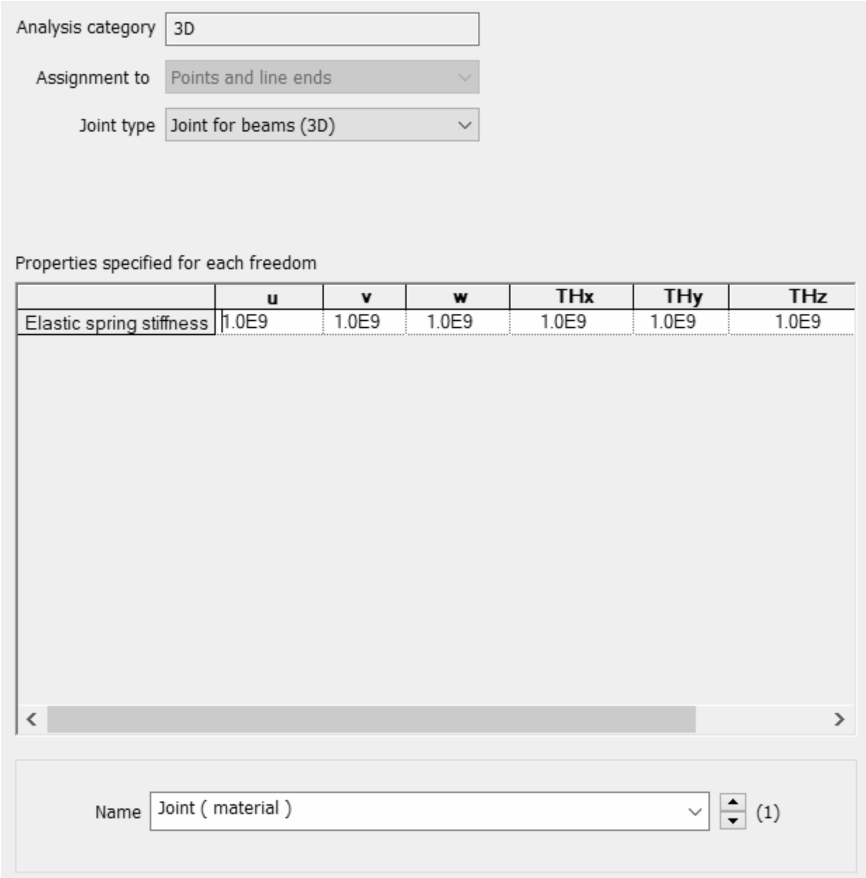
Element Name	**JSH4, JL46**



Element Group	Joints
Element Subgroup	3D Joints
Element Description	3D joint elements which connects two nodes by six springs in the local x, y and z-directions. Use JL46 for semiloof beam end nodes.
Number Of Nodes	4. The 3rd and 4th nodes are used to define the local x-axis and local xy-plane respectively.
Freedoms	U, V, W, θx, θy, θz: at nodes 1 and 2 (active nodes).
Node Coordinates	X, Y, Z: at each node.



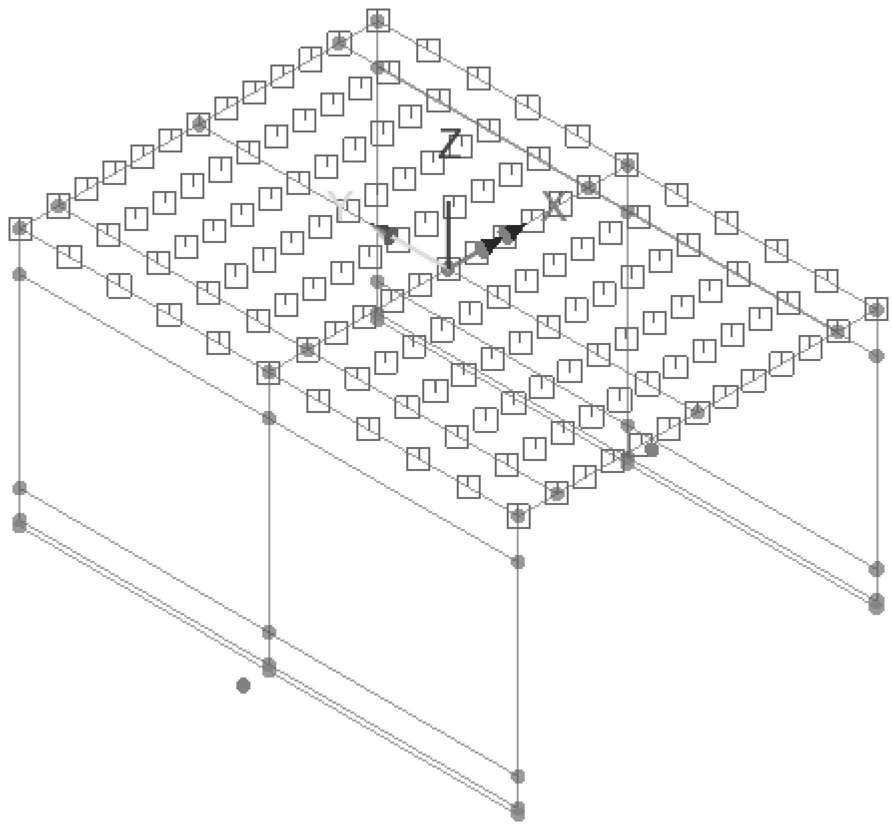
Material:


Analysis category
3D
Assignment to
Points and line ends
Joint type
Joint for beams (3D)
Properties specified for each freedom
u
v
w
THx
THy
THz
Elastic spring stiffness
1.0E9
1.0E9
1.0E9
1.0E9
1.0E9
1.0E9
Name
Joint (material)
(1)

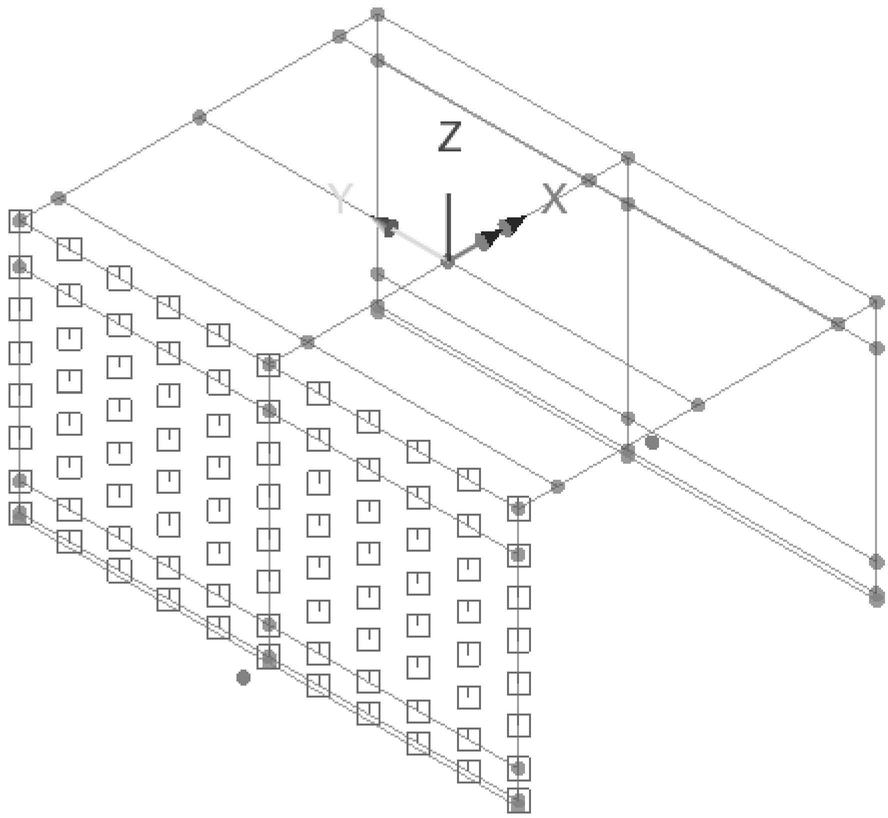
2.7 SEARCH AREA

Discrete load can be applied to structure as geometrical load areas. In FEM program load areas are termed Search Area.

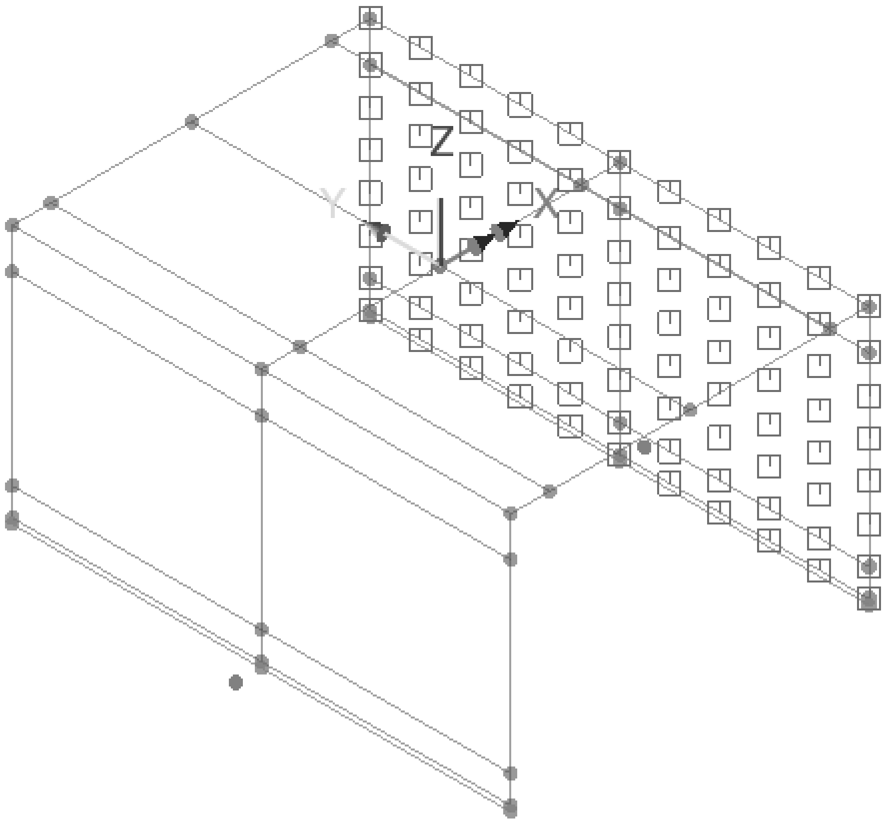
2.7.1 Search area : Superstructure



2.7.2 Search area : Abutment 1



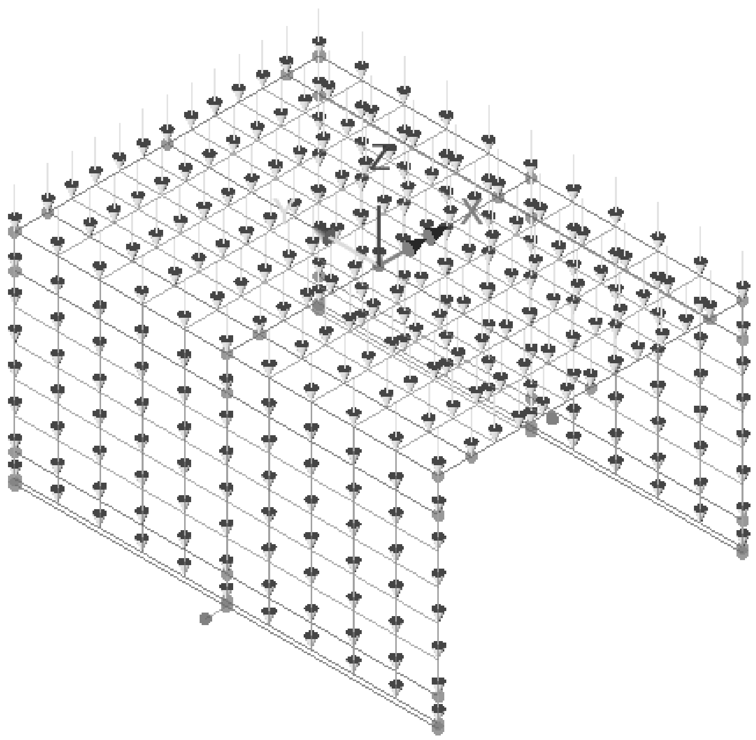
2.7.3 Search area : Abutment 2



3. LOADS

3.1 DEAD WEIGHT

$\gamma_c = 25 \cdot \frac{kN}{m^3}$: concrete



Overview 3D

Loadcase : EGEN

Structural loading : Body force

Linear acceleration in Z (a_z) : -10 $\frac{m}{s^2}$

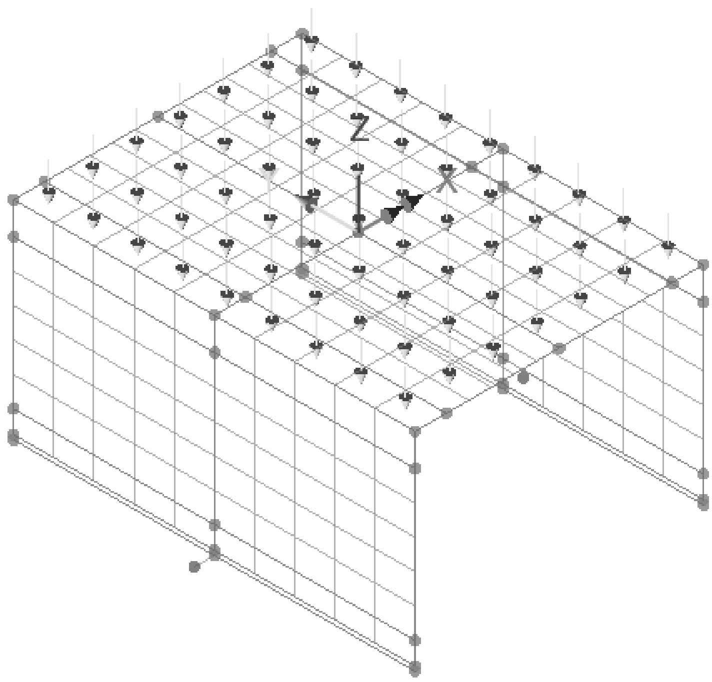
Component	Value
Linear acceleration in X	0.0
Linear acceleration in Y	0.0
Linear acceleration in Z	-10.0
Angular velocity about X axis	0.0
Angular velocity about Y axis	0.0
Angular velocity about Z axis	0.0
Angular acceleration about X axis	0.0
Angular acceleration about Y axis	0.0
Angular acceleration about Z axis	0.0

Name EGEN (1415)

3.2 SURFACING

Surfacing load is seen below:

$$q_{belägg} = \gamma_{beläggning} \cdot t + q_{matta} = 22\frac{kN}{m^3} \cdot 0.105m + 0.11kPa = 2.6kPa$$



View 3D

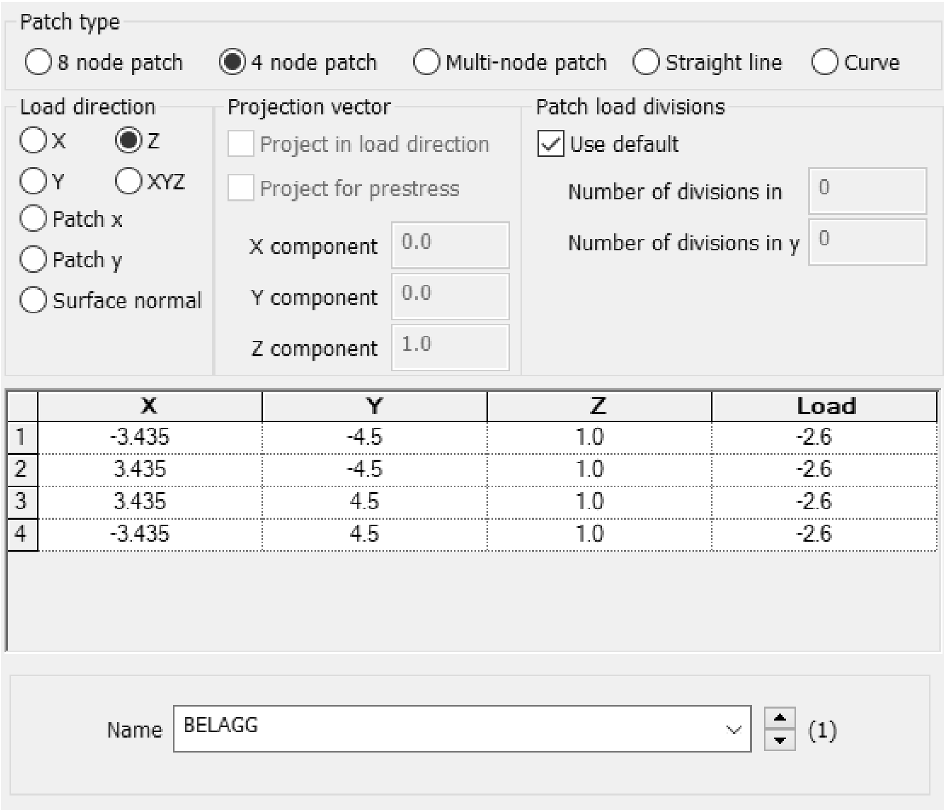
Loadcase : BELAGG

Structural loading : Discrete 4 node patch load

Surface load (q_z) : -2.6kPa

Search Area : Farbana

Loads outside search area : Include full load



	X	Y	Z	Load
1	-3.435	-4.5	1.0	-2.6
2	3.435	-4.5	1.0	-2.6
3	3.435	4.5	1.0	-2.6
4	-3.435	4.5	1.0	-2.6

3.3 EARTH PRESSURE

Earth pressure is determined for “förstärkningslager material” according to TK Geo 13 table 5.2-1 and table 5.2-3.

$\gamma_{m.\phi} = 1.30$: TK Geo 13 section 2.3.1

$\gamma_{m.E} = 1.30$: TK Geo 13 section 2.3.1

$$\gamma = 22\frac{kN}{m^3}$$

$$\gamma' = 13\frac{kN}{m^3}$$

$$X_d = \frac{1}{\gamma_m}\cdot\eta\cdot\overline{X} \equiv \frac{1}{\gamma_m}\cdot X_k$$

$$\rightarrow \varphi_d = arctan\left(\frac{tan\varphi_k}{\gamma_m}\right) = arctan\left(\frac{tan45°}{1.0}\right) = 45°$$: design method D2

$$\rightarrow \varphi_d = arctan\left(\frac{tan\varphi_k}{\gamma_m}\right) = arctan\left(\frac{tan45°}{1.3}\right) = 38°$$: design method D3

Earth pressure coefficients are seen below.

$$K_o = 1 - sin(\varphi_d)$$

$$K_a = tan^2(45° - \frac{\varphi_d}{2})$$

$$K_p = tan^2(45° + \frac{\varphi_d}{2})$$

φ_d	K_a	K_0	K_p	Method
38°	0.24	0.38	4.20	D3
45°	0.17	0.29	5.82	D2

Bridge design is conducted using method D2 according to¨TK Geo section 3.16.1.

Remark
- Evaluation of risk for sliding may be conducted using active earth pressure, see KBB section B.3.1.2.

- Evaluation of load combination accident characteristic values may be used to determine earth pressure, see KBB section C.3.5.

3.3.1 Load against support 1

$q_{vilo}\ (0m) = 0kPa$: top of surfacing

$q_{vilo}\ (5.0m) = 5.0m \cdot 8.6\frac{kN}{m^3} = 43kPa$: bottom of foundation slab

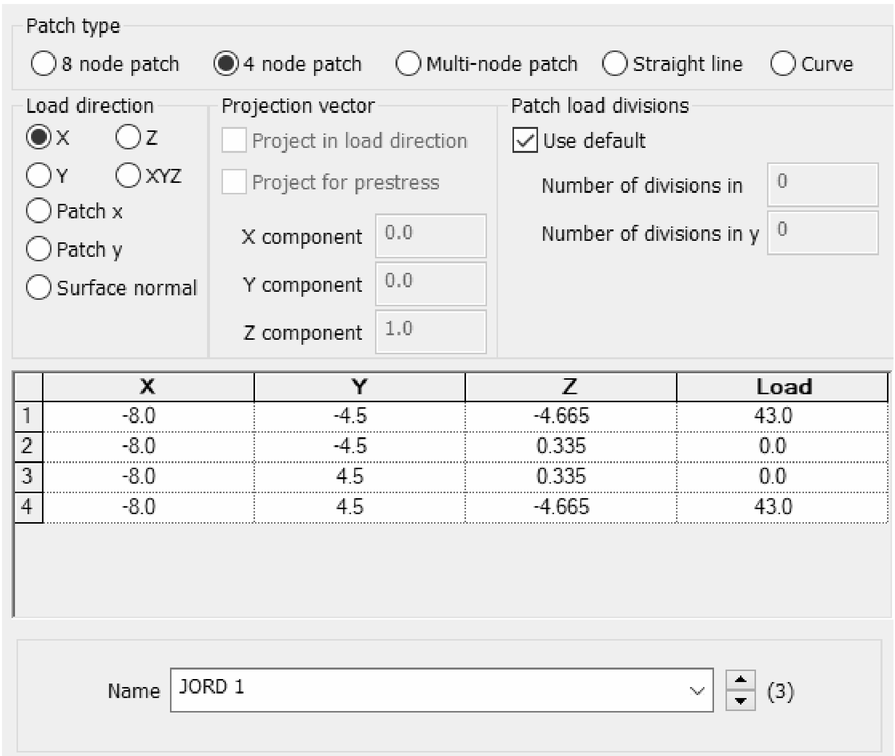
Loadcase : JORD 1

Structural loading : Discrete 4 node patch load

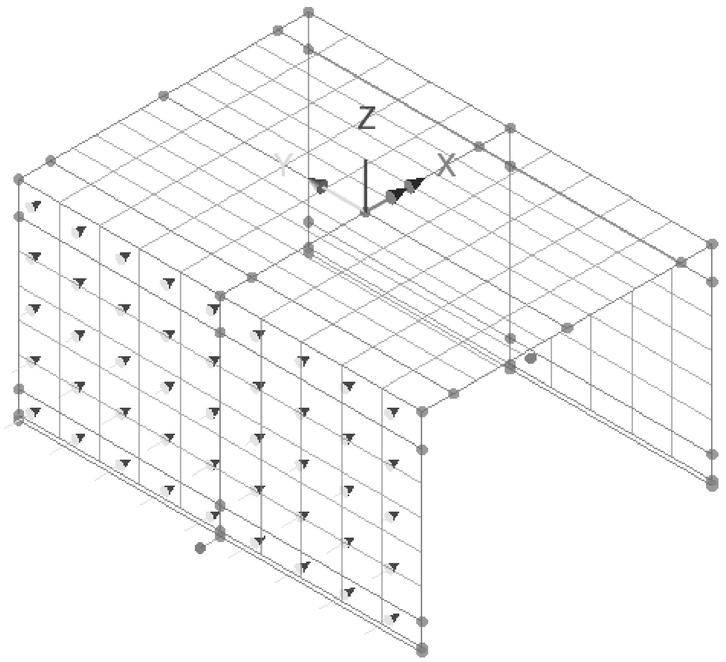
Surface load (q_x) : 0 kPa → +43 kPa

Search Area : Ramben 1

Loads outside search area : Include full load



	X	Y	Z	Load
1	-8.0	-4.5	-4.665	43.0
2	-8.0	-4.5	0.335	0.0
3	-8.0	4.5	0.335	0.0
4	-8.0	4.5	-4.665	43.0



Overview 3D

3.3.2 Last against support 2

$q_{vilo}\,(0m) = 0kPa$: top of surfacing

$q_{vilo}\,(5.0m) = 5.0m \cdot 8.6\frac{kN}{m^3} = 43kPa$: bottom of foundation slab

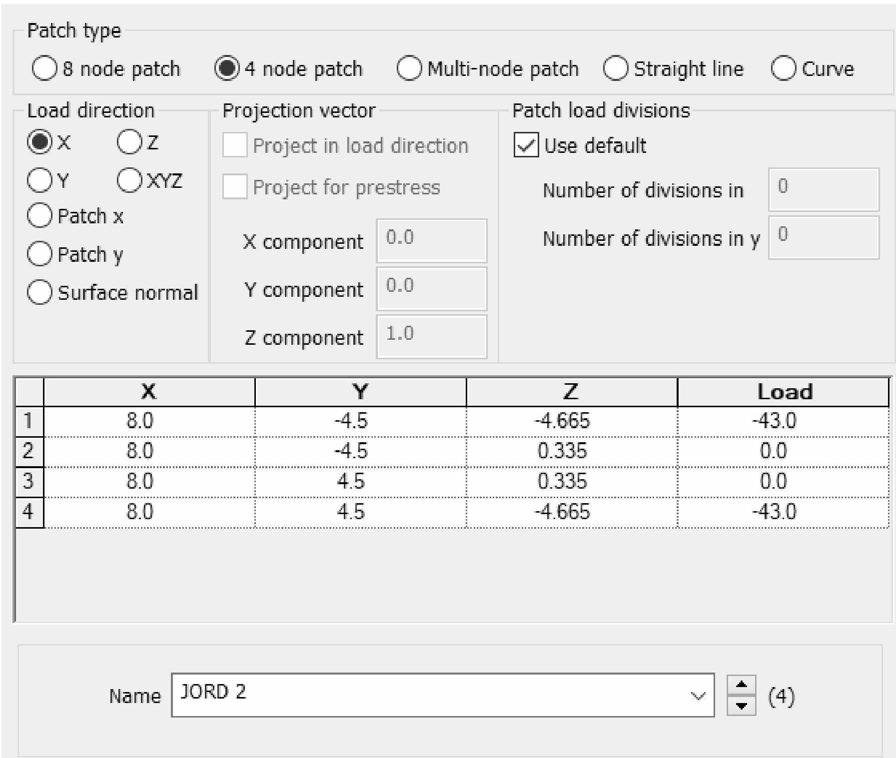
Loadcase : JORD 2

Structural loading : Discrete 4 node patch load

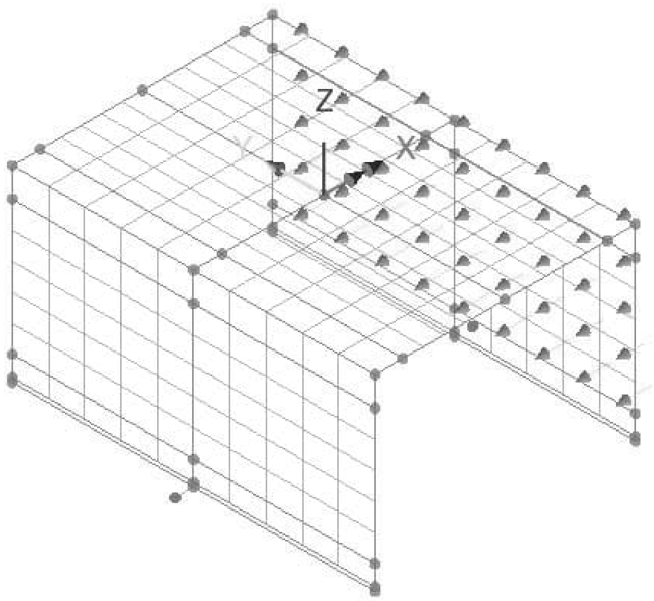
Surface load (q_x) : 0 kPa → -43 kPa

Search Area : Ramben 2

Loads outside search area : Include full load



	X	Y	Z	Load
1	8.0	-4.5	-4.665	-43.0
2	8.0	-4.5	0.335	0.0
3	8.0	4.5	0.335	0.0
4	8.0	4.5	-4.665	-43.0



Overview 3D

3.3.3 Load combinations

Load combinations of existing load cases.

Load combination basic JORD :

Load case	Factor
JORD 1	1
JORD 2	1

3.4 SUPPORT SETTLEMENT

Support settlement is determined in RBB section B.3.1.4. Effect of vertical and horizontal settlement need not be combined.

Vertical differential settlement of 10 mm is assumed for both supports. A verification of this will be performed to prove this assumption is on safe side.

Horizontal settlement (X- and Y-direction) of ±10 mm is applied.

When determining load effect reduction due to creep will be applied.

Remark

Load case should be considered in service stare (SLS) according to SS-EN 1992-1-1 §2.3.1.3.
If considered the effect of gradual cracking according to SS-EN 1992-1-1 §5.4(3) should be used.
On safe side the favourable effect of cracking is not considered.

Load case does not have to be considered for ultimate state (ULS) according to SS-EN 1992-1-1 §2.3.1.3. If considered reduced stiffness due to cracking according to SS-EN 1992-1-1 §5.4(3) should be used.

3.4.1 Vertical settlement

3.4.1.1 Support 1

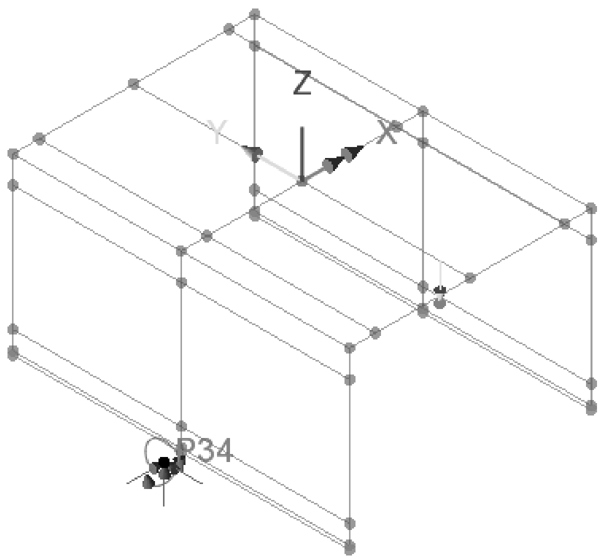
Load: STOD_1Z

Structural loading : Prescribed Displacement

Translation at point in Z direction : -0.010 m

Load case : STOD_1Z

Point : P34



3.4.1.2 Support 2

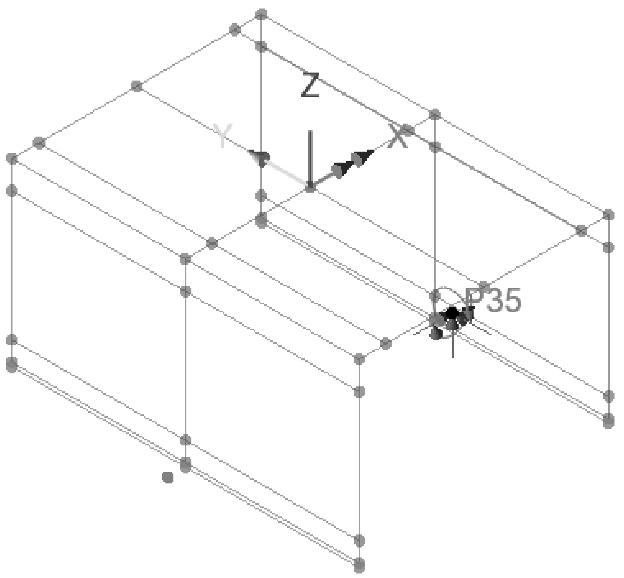
Load: STOD_2Z

Structural loading : Prescribed Displacement

Translation at point in Z direction : -0.010 m

Load case : STOD_2Z

Point : P35



3.4.2 Horizontal settlement

3.4.2.1 Support 1

Load : STOD_1X

Structural loading : Prescribed Displacement

Translation at point in X direction : 0.010 m

Load case : STOD_1Y+

Point : P34

3.4.2.2 Support 2

Load : STOD_2X

Structural loading : Prescribed Displacement

Translation at point in X direction : 0.010 m

Load case : STOD_2X+

Point : P35

3.4.3 Combined support settlement

Basic load cases :

Load case	Load	Factor
STOD_1X+	STOD_1X	1
STOD_2X+	STOD_2X	1
STOD_1X-	STOD_1X	-1
STOD_2X-	STOD_2X	-1

Envelope STOD-X :

Load case
STOD_1X+
STOD_2X+
STOD_1X-
STOD_2X-

Smart loadcombination STOD-Z :

Load case	Permanent factor	Variable factor
STOD_1Z	0	1
STOD_2Z	0	1

Envelope STOD :

Load case
STOD-X
STOD-Z

3.5 CREEP

Total creep is determined according to SS-EN 1992-1-1 §3.1.4 and KBB section B.3.3.6 for RH 80% at time t_1.

Time for first loading (= time when formwork was removed) is termed t_0.

$t_0 = 5\ days$

$t_1 = 120\ years$

Bridge consists of parts with different thicknesses as seen below.

Creep is determine using Mathcad program PROG A001.

For thickness t = 0.45 m → $\phi(t_1, t_0) = 2.02$ see page A3:19.

However creep value $\varphi(t_1, t_0) = 2.0$ is chosen on safe side for all components.

The effect of stiffness due to creep see SS-EN 1992-1-1 5.8.7.

Load	φ
Permanent	2.0
Variable excluding temperature	0
Temperature	0.3*

* = According to Swedish practice.

$$E^{system} = \frac{E_{cm}}{1+\varphi}$$

Instead of adjusting E-modulus load coefficients are adjusted as seen below.

$$f_{KRYMP} = \frac{1}{1+\varphi_{ef}} = \frac{1}{1+2.0} = 0.33$$

$$f_{STÖD} = \frac{1}{1+\varphi_{ef}} = \frac{1}{1+2.0} = 0.33$$

$$f_{TEMP} = \frac{1}{1+\varphi_{ef}} = \frac{1}{1+0.3} = 0.77$$

Objekt: Bridge nr 1

Betong (C30/37, C35/45, C40/50 och C45/55): $BTG = "C35/45"$

Relativ fuktighet : $RH = 80\%$

Tvärsnittetsbredd : $b = 9.0m$

Tvärsnittetshöjd : $h = 0.45m$

Tvärsnittsarea : $A_c = b \cdot h = 4.05 \cdot m^2$

Omkrets i kontakt med "luft" : $u = 2 \cdot b = 18\,m$

Bärverkets ekvivalenta tjocklek : $h_0 = \frac{2 \cdot A_c}{u} = 0.45\,m$

Studerad tidpunkt för bestämning av krypning : $t_1 = 120år$ $t_1 = 43800 \cdot dag$

Tidpunkt för pålastning (= formrivning): $t_0 = 5dag$

Indatakvitto

$f_{cm} = 43 \cdot MPa$

BERÄKNING

Uttryck för bestämning av kryptalet är hämtat från SS-EN 1992-1-1 Bilaga B.1.

$$\alpha_1 = \left(\frac{35MPa}{f_{cm}}\right)^{0.7} = 0.87$$

$$\alpha_2 = \left(\frac{35MPa}{f_{cm}}\right)^{0.2} = 0.96$$

$$\alpha_3 = \left(\frac{35MPa}{f_{cm}}\right)^{0.5} = 0.9$$

$$\varphi_{RH} = \begin{cases} 1 + \dfrac{1 - RH}{0.1\sqrt[3]{\dfrac{h_0}{mm}}} & \text{if } f_{cm} \le 35MPa \\ \left(1 + \dfrac{1 - RH}{0.1\sqrt[3]{\dfrac{h_0}{mm}}}\cdot\alpha_1\right)\cdot\alpha_2 & \text{otherwise} \end{cases} = 1.18$$

$$\beta_0 = \frac{1}{0.1 + t_0^{\,0.20}} = 0.68$$

$$\beta_{fcm} = \frac{16.8}{\sqrt{\dfrac{f_{cm}}{MPa}}} = 2.56$$

$$\beta_H = \left| \begin{array}{l} \text{if } f_{cm} \le 35\text{MPa} \\ \quad \left| \begin{array}{l} \beta_{H.max} \leftarrow 1500 \\ \beta_H \leftarrow \beta_{H.max} \ \text{ if } 1.5\cdot\left[1 + (0.012\cdot 100\text{RH})^{18}\right]\cdot\dfrac{h_0}{\text{mm}} + 250 > \beta_{H.max} \\ \beta_H \leftarrow 1.5\cdot\left[1 + (0.012\cdot 100\text{RH})^{18}\right]\cdot\dfrac{h_0}{\text{mm}} + 250 \ \text{ otherwise} \end{array} \right. \\ \text{if } f_{cm} > 35\text{MPa} \\ \quad \left| \begin{array}{l} \beta_{H.max} \leftarrow 1500\cdot\alpha_3 \\ \beta_H \leftarrow \beta_{H.max} \ \text{ if } 1.5\cdot\left[1 + (0.012\cdot 100\text{RH})^{18}\right]\cdot\dfrac{h_0}{\text{mm}} + 250 > \beta_{H.max} \\ \beta_H \leftarrow 1.5\cdot\left[1 + (0.012\cdot 100\text{RH})^{18}\right]\cdot\dfrac{h_0}{\text{mm}} + 250\cdot\alpha_3 \ \text{ otherwise} \end{array} \right. \\ \beta_H \end{array} \right.$$

$$\beta_H = 1224$$

$$\beta_c = \left(\frac{t_1 - t_0}{\beta_H + t_1 - t_0}\right)^{0.3} = 0.99$$

$$\varphi_{t0} = \varphi_{RH}\cdot\beta_{fcm}\cdot\beta_0 = 2.04$$

$$\varphi_{t1} = \varphi_{t0}\cdot\beta_c = 2.02$$

3.6 SHRINKAGE

Total shrinkage according to SS-EN 1992-1-1 §3.1.4 and KBB section B.3.1.5 for RH 80%.

Determination of load effect from shrinkage should consider the reduced concrete stiffness from creep.

$t_s = 0\ days$

$t_1 = 120\ years$

Shrinkage after time t_1.

Total shrinkage $\varepsilon_{cs}\ (t_1) = 0.024\%$ for beams in superstructure is calculated using Mathcad program PROG A002, see page A3:24.

Remark

Shrinkage must be considered for service state (SLS) see SS-EN 1992-1-1 §2.3.2.2(1).

Shrinkage does not have to be used for ultimate state (ULS) see SS-EN 1992-1-1 §2.3.2.2(2).

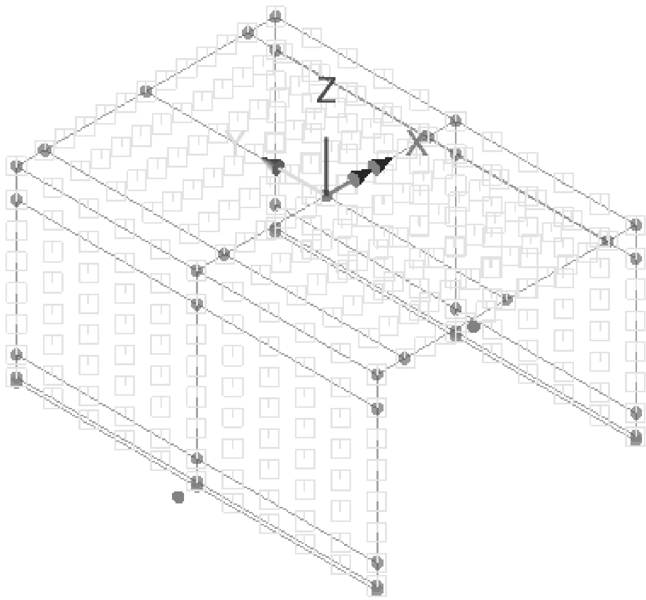
Loadcase : KRYMP

Structural loading : Temperature

Definition : Nodal

Initial temperature : 0 °C

Final temperature : -25 °C



Objekt: Bridge nr 1

Betong (C30/37, C35/45, C40/50 och C45/55): $BTG = "C35/45"$

Relativ fuktighet : $RH = 80\%$

Tvärsnittetsbredd : $b = 9.0m$

Tvärsnittetshöjd : $h = 0.45m$

Tvärsnittsarea : $A_c = b \cdot h = 4.05 \cdot m^2$

Omkrets i kontakt med "luft" : $u = 2 \cdot b = 18\,m$

Bärverkets ekvivalenta tjocklek : $h_0 = \frac{2 \cdot A_c}{u} = 0.45\,m$

Studerad tidpunkt för bestämning av krypning : $t_1 = 120år$ $t_1 = 43800 \cdot dag$

Tidpunkt för pålastning (= formrivning): $t_0 = 5dag$

Indatakvitto

$f_{cm} = 43 \cdot MPa$

BERÄKNING

Uttryck för bestämning av kryptalet är hämtat från SS-EN 1992-1-1 Bilaga B.1.

$$\alpha_1 = \left(\frac{35MPa}{f_{cm}}\right)^{0.7} = 0.87$$

$$\alpha_2 = \left(\frac{35MPa}{f_{cm}}\right)^{0.2} = 0.96$$

$$\alpha_3 = \left(\frac{35MPa}{f_{cm}}\right)^{0.5} = 0.9$$

$$\varphi_{RH} = \begin{vmatrix} 1 + \dfrac{1 - RH}{0.1\sqrt[3]{\dfrac{h_0}{mm}}} \quad \text{if } f_{cm} \le 35MPa \\ \left(1 + \dfrac{1 - RH}{0.1\sqrt[3]{\dfrac{h_0}{mm}}}\cdot\alpha_1\right)\cdot\alpha_2 \quad \text{otherwise} \end{vmatrix} = 1.18$$

$$\beta_0 = \frac{1}{0.1 + t_0^{\,0.20}} = 0.68$$

$$\beta_{fcm} = \frac{16.8}{\sqrt{\dfrac{f_{cm}}{MPa}}} = 2.56$$

$$\beta_H = \left| \begin{array}{l} \text{if } f_{cm} \le 35\text{MPa} \\ \quad \left| \begin{array}{l} \beta_{H.max} \leftarrow 1500 \\ \beta_H \leftarrow \beta_{H.max} \quad \text{if } 1.5\cdot\left[1 + (0.012\cdot 100RH)^{18}\right]\cdot\dfrac{h_0}{mm} + 250 > \beta_{H.max} \\ \beta_H \leftarrow 1.5\cdot\left[1 + (0.012\cdot 100RH)^{18}\right]\cdot\dfrac{h_0}{mm} + 250 \quad \text{otherwise} \end{array} \right. \\ \text{if } f_{cm} > 35\text{MPa} \\ \quad \left| \begin{array}{l} \beta_{H.max} \leftarrow 1500\cdot\alpha_3 \\ \beta_H \leftarrow \beta_{H.max} \quad \text{if } 1.5\cdot\left[1 + (0.012\cdot 100RH)^{18}\right]\cdot\dfrac{h_0}{mm} + 250 > \beta_{H.max} \\ \beta_H \leftarrow 1.5\cdot\left[1 + (0.012\cdot 100RH)^{18}\right]\cdot\dfrac{h_0}{mm} + 250\cdot\alpha_3 \quad \text{otherwise} \end{array} \right. \\ \beta_H \end{array} \right.$$

$$\beta_H = 1224$$

$$\beta_c = \left(\frac{t_1 - t_0}{\beta_H + t_1 - t_0}\right)^{0.3} = 0.99$$

$$\varphi_{t0} = \varphi_{RH}\cdot\beta_{fcm}\cdot\beta_0 = 2.04$$

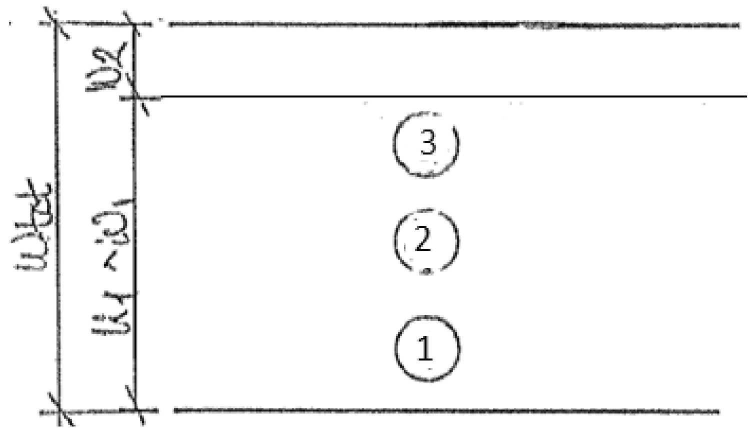
$$\varphi_{t1} = \varphi_{t0}\cdot\beta_c = 2.02$$

3.7 TRAFFIC

Evaluation of vertical traffic is performed for LM 1 and LM 2 according to SS-EN 1991-2 section 4.3.

Evaluation will also be performed EG A/B = 180kN/300 kN according to TRVFS 2011:12 chapter 6 point 3§.

3.7.1 Traffic lane division



Total traffic width : $w_{tot} = 9.0m$

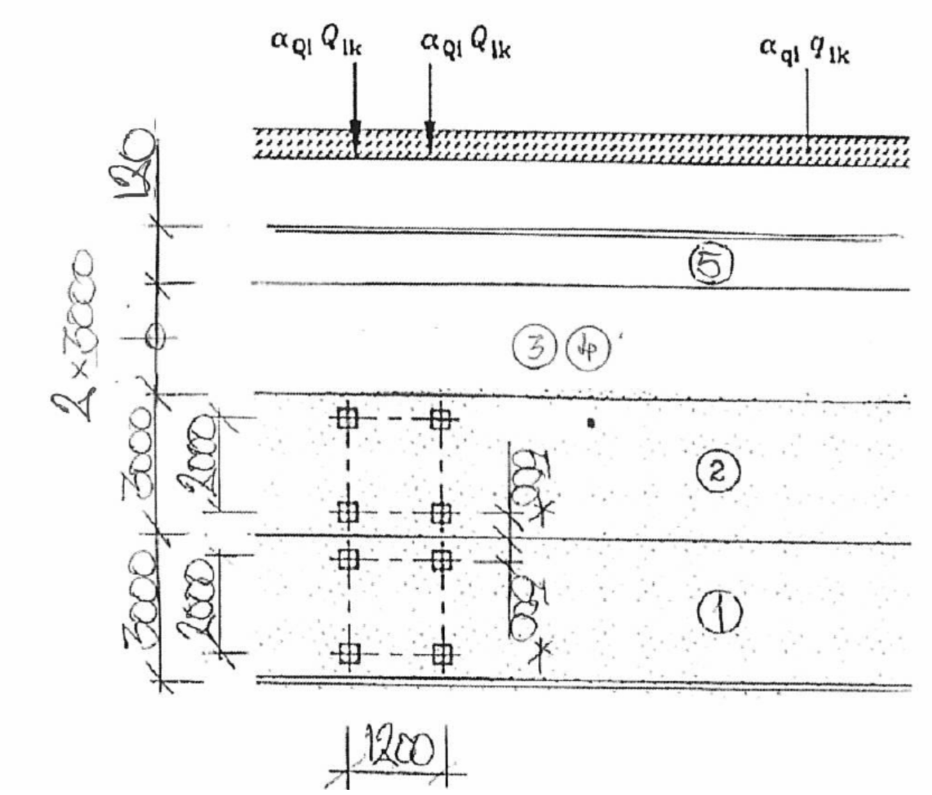
Number of traffic lanes : $n_1 = Integer\left[\frac{w_{tot}}{3.0m}\right] = 3\ st$

Full traffic width : $w_1 = 3.0m$

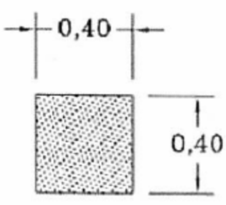
Remaining width : $w_2 = 0m$

3.7.2 Load model 1 (LM 1)

Characteristic values according to SS-EN 1991-2 §4.3.2.



* = When studying local effects 250 mm is to be assumed.



Axellaster :

α_Q : national adaptation factor according to TRVFS 2011:12 table 7.1

$Q'_k = \alpha_Q \cdot Q_k$: characteristic value including national adaptation factor

Traffic lane	Q_k	α_Q	Q'_k	Remark
1	300	0,9	270	LM1- 2 x 270 kN
2	200	0,9	180	LM1- 2 x 180 kN
3-9	100	0	0	No load
-	kN	-	kN	-

Utbredda laster :

α_q : national adaptation factor according to TRVFS 2011:12 table 7.1

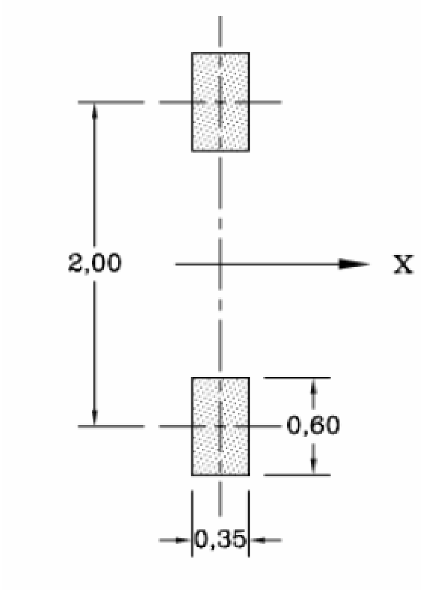
$q'_k = \alpha_q \cdot q_k$: characteristic value including national adaptation factor

Traffic lande	q_k	α_q	q'_k
1	9.0	0.8	7.2
2-9	2.5	1.0	2.5
-	kPa	-	kPa

Remark
Evaluation is performed using Vehicle Load Optimisation (VLO), see section 3.7.4.

3.7.3 Load model 2 (LM 2)

Characteristic vertical load according to SS-EN 1991-2 §4.3.3.



$\beta_Q = \alpha_Q = 0.90$: national adaptation factor

$Q_k = 400$ kN : characteristic value

$Q'_k = \beta_k \cdot Q_k = 360$ kN : characteristic value including national adaptation factor

3.7.4 Load model EG A/B

Calculation is performed using traffic load EG A/B = 180 kN/300 kN excluding dynamic factor.

Traffic load EG A/B are applied to two traffic lanes. Traffic on first lane is multiplied by 1.00 while second lane is multiplied 0.80.

Evaluation is performed with wheelbase distance 1.7 m and 2.3 m.

$\varepsilon_{dyn} = 25\ \%$: dynamic factor*

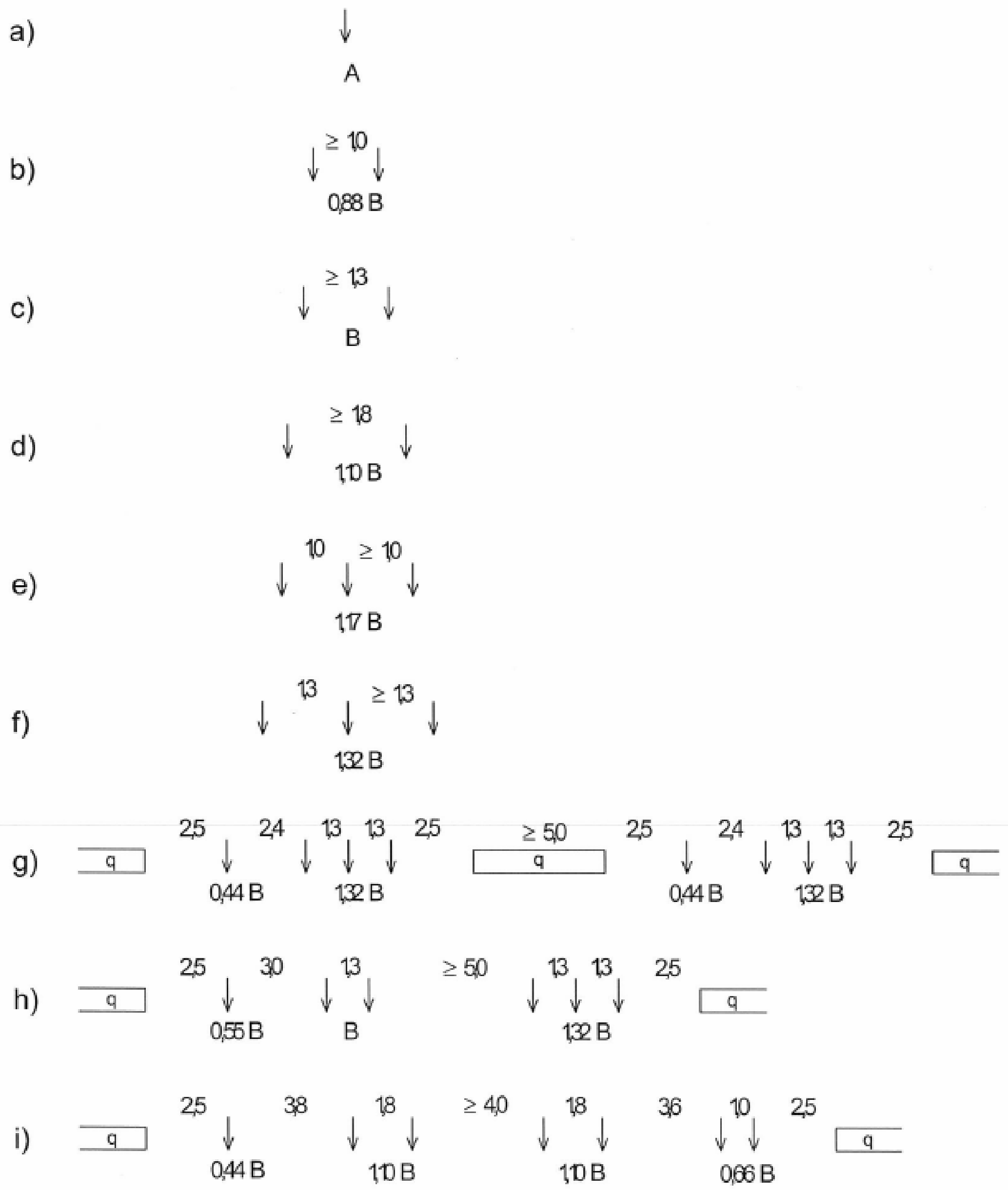
$A' = A \cdot (1 + \varepsilon_{dyn}) = 180\ kN \cdot (1+0.25) = 225\ kN$: single load including dynamic factor

$B' = B \cdot (1 + \varepsilon_{dyn}) = 300\ kN \cdot (1+0.25) = 375\ kN$: tandem load including dynamic factor

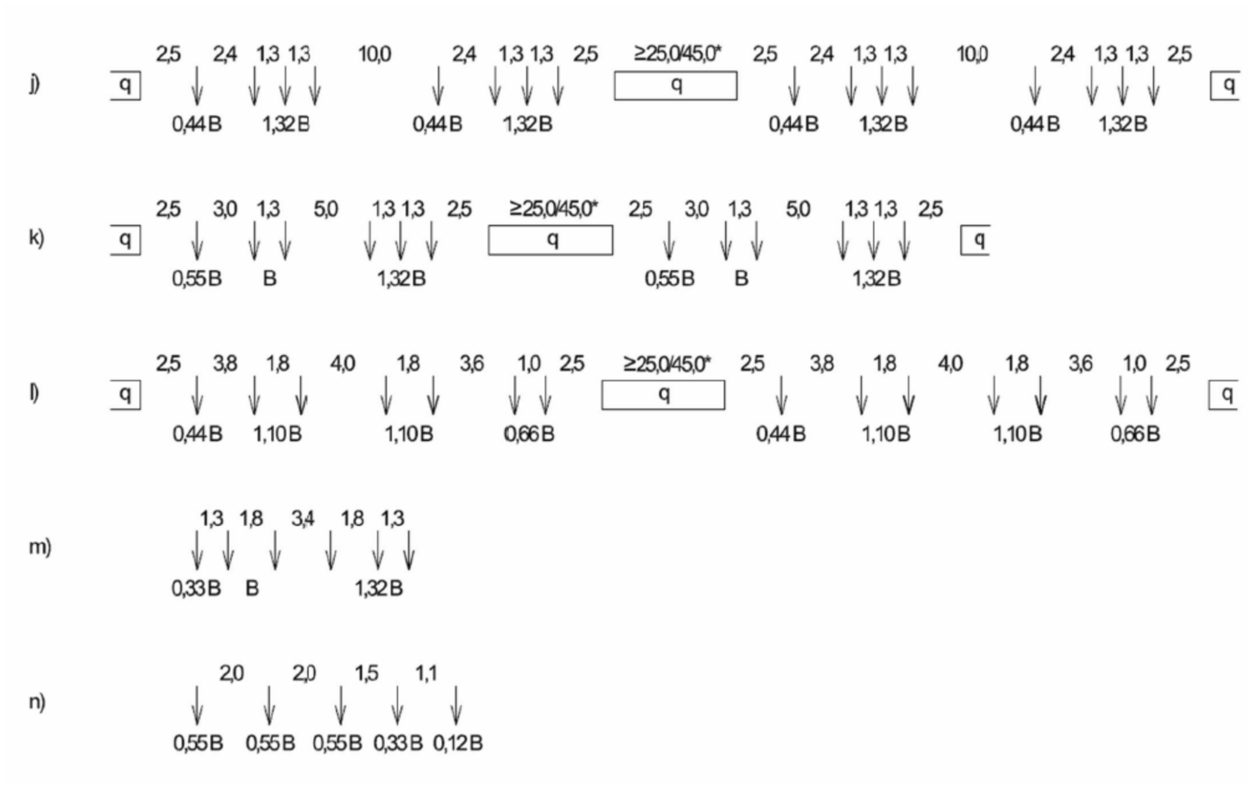
$p = 5 \frac{kN}{m}$: surface load

* = see KBB section B.3.2.1.3.

Remark
Evaluation see Vehicle Load Optimisation (VLO), see section 3.7.5.



a) A
b) ≥ 1,0 0,88 B
c) ≥ 1,3 B
d) ≥ 1,8 1,10 B
e) 1,0 ≥ 1,0 1,17 B
f) 1,3 ≥ 1,3 1,32 B
g) q 2,5 2,4 1,3 1,3 2,5 0,44 B 1,32 B ≥ 5,0 q 2,5 2,4 1,3 1,3 2,5 0,44 B 1,32 B q
h) q 2,5 3,0 1,3 0,55 B B ≥ 5,0 1,3 1,3 2,5 1,32 B q
i) q 2,5 3,8 1,8 0,44 B 1,10 B ≥ 4,0 1,8 3,6 1,0 2,5 1,10 B 0,66 B q



j)
2,5 2,4 1,3 1,3 10,0 2,4 1,3 1,3 2,5 ≥25,0/45,0* 2,5 2,4 1,3 1,3 10,0 2,4 1,3 1,3 2,5
q q q
0,44B 1,32B 0,44B 1,32B 0,44B 1,32B 0,44B 1,32B
k)
2,5 3,0 1,3 5,0 1,3 1,3 2,5 ≥25,0/45,0* 2,5 3,0 1,3 5,0 1,3 1,3 2,5
q q q
0,55B B 1,32B 0,55B B 1,32B
l)
2,5 3,8 1,8 4,0 1,8 3,6 1,0 2,5 ≥25,0/45,0* 2,5 3,8 1,8 4,0 1,8 3,6 1,0 2,5
q q q
0,44B 1,10B 1,10B 0,66B 0,44B 1,10B 1,10B 0,66B
m)
1,3 1,8 3,4 1,8 1,3
0,33B B 1,32B
n)
2,0 2,0 1,5 1,1
0,55B 0,55B 0,55B 0,33B 0,12B

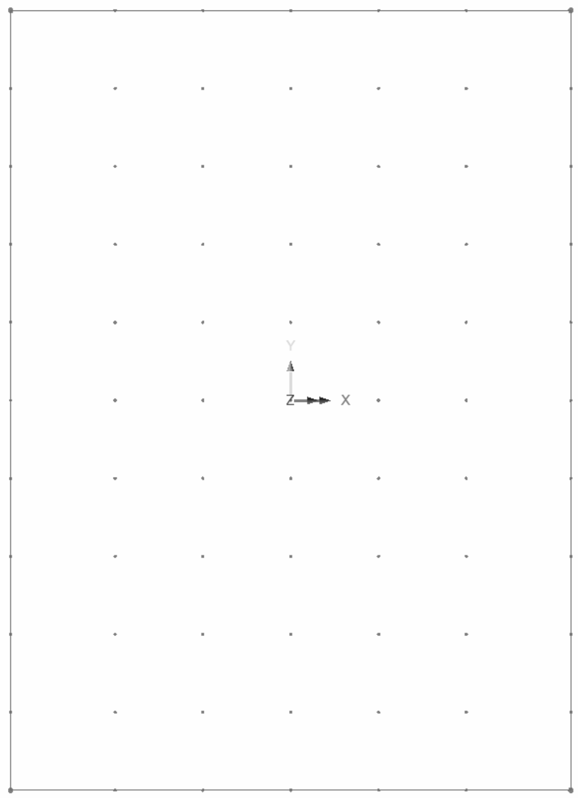
3.7.5 Vehicle Load Optimization (VLO)

Influence surfaces are created using *Direct Method Influence.* This is done by applying *Influence components* to *Nodes in superstructure* as seen below.

Influence components :

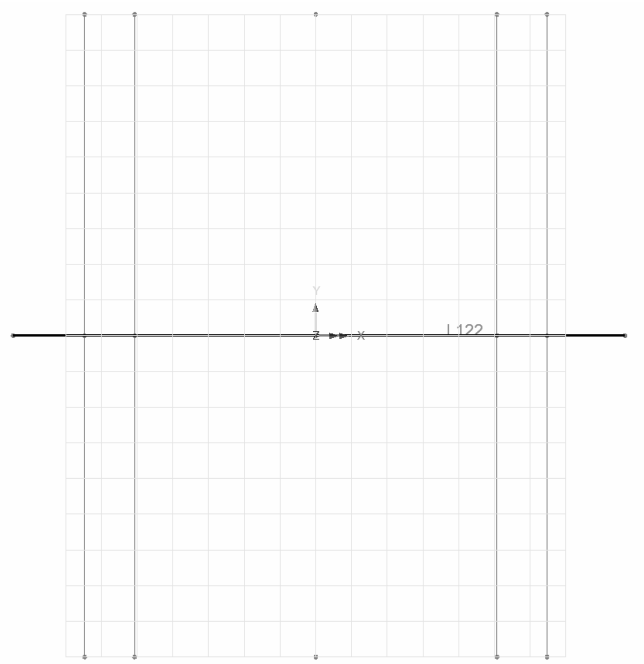
Attribute nr.	Name	Entity
1	Inf1 – Mx	Force/moment – Thick shell
2	Inf2 – My	-”-
3	Inf3 – Sx	-”-
4	Inf4 – Sy	-”-
5	Inf5 – FX	Reaction : Support
6	Inf6 – FY	-”-
7	Inf7 – FZ	-”-
8	Inf8 – MX	-”-
9	Inf9 – MY	-”-

Nodes in superstructure (number of nodes 77 = 11 x 7):

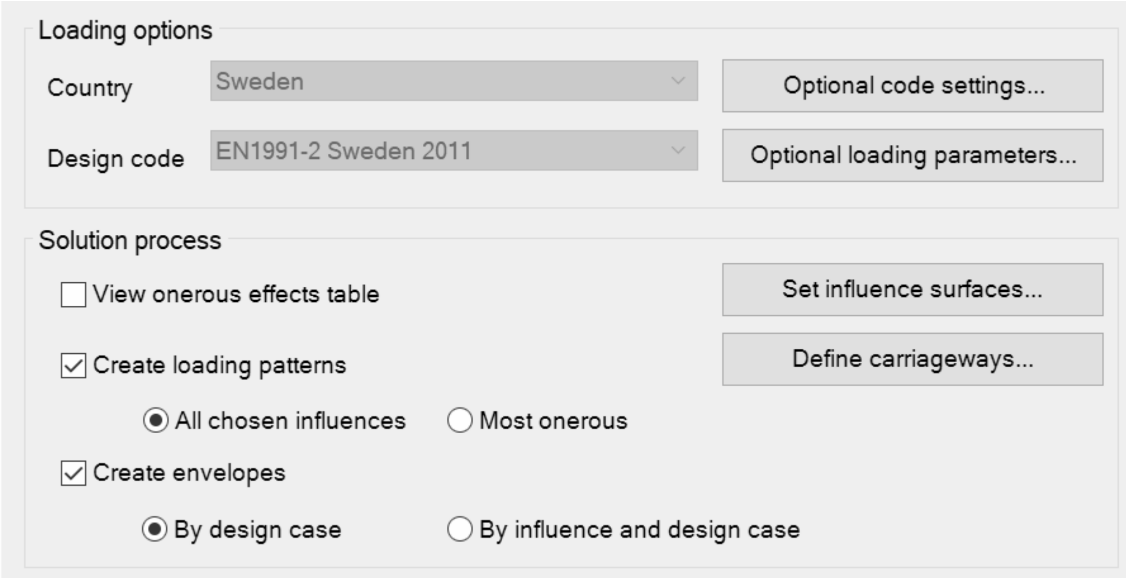


Influence surfaces :

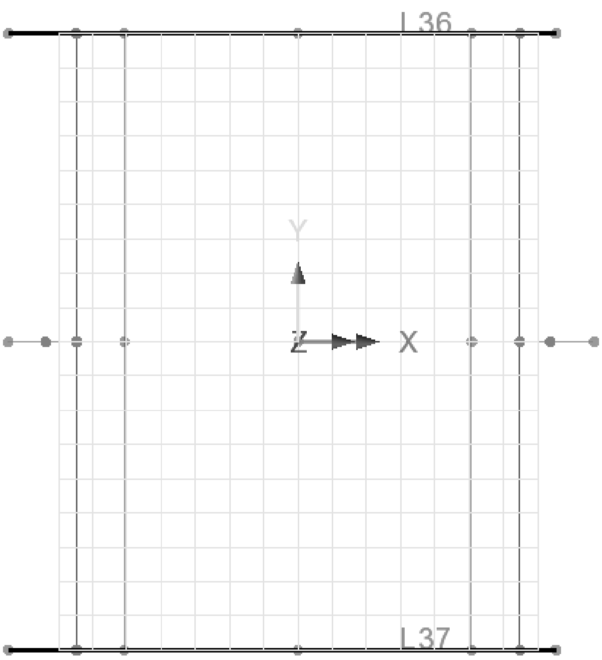
Search area:	Superstructure
Definition type:	Grid
Centerline (path):	L122
Transverse width:	9.0 m
Longitudinal spacing:	0.5 m
Transversal spacing:	0.5 m



Vehicle load optimisation options:

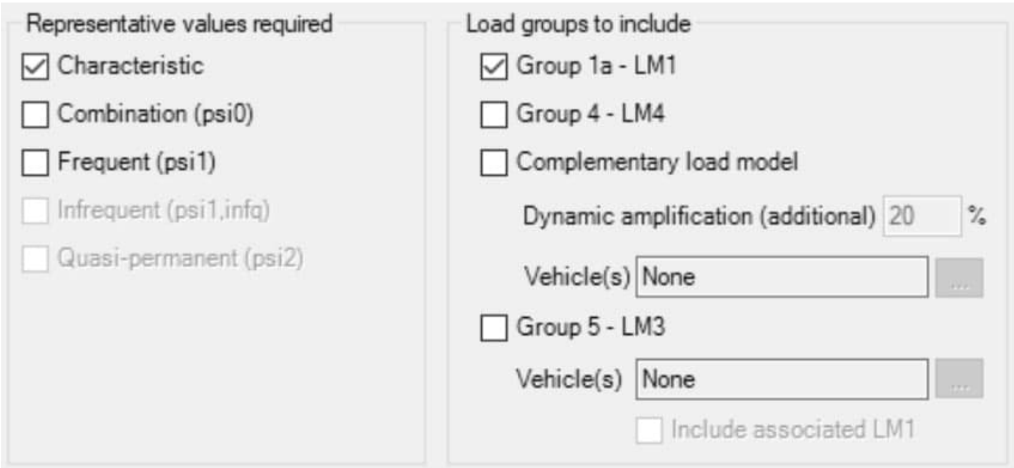


Vehicle longitudinal incremental movement:	0.25 m
Vehicle transverse incremental movement:	1.0 m
Vehicle direction:	both
Definition of carriageway (kerbs):	L36 & L37
Influence surfaces:	Include all (positive & negative)



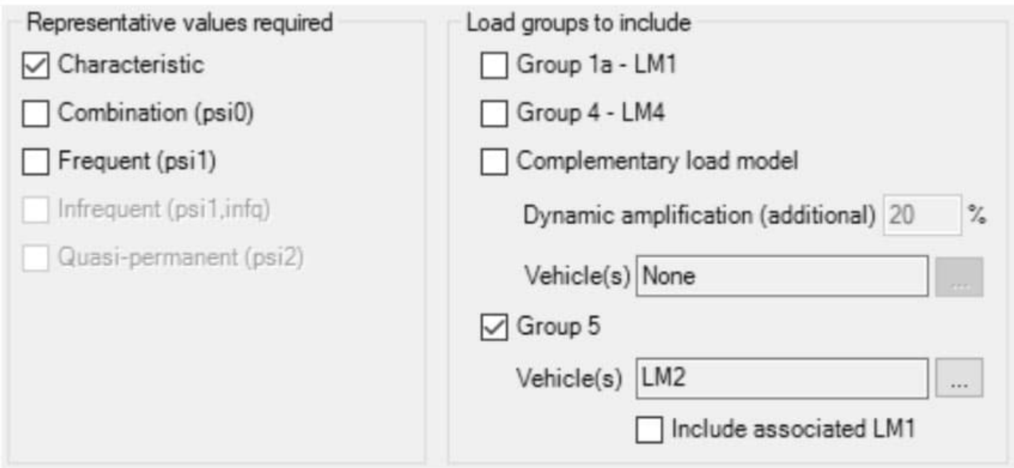
3.7.5.1 Envelope : LM 1

Load model 1 (LM1) defined in SS-EN 1991-2 section 4.3.2.



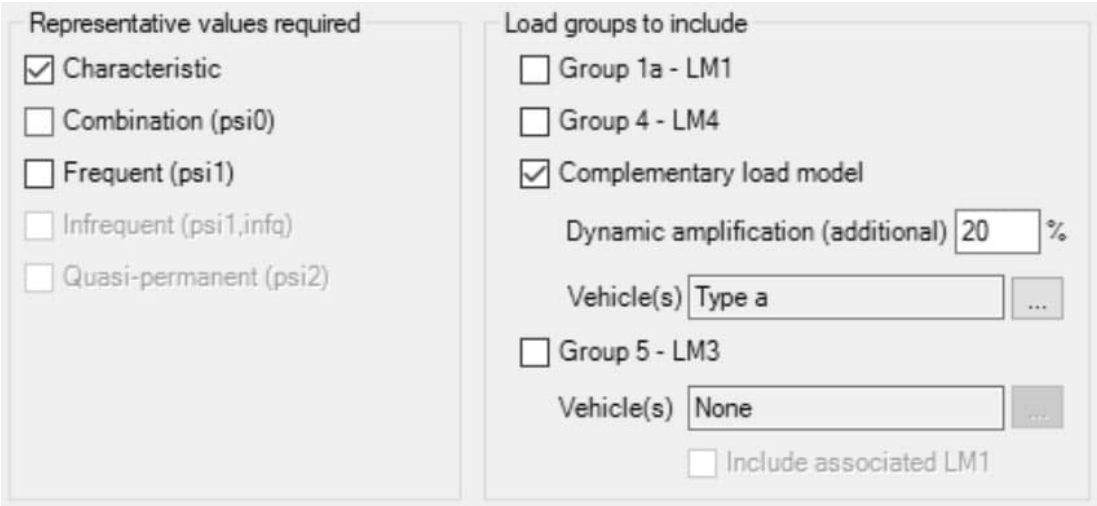
3.7.5.2 Envelope : LM 2

Load model 2 (LM2) defined in SS-EN 1991-2 section 4.3.3. The load is defined in Group 5 (special vehicle) since Group 1b is not defined in present version of software.



3.7.5.3 Envelope : EG A

EG A is defined as complementary load model with options seen below.

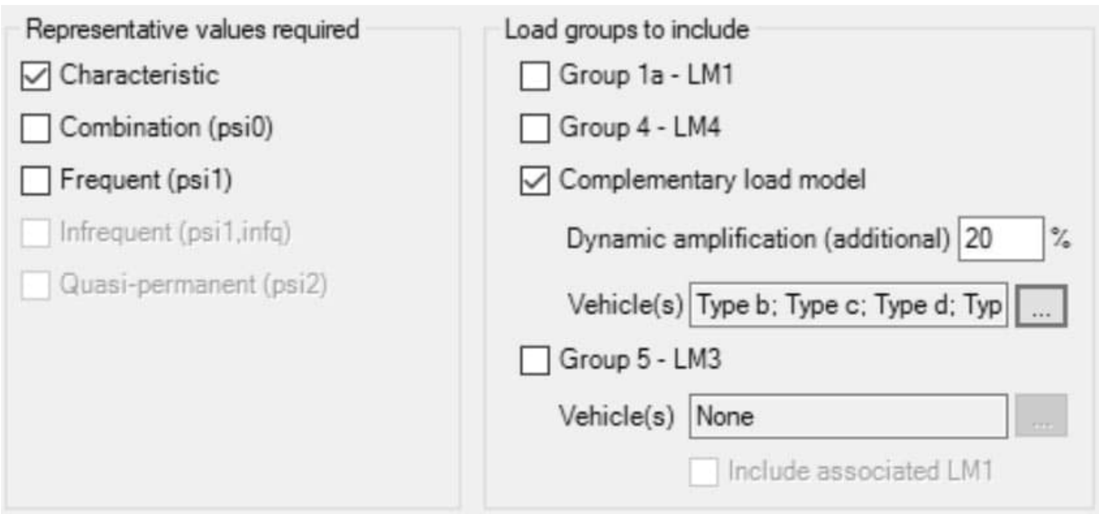


Dynamic amplification (additional): 20 %

Vehicle selection: Type a

3.7.5.4 Envelope : EG B

EG B is defined as complementary load model with options seen below.



Dynamic amplification (additional): 20 %

Vehicle selection: Type b → n

3.7.5.5 Combined traffic load

There are a total 3 different traffic loads termed LM 1, LM2, EG A and EG B.

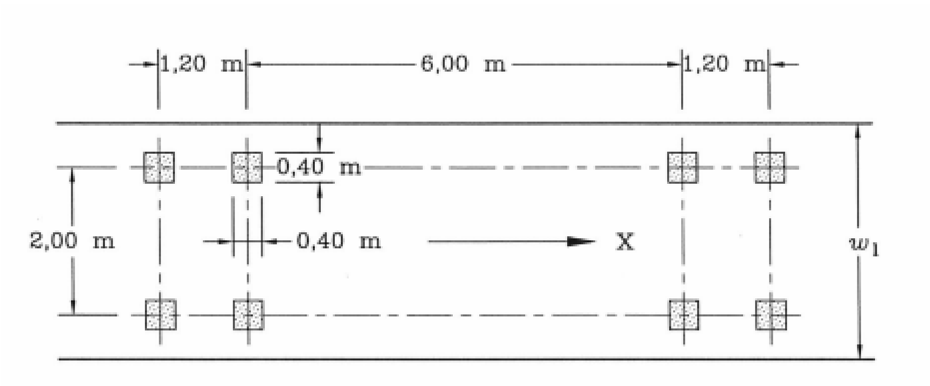
The envelope is used to identify the most onerous load effect.

Envelope VÄGTRAFIK :

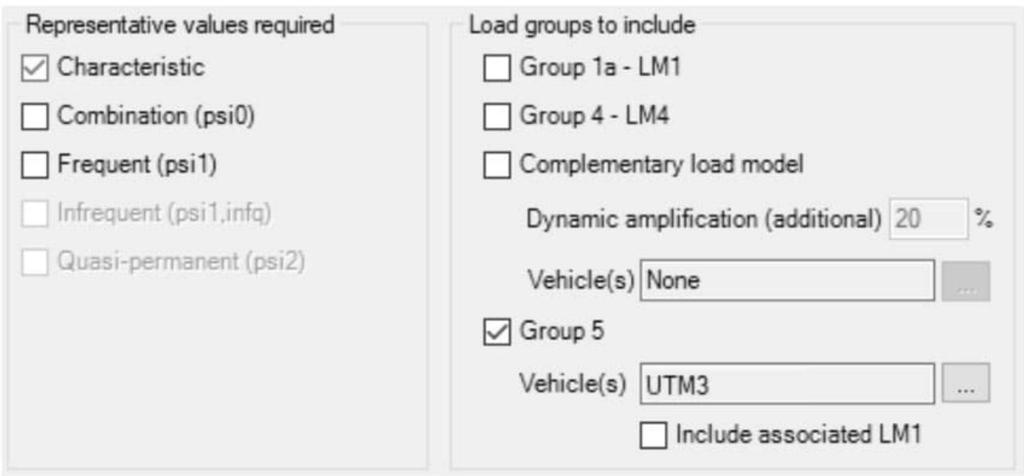
Envelope
LM 1
LM 2
EG A
EG B

3.7.5.6 Fatigue model

Fatigue model 3 (UTM3) defined in SS-EN 1991-2 section 4.6.4. The load is defined in Group 5 (special vehicle) in present version of software.



Q_k = 120 kN : characteristic value including nation adaptation factors.



3.8 BRAKING LOAD

Braking load is defined by SS-EN 1991-2 §4.4.1.

Load acts at level of surfacing.

L = 0.2m+6.47m+0.2m =6.87 m

Load model LM 1 :

$$Q_{lk} = 0.6\alpha_{Q1} \cdot (2Q_{ik}) + 0.1\alpha_{q1} \cdot q_{1k} \cdot w_1 \cdot L$$

$$180kN \cdot \alpha_{Q1} \leq Q_{lk} \leq 900kN$$

$$Q_{broms} = 0.6 \cdot (2 \cdot 270kN) + 0.1 \cdot 7.2kPa \cdot 3.0m \cdot 6.87m = 324kN + 15kN = 339kN$$

Load model EG B = 300 kN (see : TRVFS 2011:12 chapter 6 §3) :

Type m is considered critical.

$$Q_{lk} = 0.35 \cdot \sum Q_{EG_B} + 0.1 \cdot p \cdot L_q$$

$$Q_{lk} \leq 500kN$$

$$Q_{broms} = 0.35 \cdot (1 + 1.32) \cdot B = 0.35 \cdot (1 + 1.32) \cdot 300kN = 244kN$$

3.8.1 Load definition

Load is applied to static model as line load at centre of bridge with distribution width $0.5w_{tot}$ chosen on safe side.

$$p_x = \frac{Q_{broms}}{0.5w_{tot}} = \frac{339kN}{0.5 \cdot 9.0m} = 75\frac{kN}{m}$$

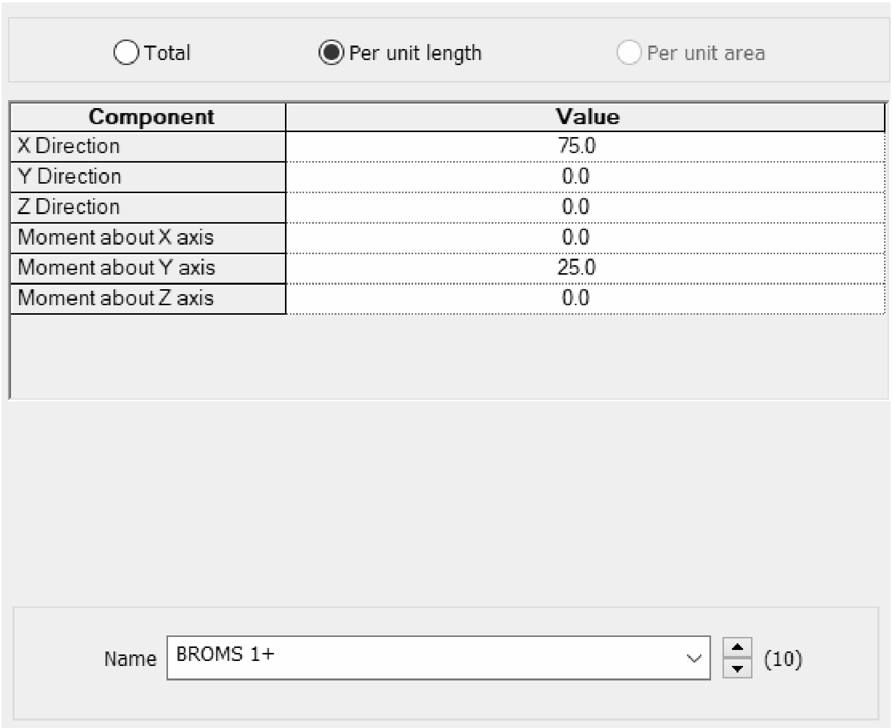
$$m_y = p_x \cdot \left(\frac{0.45m}{2} + t_{bel}\right) = 75\frac{kN}{m} \cdot \left(\frac{0.45m}{2} + 0.11m\right) = 25\frac{kNm}{m}$$

Load case : BROMS 1+

Structural loading : Global distributed

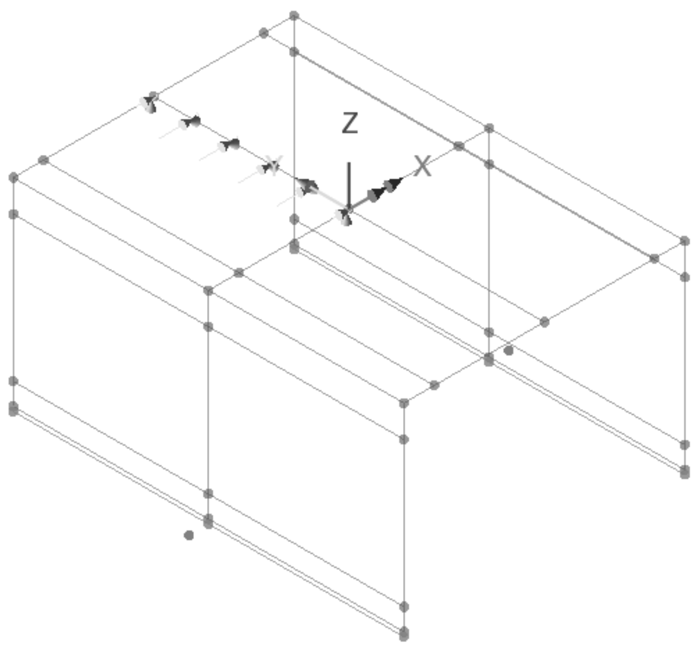
Line load (p_x) : 75 kN/m

Line load (m_y) : 25 kNm/m


Total   Per unit length   Per unit area

Component	Value
X Direction	75.0
Y Direction	0.0
Z Direction	0.0
Moment about X axis	0.0
Moment about Y axis	25.0
Moment about Z axis	0.0

Name BROMS 1+ (10)

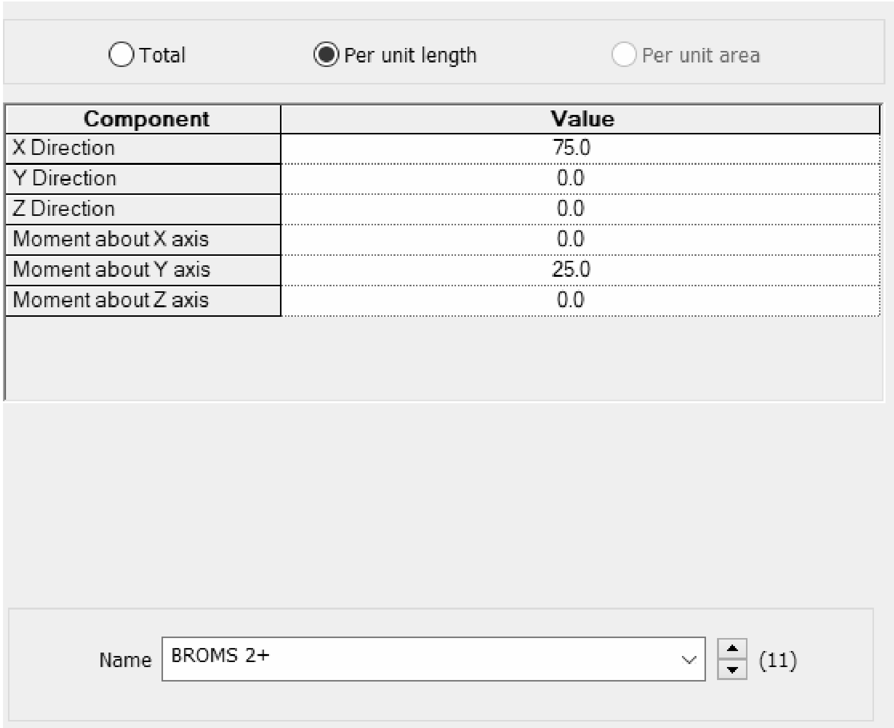


Loadcase : BROMS 2+

Structural loading : Global distributed

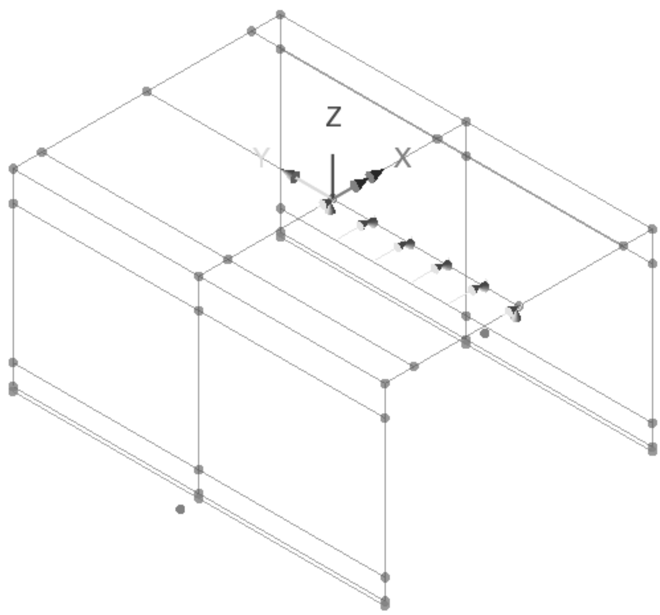
Line load (p_x) : 75 kN/m

Line load (m_y) : 25 kNm/m


Total Per unit length Per unit area

Component	Value
X Direction	75.0
Y Direction	0.0
Z Direction	0.0
Moment about X axis	0.0
Moment about Y axis	25.0
Moment about Z axis	0.0

Name BROMS 2+ (11)



3.8.2 Load combination

Basic load cases :

Load case	Load	Factor
BROMS 1-	BROMS 1+	-1
BROMS 2-	BROMS 2+	-1

Envelope BROMS :

Load case
BROMS 1+
BROMS 1-
BROMS 2+
BROMS 2-

3.9 LATERAL FORCE

Lateral force is defined by SS-EN 1991-2 §4.4.2.

The load is orthogonal to braking force and acts due to skewed braking.

Load model LM 1 :

$Q_{tk} = 0.25Q_{lk} = 0.25 \cdot 339kN = 85kN$: skewed braking

Load model EG B = 300 kN (see TRVFS 2011:12 chapter 6 §3) :

$Q_{tk} = 0.25Q_{lk} = 0.25 \cdot 185N = 46kN$: skewed braking

Remark
Lateral force associated to LM 1 will be applied to all traffic loads on safe side.

$\rightarrow Q_{sido} = 85kN$

3.9.1 Definition of load

Load is applied to static model as line load acting along centreline of superstructure. A distribution width of $0.5L_{spann}$ is used on safe side.

$$p_y = \frac{Q_{sido}}{0.5L_{spann}} = \frac{85kN}{0.5 \cdot 6.47m} = 26\frac{kN}{m}$$

$$m_x = -p_y \cdot \left(\frac{0.45m}{2} + t_{bel}\right) = -26\frac{kN}{m} \cdot \left(\frac{0.45m}{2} + 0.11m\right) = -8\frac{kNm}{m}$$

Loadcase : SIDO+

Structural loading : Global distributed

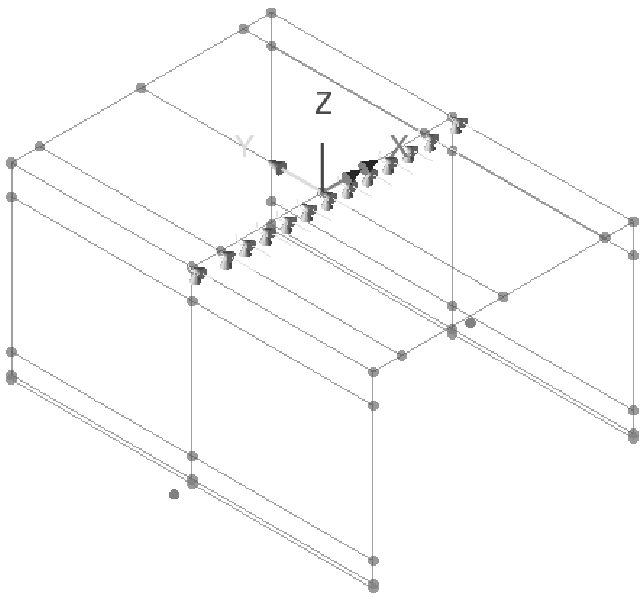
Line load (p_y) : 26 kN/m

Line load (m_x) : -8 kNm/m

Total / Per unit length / Per unit area

Component	Value
X Direction	0.0
Y Direction	26.0
Z Direction	0.0
Moment about X axis	-8.0
Moment about Y axis	0.0
Moment about Z axis	0.0

Name SIDO+ (12)



3.9.2 Load combination

Basic load cases :

Load case	Load	Factor
SIDO-	SIDO+	-1

Envelope SIDO :

Load case
SIDO+
SIDO-

-

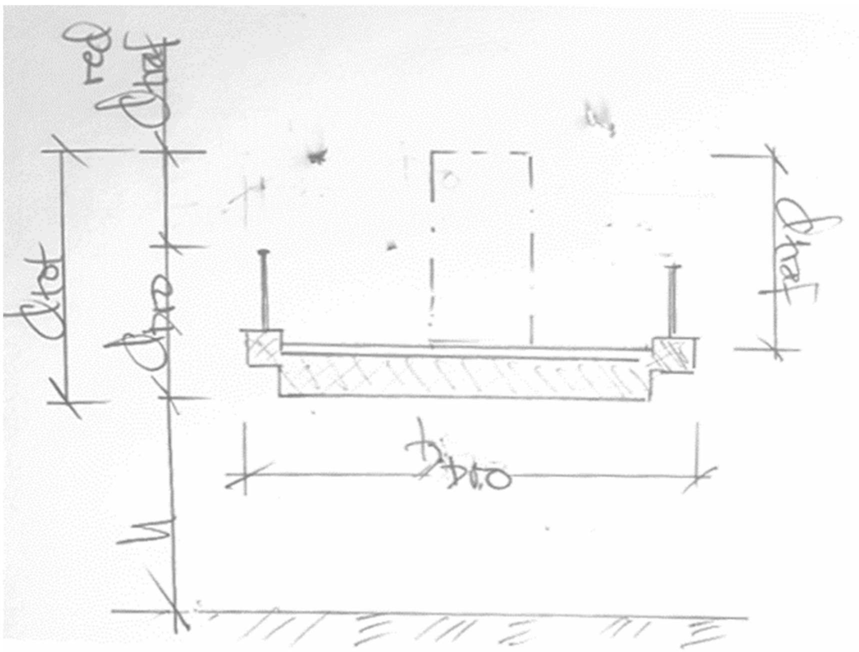
3.10 WIND LOAD

Windload on bridges is defined by EN 1991-1-4 chapter 8.

Duration coefficients (see SS-EN 1990 attachment A2 table A2.1) :

$\psi_k = 1.00$
$\psi_0 = 0.30$
$\psi_1 = 0.20$
$\psi_2 = 0$

Load intensity:



Terrain type II is applied on safe side according to SS-EN 1991-1-4 table 4.1.

h = 3 m but 4 m is applied on safe side

$q_p\left(h = 4m; Type\ \ II;\ v_b = 23\frac{m}{s}\right) = 0.54kPa$: TRVFS 2011:12 attachment 4 table 4.2

$q_b = \frac{1}{2}\cdot\rho\cdot v_b^2 = \frac{1}{2}\cdot 1.25\frac{kg}{m^3}\cdot\left(23\frac{m}{s}\right)^2 = 0.33\frac{kN}{m^2}$: SS-EN 1991-1-4 chapter 4.5

$c_e = \frac{q_p}{q_b} = \frac{0.54kPa}{0.33kPa} = 1.64$: SS-EN 1991-1-4 chapter 4.5

$d_{bro} = 0.45m + 0.17m + 0.12m + 1.10m = 1.84m$: construction height

$d_{traf}^{red} = 2.0m - (0.12m + 1.10m) = 0.78m$: construction height above railing

$$d_{tot} = 1.84 + 0.78m = 2.6m$$

$$\rightarrow \frac{b_{bro}}{d_{tot}} = \frac{9.0m}{2.6m} = 3.5$$

$c_{f.x}\left(\frac{b_{bro}}{d_{tot}} = 3.5\right) = 1.35$: SS-EN 1991-1-4 sketch 8.3

$$C = c_e\cdot c_{f.x} = 1.64\cdot 1.35 = 2.2$$

Wind load structure :

$$\frac{A_{ref.x}^{bro}}{L} \equiv d_{bro}$$

$$p_{vind}^{bro} = \frac{F_w}{L} = \frac{1}{2}\cdot\rho\cdot v_b^2\cdot C\cdot\frac{A_{ref.x}^{bro}}{L} = \frac{1}{2}\cdot 1.25\frac{kg}{m^3}\cdot\left(23\frac{m}{s}\right)^2\cdot 2.2\cdot 1.84m = 1.3\frac{kN}{m}$$

Wind load traffic (above railing) :

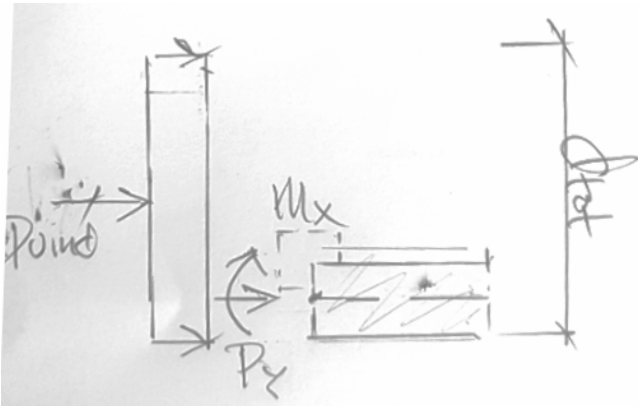
$$\frac{A_{ref.x}^{traf}}{L} \equiv d_{traf}^{res}$$

$$p_{vind}^{traf} = \frac{F_w}{L} = \frac{1}{2}\cdot\rho\cdot v_b^2\cdot C\cdot\frac{A_{ref.x}^{bro}}{L} = \frac{1}{2}\cdot 1.25\frac{kg}{m^3}\cdot\left(23\frac{m}{s}\right)^2\cdot 2.2\cdot 0.78m = 0.6\frac{kN}{m}$$

3.10.1 Definition of load

Load is applied as a line load acting along each edge beam.

$$p_{vind} = p_{vind}^{bro} + p_{vind}^{trafik} = 1.3\,\frac{kN}{m} + 0.6\,\frac{kN}{m} = 1.9\,\frac{kN}{m}$$



$$p_y = 1.9\,\frac{kN}{m}$$

$\rightarrow$

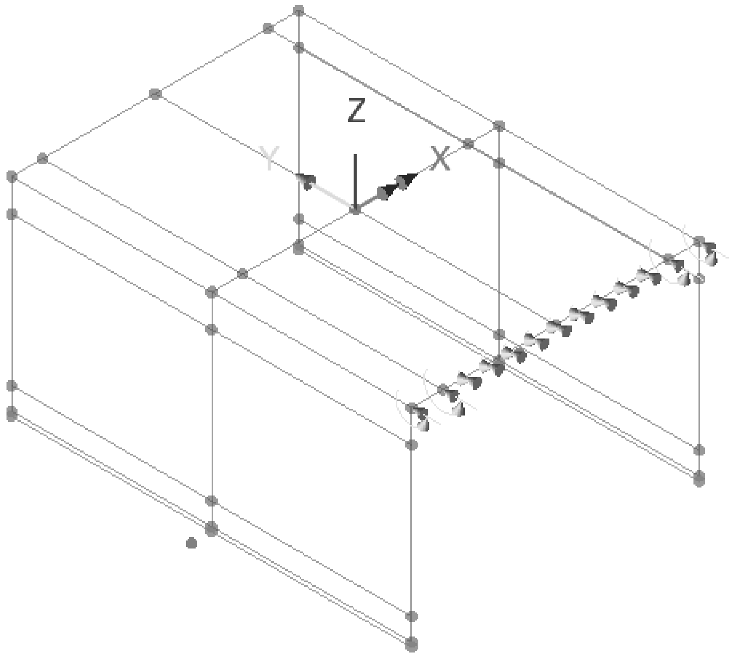
$$m_x = -p_y \cdot \frac{d_{tot} - 0.45m}{2} = -1.9\,\frac{kN}{m} \cdot \frac{2.6m - 0.45m}{2} = -2.0\,\frac{kNm}{m}$$

Load : VIND+

Structural loading : Global distributed

Line load in Y direction (p_y) : +1.9 $\frac{kN}{m}$

Line moment about X axis (m_x) : -2.0 $\frac{kNm}{m}$

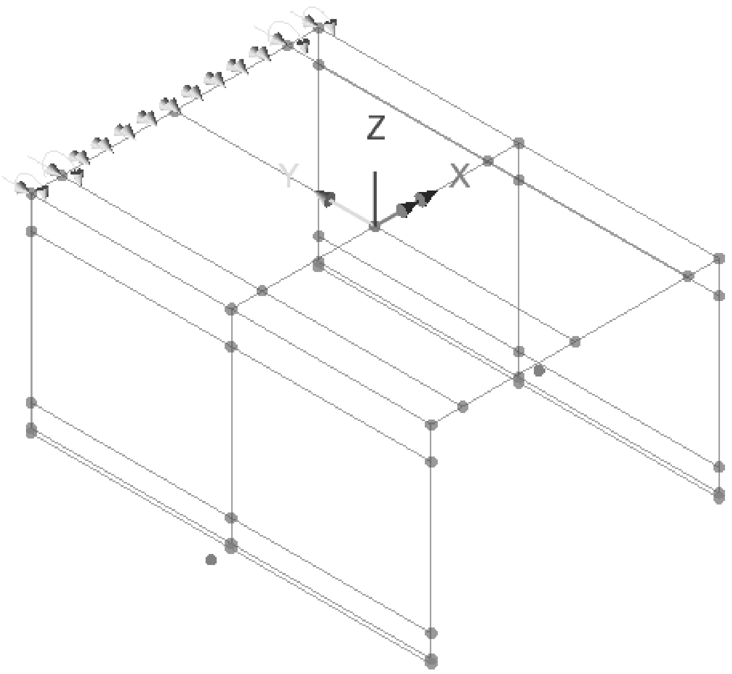


Load : VIND-

Structural loading : Global distributed

Line load in Y direction (p_y) : -1.9 $\frac{kN}{m}$

Line moment about X axis (m_x) : 2.0 $\frac{kNm}{m}$



3.10.2 Load combination

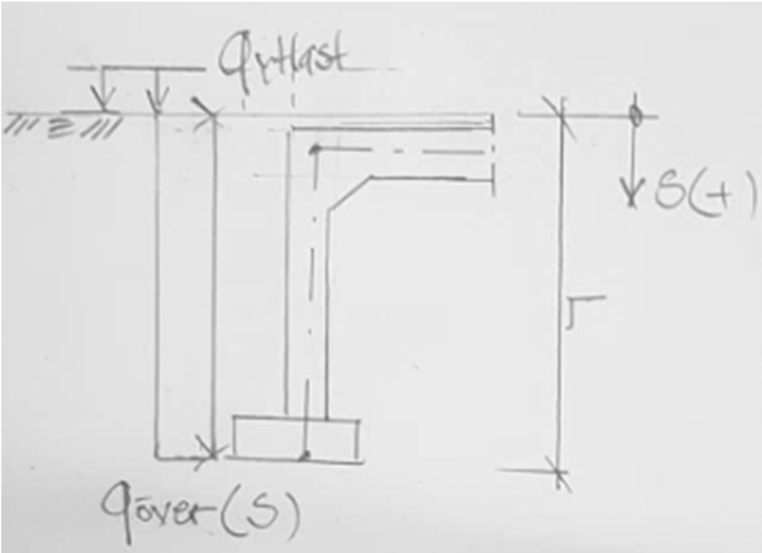
Envelope VIND :

Load case
VIND+
VIND-

3.11 SURCHARGE

Vertical surcharge is 20 kPa within road width 6 m. Remaining road has a vertical surcharge of 10 kPa.

$q_{över}\ (s) = K_0 \cdot q_{ytlast}$



$q_{ytlast}^{b=6.0m} = 0.39 \cdot 20kPa = 8kPa$

$q_{ytlast}^{övrigt} = 0.39 \cdot 10kPa = 4kPa$

3.11.1 Load abutment 1

Surcharge is composed of three various surface loads as seen below.

OVER 1-1 : load width 9.0 m and $q_{ytlast} = 4kPa$

OVER 1-21 : load width 6.0 m and $q_{ytlast} = 4kPa$

OVER 1-22 : load width 6.0 m and $q_{ytlast} = 4kPa$

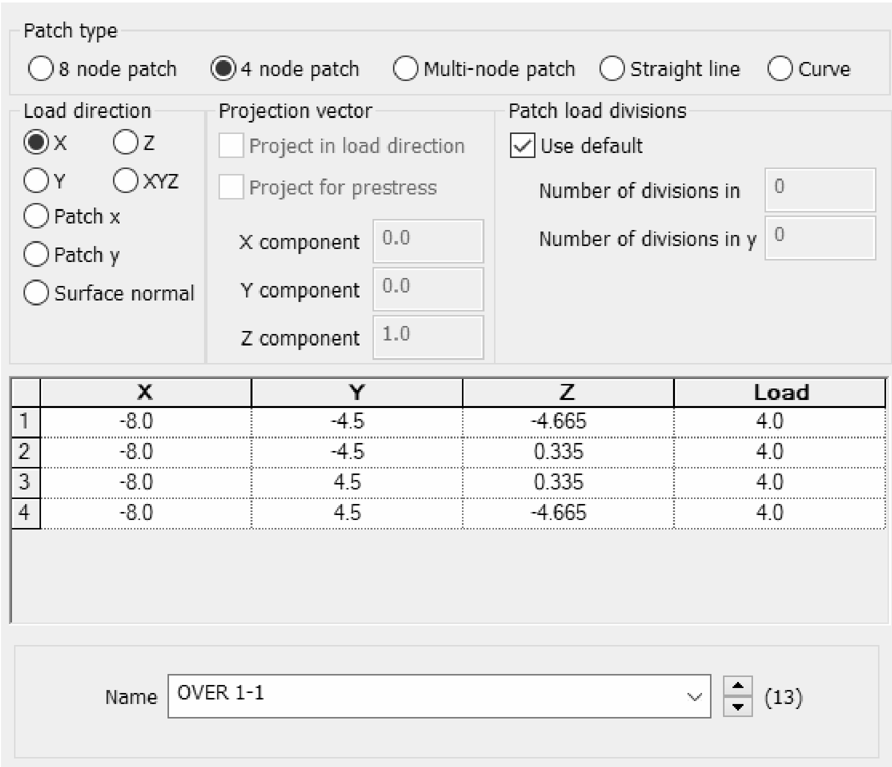
Loadcase : OVER 1-1

Structural loading : Discrete 4 node patch load

Surface load (q_x) : 4 kPa

Search Area : Ramben 1

Loads outside search area : Include full load



Patch type

8 node patch | (●) 4 node patch | Multi-node patch | Straight line | Curve

Load direction: (●) X | Z | Y | XYZ | Patch x | Patch y | Surface normal

Projection vector

Project in load direction

Project for prestress

X component 0.0

Y component 0.0

Z component 1.0

Patch load divisions

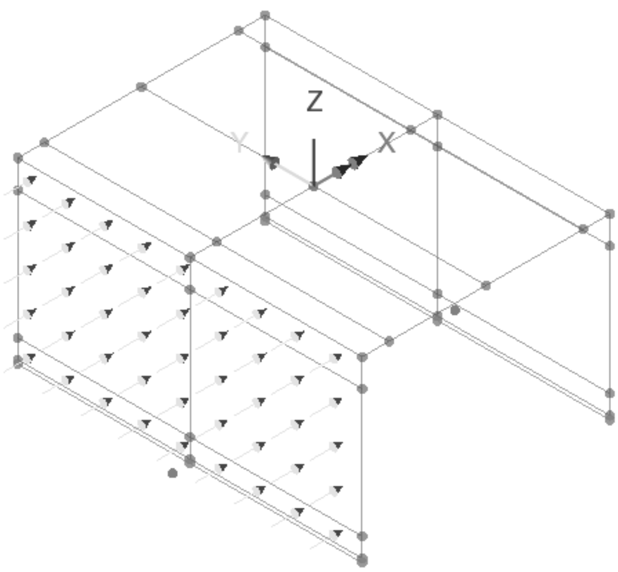
☑ Use default

Number of divisions in 0

Number of divisions in y 0

	X	Y	Z	Load
1	-8.0	-4.5	-4.665	4.0
2	-8.0	-4.5	0.335	4.0
3	-8.0	4.5	0.335	4.0
4	-8.0	4.5	-4.665	4.0

Name OVER 1-1 (13)



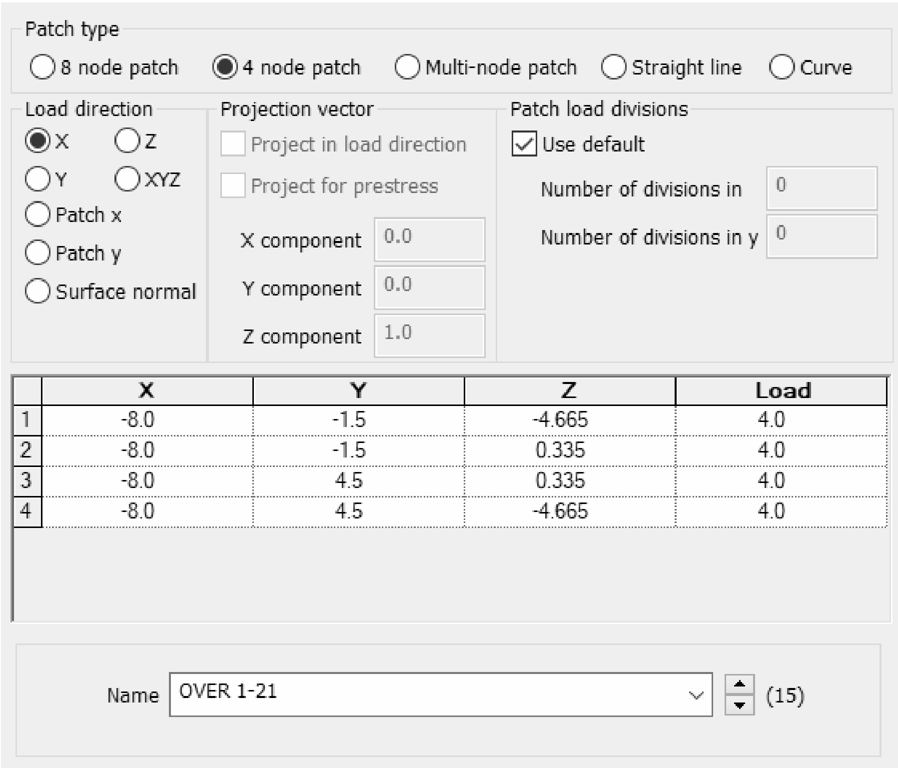
Loadcase : OVER 1-21

Structural loading : Discrete 4 node patch load

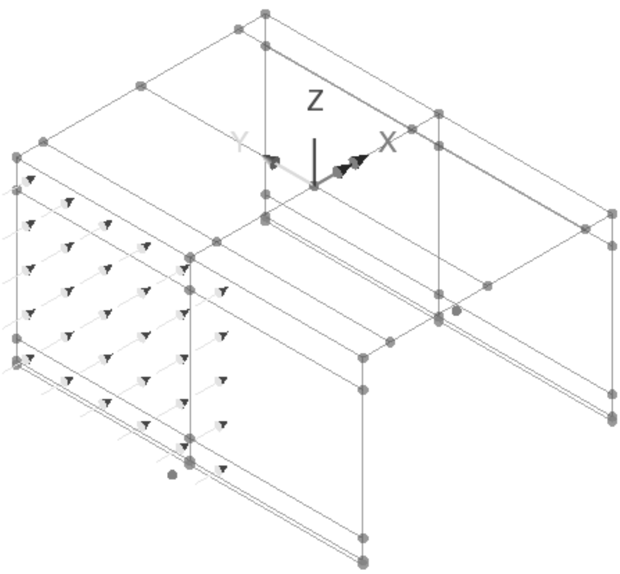
Surface load (q_x) : 4 kPa

Search Area : Ramben 1

Loads outside search area : Include full load



	X	Y	Z	Load
1	-8.0	-1.5	-4.665	4.0
2	-8.0	-1.5	0.335	4.0
3	-8.0	4.5	0.335	4.0
4	-8.0	4.5	-4.665	4.0



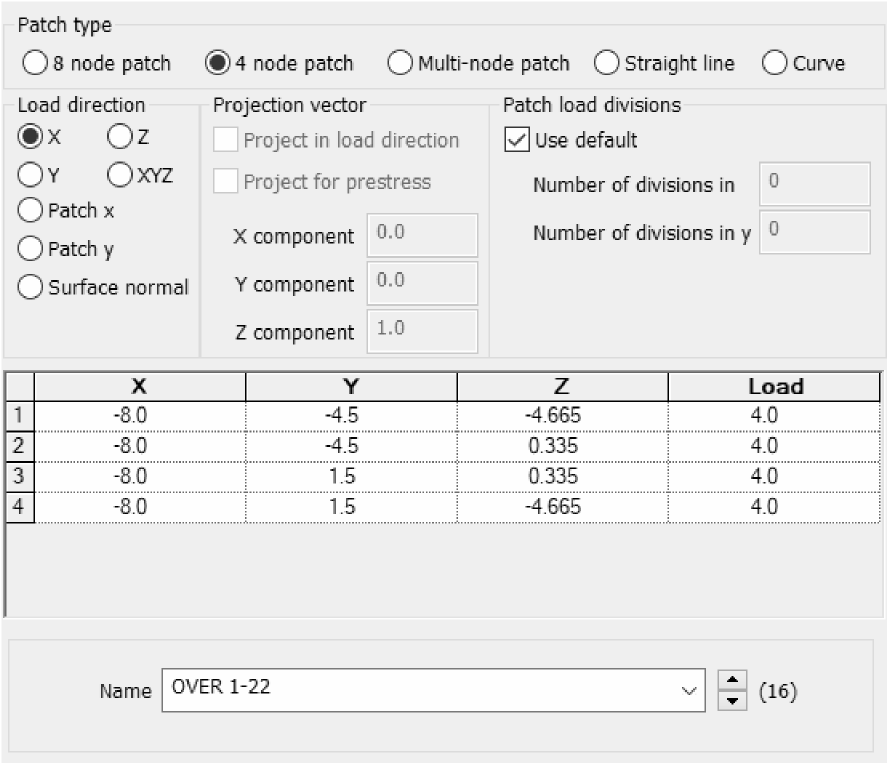
Loadcase : OVER 1-22

Structural loading : Discrete 4 node patch load

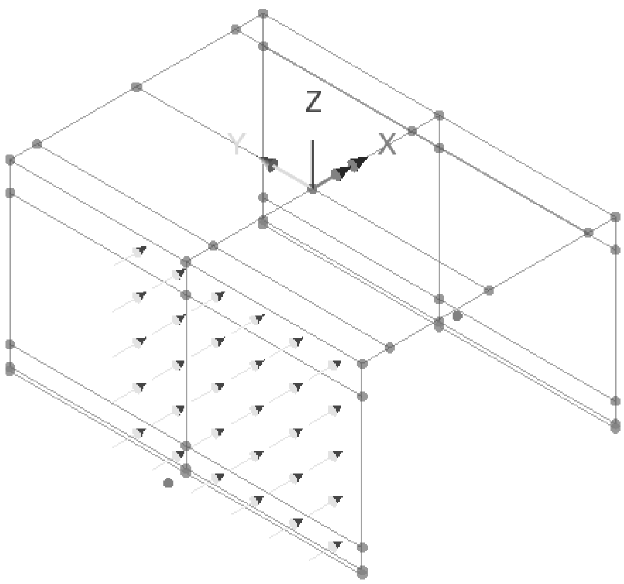
Surface load (q_x) : 4 kPa

Search Area : Ramben 1

Loads outside search area : Include full load



	X	Y	Z	Load
1	-8.0	-4.5	-4.665	4.0
2	-8.0	-4.5	0.335	4.0
3	-8.0	1.5	0.335	4.0
4	-8.0	1.5	-4.665	4.0



3.11.2 Load abutment 2

Surcharge is composed of three various surface loads as seen below.

OVER 2-1 : load width 9.0 m and $q_{ytlast} = 4kPa$

OVER 2-21 : load width 6.0 m and $q_{ytlast} = 4kPa$

OVER 2-22 : load width 6.0 m and $q_{ytlast} = 4kPa$

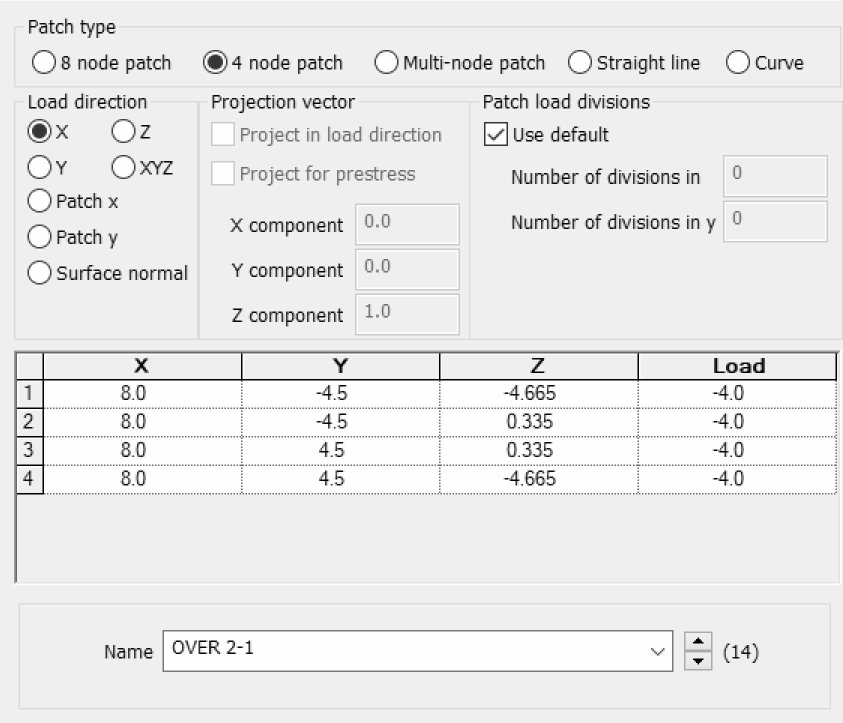
Loadcase : OVER 2-1

Structural loading : Discrete 4 node patch load

Surface load (q_x) : -4 kPa

Search Area : Ramben 2

Loads outside search area : Include full load


Patch type

8 node patch | 4 node patch | Multi-node patch | Straight line | Curve

Load direction: X | Z | Y | XYZ | Patch x | Patch y | Surface normal

Projection vector: Project in load direction | Project for prestress

X component 0.0

Y component 0.0

Z component 1.0

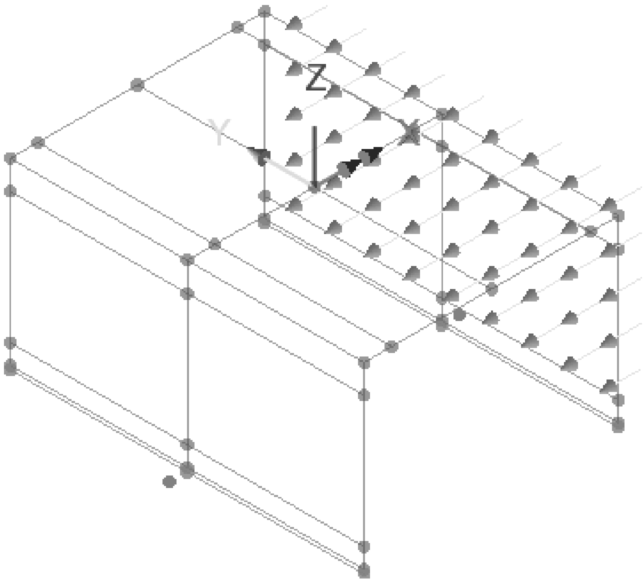
Patch load divisions: Use default

Number of divisions in 0

Number of divisions in y 0

	X	Y	Z	Load
1	8.0	-4.5	-4.665	-4.0
2	8.0	-4.5	0.335	-4.0
3	8.0	4.5	0.335	-4.0
4	8.0	4.5	-4.665	-4.0

Name OVER 2-1 (14)



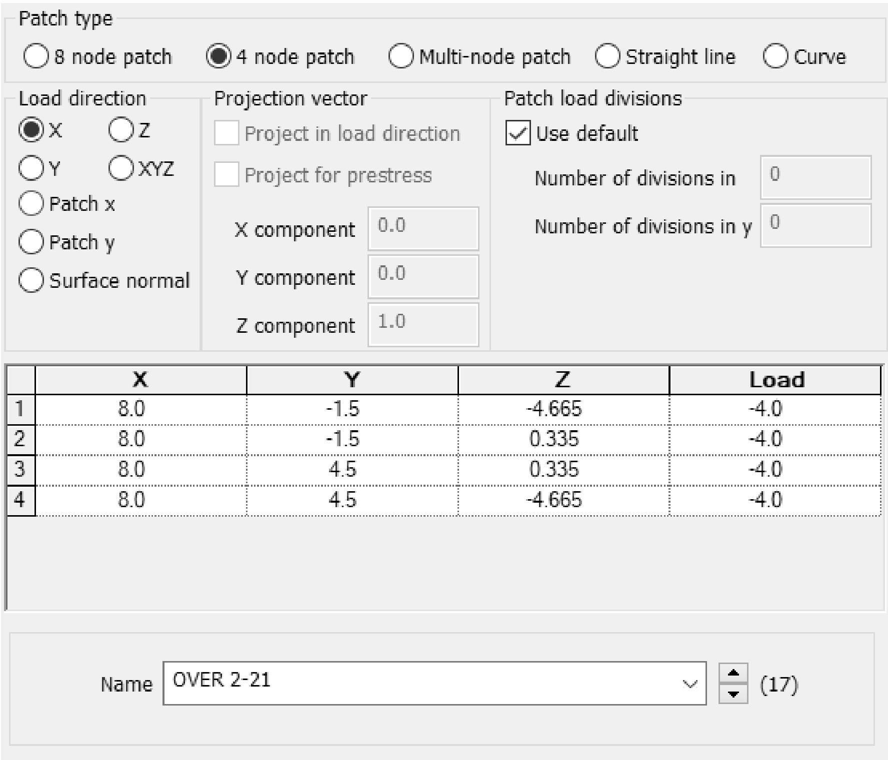
Loadcase : OVER 2-21

Structural loading : Discrete 4 node patch load

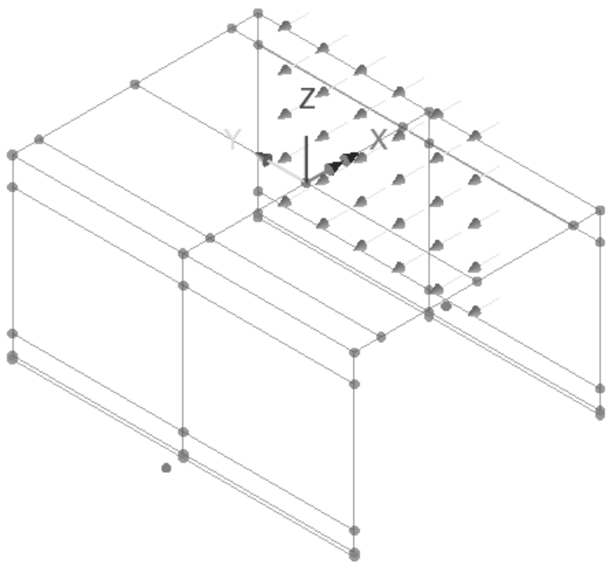
Surface load (q_x) : -4 kPa

Search Area : Ramben 2

Loads outside search area : Include full load



	X	Y	Z	Load
1	8.0	-1.5	-4.665	-4.0
2	8.0	-1.5	0.335	-4.0
3	8.0	4.5	0.335	-4.0
4	8.0	4.5	-4.665	-4.0



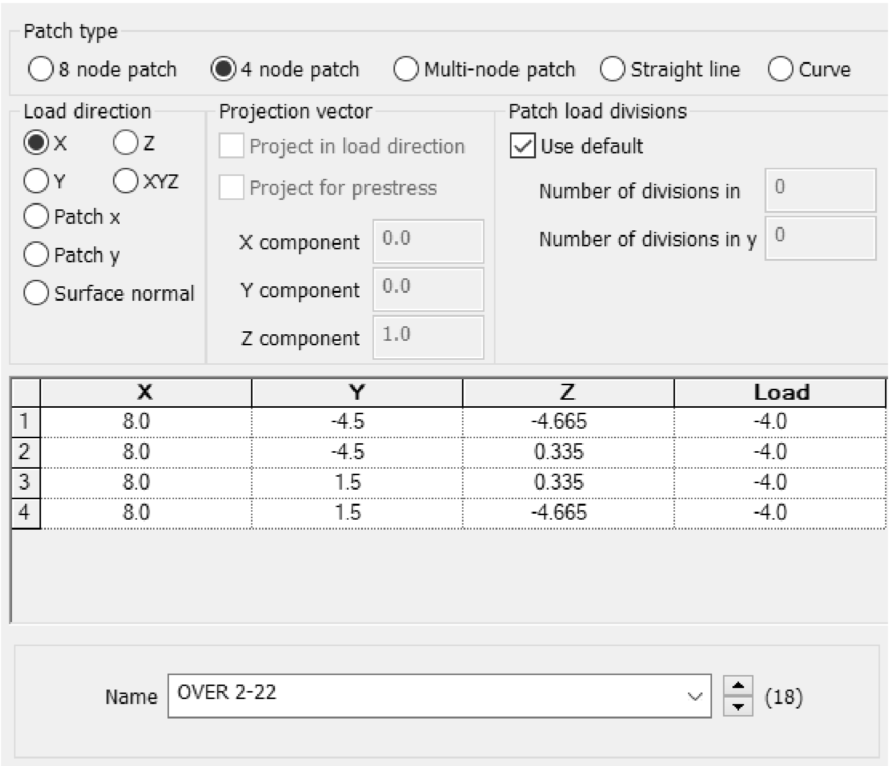
Loadcase : OVER 2-22

Structural loading : Discrete 4 node patch load

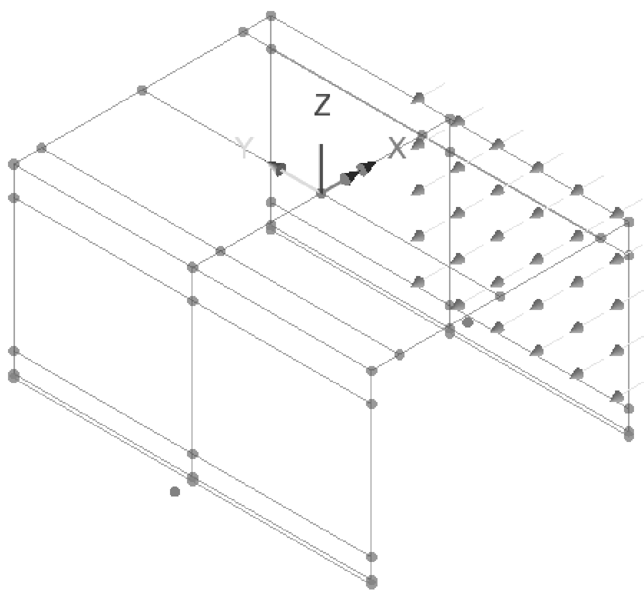
Surface load (q_x) : -4 kPa

Search Area : Ramben 2

Loads outside search area : Include full load



	X	Y	Z	Load
1	8.0	-4.5	-4.665	-4.0
2	8.0	-4.5	0.335	-4.0
3	8.0	1.5	0.335	-4.0
4	8.0	1.5	-4.665	-4.0



3.11.3 Load combination

Envelope OVER 1-2 :

Load case
OVER 1-21
OVER 1-22

Envelope OVER 2-2 :

Load case
OVER 2-21
OVER 2-22

Load combination smart OVER :

Load case	Permanent factor	Variable factor
OVER 1-1	0	1
OVER 1-2	0	1
OVER 2-1	0	1
OVER 2-2	0	1

Smart load combination OVER :

Load case	Permanent factor	Variable factor
OVER-1	0	1.00
OVER-2	0	1.00

3.12 TEMPERATURE

Temperature effect bridges according to TRVK Bro 11 section B.3.2.5 and EN 1991-1-5 chapter 6.

Effect in service state see SS-EN 1992-1-1 §2.3.1.2. If used then apply effect of gradual cracking according to SS-EN 1992-1-1 §5.4(3).

Effect in ultimate state is not required according to SS-EN 1992-1-1 §2.3.1.2. If used apply reduced stiffness according to SS-EN 1992-1-1 §5.4(3).

Casting temperature, T_{mont} = +10° C : EN 1991-1-5A.1(3)

Expansion coefficient, $\alpha = 12 \cdot 10^{-6}$

Concrete slab $\Rightarrow$ typ 3

Location : Karlstad

T_{max}= +34° C : BFS 2013:10 EKS 9 Tabell C-11

T_{min}= -37° C : BFS 2010:3 EKS 6 Tabell C-11

Duration coefficients :

Coefficients according to SS-EN 1990/A1 table A2.3

$\psi_0 = 0.60$
$\psi_1 = 0.60$
$\psi_2 = 0.50$

3.12.1 Even temperature over entire bridge (JTEMP)

Even temperature over entire bridge according to EN 1991-1-5 section 6.1.3.3. This temperature change is seasonal.

Funktion enligt SS EN 1991-1-5 figur 6.1 (funktion till bro typ 3) :

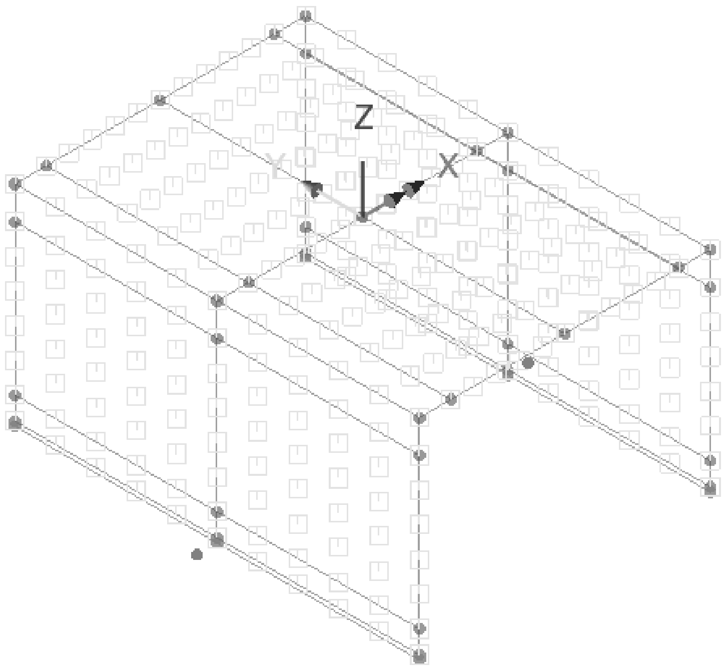
$$T_e(T) = \text{linterp}\left[(-50 \quad 0 \quad 30 \quad 50)^T \cdot {}^\circ C, (-42 \quad 7 \quad 32 \quad 52)^T \cdot {}^\circ C, T\right]$$

$$T_{e.max} = T_e(T_{max}) = 36^\circ C$$

$$T_{e.min} = T_e(T_{min}) = -29^\circ C$$

$$T^+ = T_{e.max} - T_0 = +36℃ - 10℃ = +26℃$$

$$T^- = T_{e.min} - T_0 = -29℃ - 10℃ = -39℃$$



Load : JTEMP+

Structural loading : Temperature

Final temperature : +26C

Initial temperature : ±0 C

Loadcase : JTEMP+

Load : JTEMP-

Structural loading : Temperature

Final temperature : -39C

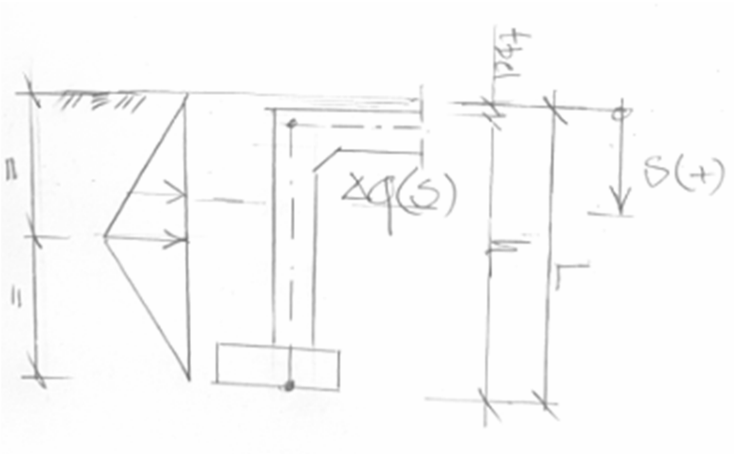
Initial temperature : ±0 C

Loadcase : JTEMP-

-

3.12.2 Increased earth pressure due to movement (DELTA P)

$$\rightarrow \delta = (T^{+} - T^{-}) \cdot \alpha \cdot \frac{L_{bro}}{2} = (26°\mathrm{C} + 39°\mathrm{C}) \cdot 1.2 \cdot 10^{-5} \cdot \frac{6870mm}{2} = 2.7mm$$



$h = 4890mm$

$t_{bel} = 110mm$

$\rightarrow L = 5000mm$

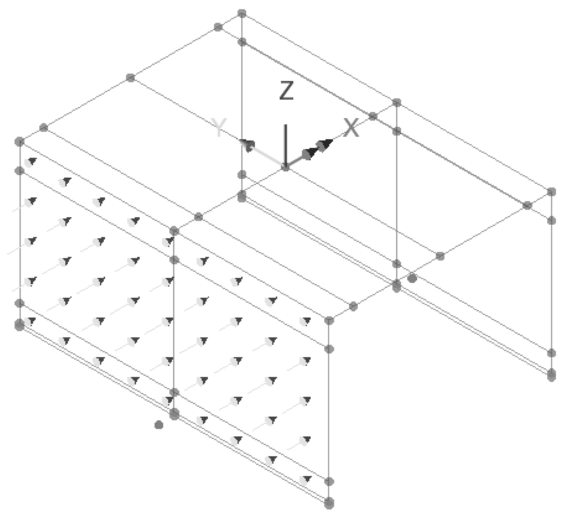
$$\Delta q(s) = c \cdot \gamma \cdot s \cdot \frac{\delta}{h} = 600 \cdot 22 \frac{kN}{m^3} \cdot s \cdot \frac{2.7mm}{4890mm}$$

$$\Delta q_{max} = 600 \cdot 22 \frac{kN}{m^3} \cdot \frac{5000mm}{2} \cdot \frac{2.7mm}{4890mm} = 18kPa$$

3.12.2.1 Load abutment 1

Discrete patch load : DELTA P-1

Search Area : Ramben 1



Patch type

(•) 8 node patch ( ) 4 node patch ( ) Multi-node patch ( ) Straight line ( ) Curve

Load direction

(•) X ( ) Z
( ) Y ( ) XYZ
( ) Patch x
( ) Patch y
( ) Surface normal

Projection vector

[ ] Project in load direction
[ ] Project for prestress
X component 0.0
Y component 0.0
Z component 1.0

Patch load divisions

[✓] Use default
Number of divisions in 0
Number of divisions in y 0

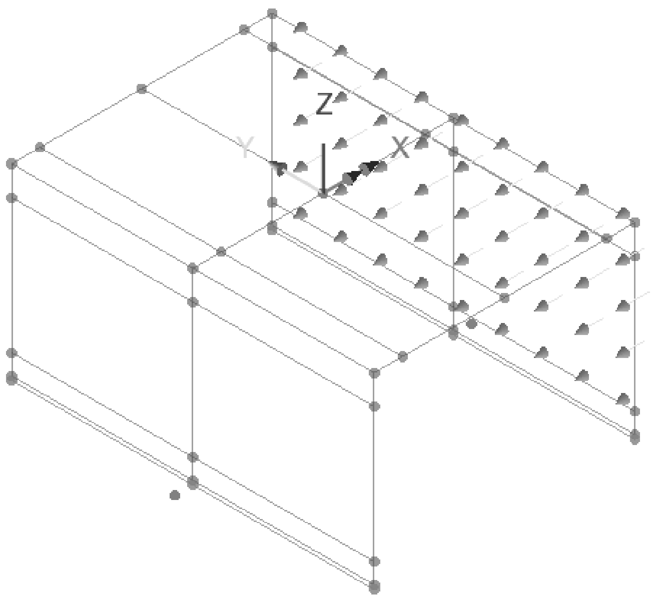
	X	Y	Z	Load
1	-8.0	-4.5	-4.665	0.0
2	-8.0	-4.5	-2.165	18.0
3	-8.0	-4.5	0.335	0.0
4	-8.0	0.0	0.335	0.0
5	-8.0	4.5	0.335	0.0
6	-8.0	4.5	-2.165	18.0
7	-8.0	4.5	-4.665	0.0

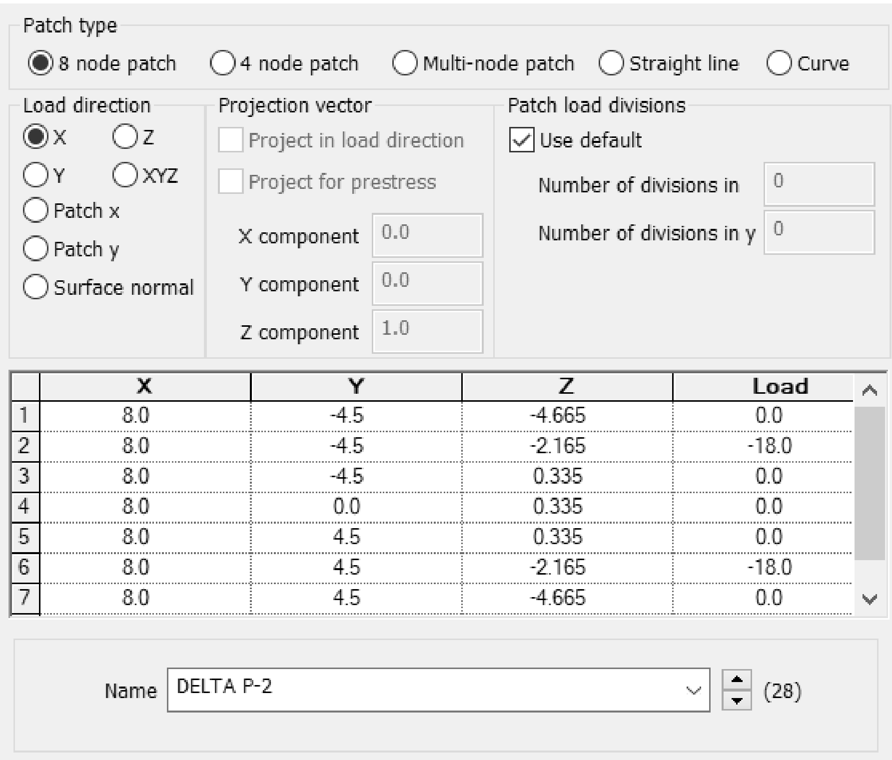
Name DELTA P-1 (27)

3.12.2.2 Load abutment 2

Discrete patch load : DELTA P-2

Search Area : Ramben 2





Patch type

(•) 8 node patch ( ) 4 node patch ( ) Multi-node patch ( ) Straight line ( ) Curve

Load direction

(•) X ( ) Z
( ) Y ( ) XYZ
( ) Patch x
( ) Patch y
( ) Surface normal

Projection vector

[ ] Project in load direction
[ ] Project for prestress

X component 0.0
Y component 0.0
Z component 1.0

Patch load divisions

[x] Use default

Number of divisions in 0
Number of divisions in y 0

	X	Y	Z	Load
1	8.0	-4.5	-4.665	0.0
2	8.0	-4.5	-2.165	-18.0
3	8.0	-4.5	0.335	0.0
4	8.0	0.0	0.335	0.0
5	8.0	4.5	0.335	0.0
6	8.0	4.5	-2.165	-18.0
7	8.0	4.5	-4.665	0.0

Name DELTA P-2 (28)

3.12.2.3 Load combination

Load combination basic DELTA P :

Loadcase	Factor
DELTA P-1	1
DELTA P-2	1

3.12.3 Uneven temperature of entire cross section (OJTEMP)

Linear temperature difference over cross section is determined by EN 1991-1-5 § 6.1.4.1 with a surfacing thickness 110 mm and type 3.

$k_{1.sur} = 0.70$

$k_{2.sur} = 1.00$

$\Delta T_{max} = +15°\text{C} \cdot k_{1.sur} = +15°\text{C} \cdot 0.70 = 11°\text{C}$: top level hotter

$\Delta T_{min} = -8°\text{C} \cdot k_{2.sur} = -8°\text{C} \cdot 1.00 = -8°\text{C}$: bottom level hotter

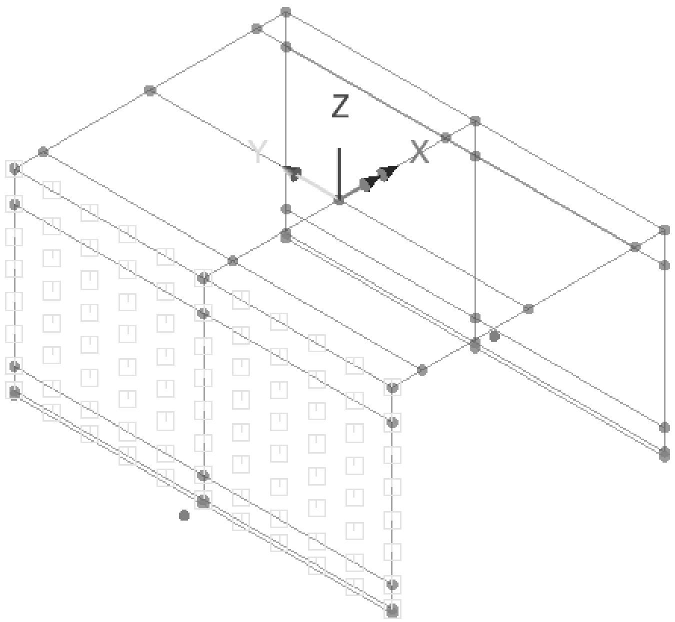
Remark

Uneven temperature is given with temperature gradient $\frac{\delta T}{\delta Z}$ inside software.

3.12.3.1 Uneven temperature *abutment 1*

$\left|\frac{\delta T^{max}}{\delta Z}\right| = \left|\frac{11°C}{0.40m}\right| = 28\frac{°C}{m}$: maximal temperature gradient on side from filling

$\left|\frac{\delta T^{min}}{\delta Z}\right| = \left|\frac{-8°C}{0.40m}\right| = 20\frac{°C}{m}$: minimal temperature gradient on side towards filling



Loadcase : OJTEMP 1 –MAX

Structural loading : Temperature

Definition : Element

Final Z temperature gradient : +28 °C/m

Loadcase : OJTEMP 1 –MIN

Structural loading : Temperature

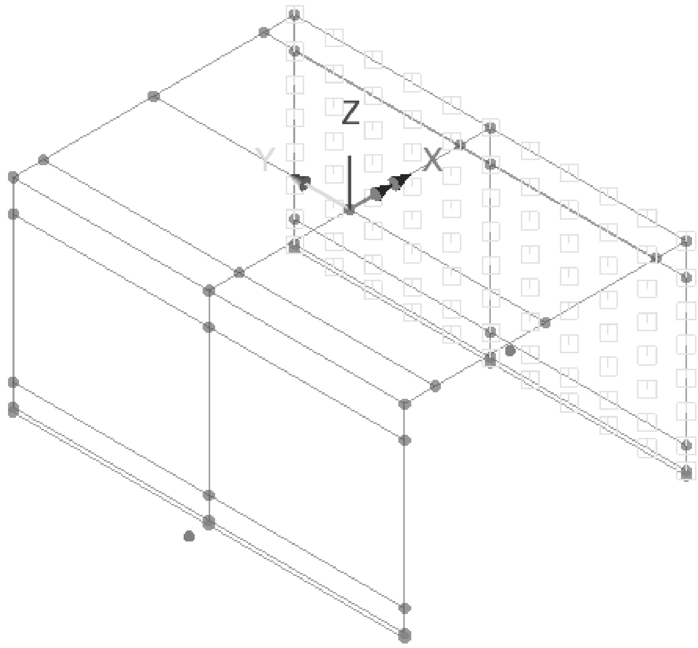
Definition : Element

Final Z temperature gradient : -20 °C/m

3.12.3.2 Uneven temperature *abutment 2*

$\left|\frac{\delta T^{max}}{\delta Z}\right| = \left|\frac{11℃}{0.40m}\right| = 28\frac{℃}{m}$: maximal temperature gradient on side from filling

$\left|\frac{\delta T^{min}}{\delta Z}\right| = \left|\frac{-8℃}{0.40m}\right| = 20\frac{℃}{m}$: minimal temperature gradient on side towards filling



Loadcase : OJTEMP 2 –MAX

Structural loading : Temperature

Definition : Element

Final Z temperature gradient : +20 °C/m

Loadcase : OJTEMP 2 –MIN

Structural loading : Temperature

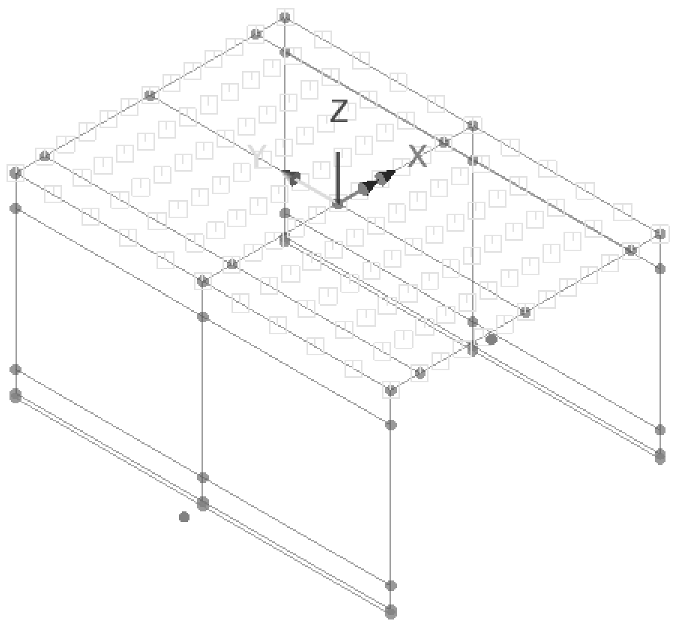
Definition : Element

Final Z temperature gradient : -28 °C/m

3.12.3.3 Uneven temperature *superstructure*

$\left|\frac{\delta T^{max}}{\delta Z}\right| = \left|\frac{11℃}{0.45m}\right| = 24\frac{℃}{m}$: maximal temperature gradient acting at top side

$\left|\frac{\delta T^{min}}{\delta Z}\right| = \left|\frac{-8℃}{0.45m}\right| = 18\frac{℃}{m}$: minimal temperature gradient acting at bottom side



Loadcase : OJTEMP 3 –MAX

Structural loading : Temperature

Definition : Element

Final Z temperature gradient : +24 °C/m

Loadcase : OJTEMP 3 –MIN

Structural loading : Temperature

Definition : Element

Final Z temperature gradient : -18 °C/m

3.12.3.4 Load combination

Load combination smart OJTEMP:

Load case	Permanent factor	Variable factor
OJTEMP 1-MAX	0	1
OJTEMP 1-MIN	0	1
OJTEMP 2-MAX	0	1
OJTEMP 2-MIN	0	1
OJTEMP 3-MAX	0	1
OJTEMP 3-MIN	0	1

3.12.4 Simultaneous even and uneven temperature change

Simultaneous even and uneven temperature change according to EN 1991-1-5 § 6.1.5.

Alternative 1 ($\omega_M = 0.75$) : $T + \omega_M \cdot \Delta T$

Alternative 2 ($\omega_N = 0.35$) : $\omega_N \cdot T + \Delta T$

Load combination basic JTEMP MAX :

Load case	Factor
JTEMP+	1
DELTA P	1

Load combination basic JTEMP MIN :

Load case	Factor
JTEMP-	1

Envelope JTEMP :

Load case
JTEMP MAX
JTEMP MIN

Load combination smart TEMP-1 :

Load case	Permanent factor	Variable factor
JTEMP	0	1.00
OJTEMP	0	0.75

Loadcombination smart TEMP-2 :

Load case	Permanent factor	Variable factor
JTEMP	0	0.35
OJTEMP	0	1.00

Envelope TEMP :

Load case
TEMP-1
TEMP-2

3.13 LOAD COMBINATIONS

Verification of resistance is to be performed at different states as seen below.

Design is to be performed using method of partial coefficients according to EN-1990.

Resistance must be verified for both ultimate and service state.

Verification of ultimate state used various load coefficients depending on type of resistance break as seen below.

EQU : verification of overturning of foundation

STR/GEO : verification of structural and geotechnical resistance

Design is to be performed using a “simplified method” for load coefficients. How chosen coefficients are determined is shown in Mathcad program PROG L2.002. All formulas and part results are shown.

3.13.1 Ultimate state (ULS)

This load combination is the main normal load situation where the variable loads are dominant.

KBB section B.3.3.1 has requirements on load combination seen listed below:

- Design method D2 is to be used for STR according to SS-EN 1990 section A.2.3.1(5).

  Design value according to table A2.4(B) is used for both geotechnical and structural loads.

  A1 (structure load) + A1 (geotechnical load, $\psi\gamma = 1.35$ & $\gamma_M = 1.00 \rightarrow 0.29$)

- Design method D3 is to be used for GEO see SS-EN 1990 section A.2.3.1(5).

  Design value according to table A2.4(C) is to be used for both geotechnical loads while table A2.4(B) for structural loads.

  A1 (structural load) + A2 (geotechnical load, $\psi\gamma = 1.00$ & $\gamma_M = 1.30 \rightarrow 0.38$)

In order to limit the number of load combinations design values table A2.4(B) are used also for geotechnical evaluation of GEO. Fictive load coefficients seen below are used for the geotechnical loads.

Verification of geotechnical loads :

$$K_o(D2) = 1 - sin(\varphi_d) = 1 - sin45^{\circ} = 0.29$$

$$K_o(D3) = 1 - sin(\varphi_d) = 1 - sin38^{\circ} = 0.38$$

Earthpressure→ $1.35^{1.)} \cdot K_0(D2) = 0.39 > 1.00 \cdot K_0(D3) = 0.38$ dvs OK !

Surcharge → $1.70^{2.)} \cdot K_0(D2) = 0.49 \equiv 1.30 \cdot K_0(D3) = 0.49$ dvs OK !

$^{1.)}$ Load coefficient $\psi\gamma_{ULS\text{-}B} = 1.35$ is used instead of 1.20

$^{2.)}$ Load coefficient $\psi\gamma_{ULS\text{-}B} = 1.70$ is used instead of 1.50

Design method D2
(Used for both STR & GEO)

For design method D2 (setting B) there are two expressions of equation 6.10a & 6.10b according to SS-EN 1990.

$$E_{Sd}^{10a} = \sum_{j\geq 1} \gamma_{G.j} \cdot G_{k,j} + \gamma_{Q.1} \cdot \psi_{0,1} \cdot Q_{k.1} + \sum_{i>1} \gamma_{Q.i} \cdot \psi_{0,i} \cdot Q_{k,i} = \psi \gamma_{ULS-A} \cdot (\sum_{j>1} G_{k,j} + \sum_{i>1} Q_{k,i})$$

$$E_{sd}^{10b} = \sum_{j\geq 1} \xi_j \cdot \gamma_{G.j} \cdot G_{k,j} + \gamma_{Q.1} \cdot Q_{k.1} + \sum_{i>1} \gamma_{Q.i} \cdot \psi_{0,i} \cdot Q_{k,i} = \psi \gamma_{ULS-B} \cdot (\sum_{j>1} G_{k,j} + \sum_{i>1} Q_{k,i})$$

Equation 6.10a is used when permanent loads are dominant. This situation arises during construction stage but is not considered critical for operational stage.

Equation 6.10b is used when variable loads are dominant. This situation arises during operational stage. This is the situation used in static model.

Simplified method for design method D2

Design is performed using the ”simplified method” where load coefficients associated to equation 6.10a is termed ULS-A while ULS-B is used for equation 6.10b.

On the safe side the same load coefficient is used for traffic lane loads as for axis loads.

Nr	Last		$\psi\gamma_{ULS-A}$	$\psi\gamma_{ULS-B}$		$\psi\gamma_{ULS-B}$
	Permanent loads					
1	Egentyngd	max	1,35	1,20		1,20
		min	1,00	1,00		1,00
2	Beläggning	max	1,35	1,20		1,20
		min	1,00	1,00		1,00
3	Överfyllnad	max	1,35	1,20		1,20
		min	1,00	1,00		1,00
4	Jordtryck	max	1,35	1,20		**1,35**
		min	1,00	1,00		1,00
5	Vattentryck	max	1,35	1,20		1,20
		min	1,00	1,00		1,00
6	Stödförskjutning [1.)]	max	1,35	1,20		1,20
		min	1,00	1,00		1,00
7	Krympning [2.)]	max	1,35	1,20		1,20
		min	1,00	1,00		1,00
8	Spännkraft	max	1,35	1,35		1,35
		min	1,00	1,00		1,00
					⇒	
	Variable loads					
	Lastmodell LM 1 :					
9	Boggiesystem		1.13/0.84	1.13/1.50		1.13/1.50
10	Utbredd last		0.60/0.24	0.60/1.50		0.60/1.50
11	Bromskraft		0.84/1.13	1.13/1.50		1.13/1.50
12	Sidokraft		0.84/1.13	1.13/1.50		1.13/1.50
13	Centrifugalkraft		0.84/1.13	1.13/1.50		1.13/1.50
	Lastmodell LM 2 :					
14	Enstaka axellast		0	0/1.50		0/1.50
	Typfordon EG A/B :					
15	Typfordon EG A/B		1.13/0.84	1.13/1.50		1.13/1.50
20	Bromskraft		0.84/1.13	1.13/1.50		1.13/1.50
21	Sidokraft		0.84/1.13	1.13/1.50		1.13/1.50
22	Centrifugalkraft		0.84/1.13	1.13/1.50		1.13/1.50
16	Temperatur [3.)]		0.90	0.90/1.50		0.90/1.50
	Vindlaster:					
17	Vindlast mot bro		0.45	0.45/1.50		0.45/1.50
18	Vindlast mot trafik		0.45	0.45/1.50		0.45/1.50
19	Överlast		1.13	1.13/1.50		1.13/**1.70**

Load combination smart *ULS-PERM :*

Load case	Permanent factor	Variable factor
EGEN	1.00	0.20
BELÄGG	1.00	0.20
JORD	1.00	0.20
STOD	0	$1.2 \cdot f_{STOD} = 0.40$
KRYMP	0	$1.2 \cdot {}_{SKRYMP} = 0.40$

Load combination smart *ULS-VAR :*
(Load cases to consider : 6 / Variable loadcases : 1)

Load case	Permanent factor	Variable factor
VÄGTRAFIK	1.13	0.37
BROMS	1.13	0.37
SIDO	1.13	0.37
TEMP	0.90	0.60
VIND	0.45	1.05
OVER	1.13	0.57

For STR load case TEMP may be neglected, see SS-EN 1992-1-1 section 2.3.1.2(2).

Load combination smart *ULS :*

Load case	Permanent factor	Variable factor
ULS-PERM	1	0
ULS-VAR	0	1

3.13.2 Service state (SLS)

Service state is divided into three different load combinations dependant on duration of loads, as seen below.

Load combination	Duration
SLS:K	Characteristic
SLS:F	Frequent
SLS:Q	Quasi-permanent

Load combination SLS:K see EN 1990 equation 6.14b:

$$E_{Sd} = \sum_{j\geq 1} G_{k,j} + Q_{k.1} + \sum_{i>1} \psi_{0,i} \cdot Q_{k,i} = \psi\gamma_{SLS.K} \cdot (\sum_{j>1} G_{k,j} + \sum_{i>1} Q_{k,i})$$

Load combination SLS:F see EN 1990 equation 6.15b:

$$E_{Sd} = \sum_{j\geq 1} G_{k,j} + \psi_1 \cdot Q_{k.1} + \sum_{i>1} \psi_{2,i} \cdot Q_{k,i} = \psi\gamma_{SLS.2} \cdot (\sum_{j>1} G_{k,j} + \sum_{i>1} Q_{k,i})$$

Load combination SLS:Q see EN 1990 equation 6.16b:

$$E_{Sd} = \sum_{j\geq 1} G_{k,j} + \sum_{i>0} \psi_{2,i} \cdot Q_{k,i} = \psi\gamma_{SLS.Q} \cdot (\sum_{j>1} G_{k,j} + \sum_{i>1} Q_{k,i})$$

Design will be performed using ”simplified method” with load coefficients derived from equations see above.

Simplified method (see separate derivation)

Nr	Last		$\psi\gamma_{SLS-K}$	$\psi\gamma_{SLS-F}$	$\psi\gamma_{SLS-Q}$
	Permanent loads				
1	Egentyngd	max	1,00	1,00	1,00
		min	1,00	1,00	1,00
2	Beläggning	max	1,10	1,10	1,10
		min	0,90	0,90	0,90
3	Överfyllnad	max	1,10	1,10	1,10
		min	0,90	0,90	0,90
4	Jordtryck	max	1,10	1,10	1,10
		min	0,90	0,90	0,90
5	Vattentryck	max	1,00	1,00	1,00
		min	1,00	1,00	1,00
6	Stödförskjutning	max	1,00	1,00	1,00
		min	1,00	1,00	1,00
7	Krympning	max	1,00	1,00	1,00
		min	1,00	1,00	1,00
8	Spännkraft	max	1,00	1,00	1,00
		min	1,00	1,00	1,00
	Variable loads				
	Lastmodell LM 1 :				
9	Boggiesystem		0.75/1.00	0/0.75	0
10	Utbredd last		0.40/1.00	0/0.40	0
11	Bromskraft		0.56/0.75	0/0.56	0
12	Sidokraft		0.56/0.75	0/0.56	0
13	Centrifugalkraft		0.56/0.75	0/0.56	0
	Lastmodell LM 2 :				
14	Enstaka axellast		0.75/1.00	0/0.75	0
	Typfordon EG A/B :				
15	Typfordon EG A/B		0.75/1.00	0/0.75	0
20	Bromskraft		0.56/0.75	0/0.56	0
22	Sidokraft		0.56/0.75	0/0.56	0
22	Centrifugalkraft		0.56/0.75	0/0.56	0
16	Temperatur		0.60/1.00	0.50/0.60	0.50
	Vindlaster:				
17	Vindlast mot bro		0.30/1.00	0/0.30	0
18	Vindlast mot trafik		0.30/1.00	0/0.30	0
19	Överlast		0.75/1.00	0/0.75	0

Load combination smart SLS-PERM :

Loadcase	Permanent factor	Variable factor
EGEN	1.00	0
BELÄGG	0.90	0.20
JORD	0.90	0.20
STOD	0	$1.0 \cdot f_{STOD} = 0.33$
KRYMP	0	$1.0 \cdot f_{KRYMP} = 0.33$

Load combination smart *SLS-K-VAR* :
(Load cases to consider : 6 / Variable loadcases : 1)

Loadcase	Permanent factor	Variable factor
VÄGTRAFIK	0.75	0.25
BROMS	0.56	0.19
SIDO	0.56	0.19
TEMP	0.60	0.40
VIND	0.60	0.40
OVER	0.75	0.25

Load combination smart *SLS-F-VAR* :

Load case	Permanent factor	Variable factor
VÄGTRAFIK	0	0.75
BROMS	0	0.56
SIDO	0	0.56
TEMP	0	0.60
VIND	0	0.30
OVER	0	0.75

Load combination smart *SLS-K :*

Load case	Permanent factor	Variable factor
SLS-PERM	1	0
SLS-K-VAR	0	1

Load combination smart *SLS-F :*

Load case	Permanent factor	Variable factor
SLS-PERM	1	0
SLS-F-VAR	0	1

Load combination smart *SLS-Q :*

Load case	Permanent factor	Variable factor
SLS-PERM	1	0
TEMP	0	0.50

3.13.3 Fatigue

Risk of fatigue is performed using simplified method, termed λ-method.

Load combination according to SS-EN 1992-1-1 section 6.8.3 equation 6.69 :
(In this load combination traffic is assumed to be UTM3 thus all other traffic loads are not applied)

$$E_{Sd} = \sum_{j\geq 1} G_{k,j} + P + \psi_{1,1} \cdot Q_{k,1} + \sum_{i>1} \psi_{2,i} \cdot Q_{k,i} + Q_{fat} = \psi\gamma_{UTM} \cdot (\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} Q_{k,i} + Q_{fat})$$

According to SS-EN 1992-2 attachment NN 2.1 this method assumes verification of ULM3 according to SS-EN 1991-2 section 4.6.4 :

Load combination UTM results in a expression that complies with frequent load combination in

service state (SLS:F):

$$E_{Sd} \approx \psi\gamma_{SLS.F} \cdot (\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} Q_{k,j}) + Q_{ULM3} = \psi\gamma_{UTM} \cdot (\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} Q_{k,i} + Q_{ULM3})$$

Simplified method (see separate derivation)

Nr	Last		$\psi\gamma_{UTM}$
	Permanent loads		
1	Egentyngd	max	1,00
		min	1,00
2	Beläggning	max	1,00
		min	1,00
3	Överfyllnad	max	1,00
		min	1,00
4	Jordtryck	max	1,00
		min	1,00
5	Vattentryck	max	1,00
		min	1,00
6	Stödförskjutning	max	1,00
		min	1,00
7	Krympning	max	1,00
		min	1,00
8	Spännkraft	max	1,00
		min	1,00
	Variable loads		
	Lastmodell LM 1 :		
9	Boggiesystem		-
10	Utbredd last		-
11	Bromskraft		-
12	Sidokraft		-
13	Centrifugalkraft		-
	Lastmodell LM 2 :		
14	Enstaka axellast		-
	Typfordon EG A/B :		
15	Typfordon EG A/B		-
20	Bromskraft		-
22	Sidokraft		-
22	Centrifugalkraft		-
16	Temperatur		0.60[a.)]
	Vindlaster:		
17	Vindlast mot bro		0.30[a.)]
18	Vindlast mot trafik		0.30[a.)]
19	Överlast		0.75[a.)]
23	ULM3		1.00

[a.)] Loads are not consider as fatigue loads when analysing stress width range.

Load combination smart FAT :

Loadcase	Permanent factor	Variable factor
EGEN	1.00	0
BELÄGG	1.00	0
JORD	1.00	0
STOD	-	-
KRYMP	-	-
STOD	-	-
KRYMP	-	-
UTM	-	1.00
OVER	-	-
TEMP	-	-

Load cases STOD (settlement), KRYMP (shrinkage) and OVER (surcharge) are not used since not considered to be fatigue loads.

For verification STR the load case TEMP (temperature) may be neglected according to SS-EN 1992-1-1 section 2.3.1.2(2).

3.13.4 Derivation simplified method

See Mathcad program PROG L2.002.

Objekt : Bridge nr 1

Säkerhetsklass

$\gamma_d = 1.00$

Permanenta laster

Lastkoefficienter avseende sannolikhet för avvikelser från karakteristiska värden i brottgränstillstånd

Nr.	Last	ξ	$\gamma_{G,sup}$	$\gamma_{G,inf}$	Anm.
1	Egentyngd	0.89	1.35	1.00	SS-EN 1990 bilaga A2 Tabell A2.4(B) + TRVFS 2011:12
2	Beläggning	0.89	1.35	1.00	-"- -"- -"- -"-
3	Överfyllnad	0.89	1.35	1.00	-"- -"- -"- -"-
4	Jordtryck	0.89	1.35	1.00	-"- -"- -"- -"-
5	Vattentryck	0.89	1.35	1.00	-"- -"- -"- -"-
6	Stödförskjutning	0.89	1.35	1.00	-"- -"- -"- -"-
7	Krympning	0.89	1.35	1.00	-"- -"- -"- -"-

Nr.	Last	γ_P	Anm.
8	Spännkraft	1.35	SS-EN 1990 bilaga A2 Tabell A2.4(B) + TRVFS 2011:12

Koefficienter avseende variationer av karakteristiska värden

Nr.	Last	η_{sup}	η_{inf}	Anm.
1	Egentyngd	1.00	1.00	Spridning enligt gängse beräkningspraxis
2	Beläggning	1.10	0.90	-"- -"- -"- -"-
3	Överfyllnad	1.10	0.90	-"- -"- -"- -"-
4	Jordtryck	1.10	0.90	-"- -"- -"- -"-
5	Vattentryck	1.00	1.00	-"- -"- -"- -"-
6	Stödförskjutning	1.00	1.00	-"- -"- -"- -"-
7	Krympning	1.00	1.00	-"- -"- -"- -"-

$$G_{k,j}^{\sup} = \eta_{\sup,j} \cdot G_{k,j}$$

$$G_{k,j}^{\inf} = \eta_{\inf,j} \cdot G_{k,j}$$

Variabla laster

Lastkoefficienter avseende varaktighet och frekvens hos karakteristiska värden

Nr.	Last	ψ_k	ψ_0	ψ_1	ψ_2	Anm.
	Lastsystem gr1a (LM 1)					
9	Boggiesystem	1.00	0.75	0.75	0	SS-EN 1990 bilaga A2 Tabell A2.1
10	Utbredd last	1.00	0.40	0.40	0	-"- -"- -"-
11	Bromskraft	1.00	0.75[a.)]	0.75[b.)]	0	-"- -"- -"-
12	Sidokraft	1.00	0.75[a.)]	0.75[b.)]	0	-"- -"- -"-
13	Centrifugalkraft	1.00	0.75	0.75	0	-"- -"- -"-
	Lastsystem gr1b (LM 2)					
14	Enstaka axellast	1.00	0	0.75	0	SS-EN 1990 bilaga A2 Tabell A2.1
-	Bromskraft	1.00	0	0.75	0	-"- -"- -"-
-	Sidokraft	1.00	0	0.75	0	-"- -"- -"-
-	Centrifugalkraft	1.00	0	0.75	0	-"- -"- -"-
	Lastsystem gr2 (LM 1)					
9	Boggiesystem	1.00	0.75	0.75	0	SS-EN 1990 bilaga A2 Tabell A2.1
10	Utbredd last	1.00	0.40	0.40	0	-"- -"- -"-
11	Bromskraft	1.00	0	0	0	-"- -"- -"-
12	Sidokraft	1.00	0	0	0	-"- -"- -"-
13	Centrifugalkraft	1.00	0	0	0	-"- -"- -"-
	Typfordon EG A/B					
15	Typfordon EG A/B	1.00	0.75	0.75	0	TRVFS kapitel 7 §5
20	Bromskraft	1.00	0.75	0.75	0	TRVFS kapitel 6 §3
21	Sidokraft	1.00	0.75	0.75	0	-"- -"- "
22	Centrifugalkraft	1.00	0.75	0.75	0	-"- -"- "
	Temperatur					
16	Temperatur	1.00	0.60	0.60	0.50	SS-EN 1990 bilaga A2 Tabell A2.1
	Vindlaster					
17	Vindlast mot bro	1.00	0.30	0.20	0	TRVFS kapitel 7 §5 Tabell a
18	Vindlast mot trafik	1.00	0.30	0.20	0	-"- -"- -"-
	Överlast					
19	Överlast	1.00	0.75	0.75	1.00	TRVFS kapitel 7 §5

[a.)] Värde tillhörande boggiesystem tillämpas på säker sida dock medges att viktat värde tillhörande utbredd last tillämpas.

[b.)] Värde tillhörande boggiesystem tillämpas på säker sida dock medges att viktat värde tillhörande utbredd last tillämpas.

Reduktionsfaktor vid bestämning av fiktiva karakteristiska värden för olika lastsystem

$$Q'_k = \eta_{traf} \cdot Q_k$$

Nr.	Last	η_{traf}	Lastvärde	Anm.
	Lastsystem gr1a (LM1)			
9	Boggiesystem	1.00	Karakteristisk	SS-EN 1991-2 Tabell 4.4a
10	Utbredd last	1.00	Karakteristisk	-"- -"- -"-
11	Bromskraft	0.75[a.)]	Frekvent	-"- -"- -"-
12	Sidokraft	0.75[a.)]	Frekvent	-"- -"- -"-
13	Centrifugalkraft	0.75	Frekvent	-"- -"- -"-
	Lastsystem gr1b (LM2)			
14	Enstaka axellast	1.00	Karakteristisk	SS-EN 1991-2 Tabell 4.4a
-	Bromskraft	0	-	-"- -"- -"-
-	Sidokraft	0	-	-"- -"- -"-
-	Centrifugalkraft	0	-	-"- -"- -"-
	Lastsystem gr2 (LM1)			
9	Boggiesystem	0.75	Frekvent	SS-EN 1991-2 Tabell 4.4a + NA
10	Utbredd last	0.40	Frekvent	-"- -"- -"-
11	Bromskraft	1.00	Karakteristisk	SS-EN 1991-2 Tabell 4.4a
12	Sidokraft	1.00	Karakteristisk	-"- -"- -"-
13	Centrifugalkraft	1.00	Karakteristisk	-"- -"- -"-
	Lastsystem Typfordon			
15	Typfordon EG A/B	b.)	b.)	TRVFS 2011:12 kapitel 6 §3
20	Bromskraft	b.)	b.)	-"- -"- -"-
21	Sidokraft	b.)	b.)	-"- -"- -"-
22	Centrifugalkraft	b.)	b.)	-"- -"- -"-

[a.)] Värde tillhörande boggiesystem tillämpas på säker sida dock medges att viktat värde tillhörande utbredd last tillämpas.

[b.)] Enligt TRVFS 2011:12 skall typfordon EG A/B kombineras enligt samma principer som LM1 med tillhörande horisontalkrafter.

Brottgränstillstånd (STR/GEO uppsättning B) enligt SS-EN 1990 avsnitt 6.4.3.2

Ekvation 6.10a :

$$E_{Sd.A}^{\max} = \sum_{j \ge 1} \gamma_{G,j}^{\sup} \cdot G_{k,j} + \gamma_p \cdot P + \gamma_{Q,1} \cdot \psi_{0,1} \cdot Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i} = \psi\gamma_{ULS.A}^{\max} \cdot (\sum_{j \ge 1} G_{k,j} + P + \sum_{i \ge 1} Q_{k,j})$$

$$E_{Sd.A}^{\min} = \sum_{j \ge 1} \gamma_{G,j}^{\inf} \cdot G_{k,j} + P + \gamma_{Q,1} \cdot \psi_{0,1} \cdot Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i} = \psi\gamma_{ULS.A}^{\min} \cdot (\sum_{j \ge 1} G_{k,j} + P + \sum_{i \ge 1} Q_{k,j})$$

Ekvation 6.10b :

$$E_{Sd.B}^{\max} = \sum_{j \ge 1} \xi_j \cdot \gamma_{G,j}^{\sup} \cdot G_{k,j} + \gamma_p \cdot P + \gamma_{Q,1} \cdot Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i} = \psi\gamma_{ULS.B}^{\max} \cdot (\sum_{j \ge 1} G_{k,j} + P + \sum_{i \ge 1} Q_{k,j})$$

$$E_{Sd.B}^{\min} = \sum_{j \ge 1} \gamma_{G,j}^{\inf} \cdot G_{k,j} + P + \gamma_{Q,1} \cdot Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i} = \psi\gamma_{ULS.B}^{\min} \cdot (\sum_{j \ge 1} G_{k,j} + P + \sum_{i \ge 1} Q_{k,j})$$

Lastkombination nr. 1 med huvudlasten : Lastsystem gr1a (LM1)

Lastkombinatiom enligt ekvation 6.10a : ULS A-1

Lastkombinatiom enligt ekvation 6.10b : ULS B-1

Nr	Last		$\psi\gamma_{ULS.A-1}$	$\psi\gamma_{ULS.B-1}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35$= 1.35	$\gamma_d \cdot 1.35$= 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1a (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	$\gamma_d \cdot 1.5 \cdot \eta_{traf}$= 1.50	X
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.60	$\gamma_d \cdot 1.5 \cdot \eta_{traf}$= 1.50	X
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	$\gamma_d \cdot 1.5 \cdot \eta_{traf}$= 1.13	X
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	$\gamma_d \cdot 1.5 \cdot \eta_{traf}$= 1.13	X
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	$\gamma_d \cdot 1.5 \cdot \eta_{traf}$= 1.13	X
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	

Lastkombination nr. 2 med huvudlasten : Temperatur

Lastkombinatiom enligt ekvation 6.10a : ULS A-2

Lastkombinatiom enligt ekvation 6.10b : ULS B-2

Nr	Last		$\psi\gamma_{ULS.A\text{-}2}$	$\psi\gamma_{ULS.B\text{-}2}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35$= 1.35	$\gamma_d \cdot 1.35$= 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1a (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.60	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.60	
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	$\gamma_d \cdot 1.5$= 1.50	X
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	

Lastkombination nr. 3 med huvudlasten : Vindlast

Lastkombinatiom enligt ekvation 6.10a : ULS A-3

Lastkombinatiom enligt ekvation 6.10b : ULS B-3

Nr	Last		$\psi\gamma_{ULS.A\text{-}3}$	$\psi\gamma_{ULS.B\text{-}3}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35 =$ 1.35	$\gamma_d \cdot 1.35 =$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1a (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.60	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.60	
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot 1.5 =$ 1.50	X
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot 1.5 =$ 1.50	X
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	

Lastkombination nr. 4 med huvudlasten : Överlast

Lastkombinatiom enligt ekvation 6.10a : ULS A-4

Lastkombinatiom enligt ekvation 6.10b : ULS B-4

Nr	Last		$\psi\gamma_{ULS.A-4}$	$\psi\gamma_{ULS.B-4}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G}=$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}=$ 1.20	
		min	$\gamma_{inf,G}=$ 1.00	$\gamma_{inf,G}=$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G}=$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}=$ 1.20	
		min	$\gamma_{inf,G}=$ 1.00	$\gamma_{inf,G}=$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G}=$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}=$ 1.20	
		min	$\gamma_{inf,G}=$ 1.00	$\gamma_{inf,G}=$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G}=$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}=$ 1.20	
		min	$\gamma_{inf,G}=$ 1.00	$\gamma_{inf,G}=$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G}=$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}=$ 1.20	
		min	$\gamma_{inf,G}=$ 1.00	$\gamma_{inf,G}=$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G}=$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}=$ 1.20	
		min	$\gamma_{inf,G}=$ 1.00	$\gamma_{inf,G}=$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G}=$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}=$ 1.20	
		min	$\gamma_{inf,G}=$ 1.00	$\gamma_{inf,G}=$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35=$ 1.35	$\gamma_d \cdot 1.35=$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1a (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 1.13	
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.60	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.60	
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.84	
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.84	
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}=$ 0.84	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5=$ 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5=$ 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5=$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5=$ 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5=$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5=$ 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5=$ 1.13	$\gamma_d \cdot 1.5=$ 1.50	X

Lastkombination nr. 5 med huvudlasten : Lastsystem gr1Bb (LM2)

Lastkombinatiom enligt ekvation 6.10a : ULS A-5

Lastkombinatiom enligt ekvation 6.10b : ULS B-5

Nr	Last		$\psi\gamma_{ULS.A-5}$	$\psi\gamma_{ULS.B-5}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35$= 1.35	$\gamma_d \cdot 1.35$= 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1b (LM2) :				
14	Enstaka axellast		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0	$\gamma_d \cdot 1.5 \cdot \eta_{traf}$= 1.50	X
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	

Lastkombination nr. 6 med huvudlasten : Temperatur

Lastkombinatiom enligt ekvation 6.10a : ULS A-6

Lastkombinatiom enligt ekvation 6.10b : ULS B-6

Nr	Last		$\psi\gamma_{ULS.A\text{-}6}$	$\psi\gamma_{ULS.B\text{-}6}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35 =$ 1.35	$\gamma_d \cdot 1.35 =$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1b (LM2) :				
14	Enstaka axellast		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	$\gamma_d \cdot 1.5 =$ 1.50	X
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	

Lastkombination nr. 7 med huvudlasten : Vindlast

Lastkombinatiom enligt ekvation 6.10a : ULS A-7

Lastkombinatiom enligt ekvation 6.10b : ULS B-7

Nr	Last		$\psi\gamma_{ULS.A\text{-}7}$	$\psi\gamma_{ULS.B\text{-}7}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35 =$ 1.35	$\gamma_d \cdot 1.35 =$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1b (LM2) :				
14	Enstaka axellast		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot 1.5 =$ 1.50	X
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot 1.5 =$ 1.50	X
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	

Lastkombination nr. 8 med huvudlasten : Överlast

Lastkombinatiom enligt ekvation 6.10a : ULS A-8

Lastkombinatiom enligt ekvation 6.10b : ULS B-8

Nr	Last		$\psi\gamma_{ULS.A-8}$	$\psi\gamma_{ULS.B-8}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35$= 1.35	$\gamma_d \cdot 1.35$= 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr1b (LM2) :				
14	Enstaka axellast		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	$\gamma_d \cdot 1.5$= 1.50	X

Lastkombination nr. 9 med huvudlasten : Lastsystem gr2 (LM1)

Lastkombinatiom enligt ekvation 6.10a : ULS A-9

Lastkombinatiom enligt ekvation 6.10b : ULS B-9

Nr	Last		$\psi\gamma_{ULS.A\text{-}9}$	$\psi\gamma_{ULS.B\text{-}9}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
8	Spännkraft	max	$\gamma_d \cdot 1.35 = 1.35$	$\gamma_d \cdot 1.35 = 1.35$	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr2 (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} = 0.84$	$\gamma_d \cdot 1.5 \cdot \eta_{traf} = 1.13$	X
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} = 0.24$	$\gamma_d \cdot 1.5 \cdot \eta_{traf} = 0.60$	X
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} = 1.13$	$\gamma_d \cdot 1.5 \cdot \eta_{traf} = 1.50$	X
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} = 1.13$	$\gamma_d \cdot 1.5 \cdot \eta_{traf} = 1.50$	X
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} = 1.13$	$\gamma_d \cdot 1.5 \cdot \eta_{traf} = 1.50$	X
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.90$	$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.90$	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.45$	$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.45$	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.45$	$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.45$	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 = 1.13$	$\gamma_d \cdot \psi_0 \cdot 1.5 = 1.13$	

Lastkombination nr. 10 med huvudlasten : Temperatur

Lastkombinatiom enligt ekvation 6.10a : ULS A-10

Lastkombinatiom enligt ekvation 6.10b : ULS B-10

Nr	Last		$\psi\gamma_{ULS.A-10}$	$\psi\gamma_{ULS.B-10}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G}$= 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$= 1.20	
		min	$\gamma_{inf,G}$= 1.00	$\gamma_{inf,G}$= 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35$= 1.35	$\gamma_d \cdot 1.35$= 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr2 (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.84	
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.24	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 0.24	
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$= 1.13	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.90	$\gamma_d \cdot 1.5$= 1.50	X
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$= 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5$= 1.13	

Lastkombination nr. 11 med huvudlasten : Vindlast

Lastkombinatiom enligt ekvation 6.10a : ULS A-11

Lastkombinatiom enligt ekvation 6.10b : ULS B-11

Nr	Last		$\psi\gamma_{ULS.A-11}$	$\psi\gamma_{ULS.B-11}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35 =$ 1.35	$\gamma_d \cdot 1.35 =$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr2 (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.24	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.24	
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot 1.5 =$ 1.50	X
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot 1.5 =$ 1.50	X
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	

Lastkombination nr. 12 med huvudlasten : Överlast

Lastkombinatiom enligt ekvation 6.10a : ULS A-12

Lastkombinatiom enligt ekvation 6.10b : ULS B-12

Nr	Last		$\psi\gamma_{ULS.A\text{-}12}$	$\psi\gamma_{ULS.B\text{-}12}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35 =$ 1.35	$\gamma_d \cdot 1.35 =$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr2 (LM1) :				
9	Boggiesystem		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.84	
10	Utbredd last		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.24	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 0.24	
11	Bromskraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
12	Sidokraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
13	Centrifugalkraft		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	$\gamma_d \cdot 1.5 =$ 1.50	X

Lastkombination nr. 13 med huvudlasten : Lastsystem gr5 (Typfordon EG A/B)

Lastkombinatiom enligt ekvation 6.10a : ULS A-13

Lastkombinatiom enligt ekvation 6.10b : ULS B-13

Nr	Last		$\psi\gamma_{ULS.A-13}$	$\psi\gamma_{ULS.B-13}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35 =$ 1.35	$\gamma_d \cdot 1.35 =$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr5 (LM3) :				
15	Typfordon EG A/B		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot 1.5 \cdot \eta_{traf} =$ 1.50	X
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	

Lastkombination nr. 14 med huvudlasten : Temperatur

Lastkombinatiom enligt ekvation 6.10a : ULS A-14

Lastkombinatiom enligt ekvation 6.10b : ULS B-14

Nr	Last		$\psi\gamma_{ULS.A\text{-}14}$	$\psi\gamma_{ULS.B\text{-}14}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} =$ 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} =$ 1.20	
		min	$\gamma_{inf,G} =$ 1.00	$\gamma_{inf,G} =$ 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35 =$ 1.35	$\gamma_d \cdot 1.35 =$ 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr5 (LM3) :				
15	Typfordon EG A/B		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} =$ 1.13	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.90	$\gamma_d \cdot 1.5 =$ 1.50	X
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 =$ 1.13	

<u>Lastkombination nr. 15 med huvudlasten : Vindlast</u>

Lastkombinatiom enligt ekvation 6.10a : ULS A-15

Lastkombinatiom enligt ekvation 6.10b : ULS B-15

Nr	Last		$\psi\gamma_{ULS.A\text{-}15}$	$\psi\gamma_{ULS.B\text{-}15}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G} = 1.35$	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G} = 1.20$	
		min	$\gamma_{inf,G} = 1.00$	$\gamma_{inf,G} = 1.00$	
8	Spännkraft	max	$\gamma_d \cdot 1.35 = 1.35$	$\gamma_d \cdot 1.35 = 1.35$	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr5 (LM3) :				
15	Typfordon EG A/B		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} = 1.13$	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf} = 1.13$	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.90$	$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.90$	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.45$	$\gamma_d \cdot 1.5 = 1.50$	X
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5 = 0.45$	$\gamma_d \cdot 1.5 = 1.50$	X
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5 = 1.13$	$\gamma_d \cdot \psi_0 \cdot 1.5 = 1.13$	

<u>Lastkombination nr. 16 med huvudlasten : Överlast</u>

Lastkombinatiom enligt ekvation 6.10a : ULS A-16

Lastkombinatiom enligt ekvation 6.10b : ULS B-16

Nr	Last		$\psi\gamma_{ULS.A-16}$	$\psi\gamma_{ULS.B-16}$	Största last
	Permanenta laster				
1	Egentyngd	max	$\gamma_d \cdot \gamma_{sup,G}$ = 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$ = 1.20	
		min	$\gamma_{inf,G}$ = 1.00	$\gamma_{inf,G}$ = 1.00	
2	Beläggning	max	$\gamma_d \cdot \gamma_{sup,G}$ = 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$ = 1.20	
		min	$\gamma_{inf,G}$ = 1.00	$\gamma_{inf,G}$ = 1.00	
3	Överfyllnad	max	$\gamma_d \cdot \gamma_{sup,G}$ = 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$ = 1.20	
		min	$\gamma_{inf,G}$ = 1.00	$\gamma_{inf,G}$ = 1.00	
4	Jordtryck	max	$\gamma_d \cdot \gamma_{sup,G}$ = 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$ = 1.20	
		min	$\gamma_{inf,G}$ = 1.00	$\gamma_{inf,G}$ = 1.00	
5	Vattentryck	max	$\gamma_d \cdot \gamma_{sup,G}$ = 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$ = 1.20	
		min	$\gamma_{inf,G}$ = 1.00	$\gamma_{inf,G}$ = 1.00	
6	Stödförskjutning	max	$\gamma_d \cdot \gamma_{sup,G}$ = 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$ = 1.20	
		min	$\gamma_{inf,G}$ = 1.00	$\gamma_{inf,G}$ = 1.00	
7	Krympning	max	$\gamma_d \cdot \gamma_{sup,G}$ = 1.35	$\gamma_d \cdot 0.89 \cdot \gamma_{sup,G}$ = 1.20	
		min	$\gamma_{inf,G}$ = 1.00	$\gamma_{inf,G}$ = 1.00	
8	Spännkraft	max	$\gamma_d \cdot 1.35$ = 1.35	$\gamma_d \cdot 1.35$ = 1.35	
		min	1.00	1.00	
	Variabla laster				
	Lastsystem gr5 (LM3) :				
15	Typfordon EG A/B		$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$ = 1.13	$\gamma_d \cdot \psi_0 \cdot 1.5 \cdot \eta_{traf}$ = 1.13	
	Temperatur :				
16	Temperatur		$\gamma_d \cdot \psi_0 \cdot 1.5$ = 0.90	$\gamma_d \cdot \psi_0 \cdot 1.5$ = 0.90	
	Vindlaster :				
17	Vindlast mot bro		$\gamma_d \cdot \psi_0 \cdot 1.5$ = 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$ = 0.45	
18	Vindlast mot trafik		$\gamma_d \cdot \psi_0 \cdot 1.5$ = 0.45	$\gamma_d \cdot \psi_0 \cdot 1.5$ = 0.45	
	Överlast :				
19	Överlast		$\gamma_d \cdot \psi_0 \cdot 1.5$ = 1.13	$\gamma_d \cdot 1.5$ = 1.50	X

Förenklad metod :
Lastkombination ULS-A innebär enveloppet för lastkombinationer ULS.A-1, ULS.A-2, ... ULS.A-16.
Lastkombination ULS-B innebär enveloppet för lastkombinationer ULS.B-1, ULS.B-2, ... ULS.B-16.

Nr	Last		$\psi\gamma_{ULS-A}$	$\psi\gamma_{ULS-B}$
	Permanenta laster			
1	Egentyngd	max	1.35	1.20
		min	1.00	1.00
2	Beläggning	max	1.35	1.20
		min	1.00	1.00
3	Överfyllnad	max	1.35	1.20
		min	1.00	1.00
4	Jordtryck	max	1.35	1.20
		min	1.00	1.00
5	Vattentryck	max	1.35	1.20
		min	1.00	1.00
6	Stödförskjutning	max	1.35	1.20
		min	1.00	1.00
7	Krympning	max	1.35	1.20
		min	1.00	1.00
8	Spännkraft	max	1.35	1.35
		min	1.00	1.00
	Variabla laster			
	Lastmodell LM 1 :			
9	Boggiesystem		1.13/0.84	1.13/1.50
10	Utbredd last		0.60/0.24	0.60/1.50
11	Bromskraft		0.84/1.13	1.13/1.50
12	Sidokraft		0.84/1.13	1.13/1.50
13	Centrifugalkraft		0.84/1.13	1.13/1.50
	Lastmodell LM 2 :			
14	Enstaka axellast		0	0/1.50
	Typfordon EG A/B :			
15	Typfordon EG A/B		1.13/0.84	1.13/1.50
20	Bromskraft		0.84/1.13	1.13/1.50
21	Sidokraft		0.84/1.13	1.13/1.50
22	Centrifugalkraft		0.84/1.13	1.13/1.50
16	Temperatur		0.90	0.90/1.50
	Vindlaster:			
17	Vindlast mot bro		0.45	0.45/1.50
18	Vindlast mot trafik		0.45	0.45/1.50
19	Överlast		1.13	1.13/1.50

Bruksgränstillstånd SLS enligt SS-EN 1990 avsnitt 6.5.3

Karakteristisk lastkombination SLS:K (ekvation 6.14b) :

$$E_{Sd}^{max} = \sum_{j \geq 1} \gamma_{sup,j} \cdot G_{k,j} + P + Q_{k,1} + \sum_{i>1} \psi_{0,i} \cdot Q_{k,i} = \psi\gamma_{SLS.K}^{max} \cdot (\sum_{j \geq 1} G_{k,j} + P + \sum_{i \geq 1} Q_{k,j})$$

$$E_{Sd}^{min} = \sum_{j \geq 1} \gamma_{inf,j} \cdot G_{k,j} + P + Q_{k,1} + \sum_{i>1} \psi_{0,i} \cdot Q_{k,i} = \psi\gamma_{SLS.K}^{min} \cdot (\sum_{j \geq 1} G_{k,j} + P + \sum_{i \geq 1} Q_{k,j})$$

Frekvent lastkombination SLS:F (ekvation 6.15b) :

$$E_{Sd}^{max} = \sum_{j \geq 1} \cdot \eta_{sup.j} \cdot G_{k,j} + P + \psi_{1,1} \cdot Q_{k,1} + \sum_{i>1} \cdot \psi_{2,i} \cdot Q_{k,i} = \psi\gamma_{SLS.F}^{max} \cdot (\sum_{j \geq 1} G_{k,j} + P + \sum_{i \geq 1} Q_{k,j})$$

$$E_{Sd}^{min} = \sum_{j \geq 1} \eta_{inf.j} \cdot G_{k,j} + P + \psi_{1,1} \cdot Q_{k,1} + \sum_{i>1} \cdot \psi_{2,i} \cdot Q_{k,i} = \psi\gamma_{SLS.F}^{min} \cdot (\sum_{j \geq 1} G_{k,j} + P + \sum_{i \geq 1} Q_{k,j})$$

Kvasipermanent lastkombination SLS:Q (ekvation 6.16b) :

$$E_{Sd}^{max} = \sum_{j \geq 1} \gamma_{sup.j} \cdot G_{k,j} + P + \sum_{i \geq 1} \cdot \psi_{2,i} \cdot Q_{k,i} = \psi\gamma_{SLS.Q}^{max} \cdot (\sum_{j \geq 1} G_{k,j} + P + \sum_{i \geq 1} Q_{k,j})$$

$$E_{Sd}^{min} = \sum_{j \geq 1} \eta_{inf,j} \cdot G_{k,j} + P + \sum_{i \geq 1} \cdot \psi_{2,i} \cdot Q_{k,i} = \psi\gamma_{SLS.Q}^{min} \cdot (\sum_{j \geq 1} G_{k,j} + P + \sum_{i \geq 1} Q_{k,j})$$

Lastkombination nr. 1 med huvudlasten : Lastsystem gr1a (LM1)

Karakteristisk lastkombinatiom SLS-K.1 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.1 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.1 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.1}$	$\psi\gamma_{SLS\text{-}F.1}$	$\psi\gamma_{SLS\text{-}Q.1}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1a (LM1) :					
9	Boggiesystem		η_{traf}= 1.00	$\psi_1 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	X
10	Utbredd last		η_{traf}= 1.00	$\psi_1 \cdot \eta_{traf}$= 0.40	$\psi_2 \cdot \eta_{traf}$= 0	X
11	Bromskraft		η_{traf}= 0.75	$\psi_1 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	X
12	Sidokraft		η_{traf}= 0.75	$\psi_1 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	X
13	Centrifugalkraft		η_{traf}= 0.75	$\psi_1 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	X
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 2 med huvudlasten : Temperatur

Karakteristisk lastkombinatiom SLS-K.2 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.2 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.2 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.2}$	$\psi\gamma_{SLS\text{-}F.2}$	$\psi\gamma_{SLS\text{-}Q.2}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1a (LM1) :					
9	Boggiesystem		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
10	Utbredd last		$\psi_0 \cdot \eta_{traf}$= 0.40	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
11	Bromskraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
12	Sidokraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
13	Centrifugalkraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		1.00	ψ_1= 0.60	ψ_2= 0.50	X
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 3 med huvudlasten : Vindlast

Karakteristisk lastkombinatiom SLS-K.3 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.3 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.3 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.3}$	$\psi\gamma_{SLS\text{-}F.3}$	$\psi\gamma_{SLS\text{-}Q.3}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1a (LM1) :					
9	Boggiesystem		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
10	Utbredd last		$\psi_0 \cdot \eta_{traf}$= 0.40	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
11	Bromskraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
12	Sidokraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
13	Centrifugalkraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		1.00	ψ_1= 0.30	ψ_2= 0	X
18	Vindlast mot trafik		1.00	ψ_1= 0.30	ψ_2= 0	X
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

<u>Lastkombination nr. 4 med huvudlasten : Överlast</u>

Karakteristisk lastkombinatiom SLS-K.4 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.4 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.4 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.4}$	$\psi\gamma_{SLS\text{-}F.4}$	$\psi\gamma_{SLS\text{-}Q.4}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1a (LM1) :					
9	Boggiesystem		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
10	Utbredd last		$\psi_0 \cdot \eta_{traf}$= 0.40	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
11	Bromskraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
12	Sidokraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
13	Centrifugalkraft		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		1.00	ψ_1= 0.75	ψ_2= 0	X

Lastkombination nr. 5 med huvudlasten : Lastsystem gr1b (LM2)

Karakteristisk lastkombinatiom SLS-K.5 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.5 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.5 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS-K.5}$	$\psi\gamma_{SLS-F.5}$	$\psi\gamma_{SLS-Q.5}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1b (LM2) :					
14	Enstaka axellast		η_{traf}= 1.00	$\psi_1 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	X
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 6 med huvudlasten : Temperatur

Karakteristisk lastkombinatiom SLS-K.6 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.6 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-K.6 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.6}$	$\psi\gamma_{SLS\text{-}F.6}$	$\psi\gamma_{SLS\text{-}Q.6}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1b (LM2) :					
14	Enstaka axellast		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		1.00	ψ_1= 0.60	ψ_2= 0.50	X
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 7 med huvudlasten : Vindlast

Karakteristisk lastkombinatiom SLS-K.7 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.7 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-K.7 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.7}$	$\psi\gamma_{SLS\text{-}F.7}$	$\psi\gamma_{SLS\text{-}Q.7}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1b (LM2) :					
14	Enstaka axellast		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		1.00	ψ_1= 0.30	ψ_2= 0	X
18	Vindlast mot trafik		1.00	ψ_1= 0.30	ψ_2= 0	X
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 8 med huvudlasten : Överlast

Karakteristisk lastkombinatiom SLS-K.8 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.8 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-K.8 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.8}$	$\psi\gamma_{SLS\text{-}F.8}$	$\psi\gamma_{SLS\text{-}Q.8}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr1b (LM2) :					
14	Enstaka axellast		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		1.00	ψ_1= 0.75	ψ_2= 0	X

Lastkombination nr. 9 med huvudlasten : Lastsystem gr2 (LM1)

Karakteristisk lastkombinatiom SLS-K.9 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.9 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-K.9 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.9}$	$\psi\gamma_{SLS\text{-}F.9}$	$\psi\gamma_{SLS\text{-}Q.9}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr2 (LM1) :					
9	Boggiesystem		η_{traf}= 0.75	$\psi_1 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	X
10	Utbredd last		η_{traf}= 0.40	$\psi_1 \cdot \eta_{traf}$= 0.16	$\psi_2 \cdot \eta_{traf}$= 0	X
11	Bromskraft		η_{traf}= 1.00	$\psi_1 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	X
12	Sidokraft		η_{traf}= 1.00	$\psi_1 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	X
13	Centrifugalkraft		η_{traf}= 1.00	$\psi_1 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	X
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 10 med huvudlasten : Temperatur

Karakteristisk lastkombinatiom SLS-K.10 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.10 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.10 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.10}$	$\psi\gamma_{SLS\text{-}F.10}$	$\psi\gamma_{SLS\text{-}Q.10}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr2 (LM1) :					
9	Boggiesystem		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
10	Utbredd last		$\psi_0 \cdot \eta_{traf}$= 0.16	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
11	Bromskraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
12	Sidokraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
13	Centrifugalkraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		1.00	ψ_1= 0.60	ψ_2= 0.50	X
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

<u>Lastkombination nr. 11 med huvudlasten : Vindlast</u>

Karakteristisk lastkombinatiom SLS-K.11 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.11 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-K.11 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.11}$	$\psi\gamma_{SLS\text{-}F.11}$	$\psi\gamma_{SLS\text{-}Q.11}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr2 (LM1) :					
9	Boggiesystem		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
10	Utbredd last		$\psi_0 \cdot \eta_{traf}$= 0.16	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
11	Bromskraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
12	Sidokraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
13	Centrifugalkraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		1.00	ψ_1= 0.30	ψ_2= 0	X
18	Vindlast mot trafik		1.00	ψ_1= 0.30	ψ_2= 0	X
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 12 med huvudlasten : Överlast

Karakteristisk lastkombinatiom SLS-K.12 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.12 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-K.12 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.12}$	$\psi\gamma_{SLS\text{-}F.12}$	$\psi\gamma_{SLS\text{-}Q.11}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr2 (LM1) :					
9	Boggiesystem		$\psi_0 \cdot \eta_{traf}$= 0.56	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
10	Utbredd last		$\psi_0 \cdot \eta_{traf}$= 0.16	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
11	Bromskraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
12	Sidokraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
13	Centrifugalkraft		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		1.00	ψ_1= 0.75	ψ_2= 0	X

Lastkombination nr. 13 med huvudlasten : Lastsystem gr5 (LM3)

Karakteristisk lastkombinatiom SLS-K.13 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.13 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.13 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.13}$	$\psi\gamma_{SLS\text{-}F.13}$	$\psi\gamma_{SLS\text{-}Q.13}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr5 (LM3) :					
15	Typfordon EG A/B		η_{traf}= 1.00	$\psi_1 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	X
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 14 med huvudlasten : Temperatur

Karakteristisk lastkombinatiom SLS-K.14 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.14 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.14 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.14}$	$\psi\gamma_{SLS\text{-}F.14}$	$\psi\gamma_{SLS\text{-}Q.14}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr5 (LM3) :					
15	Typfordon EG A/B		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		1.00	ψ_1= 0.60	ψ_2= 0.50	X
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 15 med huvudlasten : Vindlast

Karakteristisk lastkombinatiom SLS-K.15 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.15 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.15 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.15}$	$\psi\gamma_{SLS\text{-}F.15}$	$\psi\gamma_{SLS\text{-}Q.15}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr5 (LM3) :					
15	Typfordon EG A/B		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		1.00	ψ_1= 0.30	ψ_2= 0	X
18	Vindlast mot trafik		1.00	ψ_1= 0.30	ψ_2= 0	X
	Överlast :					
19	Överlast		ψ_0= 0.75	ψ_2= 0	ψ_2= 0	

Lastkombination nr. 16 med huvudlasten : Överlast

Karakteristisk lastkombinatiom SLS-K.16 enligt ekvation 6.14b.

Frekvent lastkombinatiom SLS-F.16 enligt ekvation 6.15b.

Kvasipermanent lastkombinatiom SLS-Q.16 enligt ekvation 6.16b.

Nr	Last		$\psi\gamma_{SLS\text{-}K.16}$	$\psi\gamma_{SLS\text{-}F.16}$	$\psi\gamma_{SLS\text{-}Q.16}$	Största last
	Permanenta laster					
1	Egentyngd	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
2	Beläggning	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
3	Överfyllnad	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
4	Jordtryck	max	η_{sup}= 1.10	η_{sup}= 1.10	η_{sup}= 1.10	
		min	η_{inf}= 0.90	η_{inf}= 0.90	η_{inf}= 0.90	
5	Vattentryck	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
6	Stödförskjutning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
7	Krympning	max	η_{sup}= 1.00	η_{sup}= 1.00	η_{sup}= 1.00	
		min	η_{inf}= 1.00	η_{inf}= 1.00	η_{inf}= 1.00	
8	Spännkraft	max	1.00	1.00	1.00	
		min	1.00	1.00	1.00	
	Variabla laster					
	Lastsystem gr5 (LM3) :					
15	Typfordon EG A/B		$\psi_0 \cdot \eta_{traf}$= 0.75	$\psi_2 \cdot \eta_{traf}$= 0	$\psi_2 \cdot \eta_{traf}$= 0	
	Temperatur :					
16	Temperatur		ψ_0= 0.60	ψ_2= 0.50	ψ_2= 0.50	
	Vindlaster :					
17	Vindlast mot bro		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
18	Vindlast mot trafik		ψ_0= 0.30	ψ_2= 0	ψ_2= 0	
	Överlast :					
19	Överlast		1.00	ψ_1= 0.75	ψ_2= 0	X

Förenklad metod :
Karakteristisk lastkombination SLS-K innebär enveloppet för lastkombinationer SLS-K.1, SLS-K.2, ... SLS-K.16.
Frekvent lastkombination SLS-F innebär enveloppet för lastkombinationer SLS-F.1, SLS-F.2, ... SLS-F.16.
Kvasipermanent lastkombination SLS-Q innebär enveloppet för lastkombinationer SLS-Q.1, SLS-Q.2, ...SLS-Q.16.

Nr	Last		$\psi\gamma_{SLS-K}$	$\psi\gamma_{SLS-F}$	$\psi\gamma_{SLS-Q}$
	Permanenta laster				
1	Egentyngd	max	1.00	1.00	1.00
		min	1.00	1.00	1.00
2	Beläggning	max	1.10	1.10	1.10
		min	0.90	0.90	0.90
3	Överfyllnad	max	1.10	1.10	1.10
		min	0.90	0.90	0.90
4	Jordtryck	max	1.10	1.10	1.10
		min	0.90	0.90	0.90
5	Vattentryck	max	1.00	1.00	1.00
		min	1.00	1.00	1.00
6	Stödförskjutning	max	1.00	1.00	1.00
		min	1.00	1.00	1.00
7	Krympning	max	1.00	1.00	1.00
		min	1.00	1.00	1.00
8	Spännkraft	max	1.00	1.00	1.00
		min	1.00	1.00	1.00
	Variabla laster				
	Lastmodell LM 1 :				
9	Boggiesystem		0.75/1.00	0/0.75	0
10	Utbredd last		0.40/1.00	0/0.40	0
11	Bromskraft		0.56/0.75	0/0.56	0
12	Sidokraft		0.56/0.75	0/0.56	0
13	Centrifugalkraft		0.56/0.75	0/0.56	0
	Lastmodell LM 2 :				
14	Enstaka axellast		0.75/1.00	0/0.75	0
	Typfordon EG A/B :				
15	Typfordon EG A/B		0.75/1.00	0/0.75	0
20	Bromskraft		0.56/0.75	0/0.56	0
22	Sidokraft		0.56/0.75	0/0.56	0
22	Centrifugalkraft		0.56/0.75	0/0.56	0
16	Temperatur		0.60/1.00	0.50/0.60	0.50
	Vindlaster:				
17	Vindlast mot bro		0.30/1.00	0/0.30	0
18	Vindlast mot trafik		0.30/1.00	0/0.30	0
19	Överlast		0.75/1.00	0/0.75	0

Lastkombination för utmattningskontroll

Kontrollen nedan avser förenklad kontroll enligt λ-metoden av betongkonstruktioner.

Lastkombination enligt ekvation SS-EN 1992-1-1 avsnitt 6.8.3 ekvation 6.69 :
(I denna laskombination anses trafiklasten utgöras av UTM varvid övriga trafiklaster utgår)

$$E_{Sd} = \sum_{j\geq 1} G_{k,j} + P + \psi_{1,1} \cdot Q_{k,1} + \sum_{i>1} \psi_{2,i} \cdot Q_{k,i} + Q_{fat} = \psi\gamma_{UTM} \cdot (\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} Q_{k,i} + Q_{fat})$$

Enligt SS-EN 1992-2 Bilaga NN 2.1 avser metoden kontroll av ULM3 enligt SS-EN 1991-2 avsnitt 4.6.4 :

$$Q_{fat} = Q_{ULM3}$$

Dimensionerande lastkombination UTM utmynnar uttryck enligt vid jämförelse av med frekvent lastkombination i bruksgränstillstånd (SLS:F):

$$E_{Sd} \approx \psi\gamma_{SLS.F} \cdot (\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} Q_{k,j}) + Q_{ULM3} = \psi\gamma_{UTM} \cdot (\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} Q_{k,i} + Q_{ULM3})$$

Nr	Last		$\psi\gamma_{UTM}$
	Permanenta laster		
1	Egentyngd	max	1.00
		min	1.00
2	Beläggning	max	1.00
		min	1.00
3	Överfyllnad	max	1.00
		min	1.00
4	Jordtryck	max	1.00
		min	1.00
5	Vattentryck	max	1.00
		min	1.00
6	Stödförskjutning	max	1.00
		min	1.00
7	Krympning	max	1.00
		min	1.00
8	Spännkraft	max	1.00
		min	1.00
	Variabla laster		
	Lastmodell LM 1 :		
9	Boggiesystem		-
10	Utbredd last		-
11	Bromskraft		-
12	Sidokraft		-
13	Centrifugalkraft		-
	Lastmodell LM 2 :		
14	Enstaka axellast		-
	Typfordon EG A/B :		
15	Typfordon EG A/B		-
20	Bromskraft		-
22	Sidokraft		-
22	Centrifugalkraft		-
16	Temperatur		0.60[a.)]
	Vindlaster:		
17	Vindlast mot bro		0.30[a.)]
18	Vindlast mot trafik		0.30[a.)]
19	Överlast		0.75[a.)]
23	ULM3		1.00

[a.)] Dessa laster är inte att betrakta som utmattningslaster vid bestämning av spänningsvidder.

Title: Input receipt

Model Units: kN,m,t,s,C
Report Units: kN,m,t,s,C

Model Title: System 001
Model File: System 001

Clarification of definitions.

In the report, the letter “T” is used to describe a range. The letter is an abbreviation of “to”.

See example of assignment below.

Assignment to Lines:
105T110;114T119

This expression means that the assignment occurs to the lines L105 → L110 and L114 → L119.

Assignment to Surfaces:
3T17;19T24
This expression means that the assignment occurs to the surfaces S3 → S17 and S19 → S24.

Table of Contents

1. Points

Point	X coordinate	Y coordinate	Z coordinate
28	-3,2	0,0	-4,7
34	-3,7	0,0	-4,7
100	-11,1	-4,0	5,5
101	-7,3	-4,0	5,5
102	-7,2	-4,0	5,5
103	-6,3	-4,0	5,5
104	-6,0	-4,0	5,5
105	-3,0	-4,0	5,5
106	0,0	-4,0	5,5
107	3,0	-4,0	5,5
108	6,0	-4,0	5,5
109	6,3	-4,0	5,5
110	7,2	-4,0	5,5
111	7,3	-4,0	5,5
112	11,1	-4,0	5,5
121	-6,3	-4,0	0,0
122	-6,3	-4,0	0,7
123	-6,3	-4,0	4,7
131	6,3	-4,0	0,0
132	6,3	-4,0	0,7
133	6,3	-4,0	4,7
200	-11,1	0,0	5,5
201	-7,3	0,0	5,5
202	-7,2	0,0	5,5
203	-6,3	0,0	5,5
204	-6,0	0,0	5,5
205	-3,0	0,0	5,5
206	0,0	0,0	5,5
207	3,0	0,0	5,5
208	6,0	0,0	5,5
209	6,3	0,0	5,5
210	7,2	0,0	5,5
211	7,3	0,0	5,5
212	11,1	0,0	5,5
221	-6,3	0,0	0,0
222	-6,3	0,0	0,7
223	-6,3	0,0	4,7
231	6,3	0,0	0,0
232	6,3	0,0	0,7
233	6,3	0,0	4,7
300	-11,1	4,0	5,5
301	-7,3	4,0	5,5
302	-7,2	4,0	5,5
303	-6,3	4,0	5,5
304	-6,0	4,0	5,5
305	-3,0	4,0	5,5
306	0,0	4,0	5,5
307	3,0	4,0	5,5
308	6,0	4,0	5,5
309	6,3	4,0	5,5
310	7,2	4,0	5,5
311	7,3	4,0	5,5
312	11,1	4,0	5,5
321	-6,3	4,0	0,0
322	-6,3	4,0	0,7
323	-6,3	4,0	4,7
331	6,3	4,0	0,0
332	6,3	4,0	0,7
333	6,3	4,0	4,7
400	-6,9	0,0	0,0
401	6,9	0,0	0,0

712	9,3	0,0	-0,1
721	9,8	0,0	-0,1
722	-10,0	-4,0	6,0
723	-10,0	-4,0	0,0
724	-10,0	4,0	6,0
725	-10,0	4,0	0,0
726	0,0	0,0	0,0
727	10,0	4,0	0,0
728	10,0	-4,0	0,0
729	10,0	-4,0	6,0
730	10,0	4,0	6,0
731	-10,0	4,0	3,0
732	-10,0	-4,0	3,0
733	10,0	4,0	3,0
734	10,0	-4,0	3,0
735	-10,0	0,0	6,0
736	-10,0	0,0	0,0
737	10,0	0,0	6,0
738	10,0	0,0	0,0
739	-12,0	0,0	5,5
743	12,0	0,0	5,5
744	-12,0	4,0	5,5
745	12,0	4,0	5,5
746	-12,0	-4,0	5,5
747	12,0	-4,0	5,5
748	-12,0	-1,5	5,5
749	12,0	-1,5	5,5
750	-12,0	1,5	5,5
751	12,0	1,5	5,5
752	-12,0	-0,5	5,5
753	12,0	-0,5	5,5
754	-12,0	2,5	5,5
755	12,0	2,5	5,5
756	-12,0	-2,5	5,5
757	12,0	-2,5	5,5
758	-12,0	0,5	5,5
759	12,0	0,5	5,5

2. Lines

Line	Points	Line	Points
10	739;743		
20	746;747	21	744;745
100	100;101	101	103;102
102	103;104	103	104;105
104	105;106	105	106;107
106	107;108	107	108;109
108	109;110	109	111;112
200	200;201	201	203;202
202	203;204	203	204;205
204	205;206	205	206;207
206	207;208	207	208;209
208	209;210	209	211;212
300	300;301	301	303;302
302	303;304	303	304;305
304	305;306	305	306;307
306	307;308	307	308;309
308	309;310	309	311;312
400	200;100	401	200;300
410	201;101	411	201;301
420	202;102	421	202;302
500	203;103	501	203;303
510	204;104	511	204;304
520	205;105	521	205;305
530	206;106	531	206;306
540	207;107	541	207;307
550	208;108	551	208;308
560	109;209	561	309;209
600	210;110	601	210;310
610	211;111	611	211;311
620	212;112	621	212;312
700	121;122	701	122;123
702	123;103	704	221;121
705	222;122	706	223;123
707	221;222	708	222;223
709	223;203	711	321;221
712	322;222	713	223;323
714	321;322	715	322;323
716	323;303	800	132;131
801	133;132	802	109;133
804	131;231	805	132;232
806	233;133	807	232;231
808	233;232	809	209;233
811	231;331	812	232;332
813	333;233	814	332;331
815	333;332	816	309;333
20	746;747	21	744;745
22	752;753	23	754;755
24	748;749	25	750;751
26	756;757	27	758;759

3. Surfaces

Surface	Lines	Surface	Lines
100	700;705;707;704	101	701;706;708;705
102	702;500;709;706	103	707;712;714;711
104	708;713;715;712	105	709;501;716;713
200	800;805;807;804	201	801;806;808;805
202	802;560;809;806	203	807;812;814;811
204	808;813;815;812	205	809;561;816;813
300	100;410;200;400	301	200;411;300;401
302	101;500;201;420	303	201;501;301;421
400	102;510;202;500	401	202;511;302;501
402	103;520;203;510	403	203;521;303;511
404	104;530;204;520	405	204;531;304;521
406	105;540;205;530	407	205;541;305;531
408	106;550;206;540	409	206;551;306;541
410	107;560;207;550	411	207;561;307;551
500	108;600;208;560	501	208;601;308;561
502	109;620;209;610	503	209;621;309;611

4. MESH:Line

Attribute: 7 Title: Element 8

Sub Type = Line Mesh **Element Type = BMI31**

Mesh spacing	**Nr. of elements**	**Start node end releases:**	**End node end releases:**
Uniform	8	None	None

Assignment to Lines: **Beta angle = 0,0**
704;711;804;811

5. MESH:Surface

Attribute: 3 Title: Element 6 x 8
Sub Type = Surface Mesh Element Type = QTS8

Property	**Symbol**	**Value**
Element size	size	0,0
Number of divisions in x	xDivisions	6
Number of divisions in y	yDivisions	8
Transition mesh	transition	false
Allow irregular mesh	allowIrregular	false
Element defined by name	DefinedByName	true
Single feature joint	isSingleFtrJnt	false

Assignment to Surfaces:
101;104;201;204;300;301;402T409;502;503

Attribute: 4 Title: Element 2 x 8
Sub Type = Surface Mesh Element Type = QTS8

Property	**Symbol**	**Value**
Element size	size	0,0
Number of divisions in x	xDivisions	2
Number of divisions in y	yDivisions	8
Transition mesh	transition	false
Allow irregular mesh	allowIrregular	false
Element defined by name	DefinedByName	true
Single feature joint	isSingleFtrJnt	false

Assignment to Surfaces:
100;102;103;105;200;202;203;205;302;303;400;401;410;411;500;501

6. MESH:Joint

Attribute: 1 Title: JNT4 (momentled)
Sub Type = Line Mesh **Element Type = JNT4**

Mesh spacing	**Nr. of elements**	**Start node end releases:**	**End node end releases:**
Uniform	8	None	None

Assignment to Lines: Beta angle = 0,0, Interface secondary Line 421, Mesh from primary to secondary
410;411;610;611

Attribute: 8 Title: JSH4 (support)
Sub Type = Point Mesh **Element Type = JSH4**

Property	**Symbol**	**Value**
Element defined by name	DefinedByName	false
Single feature joint	isSingleFtrJnt	false

Assignment to Points: Beta angle = 0,0, Interface secondary Point 220, Mesh from primary to secondary
400;401

7. Geometric : Line

Attribute: 1 Title: Rigid beam
Sub Type = Line Geometric
Assigned in: Analysis 1

Property	Symbol	Value
Cross sectional area	A	0,0
Second moment of area about y axis	Iyy	1000000,0
Second moment of area about z axis	Izz	1000000,0
Product moment of area	Iyz	0,0
Torsional constant	J	1000000,0
Eccentricity in local z direction, relative to specified origin	ez0	0,0
Eccentricity in local y direction, relative to specified origin	ey0	0,0
Eccentricity in local z direction, relative to beam centroid	ez	0,0
Eccentricity in local y direction, relative to beam centroid	ey	0,0
Wagner constant 1st moment of square radius about y (Iyr)	Iyr	0,0
Wagner constant 1st moment of square radius about z (Izr)	Izr	0,0
Wagner constant 4th moment of area about origin (Irr)	Irr	0,0
Wagner constant 2nd moment of warping about origin (Iwr)	Iwr	0,0
Effective shear area in local z direction	Asz	1000,0
Effective shear area in local y direction	Asy	1000,0
Radius of gyration about y axis	ky	31622,8
Radius of gyration about z axis	kz	31622,8
y axis extreme fibre, top	yt	0,0
y axis extreme fibre, bottom	yb	0,0
z axis extreme fibre, top	zt	0,0
z axis extreme fibre, bottom	zb	0,0
Shape code identifier	Type	-1
Element type	elementType	"3D Thick Beam"
Reinforcement	reinforcement	None

Assignment to Lines:
704;711;804;811

8. Geometric: Surface

Attribute: 2 Title: t1
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	Symbol	Value
Thickness	t	Funktion t1
Eccentricity in local z direction, relative to beam centroid	ez	0,0

Assignment to Surfaces:
100;103;200;203

Attribute: 3 Title: t2
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	Symbol	Value
Thickness	t	Funktion t2
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e2

Assignment to Surfaces:
101;104

Attribute: 4 Title: t3
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	Symbol	Value
Thickness	t	Funktion t3
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e3

Assignment to Surfaces:
102;105

Attribute: 5 Title: t4
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	Symbol	Value
Thickness	t	Funktion t4
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e4

Assignment to Surfaces:
400;401

Attribute: 6 Title: t5
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	Symbol	Value
Thickness	t	Funktion t5
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e5

Assignment to Surfaces:
402;403

Attribute: 7 Title: t6
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Thickness	t	0,7
Eccentricity in local z direction, relative to beam centroid	ez	0,0

Assignment to Surfaces:
404T407

Attribute: 8 Title: t7
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Thickness	t	Funktion t7
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e7

Assignment to Surfaces:
408;409

Attribute: 9 Title: t8
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Thickness	t	Funktion t8
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e8

Assignment to Surfaces:
410;411

Attribute: 10 Title: t9
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Thickness	t	Funktion t9
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e9

Assignment to Surfaces:
201;204

Attribute: 11 Title: t10
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Thickness	t	Funktion t10
Eccentricity in local z direction, relative to beam centroid	ez	Funktion e10

Assignment to Surfaces:
202;205

Attribute: 12 Title: t11
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Thickness	t	0,4
Eccentricity in local z direction, relative to beam centroid	ez	0,0

Assignment to Surfaces:
300;301;502;503

Attribute: 13 Title: t12
Sub Type = Surface Geometric
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Thickness	t	0,8
Eccentricity in local z direction, relative to beam centroid	ez	0,0

Assignment to Surfaces:
302;303;500;501

Attribute: 1 Title: Funktion t1
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"1.133 - 0.433 * u"

Attribute: 2 Title: Funktion t2
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"0.7 + 0.305 * u"

Attribute: 4 Title: Funktion t3
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"1.005 + 0.35 * u"

Attribute: 6 Title: Funktion t4
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"1.317 - u * 0.117"

Attribute: 7 Title: Funktion t5
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"1.2 - u * 0.5"

Attribute: 9 Title: Funktion t7
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"0.7 + u * 0.5"

Attribute: 10 Title: Funktion t8
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"1.2 + u * 0.117"

Attribute: 11 Title: Funktion t9
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"0.7 + u * 0.305"

Attribute: 12 Title: Funktion t10
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"1.005 + u * 0.35"

Attribute: 15 Title: Funktion e2
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"-u * 0.152"

Attribute: 16 Title: Funktion e3
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"-0.152 + 0.108 * u"

Attribute: 17 Title: Funktion e4
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"0.308 - u * 0.058"

Attribute: 20 Title: Funktion e5
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"0.25 - u * 0.25"

Attribute: 18 Title: Funktion e7
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"u * 0.25"

Attribute: 21 Title: Funktion e8
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"0.25 + 0.058 * u"

Attribute: 22 Title: Funktion e9
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"u * 0.152"

Attribute: 23 Title: Funktion e10
Sub Type = Surface Function Variation

Property	**Symbol**	**Value**
Function	function	"0.152 - u * 0.108"

9. Isotropic material

Attribute: 4 Title: Betong C35/45
Sub Type = Isotropic Material
Assigned in: Analysis 1

Property	Symbol	Value
Young's modulus	E	34000000,0
Poisson's ratio	nu	0,2
Density	rho	2,5
Coefficient of thermal expansion	alpha	0,0

Assignment to Lines:
704;711;804;811

Assignment to Surfaces:
100T105;200T205;300T303;400T411;500T503

10. Joint material

Attribute: 3 Title: JSO4 (momentled)
Sub Type = Joint Material, Spring Stiffness Only
Assigned in: Analysis 1

	u	**v**	**w**
K	1000000000000,0	1000000000000,0	1000000000000,0
Number of degrees of freedom	nDOF	3	3
Joint type	JointType	"Solids / 3D space membranes"	"Solids / 3D space membranes"
Assignment type	Assignment	"Line"	"Line"

Assignment to Lines:
410;411;420;421;600;601;610;611

Attribute: 1 Title: Joint (support)
Sub Type = Joint Material, Spring Stiffness Only
Assigned in: Analysis 1

	u	**v**	**w**	**THx**	**THy**	**THz**
	nDOF	6	6	6	6	6
Number of degrees of freedom						
Joint type	JointType	"3D beams and/or shells"		"3D beams and/or shells"		"3D beams and/or shells"
	"3D beams and/or shells"		"3D beams and/or shells"			
Assignment type	Assignment	"Point"	"Point"	"Point"	"Point"	"Point"
Elastic spring stiffness		K[0]	1,00000E9	1,00000E9	1,00000E9	1,00000E9
1,00000E9						
Elastic spring stiffness		K[1]	1,00000E9	1,00000E9	1,00000E9	1,00000E9
1,00000E9						
Elastic spring stiffness		K[2]	1,00000E9	1,00000E9	1,00000E9	1,00000E9
1,00000E9						
Elastic spring stiffness		K[3]	1,00000E9	1,00000E9	1,00000E9	1,00000E9
1,00000E9						
Elastic spring stiffness		K[4]	1,00000E9	1,00000E9	1,00000E9	1,00000E9
1,00000E9						
Elastic spring stiffness		K[5]	1,00000E9	1,00000E9	1,00000E9	1,00000E9
1,00000E9						

Assignment to Points:
220;400;401

11. Support

Attribute: 1 Title: Support lankplatta
Sub Type = Structural Support
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Translation in X	U	"F"
Translation in Y	V	"F"
Translation in Z	W	"R"
Rotation about X	THX	"F"
Rotation about Y	THY	"F"
Rotation about Z	THZ	"F"
Torsional warping	Torsion	"F"
Moment about hinge	L1	"F"
Pore pressure	pore	"C"

Assignment to Lines:
400;401;620;621

Attribute: 3 Title: Support 1
Sub Type = Structural Support
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Translation in X	U	"R"
Translation in Y	V	"R"
Translation in Z	W	"R"
Rotation about X	THX	"S"
Rotation about Y	THY	"S"
Rotation about Z	THZ	"R"
Torsional warping	Torsion	"F"
Moment about hinge	L1	"F"
Spring stiffness distribution	springType	"Total"
Stiffness in rotation about X	THXstiff	678000,0
Stiffness in rotation about Y	THYstiff	136000,0

Assignment to Points:
400

Attribute: 4 Title: Support 2
Sub Type = Structural Support
Assigned in: Analysis 1

Property	**Symbol**	**Value**
Translation in X	U	"R"
Translation in Y	V	"R"
Translation in Z	W	"R"
Rotation about X	THX	"S"
Rotation about Y	THY	"S"
Rotation about Z	THZ	"R"
Torsional warping	Torsion	"F"
Moment about hinge	L1	"F"
Spring stiffness distribution	springType	"Total"
Stiffness in rotation about X	THXstiff	678000,0
Stiffness in rotation about Y	THYstiff	136000,0

Assignment to Points:
401

12. Search Area

Attribute: 1 Title: Överbyggnad
Sub Type = Search Area

Assignment to Surfaces:
300T303;400T411;500T503

Attribute: 2 Title: Ramben 1
Sub Type = Search Area

Assignment to Surfaces:
100T105

Attribute: 3 Title: Ramben 2
Sub Type = Search Area

Assignment to Surfaces:
200T205

13. Global distributed

Attribute: 6 Title: EGEN 3
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	0,0
Z Direction	WZ	-6,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	0,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 9 Title: EGEN 3 Factor = 1
Assignment to Lines:
102T107;302T307

Attribute: 7 Title: EGEN 4
Sub Type = Body Force Load

Property	Symbol	Value
Linear acceleration in X	AccX	0,0
Linear acceleration in Y	AccY	0,0
Linear acceleration in Z	AccZ	-10,0
Angular velocity about X axis	AngVelX	0,0
Angular velocity about Y axis	AngVelY	0,0
Angular velocity about Z axis	AngVelZ	0,0
Angular acceleration about X axis	AngAccX	0,0
Angular acceleration about Y axis	AngAccY	0,0
Angular acceleration about Z axis	AngAccZ	0,0
Linear acceleration In X fluid phase	lnFlAccX	0,0
Linear acceleration In Y fluid phase	lnFlAccY	0,0
Linear acceleration In Z fluid phase	lnFlAccZ	-10,0

Loadcase ID: 10 Title: EGEN 4 Factor = 1
Assignment to Surfaces:
300T303;500T503

Attribute: 8 Title: EGEN 5
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	0,0
Z Direction	WZ	-38,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	0,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 11 Title: EGEN 5 Factor = 1
Assignment to Lines:
701;715;801;815

Attribute: 9 Title: BELAGG 1
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Area"
X Direction	WX	0,0
Y Direction	WY	0,0
Z Direction	WZ	-2,5
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 12 Title: BELAGG 1 Factor = 1
Assignment to Surfaces:
400T411

Attribute: 12 Title: BELAGG 2
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Area"
X Direction	WX	0,0
Y Direction	WY	0,0
Z Direction	WZ	-8,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 13 Title: BELAGG 2 Factor = 1
Assignment to Surfaces:
300;301;502;503

Attribute: 23 Title: BROMS+
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Area"
X Direction	WX	4,0
Y Direction	WY	0,0
Z Direction	WZ	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 68 Title: BROMS+ Factor = 1
Assignment to Surfaces:
402T409

Attribute: 24 Title: BROMS-
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Area"
X Direction	WX	-4,0
Y Direction	WY	0,0
Z Direction	WZ	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 69 Title: BROMS- Factor = 1
Assignment to Surfaces:
402T409

Attribute: 25 Title: SIDO+
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Area"
X Direction	WX	0,0
Y Direction	WY	1,0
Z Direction	WZ	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 70 Title: SIDO+ Factor = 1
Assignment to Surfaces:
402T409

Attribute: 26 Title: SIDO-
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Area"
X Direction	WX	0,0
Y Direction	WY	-1,0
Z Direction	WZ	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 71 Title: SIDO- Factor = 1
Assignment to Surfaces:
402T409

Attribute: 27 Title: JORD 3-1
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	29,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	-77,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 73 Title: JORD 3-1 Factor = 1
Assignment to Lines:
715

Attribute: 28 Title: JORD 3-2
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	-29,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	77,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 74 Title: JORD 3-2 Factor = 1
Assignment to Lines:
701

Attribute: 30 Title: JORD 3-3
Sub Type = Global Distributed Load

Property	**Symbol**	**Value**
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	29,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	77,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 77 Title: JORD 3-3 Factor = 1
Assignment to Lines:
815

Attribute: 31 Title: JORD 3-4
Sub Type = Global Distributed Load

Property	**Symbol**	**Value**
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	-29,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	-77,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 78 Title: JORD 3-4 Factor = 1
Assignment to Lines:
801

Attribute: 32 Title: OVER 3-1
Sub Type = Global Distributed Load

Property	**Symbol**	**Value**
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	8,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	-14,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 75 Title: OVER 3-1 Factor = 1
Assignment to Lines:
715

Attribute: 33 Title: OVER 3-2
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	-8,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	14,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 76 Title: OVER 3-2 Factor = 1
Assignment to Lines:
701

Attribute: 34 Title: OVER 3-3
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	8,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	14,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 79 Title: OVER 3-3 Factor = 1
Assignment to Lines:
815

Attribute: 35 Title: OVER 3-4
Sub Type = Global Distributed Load

Property	Symbol	Value
Attribute type	type	"Length"
X Direction	WX	0,0
Y Direction	WY	-8,0
Z Direction	WZ	0,0
Moment about X axis	MX	0,0
Moment about Y axis	MY	0,0
Moment about Z axis	MZ	-14,0
Moment about hinge nodes	Hinge	0,0
Pore pressure flux	pwp	0,0
Keep global	keepGlobal	false

Loadcase ID: 80 Title: OVER 3-4 Factor = 1
Assignment to Lines:
801

14. Body load

Attribute: 4 Title: EGEN 1

Sub Type = Body Force Load

Property	**Symbol**	**Value**
Linear acceleration in X	AccX	0,0
Linear acceleration in Y	AccY	0,0
Linear acceleration in Z	AccZ	-10,0
Angular velocity about X axis	AngVelX	0,0
Angular velocity about Y axis	AngVelY	0,0
Angular velocity about Z axis	AngVelZ	0,0
Angular acceleration about X axis	AngAccX	0,0
Angular acceleration about Y axis	AngAccY	0,0
Angular acceleration about Z axis	AngAccZ	0,0
Linear acceleration In X fluid phase	lnFlAccX	0,0
Linear acceleration In Y fluid phase	lnFlAccY	0,0
Linear acceleration In Z fluid phase	lnFlAccZ	-10,0

Loadcase ID: 7 Title: EGEN 1 Factor = 1
Assignment to Surfaces:
101;104;201;204

Attribute: 5 Title: EGEN 2
Sub Type = Body Force Load

Property	**Symbol**	**Value**
Linear acceleration in X	AccX	0,0
Linear acceleration in Y	AccY	0,0
Linear acceleration in Z	AccZ	-10,0
Angular velocity about X axis	AngVelX	0,0
Angular velocity about Y axis	AngVelY	0,0
Angular velocity about Z axis	AngVelZ	0,0
Angular acceleration about X axis	AngAccX	0,0
Angular acceleration about Y axis	AngAccY	0,0
Angular acceleration about Z axis	AngAccZ	0,0
Linear acceleration In X fluid phase	lnFlAccX	0,0
Linear acceleration In Y fluid phase	lnFlAccY	0,0
Linear acceleration In Z fluid phase	lnFlAccZ	-10,0

Loadcase ID: 8 Title: EGEN 2 Factor = 1
Assignment to Surfaces:
402T409

15. Prescribed load

Attribute: 13 Title: STOD_1Z

Sub Type = Prescribed Load

Property	Symbol	Value
Attribute type	type	"Total"
Prescribed displacement in X	U	0,0
Prescribed displacement in Y	V	0,0
Prescribed displacement in Z	W	0,0
Prescribed rotation about X	THX	0,0
Prescribed rotation about Y	THY	0,0
Prescribed rotation about Z	THZ	0,0
Prescribed hinge rotation	L2	0,0
Pore pressure	PorePressure	0,0
Fixed displacement in X	haveDispX	false
Fixed displacement in Y	haveDispY	false
Fixed displacement in Z	haveDispZ	true
Fixed rotation about X	haveRotX	false
Fixed rotation about Y	haveRotY	false
Fixed rotation about Z	haveRotZ	false
Fixed hinge rotation	haveRotLocal	false
Fixed pore pressure	havePorePres	false

Loadcase ID: 16 Title: STOD_1Z Factor = 1
Assignment to Points:
400

Attribute: 14 Title: STOD_2Z
Sub Type = Prescribed Load

Property	Symbol	Value
Attribute type	type	"Total"
Prescribed displacement in X	U	0,0
Prescribed displacement in Y	V	0,0
Prescribed displacement in Z	W	0,0
Prescribed rotation about X	THX	0,0
Prescribed rotation about Y	THY	0,0
Prescribed rotation about Z	THZ	0,0
Prescribed hinge rotation	L2	0,0
Pore pressure	PorePressure	0,0
Fixed displacement in X	haveDispX	false
Fixed displacement in Y	haveDispY	false
Fixed displacement in Z	haveDispZ	true
Fixed rotation about X	haveRotX	false
Fixed rotation about Y	haveRotY	false
Fixed rotation about Z	haveRotZ	false
Fixed hinge rotation	haveRotLocal	false
Fixed pore pressure	havePorePres	false

Loadcase ID: 17 Title: STOD_2Z Factor = 1
Assignment to Points:
401

Attribute: 15 Title: STOD_1X
Sub Type = Prescribed Load

Property	**Symbol**	**Value**
Attribute type	type	"Total"
Prescribed displacement in X	U	0,0
Prescribed displacement in Y	V	0,0
Prescribed displacement in Z	W	0,0
Prescribed rotation about X	THX	0,0
Prescribed rotation about Y	THY	0,0
Prescribed rotation about Z	THZ	0,0
Prescribed hinge rotation	L2	0,0
Pore pressure	PorePressure	0,0
Fixed displacement in X	haveDispX	true
Fixed displacement in Y	haveDispY	false
Fixed displacement in Z	haveDispZ	false
Fixed rotation about X	haveRotX	false
Fixed rotation about Y	haveRotY	false
Fixed rotation about Z	haveRotZ	false
Fixed hinge rotation	haveRotLocal	false
Fixed pore pressure	havePorePres	false

Loadcase ID: 18 Title: STOD_1X+ Factor = 1
Assignment to Points:
400

Attribute: 16 Title: STOD_2X
Sub Type = Prescribed Load

Property	**Symbol**	**Value**
Attribute type	type	"Total"
Prescribed displacement in X	U	0,0
Prescribed displacement in Y	V	0,0
Prescribed displacement in Z	W	0,0
Prescribed rotation about X	THX	0,0
Prescribed rotation about Y	THY	0,0
Prescribed rotation about Z	THZ	0,0
Prescribed hinge rotation	L2	0,0
Pore pressure	PorePressure	0,0
Fixed displacement in X	haveDispX	true
Fixed displacement in Y	haveDispY	false
Fixed displacement in Z	haveDispZ	false
Fixed rotation about X	haveRotX	false
Fixed rotation about Y	haveRotY	false
Fixed rotation about Z	haveRotZ	false
Fixed hinge rotation	haveRotLocal	false
Fixed pore pressure	havePorePres	false

Loadcase ID: 19 Title: STOD_2X+ Factor = 1
Assignment to Points:
401

16. Temperature and shrinkage load

Attribute: 17 Title: KRYMP
Sub Type = Temperature Load

Property	Symbol	Value
Attribute type	type	"nodal"
Final temperature	T	-24,0
Final X temperature gradient	dT/dX	0,0
Final Y temperature gradient	dT/dY	0,0
Final Z temperature gradient	dT/dZ	0,0
Initial temperature	T0	0,0
Initial X temperature gradient	dT0/dX	0,0
Initial Y temperature gradient	dT0/dY	0,0
Initial Z temperature gradient	dT0/dZ	0,0

Loadcase ID: 20 Title: KRYMP Factor = 1
Assignment to Surfaces:
100T105;200T205;400T411

Attribute: 18 Title: JTEMP+
Sub Type = Temperature Load

Property	Symbol	Value
Attribute type	type	"nodal"
Final temperature	T	24,0
Final X temperature gradient	dT/dX	0,0
Final Y temperature gradient	dT/dY	0,0
Final Z temperature gradient	dT/dZ	0,0
Initial temperature	T0	0,0
Initial X temperature gradient	dT0/dX	0,0
Initial Y temperature gradient	dT0/dY	0,0
Initial Z temperature gradient	dT0/dZ	0,0

Loadcase ID: 23 Title: JTEMP+ Factor = 1
Assignment to Surfaces:
100T105;200T205;400T411

Attribute: 19 Title: JTEMP-
Sub Type = Temperature Load

Property	Symbol	Value
Attribute type	type	"nodal"
Final temperature	T	-44,0
Final X temperature gradient	dT/dX	0,0
Final Y temperature gradient	dT/dY	0,0
Final Z temperature gradient	dT/dZ	0,0
Initial temperature	T0	0,0
Initial X temperature gradient	dT0/dX	0,0
Initial Y temperature gradient	dT0/dY	0,0
Initial Z temperature gradient	dT0/dZ	0,0

Loadcase ID: 24 Title: JTEMP- Factor = 1
Assignment to Surfaces:
100T105;200T205;400T411

Attribute: 20 Title: OJTEMP 1+
Sub Type = Temperature Load

Property	Symbol	Value
Attribute type	type	"element"
Final temperature	T	0,0
Final X temperature gradient	dT/dX	0,0
Final Y temperature gradient	dT/dY	0,0
Final Z temperature gradient	dT/dZ	14,0
Initial temperature	T0	0,0
Initial X temperature gradient	dT0/dX	0,0
Initial Y temperature gradient	dT0/dY	0,0
Initial Z temperature gradient	dT0/dZ	0,0

Loadcase ID: 25 Title: OJTEMP:1+ Factor = 1
Assignment to Surfaces:
400T411

Attribute: 21 Title: OJTEMP 1-
Sub Type = Temperature Load

Property	Symbol	Value
Attribute type	type	"element"
Final temperature	T	0,0
Final X temperature gradient	dT/dX	0,0
Final Y temperature gradient	dT/dY	0,0
Final Z temperature gradient	dT/dZ	-11,0
Initial temperature	T0	0,0
Initial X temperature gradient	dT0/dX	0,0
Initial Y temperature gradient	dT0/dY	0,0
Initial Z temperature gradient	dT0/dZ	0,0

Loadcase ID: 26 Title: OJTEMP:1- Factor = 1
Assignment to Surfaces:
400T411

Attribute: 22 Title: OJTEMP 2
Sub Type = Temperature Load

Property	Symbol	Value
Attribute type	type	"element"
Final temperature	T	4,0
Final X temperature gradient	dT/dX	0,0
Final Y temperature gradient	dT/dY	0,0
Final Z temperature gradient	dT/dZ	0,0
Initial temperature	T0	0,0
Initial X temperature gradient	dT0/dX	0,0
Initial Y temperature gradient	dT0/dY	0,0
Initial Z temperature gradient	dT0/dZ	0,0

Loadcase ID: 27 Title: OJTEMP 2+ Factor = 1
Assignment to Surfaces:
400T411

17. Discrete patch load

Symbol	Property
patchType	Patch type
sweptAngle	Swept angle
xDivisions	Number of local x divisions
yDivisions	Number of local y divisions
dirType	Load direction
pDir	Projection vector
nGridX	X Grid size
nGridY	Y Grid size
pos	Coordinates
P	Load

Attribute: 1 Title: JORD 1
Sub Type = Discrete Patch Load
Patch type: 4-noded quadrilateral

dirType	pDir_x	pDir_y	pDir_z	nGridX	nGridY
X	0,0	0,0	1,0	0	0

pos_x	pos_y	pos_z	Px
-10,0	-4,0	0,0	35,0
-10,0	-4,0	5,96	0,0
-10,0	4,0	5,96	0,0
-10,0	4,0	0,0	35,0

Loadcase ID: 14 Title: JORD 1 Factor = 1
Patch transformation = None Load transformation = None
Search area=Ramben 1
Moving status = Include Full Load Assign type = area
Include moments All
Assignment to Points:
726

Attribute: 2 Title: JORD 2
Sub Type = Discrete Patch Load
Patch type: 4-noded quadrilateral

dirType	**pDir_x**	**pDir_y**	**pDir_z**	**nGridX**	**nGridY**
X	0,0	0,0	1,0	0	0

pos_x	**pos_y**	**pos_z**	**Px**
10,0	-4,0	0,0	-35,0
10,0	-4,0	5,96	0,0
10,0	4,0	5,96	0,0
10,0	4,0	0,0	-35,0

Loadcase ID: 15 Title: JORD 2 Factor = 1
Patch transformation = None Load transformation = None
Search area=Ramben 2
Moving status = Include Full Load Assign type = area
Include moments All
Assignment to Points:
726

Attribute: 3 Title: OVER 1
Sub Type = Discrete Patch Load
Patch type: 4-noded quadrilateral

dirType	**pDir_x**	**pDir_y**	**pDir_z**	**nGridX**	**nGridY**
X	0,0	0,0	1,0	0	0

pos_x	**pos_y**	**pos_z**	**Px**
-10,0	4,0	0,0	6,0
-10,0	-4,0	0,0	6,0
-10,0	-4,0	5,96	6,0
-10,0	4,0	5,96	6,0

Loadcase ID: 28 Title: OVER 1 Factor = 1
Patch transformation = None Load transformation = None
Search area=Ramben 1
Moving status = Include Full Load Assign type = area
Include moments All
Assignment to Points:
726

Attribute: 10 Title: OVER 2
Sub Type = Discrete Patch Load
Patch type: 4-noded quadrilateral

dirType	pDir_x	pDir_y	pDir_z	nGridX	nGridY
X	0,0	0,0	1,0	0	0

pos_x	pos_y	pos_z	Px
10,0	4,0	0,0	-6,0
10,0	-4,0	0,0	-6,0
10,0	-4,0	5,96	-6,0
10,0	4,0	5,96	-6,0

Loadcase ID: 29 Title: OVER 2 Factor = 1
Patch transformation = None Load transformation = None
Search area=Ramben 2
Moving status = Include Full Load Assign type = area
Include moments All
Assignment to Points:
726

Attribute: 11 Title: DELTA P-1
Sub Type = Discrete Patch Load
Patch type: 8-noded quadrilateral

dirType	pDir_x	pDir_y	pDir_z	nGridX	nGridY
X	0,0	0,0	1,0	0	0

pos_x	pos_y	pos_z	Px
-10,0	4,0	0,0	0,0
-10,0	0,0	0,0	0,0
-10,0	-4,0	0,0	0,0
-10,0	-4,0	2,98	36,0
-10,0	-4,0	5,96	0,0
-10,0	0,0	5,96	0,0
-10,0	4,0	5,96	0,0
-10,0	4,0	2,98	36,0

Loadcase ID: 21 Title: DELTA P-1 Factor = 1
Patch transformation = None Load transformation = None
Search area=Ramben 1
Moving status = Include Full Load Assign type = area
Include moments All
Assignment to Points:
726

Attribute: 29 Title: DELTA P-2
Sub Type = Discrete Patch Load
Patch type: 8-noded quadrilateral

dirType	**pDir_x**	**pDir_y**	**pDir_z**	**nGridX**	**nGridY**
X	0,0	0,0	1,0	0	0

pos_x	**pos_y**	**pos_z**	**Px**
10,0	4,0	0,0	0,0
10,0	0,0	0,0	0,0
10,0	-4,0	0,0	0,0
10,0	-4,0	2,98	-36,0
10,0	-4,0	5,96	0,0
10,0	0,0	5,96	0,0
10,0	4,0	5,96	0,0
10,0	4,0	2,98	-36,0

Loadcase ID: 22 Title: DELTA P-2 Factor = 1
Patch transformation = None Load transformation = None
Search area=Ramben 2
Moving status = Include Full Load Assign type = area
Include moments All
Assignment to Points:
726

18. Direct Method Influence Envelope

Attribute: 1 Title: Inf1 - Reactions
Sub Type = Direct method influence
Entity: Reactions
Directions: FX, FY, FZ, MX, MY
Assignment to Points:
400;401

Attribute: 2 Title: Inf2 – Shell elements
Sub Type = Direct method influence
Entity: Force/Moment – Thick Shell
D**irections:** Sx, Mx, My
A**ssignment to Surfaces:**
100T105, 200T205;400T411;

19. Load groups: traffic

Load groups : Eurocode Load Modell 1 (LM1)
Type: Tandem axle
Axle load - lane 1: 300 kN
Axle load - lane 2: 200 kN
Axel load - lane 3: 100 kN

Lane load
Surface load - lane 1: 9.0 kPa
Surface load - remaining: 2.5 kPa

Load groups : Eurocode Load Modell 2 (LM2)
Type: Single axle
Axle load: 400 kN

Load groups : Fatigue modell 3 (UTM3)
Type: Quadruple axel
Axle load: 120 kN

20. VLO Analysis

Type: VLO – LM1 ~ Characteristic
Representative values : Charateristic
Design code : EN 1991-2 Sweden 2011
Load groups : LM1
Longitudinal increment : 0.50 m
Transverse increment : 0.50 m
Vehicule direction : Both
Kerbs : L20, L21
UDL alfa factor : 0.8, 1, 1 , 1, 1
TS alfa factor : 0.9, 0.9,0
Influence attributes :
Inf 1 - Reactions
Inf 2 - Shell elements

Type: VLO – LM2 ~ Characteristic
Representative values : Charateristic
Design code : EN 1991-2 Sweden 2011
Load groups : LM2
Longitudinal increment : 0.50 m
Transverse increment : 0.50 m
Vehicule direction : Both
Kerbs : L20, L21
TS alfa factor : 0.9
Influence attributes :
Inf 1 - Reactions
Inf 2 - Shell elements

Type: VLO – UTM3 ~ Characteristic
Representative values : Charateristic
Design code : EN 1991-2 Sweden 2011
Load groups : UTM3
Longitudinal increment : 0.50 m
Transverse increment : 0.50 m
Vehicule direction : Both
Kerbs : L20, L21
Influence attributes :
Inf 1 - Reactions
Inf 2 - Shell elements

Type: VLO – EG A ~ Characteristic
Representative values : Charateristic
Design code : EN 1991-2 Sweden 2011
Load groups : Complementary load modell
Dynamic amplification : 25 %
Load model value A : 180 kN
Load model value B : 300 kN
Load modell valute q : 5 kN/m
Lane vehicule factor most onerous lane : 1.0
Lane vehicule factor second lane : 0.8
Type vehicules : a
Longitudinal increment : 0.50 m
Transverse increment : 0.50 m
Vehicule direction : Both
Kerbs : L20, L21
Minimum width vehicule : 2.0 m
Maximum width vehicle : 2.0 m
Influence attributes :
Inf 1 - Reactions
Inf 2 - Shell elements

Type: VLO – EG B ~ Characteristic
Representative values : Charateristic
Design code : EN 1991-2 Sweden 2011
Load groups : Complementary load modell
Dynamic amplification : 25 %
Load model value A : 180 kN
Load model value B : 300 kN
Load modell valute q : 5 kN/m
Lane vehicule factor most onerous lane : 1.0
Lane vehicule factor second lane : 0.8
Type vehicules : b, c, d, e, f, g,h,I,j,k,l,m,n,o
Longitudinal increment : 0.50 m
Transverse increment : 0.50 m
Vehicule direction : Both
Kerbs : L20, L21
Minimum width vehicule : 2.0 m
Maximum width vehicle : 2.0 m
Influence attributes :
Inf 1 - Reactions
Inf 2 - Shell elements

21. Basic combination

Loadcase ID: 91 Title: EGEN
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
7	0	1,0	EGEN 1
8	0	1,0	EGEN 2
9	0	1,0	EGEN 3
10	0	1,0	EGEN 4
11	0	1,0	EGEN 5

Loadcase ID: 92 Title: BELAGG
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
12	0	1,0	BELAGG 1
13	0	1,0	BELAGG 2

Loadcase ID: 93 Title: JORD
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
14	0	1,0	JORD 1
15	0	1,0	JORD 2
73	0	1,0	JORD 3-1
74	0	1,0	JORD 3-2
75	0	1,0	JORD 3-3
76	0	1,0	JORD 3-4

Loadcase ID: 94 Title: STOD_1X-
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
18	0	-1,0	STOD_1X+

Loadcase ID: 95 Title: STOD_2X-
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
19	0	-1,0	STOD_2X+

Loadcase ID: 108 Title: DELTA P
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
21	0	1,0	DELTA P-1
22	0	1,0	DELTA P-2

Loadcase ID: 109 Title: OJTEMP 2-
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
27	0	-1,0	OJTEMP 2+

Loadcase ID: 112 Title: JTEMP MAX
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
23	0	1,0	JTEMP+

Loadcase ID: 113 Title: JTEMP MIN
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
24	0	1,0	JTEMP-

Loadcase ID: 126 Title: TEMP-ULS
Sub Type: Basic Combination

Loadcase File	Results Factor	Title	Type
108	0	1,0	DELTA P

22. Smart combination

Loadcase ID: 98 Title: STOD-Z
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
16	0	0,0	1,0	STOD_1Z
17	0	0,0	1,0	STOD_2Z

Loadcase ID: 106 Title: OVER
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
28	0	0,0	1,0	OVER 1
29	0	0,0	1,0	OVER 2
77	0	0,0	1,0	OVER 3-1
78	0	0,0	1,0	OVER 3-2
79	0	0,0	1,0	OVER 3-3
80	0	0,0	1,0	OVER 3-4

Loadcase ID: 116 Title: TEMP-1
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
114	0	0,0	0,47	JTEMP (Max)
115	0	0,0	0,47	JTEMP (Min)
120	0	0,0	0,45	OJTEMP 1 (Max)
121	0	0,0	0,45	OJTEMP 1 (Min)
108	0	0,0	1,0	DELTA P

Loadcase ID: 118 Title: TEMP-2
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
114	0	0,0	0,16	JTEMP (Max)
115	0	0,0	0,16	JTEMP (Min)
120	0	0,0	0,6	OJTEMP 1 (Max)
121	0	0,0	0,6	OJTEMP 1 (Min)
108	0	0,0	1,0	DELTA P

Loadcase ID: 122 Title: TEMP-3
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase Factor File	**Results Title Permanent**	**Type Factor**	**Variable Factor**	**Title**
114	0	0,0	0,46	JTEMP (Max)
115	0	0,0	0,46	JTEMP (Min)
110	0	0,0	0,6	OJTEMP 2 (Max)
111	0	0,0	0,6	OJTEMP 2 (Min)
108	0	0,0	1,0	DELTA P

Loadcase ID: 127 Title: ULS-PERM
Sub s46Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	**Results Permanent**	**Factor**	**Variable Factor**	**Title**
91	0	1,0	0,09	EGEN
92	0	0,9	0,31	BELAGG
93	0	0,9	0,55	JORD
100	0	0,0	0,22	STOD (Max)
101	0	0,0	0,22	STOD (Min)
20	0	0,0	0,22	KRYMP

Loadcase ID: 129 Title: ULS-VAR
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: 1

Loadcase File	**Results Permanent**	**Factor**	**Variable Factor**	**Title**
131	0	1,03	0,34	TRAFIK (Max)
132	0	1,03	0,34	TRAFIK (Min)
102	0	0,76	0,27	BROMS (Max)
103	0	0,76	0,27	BROMS (Min)
104	0	0,76	0,27	SIDO (Max)
105	0	0,76	0,27	SIDO (Min)
126	0	0,82	0,55	TEMP-ULS
106	0	1,03	0,67	OVER (Max)
107	0	1,03	0,67	OVER (Min)

Loadcase ID: 133 Title: ULS
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	**Results Permanent**	**Factor**	**Variable Factor**	**Title**
127	0	1,0	0,0	ULS-PERM (Max)
128	0	1,0	0,0	ULS-PERM (Min)
129	0	0,0	1,0	ULS-VAR (Max)
130	0	0,0	1,0	ULS-VAR (Min)

Loadcase ID: 135 Title: SLS-PERM
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	**Results**	**Permanent Factor**	**Variable Factor**	**Title**
91	0	1,00	0,0	EGEN
92	0	0,90	0,20	BELAGG
93	0	0,90	0,45	JORD
100	0	0,0	0,22	STOD (Max)
101	0	0,0	0,22	STOD (Min)
20	0	0,0	0,22	KRYMP

Loadcase ID: 137 Title: SLS-K-VAR
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: 1

Loadcase File	**Results**	**Permanent Factor**	**Variable Factor**	**Title**
131	0	0,75	0,25	TRAFIK (Max)
132	0	0,75	0,25	TRAFIK (Min)
102	0	0,56	0,19	BROMS (Max)
103	0	0,56	0,19	BROMS (Min)
104	0	0,56	0,19	SIDO (Max)
105	0	0,56	0,19	SIDO (Min)
124	0	0,6	0,40	TEMP (Max)
125	0	0,6	0,40	TEMP (Min)
106	0	0,75	0,50	OVER (Max)
107	0	0,75	0,50	OVER (Min)

Loadcase ID: 139 Title: SLS-F-VAR
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	**Results**	**Permanent Factor**	**Variable Factor**	**Title**
131	0	0,0	0,75	TRAFIK (Max)
132	0	0,0	0,75	TRAFIK (Min)
102	0	0,0	0,56	BROMS (Max)
103	0	0,0	0,56	BROMS (Min)
104	0	0,0	0,56	SIDO (Max)
105	0	0,0	0,56	SIDO (Min)
124	0	0,0	0,60	TEMP (Max)
125	0	0,0	0,60	TEMP (Min)
106	0	0,0	0,95	OVER (Max)
107	0	0,0	0,95	OVER (Min)

Loadcase ID: 141 Title: SLS-F
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
135	0	1,0	0,0	SLS-PERM (Max)
136	0	1,0	0,0	SLS-PERM (Min)
139	0	0,0	1,0	SLS-F-VAR (Max)
140	0	0,0	1,0	SLS-F-VAR (Min)

Loadcase ID: 143 Title: SLS-K
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
135	0	1,0	0,0	SLS-PERM (Max)
136	0	1,0	0,0	SLS-PERM (Min)
137	0	0,0	1,0	SLS-K-VAR (Max)
138	0	0,0	1,0	SLS-K-VAR (Min)

Loadcase ID: 145 Title: SLS-Q
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
135	0	1,0	0,0	SLS-PERM (Max)
136	0	1,0	0,0	SLS-PERM (Min)
124	0	0,0	0,5	TEMP (Max)
125	0	0,0	0,5	TEMP (Min)

Loadcase ID: 147 Title: FAT
Sub Type: Smart Combination
Loadcases to consider: All
Variable Loadcases: All

Loadcase File	Results	Permanent Factor	Variable Factor	Title
91	0	1,0	0,0	EGEN
92	0	1,0	0,0	BELAGG
93	0	1,0	0,0	JORD
149	0	0,0	1,0	UTM (Max)
150	0	0,0	1,0	UTM (Min)

23. Envelopes

Loadcase ID: 96 Title: STOD-X
Sub Type: Envelope

Loadcase File	Results Title	Type
18	0	STOD_1X+
19	0	STOD_2X+
94	0	STOD_1X-
95	0	STOD_2X-

Loadcase ID: 100 Title: STOD
Sub Type: Envelope

Loadcase File	Results Title	Type
98	0	STOD-Z (Max)
99	0	STOD-Z (Min)
96	0	STOD-X (Max)
97	0	STOD-X (Min)

Loadcase ID: 102 Title: BROMS
Sub Type: Envelope

Loadcase File	Results Title	Type
68	0	BROMS+
69	0	BROMS-

Loadcase ID: 104 Title: SIDO
Sub Type: Envelope

Loadcase File	Results Title	Type
70	0	SIDO+
71	0	SIDO-

Loadcase ID: 110 Title: OJTEMP 2
Sub Type: Envelope

Loadcase File	Results Title	Type
27	0	OJTEMP 2+
109	0	OJTEMP 2-

Loadcase ID: 114 Title: JTEMP
Sub Type: Envelope

Loadcase File	Results Title	Type
112	0	JTEMP MAX
113	0	JTEMP MIN

Loadcase ID: 120 Title: OJTEMP 1
Sub Type: Envelope

Loadcase File	Results Title	Type
25	0	OJTEMP:1+
26	0	OJTEMP:1-

Loadcase ID: 124 Title: TEMP
Sub Type: Envelope

Loadcase File	Results Title	Type
116	0	TEMP-1 (Max)
117	0	TEMP-1 (Min)
118	0	TEMP-2 (Max)
119	0	TEMP-2 (Min)
122	0	TEMP-3 (Max)
123	0	TEMP-3 (Min)

Loadcase ID: 4682 Title: EG A
Sub Type: Envelope

Loadcase File	Results Title	Type
2895	0	VLO – EG A ~ Characteristic

Loadcase ID: 4684 Title: EG B
Sub Type: Envelope

Loadcase File	Results Title	Type
3297	0	VLO – EG B ~ Characteristic

Loadcase ID: 4686 Title: UTM3
Sub Type: Envelope

Loadcase File	Results Title	Type
4503	0	VLO – UTM3 ~ Characteristic

Loadcase ID: 4634 Title: LM1
Sub Type: Envelope

Loadcase File	Results Title	Type
3699	0	VLO – LM1 ~ Characteristic

Loadcase ID: 4636 Title: LM2
Sub Type: Envelope

Loadcase File	Results Title	Type
3699	0	VLO – LM1 ~ Characteristic

Loadcase ID: 4636 Title: TRAFIK
Sub Type: Envelope

Loadcase File	Results Title	Type
4682	0	EG A (Max)
4683	0	EG A (Min)
4684	0	EG B (Max)
4685	0	EG B (Min)
4634	0	LM1 (Max)
4635	0	LM1 (Min)
4636	0	LM2 (Max)
4637	0	LM2 (Min)