

RODOVIA : PE-060
TRECHO : DIV. PB/PE - DIV. PE/AL
SUBTRECHO : Entr. BR-101 (Cabo) – Entr. Acesso à SUAPE

PROJETO EXECUTIVO DE ENGENHARIA PARA CONSTRUÇÃO DE DUAS OBRAS DE ARTE ESPECIAIS (VIADUTOS) E DA FUNDAÇÃO DE ATERRO DOS ENCONTROS, NUMA EXTENSÃO TOTAL DE 103,4 m (CADA UMA) A SER CONSTRUÍDA NA CIDADE DO CABO DE SANTO AGOSTINHO.

VOLUME 3C - MEMÓRIA DE CÁLCULO DE ESTRUTURA

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VOLUME 3C - MEMÓRIA DE CÁLCULO DE ESTRUTURA

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1. APRESENTAÇÃO

A CONSULPLAN - Consultoria e Planejamento Ltda., situada a Av. Engenheiro Alves de Souza, 709 – Imbiribeira - Recife/PE, inscrita no CNPJ/MF sob o N° 07.283.395/0001-26, Fone (081) 3339.2300, e-mail consulplan@consulplan.eng.br, apresenta a Secretaria Estadual de Turismo – SETUR/PE, Volume 3C – Memória de Cálculo de Estrutura, referente à Elaboração do Projeto Executivo de Engenharia para Construção de duas Obras de Arte Especiais (viadutos) e da Fundação de Aterro dos Encontros, numa extensão aproximada de 103,0m (cada) a ser construída na Cidade do Cabo de Santo Agostinho

Os principais elementos que caracterizam o contrato são:

Edital Tomada de Preços	: N° 003/2011
Data da Proposta	: 29/08/2011
Data da Assinatura do Contrato	: 01/09/2011
Contrato n.º	: 14/2011
Início dos Serviços	: 02/09/2011

O Projeto está sendo apresentado nos volumes discriminados a seguir:

- Volume 1: Relatório do Projeto
- Volume 2: Projeto de Execução
- Volume 3: Memória Justificativa
- Volume 3B: Estudos Geotécnicos
- Volume 3C: Memória de Cálculo de Estruturas
- Volume 4: Orçamento e Plano de Execução das Obras

Volume 1 – Relatório do Projeto

Contém a síntese das metodologias adotadas, soluções e resultados encontrados para os diversos itens componentes do Projeto. Tem a finalidade de dar uma visão geral do Projeto e reúne também as especificações gerais, particulares e complementares. É apresentado em formato A-4.

Volume 2 – Projeto de Execução

Contém as plantas, desenhos tipos, listagens de serviços e croquis necessários à execução da obra. É apresentado em formato A-3.

Volume 3 – Memória Justificativa

Contém as justificativas das soluções adotadas, descrevendo claramente as metodologias utilizadas e os resultados encontrados. Destina-se essencialmente, ao exame do DER, servindo posteriormente como elemento de consulta na fase de execução da obra. É apresentado em formato A-4.

Volume 3B – Estudos Geotécnicos

Contém os resultados das sondagens e dos ensaios efetuados, com os materiais do pavimento existente e com os materiais estudados para serem utilizados nas diversas fases da construção. É apresentado em formato A-4.

Volume 3C – Memória de Cálculo de Estruturas

Contém todas as memórias de cálculo da estrutura. É apresentado em formato A-4.

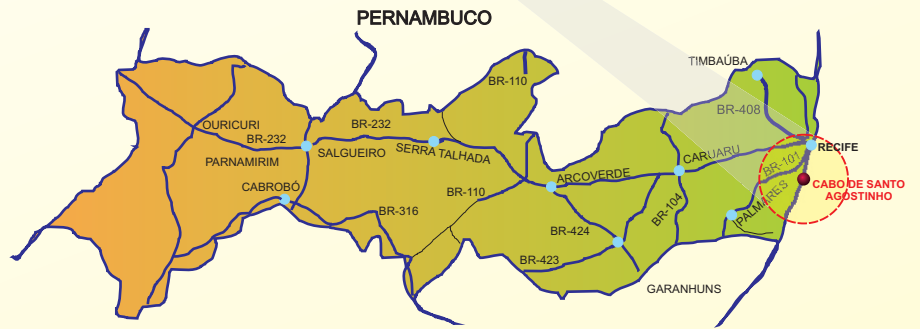
Volume 4 – Orçamento e Plano de Execução da Obra

Contém a listagem e o custo de todas as obras necessárias à execução do Projeto, obtido com base nas quantidades dos diversos serviços e em custos unitários decorrentes da aplicação da Tabela do DER/PE, com data base de julho/2011. É apresentado em formato A-4.

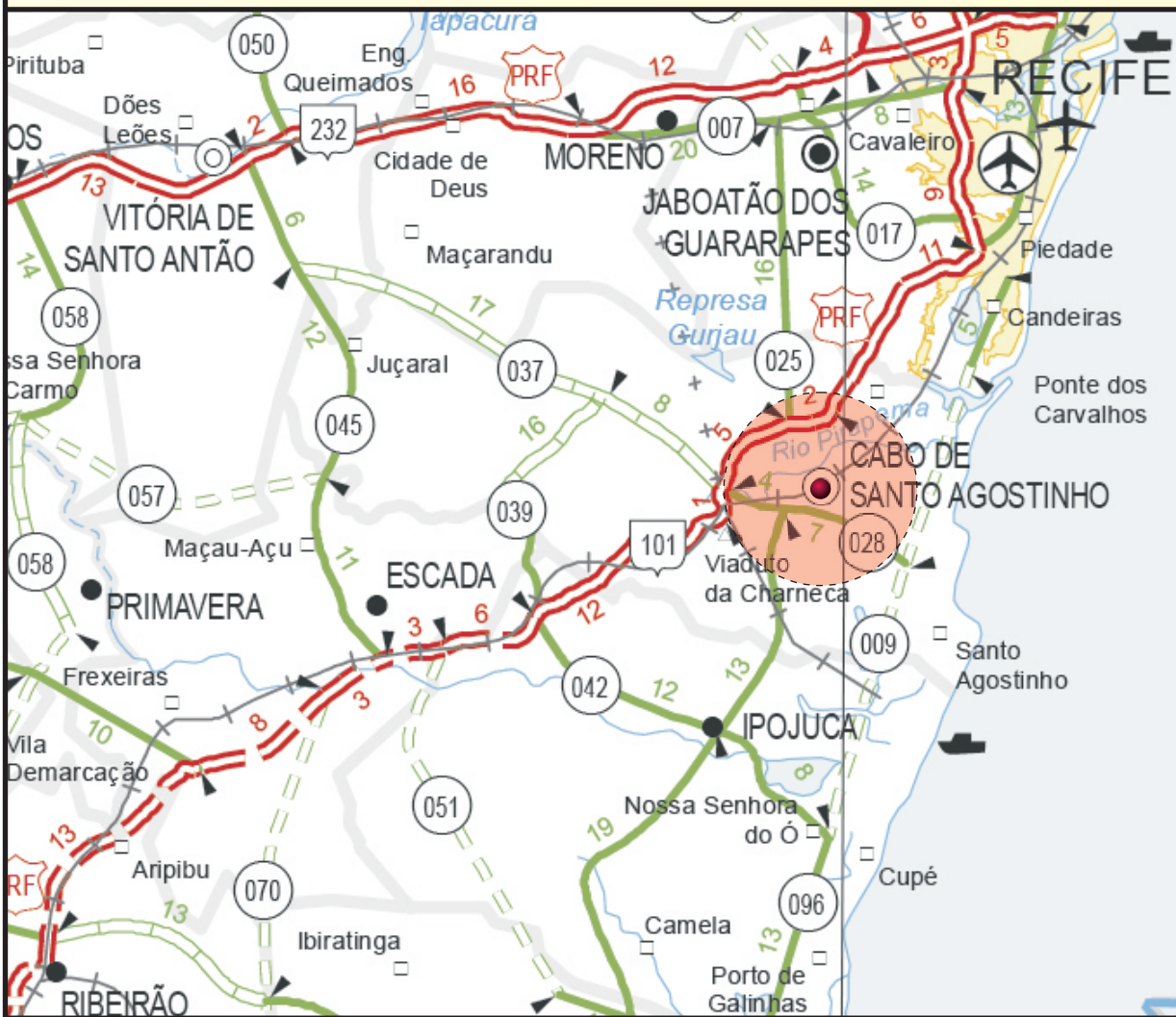
2. MAPA DE SITUAÇÃO



BRASIL



PERNAMBUCO




RECIFE

CABO DE SANTO AGOSTINHO

3. QUADRO DE QUANTIDADES

ITEM	CÓDIGO	DISCRIMINAÇÃO	ESPECIFICAÇÃO	UND.	QUANTIDADE	PREÇO (R\$) UNITÁRIO	TOTAL (R\$)	
1.0		CONSTRUÇÃO DE DUAS OBRAS DE ARTE ESPECIAIS (VIADUTOS) E DA FUNDAÇÃO DE ATERRAMENTO DOS ENCONTROS, NUMA EXTENSÃO APROXIMADA DE 103,0M (CADA) A SER CONSTRUÍDA NA CIDADE DO CABO DE SANTO AGOSTINHO						
1.1		OBRAS DE ARTE ESPECIAIS						
1.1.1		VIADUTO NA PE-060 (PISTA DIREITA)						
1.1.1.1		INFRAESTRUTURA / MESOESTRUTURA						
1.1.1.1.1	2 S 03 416 26	Tubulão ar comprimido Ø=1,4 m profundidade até 12 m lâmina d'água LF (Fck=25 Mpa AC/BC)		m	7,600			
1.1.1.1.2	COMPOSIÇÃO	Escavação para alargamento de base para tubulão ar comprimido profundidade até 12 m LF (2ª Categoria)		m3	13,100			
1.1.1.1.3	COMPOSIÇÃO	Escavação para alargamento de base para tubulão ar comprimido profundidade até 12 m LF (3ª Categoria)		m3	4,800			
1.1.1.1.4	2 S 03 412 18	Fornec. e lanç. de concr. p/ base tubulão ar comprimido até 12m LF (FCK=25 Mpa AC/BC)		m3	18,000			
1.1.1.1.5	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50 (Alargamento)	ES-118/2009	kg	440,000			
1.1.1.1.6	2 S 03 329 05	Concr.estr.fck=30MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	337,000			
1.1.1.1.7	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	934,000			
1.1.1.1.8	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	44.583,000			
1.1.1.1.9	2 S 03 324 51	Concr.estr.fck=15MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	3,800			
1.1.1.1.10	2 S 03 510 00	Aparelho apoio em neoprene fretado - fornecimento e aplicação		kg	1.323,000			
1.1.1.1.11	2 S 03 010 01	Escavação em cavas de fundação com esgotamento		m3	259,000			
1.1.1.1.12	2 S 03 119 01	Escoramento com madeira de OAE		m3	667,000			
1.1.1.1.13	2 S 03 402 20	Enscadeira simples com pranchões de madeira de lei		m2	217,000			
1.1.1.1.14	COMPOSIÇÃO	Estacas Metálicas (W310x125(H))		m	702,000			
1.1.1.1.15	COMPOSIÇÃO	Corte e Arazamento das estacas Metálicas (W310x125(H))		ud	54,000			
1.1.1.1.16	COMPOSIÇÃO	Tube de aço de 6.2mm com 2 m de comprimento ø=600 cm (Encamisamento)		m	108,000			
1.1.1.1.17	2 S 03 329 09	Concr.estr.fck=25MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	31,000			
1.1.1.2		SUPERESTRUTURA						
1.1.1.2.1	2 S 03 329 54	Concr.estr.fck=35MPa-c.raz.uso ger.conf.lanc.AC/BC (Pré-laje)	ES-117/2009	m3	38,000			
1.1.1.2.2	2 S 03 371 01	Forma de placa compensada resinada (Pré-laje)	ES-120/2009	m2	722,000			
1.1.1.2.3	COMPOSIÇÃO	Transporte Lançamento e Posicionamento (Pré-laje)		ud	624,000			
1.1.1.2.4	2 S 03 329 54	Concr.estr.fck=35MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	747,000			
1.1.1.2.5	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	3.484,000			
1.1.1.2.6	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	80.956,700			
1.1.1.2.7	COMPOSIÇÃO	Confecção e colocação cabo 12 cord de 15,2 mm		kg	23.940,000			
1.1.1.2.8	COMPOSIÇÃO	Protensão e injeção cabo 12 cord. D=15,2 mm		ud	50,000			
1.1.1.2.9	COMPOSIÇÃO	Protensão e injeção cabo 12 cord. D=15,2 mm (Passiva)		ud	30,000			
1.1.1.2.10	COMPOSIÇÃO	Confecção e colocação cabo 4 cord de 15,2 mm		kg	990,000			
1.1.1.2.11	COMPOSIÇÃO	Protensão e injeção cabo 4 cord. D=15,2 mm		ud	18,000			
EXECUÇÃO DOS SERVIÇOS DE CONSTRUÇÃO DE UMA PASSARELA PARA PEDESTRES LOCALIZADA NO KM 1,3 DA RODOVIA PE-060, DE UM RETORNO PRÓXIMO AO VIADUTO DA LINHA FÉRREA NA RODOVIA PE-060, DO VIADUTO COM VÃO DE 20,0m SOBRE A LINHA FÉRREA NA RODOVIA PE-060, RODOVIA PE-060, TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO À SUAPE, COM EXTENSÃO DE 600,00m E DUAS OBRAS ESPECIAIS (VIADUTOS) E DA FUNDAÇÃO DE ATERRAMENTO DOS ENCONTROS, NUMA EXTENSÃO APROXIMADA DE 103,4m (CADA) A SER CONSTRUÍDA NA CIDADE DO CABO DE SANTO AGOSTINHO.				QUADRO DE QUANTIDADES				
				DATA BASE: JULHO/2011		QD. - 3.1		
				BDI = 24,23 %				

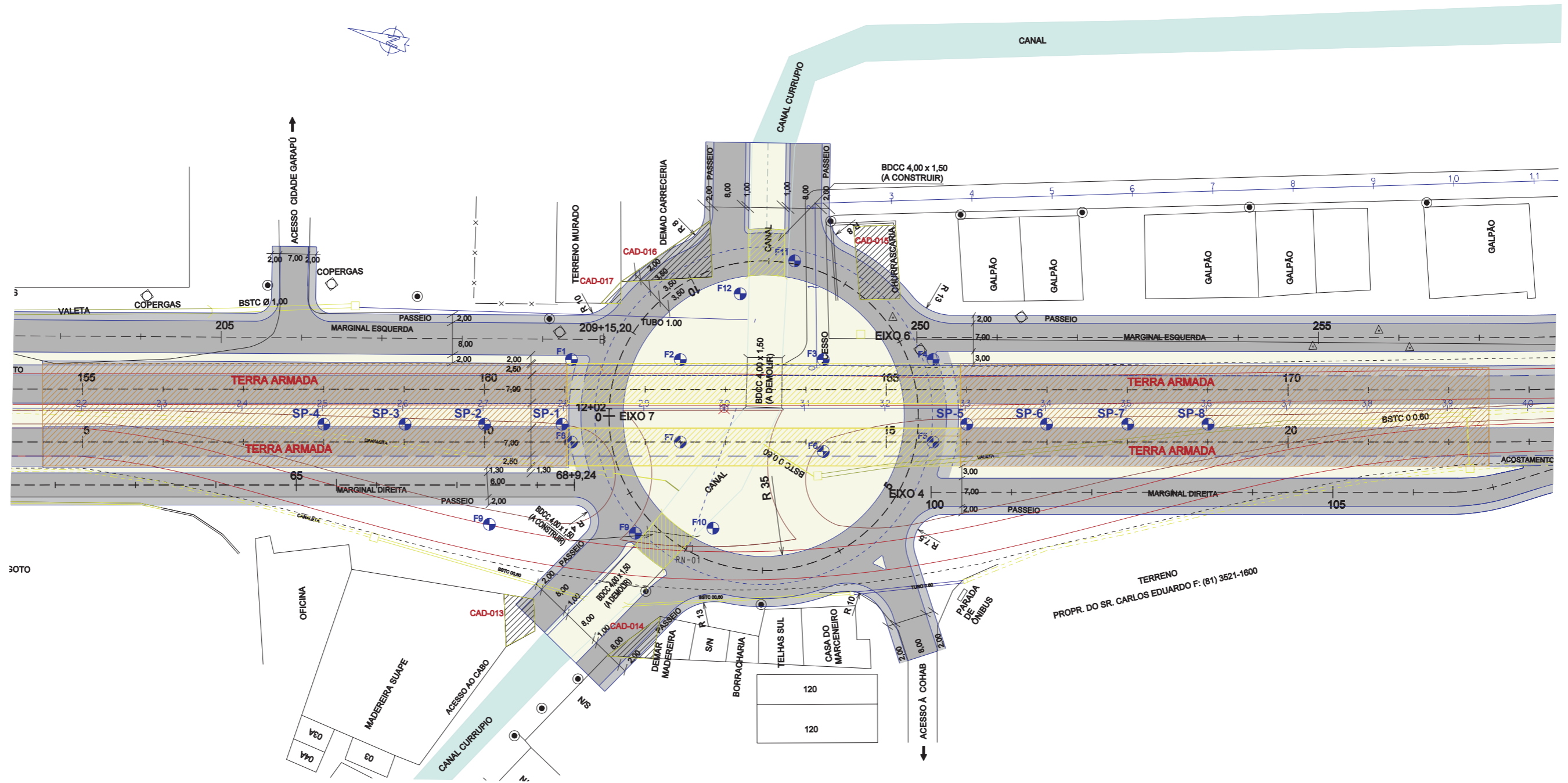
ITEM	CÓDIGO	DISCRIMINAÇÃO	ESPECIFICAÇÃO	UND.	QUANTIDADE	PREÇO (R\$) UNITÁRIO	TOTAL (R\$)
1.1.1.2.12	COMPOSIÇÃO	Transporte Lançamento e Posicionamento de Pré-moldadas P=78T		ud	5,000		
1.1.1.2.13	COMPOSIÇÃO	Transporte Lançamento e Posicionamento de Pré-moldadas P=70T		ud	10,000		
1.1.1.3		ACABAMENTO					
1.1.1.3.1		Defensas					
1.1.1.3.1.1	2 S 03 329 05	Concr.estr.fck=30MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	58,000		
1.1.1.3.1.2	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	421,000		
1.1.1.3.1.3	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	4.578,200		
1.1.1.3.1.4	2 S 03 991 02	Dreno de PVC Ø=100 mm		ud	52,000		
1.1.1.3.2		Laje de Aproximação					
1.1.1.3.2.1	2 S 03 329 05	Concr.estr.fck=30MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	25,000		
1.1.1.3.2.2	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	17,000		
1.1.1.3.2.3	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	2.420,000		
1.1.1.3.2.4	2 S 03 324 50	Concr.estr.fck=15MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	4,000		
1.1.1.3.2.5	COMPOSIÇÃO	Pintura da Superestrutura		m2	3.905,000		
1.1.1.3.2.6		Junta JEENE 2540 VV com labios polimericos - ARE 41 C (3x2cm) inclusive materiais e aplicacao		m	21,000		
1.1.2		VIADUTO NA PE-060 (PISTA ESQUERDA)					
1.1.2.1		INFRAESTRUTURA / MESOESTRUTURA					
1.1.2.1.1	2 S 03 416 26	Tubulão ar comprimido Ø=1,4 m profundidade até 12 m lâmina água LF (Fck=25 Mpa AC/BC)		m	7,600		
1.1.2.1.2	COMPOSIÇÃO	Escavação para alargamento de base para tubulão ar comprimido profundidade até 12 m LF (2ª Categoria)		m3	13,100		
1.1.2.1.3	COMPOSIÇÃO	Escavação para alargamento de base para tubulão ar comprimido profundidade até 12 m LF (3ª Categoria)		m3	4,800		
1.1.2.1.4	2 S 03 412 18	Fornec. e lanç. de concr. p/ base tubulão ar comprimido até 12m LF (FCK=25 Mpa AC/BC)		m3	18,000		
1.1.2.1.5	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50 (Alargamento)	ES-118/2009	kg	440,000		
1.1.2.1.6	2 S 03 329 05	Concr.estr.fck=30MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	337,000		
1.1.2.1.7	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	934,000		
1.1.2.1.8	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	44.583,000		
1.1.2.1.9	2 S 03 324 51	Concr.estr.fck=15MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	3,800		
1.1.2.1.10	2 S 03 510 00	Aparelho apoio em neoprene fretado - fornecimento e aplicação		kg	1.323,000		
1.1.2.1.11	2 S 03 010 01	Escavação em cavas de fundação com esgotamento		m3	259,000		
1.1.2.1.12	2 S 03 119 01	Escoramento com madeira de OAE		m3	667,000		
1.1.2.1.13	2 S 03 402 20	Ensecadeira simples com pranchões de madeira de lei		m2	217,000		
1.1.2.1.14	COMPOSIÇÃO	Estacas Metálicas (W310x125(H))		m	702,000		
1.1.2.1.15	COMPOSIÇÃO	Corte e Arazamento das estacas Metálicas (W310x125(H))		ud	54,000		
1.1.2.1.16	COMPOSIÇÃO	Tubo de aço de 6.2mm com 2 m de comprimento ø=600 cm (Encamisamento)		m	108,000		
1.1.2.1.17	2 S 03 329 09	Concr.estr.fck=25MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	31,000		
						EXECUÇÃO DOS SERVIÇOS DE CONSTRUÇÃO DE UMA PASSARELA PARA PEDESTRES LOCALIZADA NO KM 1,3 DA RODOVIA PE-060, DE UM RETORNO PRÓXIMO AO VIADUTO DA LINHA FÉRREA NA RODOVIA PE-060, DO VIADUTO COM VÃO DE 20,0m SOBRE A LINHA FÉRREA NA RODOVIA PE-060, RODOVIA PE-060, TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO À SUAPE, COM EXTENSÃO DE 600,00m E DUAS OBRAS ESPECIAIS (VIADUTOS) E DA FUNDAÇÃO DE ATERRO DOS ENCONTROS, NUMA EXTENSÃO APROXIMADA DE 103,4m (CADA) A SER CONSTRUÍDA NA CIDADE DO CABO DE SANTO AGOSTINHO.	
						QUADRO DE QUANTIDADES	
						DATA BASE: JULHO/2011	QD. - 3.2
						BDI = 24,23 %	


ITEM	CÓDIGO	DISCRIMINAÇÃO	ESPECIFICAÇÃO	UND.	QUANTIDADE	PREÇO (R\$) UNITÁRIO	TOTAL (R\$)		
1.1.2.2		SUPERESTRUTURA							
1.1.1.2.1	2 S 03 329 54	Concr.estr.fck=35MPa-c.raz.uso ger.conf.lanc.AC/BC (Pré-laje)	ES-117/2009	m3	38,000				
1.1.1.2.2	2 S 03 371 01	Forma de placa compensada resinada (Pré-laje)	ES-120/2009	m2	722,000				
1.1.1.2.3	COMPOSIÇÃO	Transporte Lançamento e Posicionamento (Pré-laje)		ud	624,000				
1.1.1.2.4	2 S 03 329 54	Concr.estr.fck=35MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	747,000				
1.1.1.2.5	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	3.484,000				
1.1.1.2.6	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	80.956,700				
1.1.1.2.7	COMPOSIÇÃO	Confecção e colocação cabo 12 cord de 15,2 mm		kg	23.940,000				
1.1.1.2.8	COMPOSIÇÃO	Protensão e injeção cabo 12 cord. D=15,2 mm		ud	50,000				
1.1.1.2.9	COMPOSIÇÃO	Protensão e injeção cabo 12 cord. D=15,2 mm (Passiva)		ud	30,000				
1.1.1.2.10	COMPOSIÇÃO	Confecção e colocação cabo 4 cord de 15,2 mm		kg	990,000				
1.1.1.2.11	COMPOSIÇÃO	Protensão e injeção cabo 4 cord. D=15,2 mm		ud	18,000				
1.1.1.2.12	COMPOSIÇÃO	Transporte Lançamento e Posicionamento de Pré-moldadas P=78T		ud	5,000				
1.1.1.2.13	COMPOSIÇÃO	Transporte Lançamento e Posicionamento de Pré-moldadas P=70T		ud	10,000				
1.1.2.3		ACABAMENTO							
1.1.1.3.1		Defensas							
1.1.1.3.1.1	2 S 03 329 05	Concr.estr.fck=30MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	58,000				
1.1.1.3.1.2	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	421,000				
1.1.1.3.1.3	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	4.578,200				
1.1.1.3.1.4	2 S 03 991 02	Dreno de PVC Ø=100 mm		ud	52,000				
1.1.1.3.2		Laje de Aproximação							
1.1.1.3.2.1	2 S 03 329 05	Concr.estr.fck=30MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	25,000				
1.1.1.3.2.2	2 S 03 371 01	Forma de placa compensada resinada	ES-120/2009	m2	17,000				
1.1.1.3.2.3	4 S 03 353 00	Fornecimento, preparo e colocação formas aço CA 50	ES-118/2009	kg	2.420,000				
1.1.1.3.2.4	2 S 03 324 50	Concr.estr.fck=15MPa-c.raz.uso ger.conf.lanc.AC/BC	ES-117/2009	m3	4,000				
1.1.1.3.2.5	COMPOSIÇÃO	Pintura da Superestrutura		m2	3.905,000				
1.1.1.3.2.6		Junta JEENE 2540 VV com labios polimericos - ARE 41 C (3x2cm) inclusive materiais e aplicacao		m	21,000				
1.2		TERRA ARMADA							
1.2.1	2 S 05 303 01	Terra armada - ECE - greide 0,0<h<6,00m		m2	1.358,970				
1.2.2	2 S 05 303 02	Terra armada - ECE - greide 6,00<h<9,00m		m2	1.224,670				
1.2.3	2 S 05 303 03	Terra armada - ECE - greide 9,00<h<12,00m		m2	714,550				
1.2.4	5 S 05 303 09	Escamas de concreto armado para terra armada	ES-120-117-118/2009	m3	923,130				
1.2.5	2 S 05 303 13	Concreto soleira e arremates de maciço terra armada AC/BC	ES-120-117-118/2009	m3	29,190				
1.2.6	2 S 05 303 11	Montagem de maciço terra armada	ES-108/2009	m2	3.298,190				
1.2.7	05.02.080	Aterro com areia em camadas de até 40,0 cm		m3	31.403,778				
				EXECUÇÃO DOS SERVIÇOS DE CONSTRUÇÃO DE UMA PASSARELA PARA PEDESTRES LOCALIZADA NO KM 1,3 DA RODOVIA PE-060, DE UM RETORNO PRÓXIMO AO VIADUTO DA LINHA FÉRREA NA RODOVIA PE-060, DO VIADUTO COM VÃO DE 20,0m SOBRE A LINHA FÉRREA NA RODOVIA PE-060, RODOVIA PE-060, TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO À SUAPE, COM EXTENSÃO DE 600,00m E DUAS OBRAS ESPECIAIS (VIADUTOS) E DA FUNDAÇÃO DE ATERRAMENTO DOS ENCONTROS, NUMA EXTENSÃO APROXIMADA DE 103,4m (CADA) A SER CONSTRUÍDA NA CIDADE DO CABO DE SANTO AGOSTINHO.				QUADRO DE QUANTIDADES	
BDI = 24,23 %				DATA BASE: JULHO/2011		QD. - 3.3			

ITEM	CÓDIGO	DISCRIMINAÇÃO	ESPECIFICAÇÃO	UND.	QUANTIDADE	PREÇO (R\$) UNITÁRIO	TOTAL (R\$)
1.3		TERRAPLENAGEM (FUNDAÇÃO DE ATERRO)					
1.3.1	COMPOSIÇÃO	Camada Drenante com Areia		m3	7.300,000		
1.3.2	COMPOSIÇÃO	Fornecimento e Instalação de Piezômetros		ud	6,000		
1.3.3	COMPOSIÇÃO	Fornecimento e Instalação de medidores de recalque		ud	6,000		
1.3.4	COMPOSIÇÃO	CPR - Consolidação Profunda Radial (Solo mole)		m2	7.300,000		
1.3.5	COMPOSIÇÃO	Aterro de Ponta com material granular para praça de trabalho		m3	5.110,000		
1.3.6	COMPOSIÇÃO	Camada estabilizada para tráfego de equipamento pesado (BGS)		m3	1.460,000		
1.3.7	COMPOSIÇÃO	Remoção da praça de trabalho com bota-fora		m3	6.570,000		
1.3.8	COMPOSIÇÃO	Camada de material selecionado com solo-areia (60% - 40%)		m3	13.198,400		
1.4		PAVIMENTAÇÃO					
1.4	COMPOSIÇÃO	Sub-base estabilizada Granulometricamente com mistura de 40% de areia		m3	1.723,220		
1.5	COMPOSIÇÃO	Base de Brita Graduada Tratada com cimento (BGTC) com 2% de Cimento		m3	1.368,530		
1.6	2 S 02 300 00	Imprimação	ES-306/97	m2	8.748,600		
1.7	2 S 02 400 00	Pintura de Ligação	ES-307/97	m2	10.920,000		
1.8	2 S 02 540 51	CBUQ - capa de rolamento AC/BC	ES-031/2006	t	2.096,640		
1.9	2 S 02 540 52	CBUQ - Binder AC/BC		t	1.310,400		
1.10		Aquisição de material betuminoso					
1.10.1	2 S 09 204 71	Aquisição de material betuminoso - CM-30 - Ceará / Bahia		t	11,370		
1.10.2	2 S 02 609 02	Aquisição de material betuminoso - RR-1C - Ceará / Bahia		t	8,740		
1.10.3	2 S 09 204 70	Aquisição de material betuminoso - CAP 50/70 - Ceará / Bahia		t	221,460		
1.11		Transporte de material betuminoso					
1.11.1	COMPOSIÇÃO	Transporte de material betuminoso - CM-30		t	11,370		
1.11.2	COMPOSIÇÃO	Transporte de material betuminoso - RR-1C		t	8,740		
1.11.3	COMPOSIÇÃO	Transporte de material betuminoso - CAP 50/70		t	221,460		
1.12	3 S 02 900 00	Remoção mecanizada de revestimento betuminoso		m3	505,280		
1.13	5 S 04 999 07	Demolição de Pavimento de Concreto		m3	2.020,000		
1.14	3 S 02 900 00	Demolição de Pavimento Flexível		m3	2.022,200		
		EXECUÇÃO DOS SERVIÇOS DE CONSTRUÇÃO DE UMA PASSARELA PARA PEDESTRES LOCALIZADA NO KM 1,3 DA RODOVIA PE-060, DE UM RETORNO PRÓXIMO AO VIADUTO DA LINHA FÉRREA NA RODOVIA PE-060, DO VIADUTO COM VÃO DE 20,0m SOBRE A LINHA FÉRREA NA RODOVIA PE-060, RODOVIA PE-060, TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO À SUAPE, COM EXTENSÃO DE 600,00m E DUAS OBRAS ESPECIAIS (VIADUTOS) E DA FUNDAÇÃO DE ATERRO DOS ENCONTROS, NUMA EXTENSÃO APROXIMADA DE 103,4m (CADA) A SER CONSTRUÍDA NA CIDADE DO CABO DE SANTO AGOSTINHO.		QUADRO DE QUANTIDADES			
		BDI = 24,23 %		DATA BASE: JULHO/2011		QD. - 3.4	

4. SONDAGENS

4.1. CROQUI DE LOCALIZAÇÃO DOS FUROS DE SONDAGEM



GOVERNO DE PERNAMBUCO		
SECRETARIA ESTADUAL DE TURISMO - SETUR/PE		
RODOVIA	OBRA: PROJETO EXECUTIVO DE ENGENHARIA PARA CONSTRUÇÃO DE DUAS OBRAS DE ARTE ESPECIAIS (VIADUTOS) E DA FUNDAÇÃO DE ATERRO DOS ENCONTROS, NUMA EXTENSÃO TOTAL DE 103,4 m (CADA UMA) A SER CONSTRUÍDA NA CIDADE DO CABO DE SANTO AGOSTINHO.	 CONSULPLAN CONSULTORIA E PLANEJAMENTO
PE-060		
CROQUI DE LOCALIZAÇÃO DOS FUROS DE SONDAGEM		QD. - 4.1

4.2 PERFIS DE SONDAGEM

Sondagem de Reconhecimento à Percussão

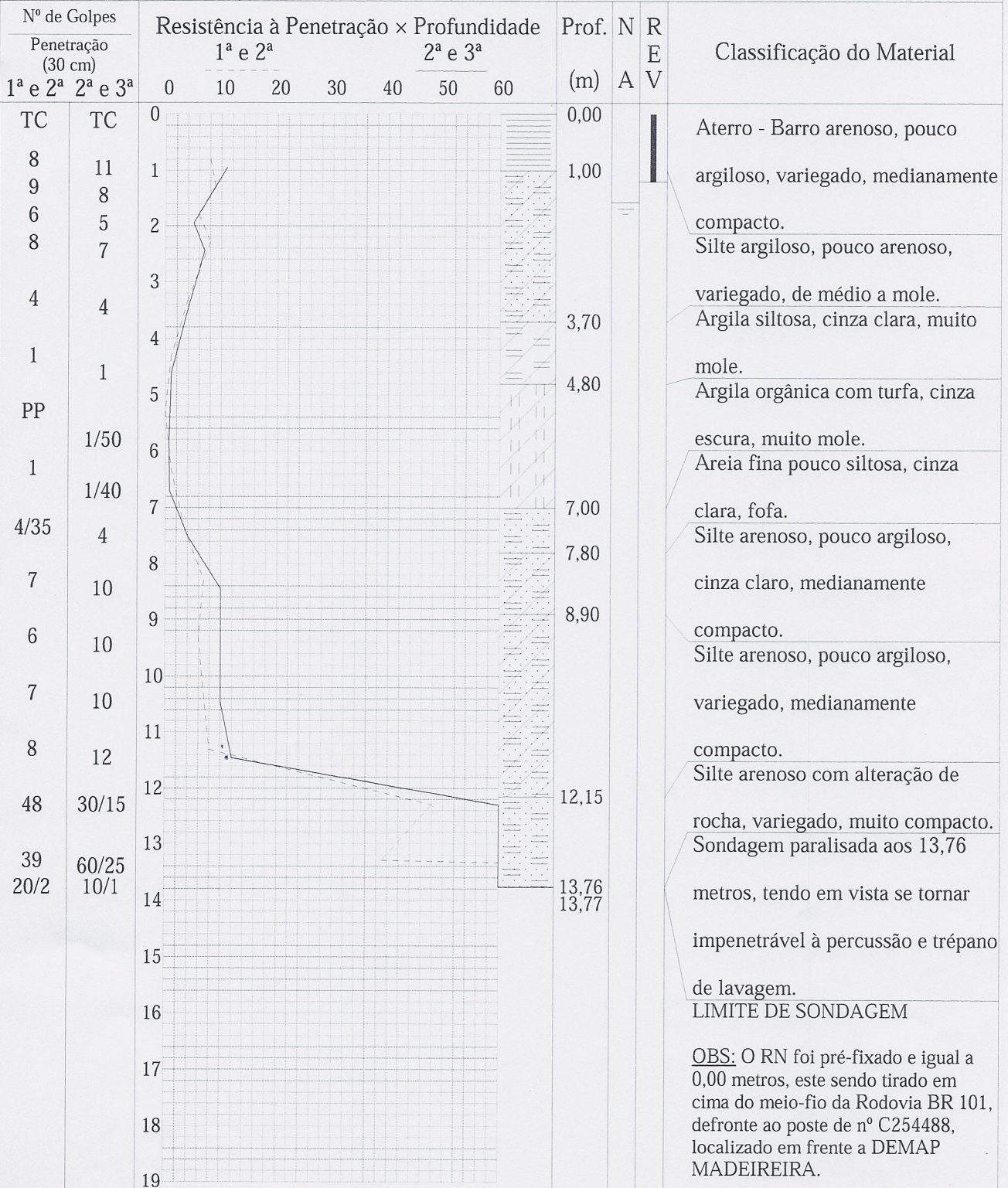
0018/11

SP - 001

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2"	Altura de queda: 75 cm	Trado concha (TC): 0,50 m	Revestimento: 1,20 m
Interno: 1"3/8	Peso (PP): 65 kgf	Cota do terreno: 0,38 m	Data: 06/04/2011
Revestimento (REV): 2"1/2	Escala vertical: 1:100	Prof. nível d'água (NA): 1,58 m	Página: 1/1



Sondagem de Reconhecimento à Percussão

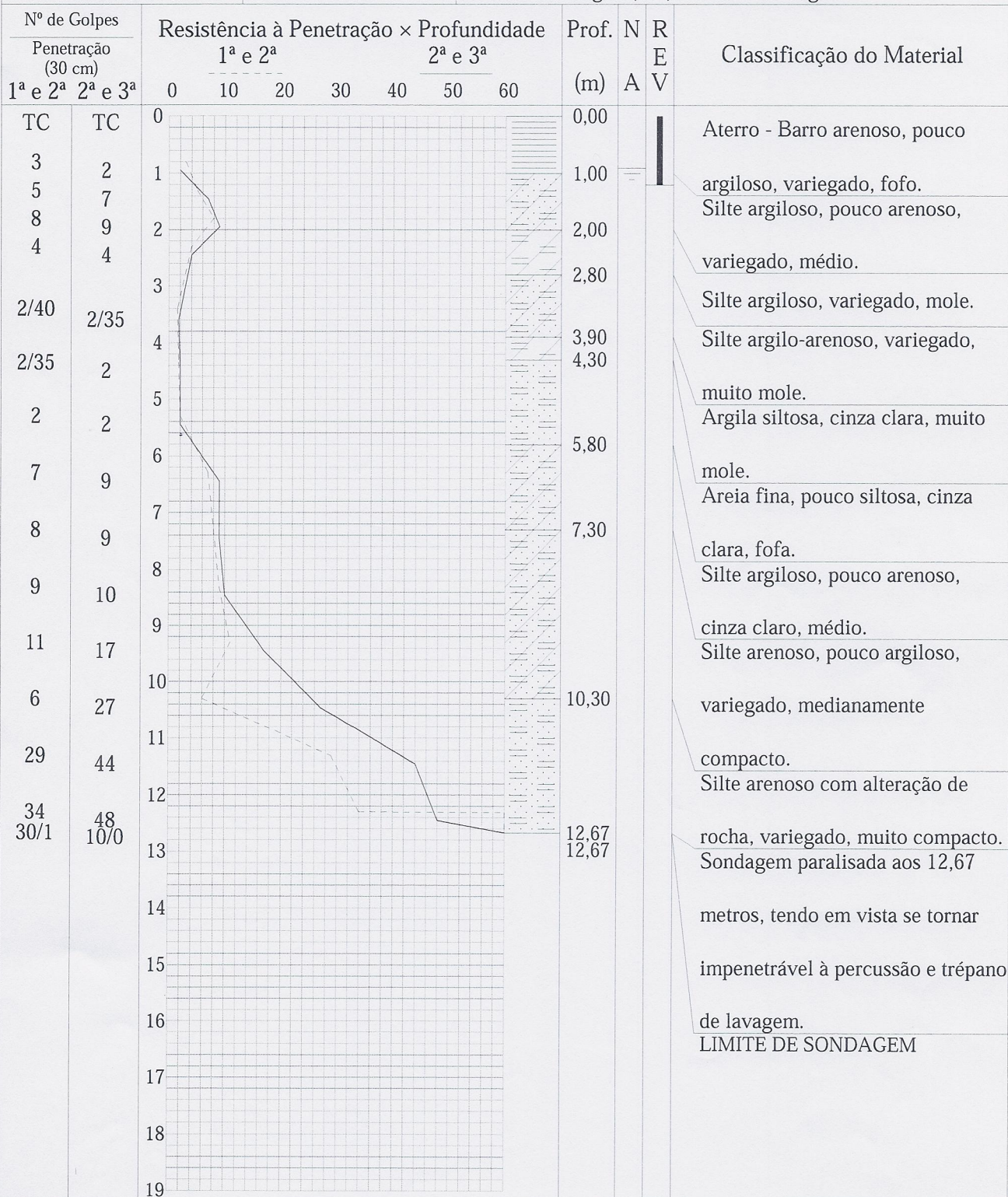
0018/11

SP - 002

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2"	Altura de queda: 75 cm	Trado concha (TC): 0,50 m	Revestimento: 1,20 m
Interno: 1"3/8	Peso (PP): 65 kgf	Cota do terreno: 0,68 m	Data: 07/04/2011
Revestimento (REV): 2"1/2	Escala vertical: 1:100	Prof. nível d'água (NA): 0,90 m	Página: 1/1



Sondagem de Reconhecimento à Percussão

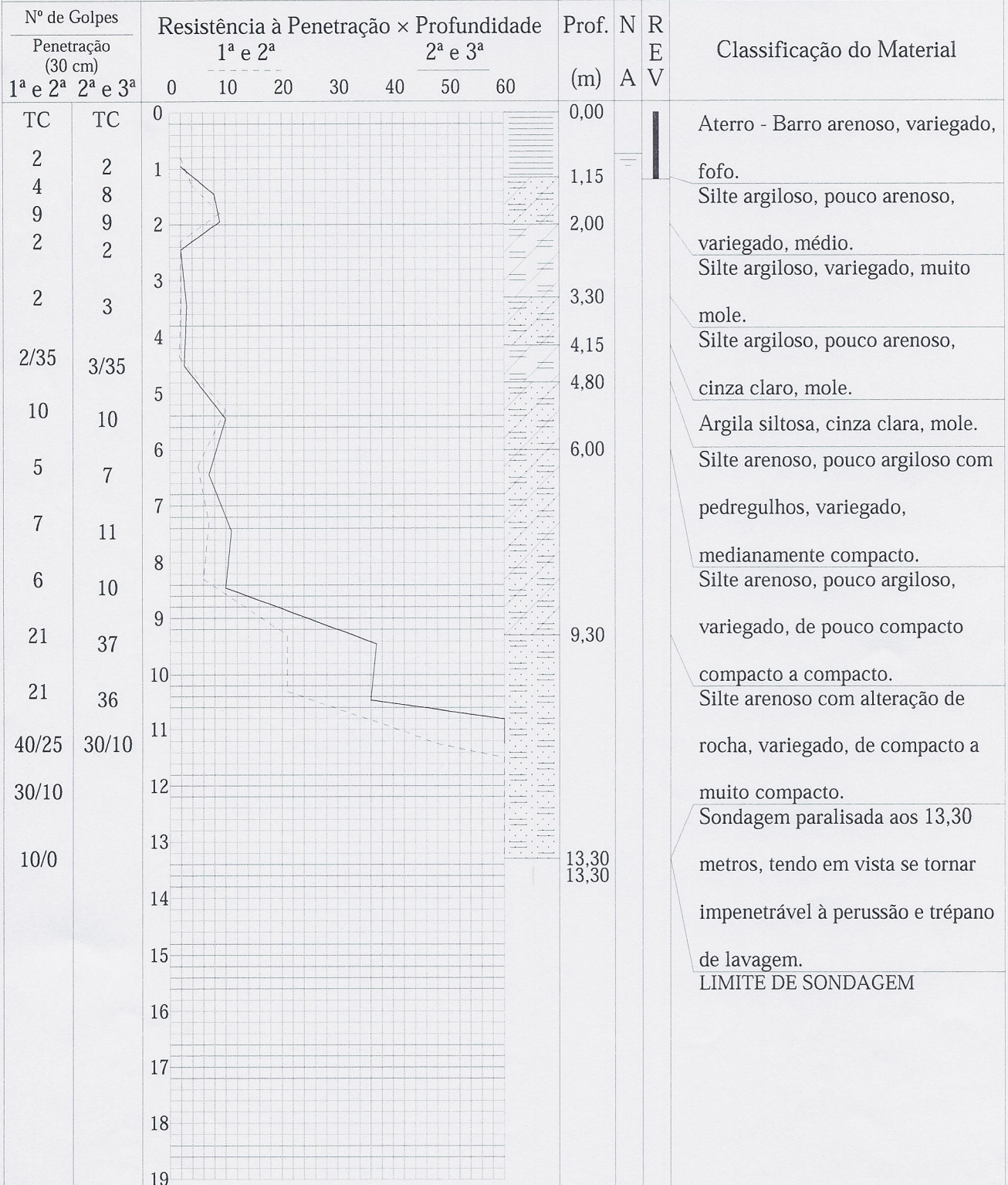
0018/11

SP - 003

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2"	Altura de queda: 75 cm	Trado concha (TC): 0,50 m	Revestimento: 1,20 m
Interno: 1"3/8	Peso (PP): 65 kgf	Cota do terreno: 0,55 m	Data: 11/04/2011
Revestimento (REV): 2"1/2	Escala vertical: 1:100	Prof. nível d'água (NA): 0,75 m	Página: 1/1



Sondagem de Reconhecimento à Percussão

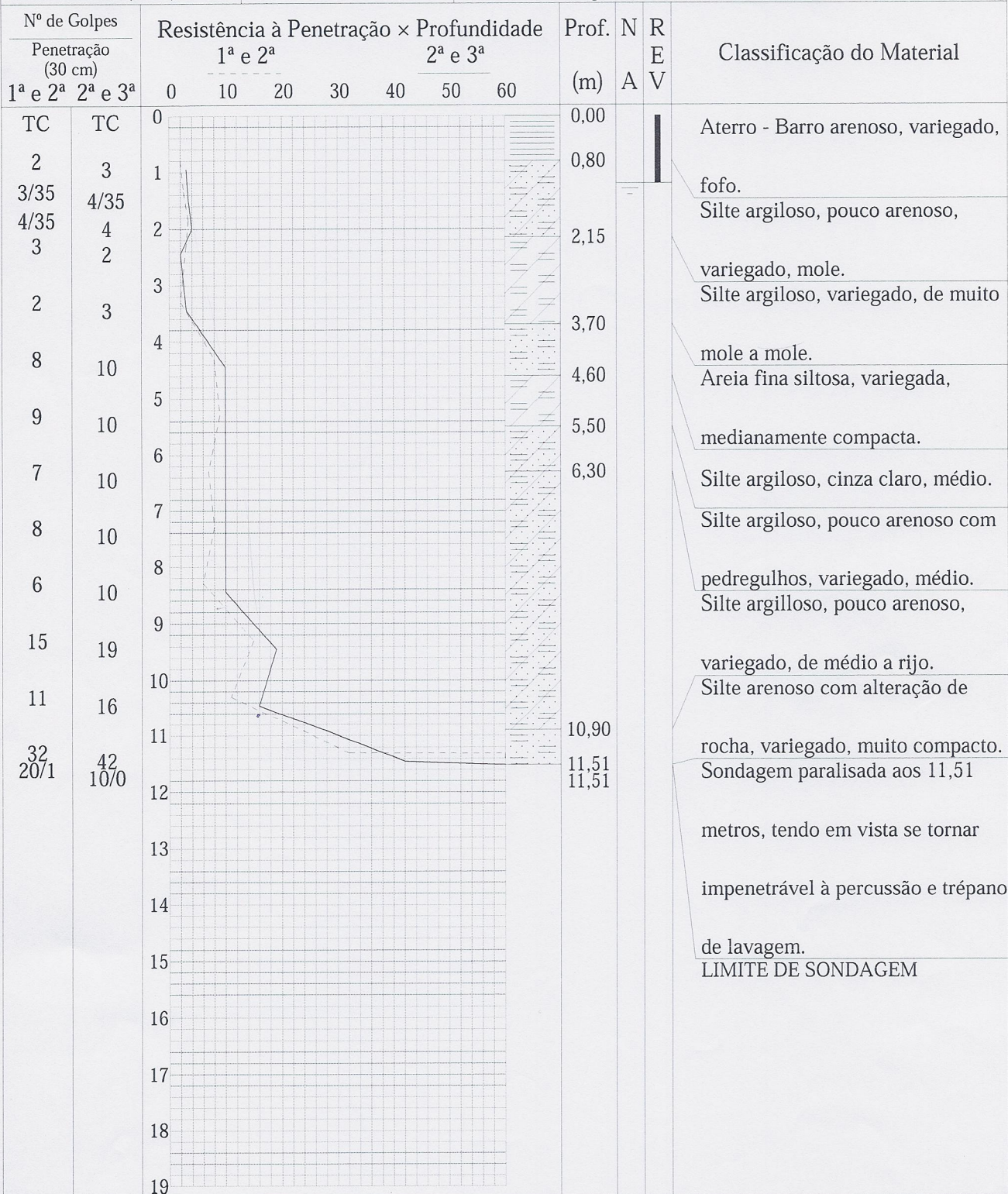
0018/11

SP - 004

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2" Altura de queda: 75 cm Trado concha (TC): 0,50 m Revestimento: 1,20 m
 Interno: 1" 3/8 Peso (PP): 65 kgf Cota do terreno: 0,48 m Data: 12/04/2011
 Revestimento (REV): 2" 1/2 Escala vertical: 1:100 Prof. nível d'água (NA): 1,20 m Página: 1/1



Sondagem de Reconhecimento à Percussão

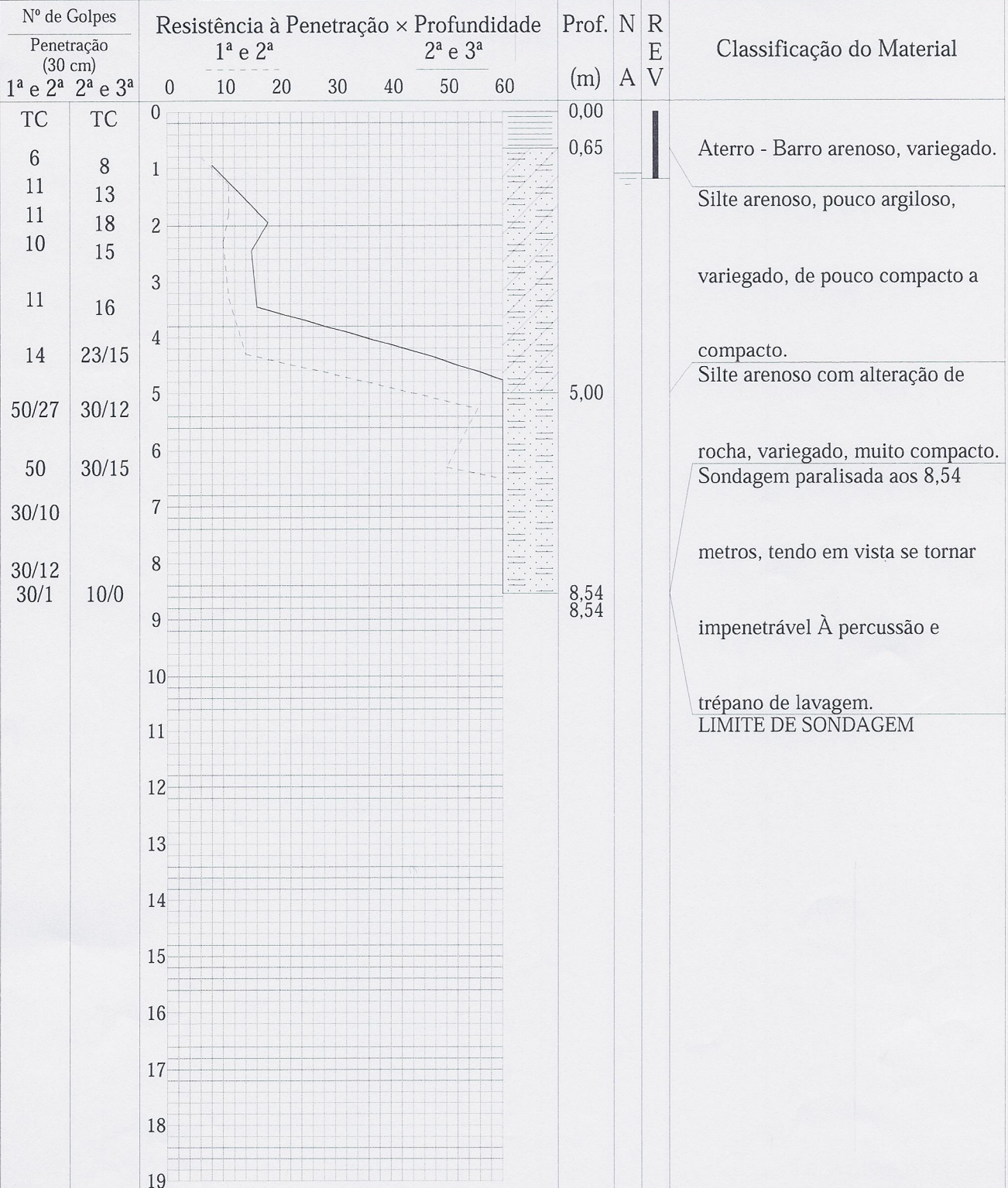
0018/11

SP - 005

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2" Altura de queda: 75 cm Trado concha (TC): 0,50 m Revestimento: 1,20 m
Interno: 1" 3/8 Peso (PP): 65 kgf Cota do terreno: 0,97 m Data: 13/04/2011
Revestimento (REV): 2" 1/2 Escala vertical: 1:100 Prof. nível d'água (NA): 1,10 m Página: 1/1



Sondagem de Reconhecimento à Percussão

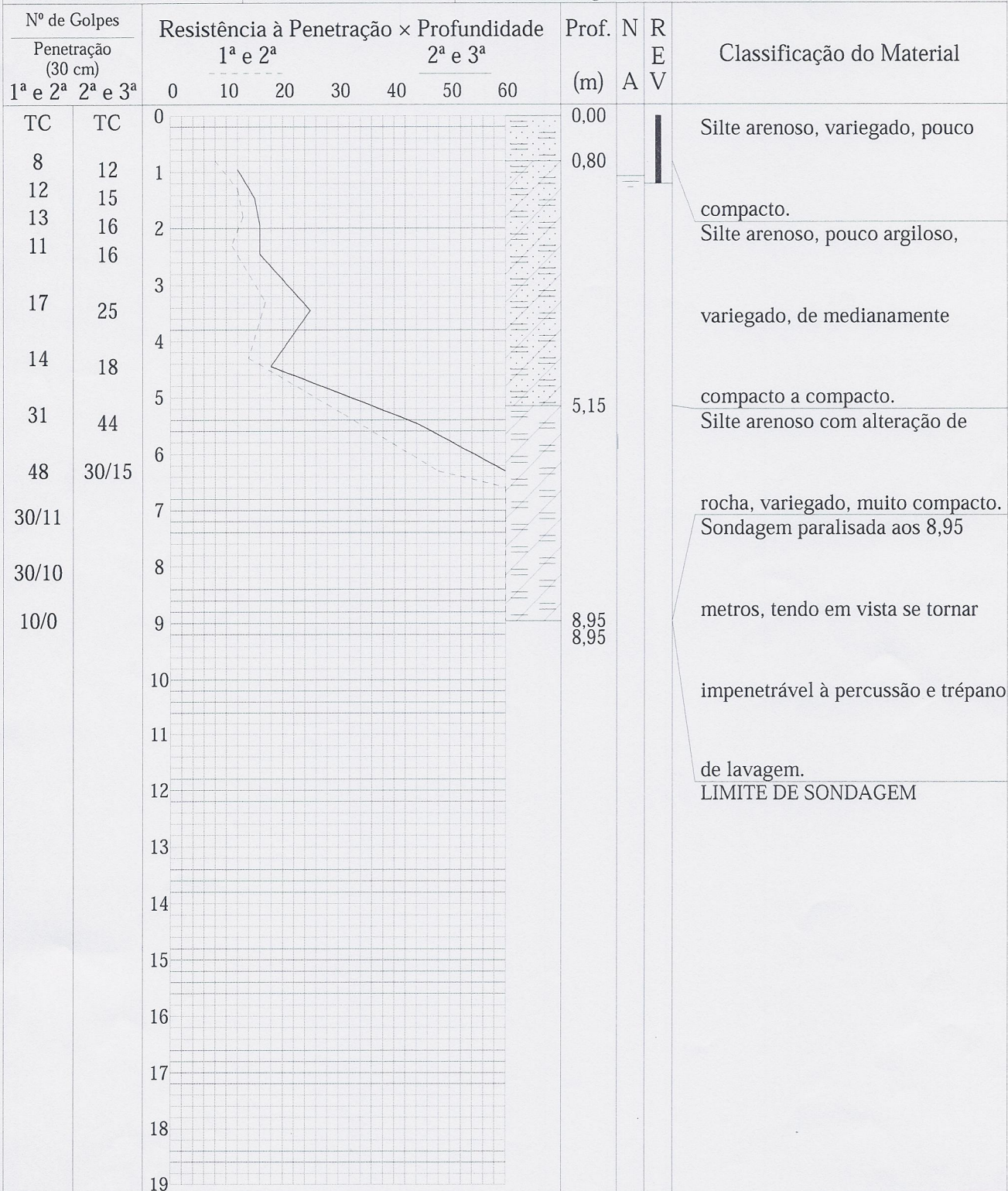
0018/11

SP - 006

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2"	Altura de queda: 75 cm	Trado concha (TC): 0,50 m	Revestimento: 1,20 m
Interno: 1"3/8	Peso (PP): 65 kgf	Cota do terreno: 1,13 m	Data: 14/04/2011
Revestimento (REV): 2"1/2	Escala vertical: 1:100	Prof. nível d'água (NA): 1,07 m	Página: 1/1



Sondagem de Reconhecimento à Percussão

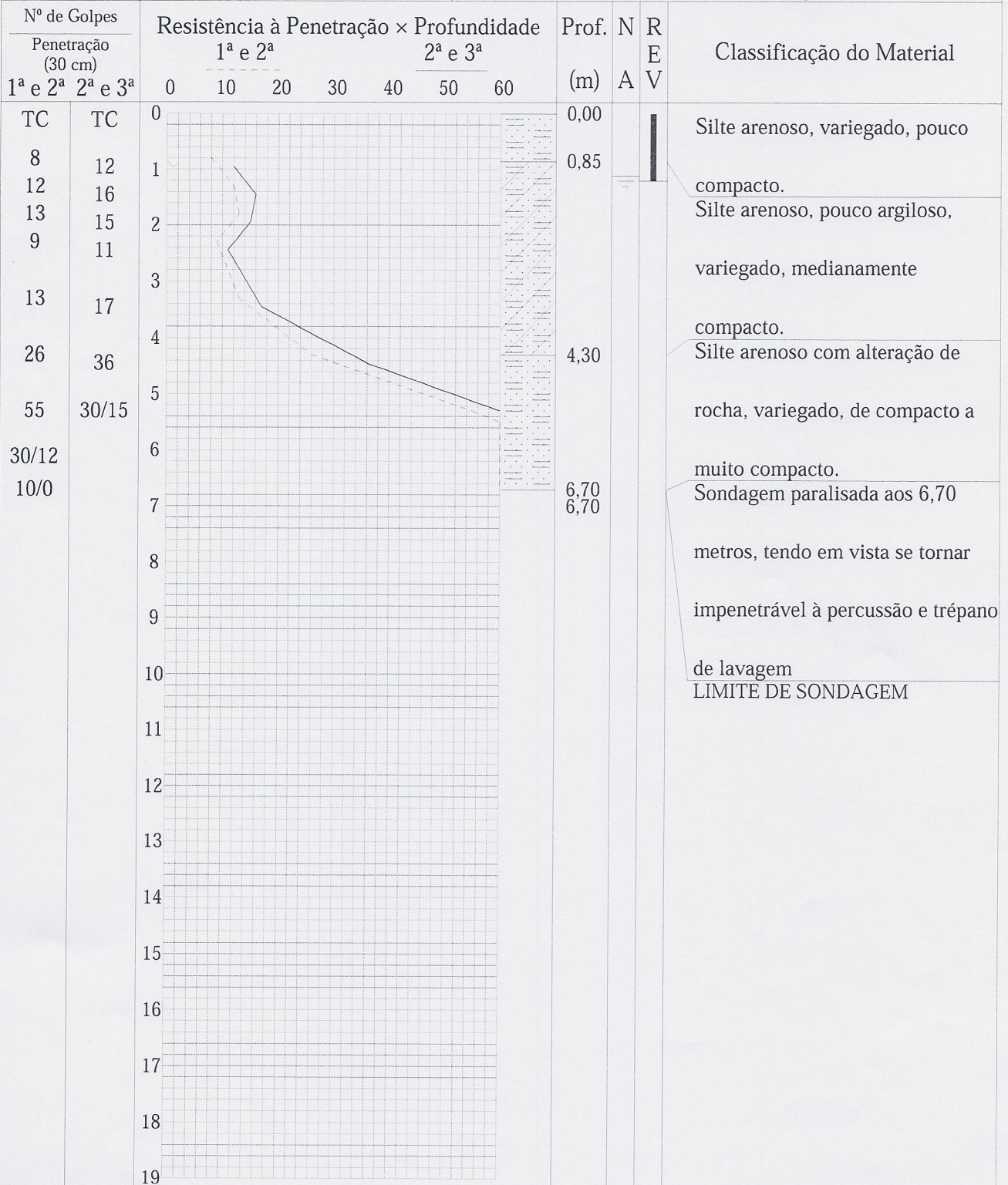
0018/11

SP - 007

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2"	Altura de queda: 75 cm	Trado concha (TC): 0,50 m	Revestimento: 1,20 m
Interno: 1"3/8	Peso (PP): 65 kgf	Cota do terreno: 1,43 m	Data: 16/04/2011
Revestimento (REV): 2"1/2	Escala vertical: 1:100	Prof. nível d'água (NA): 1,10 m	Página: 1/1



Sondagem de Reconhecimento à Percussão

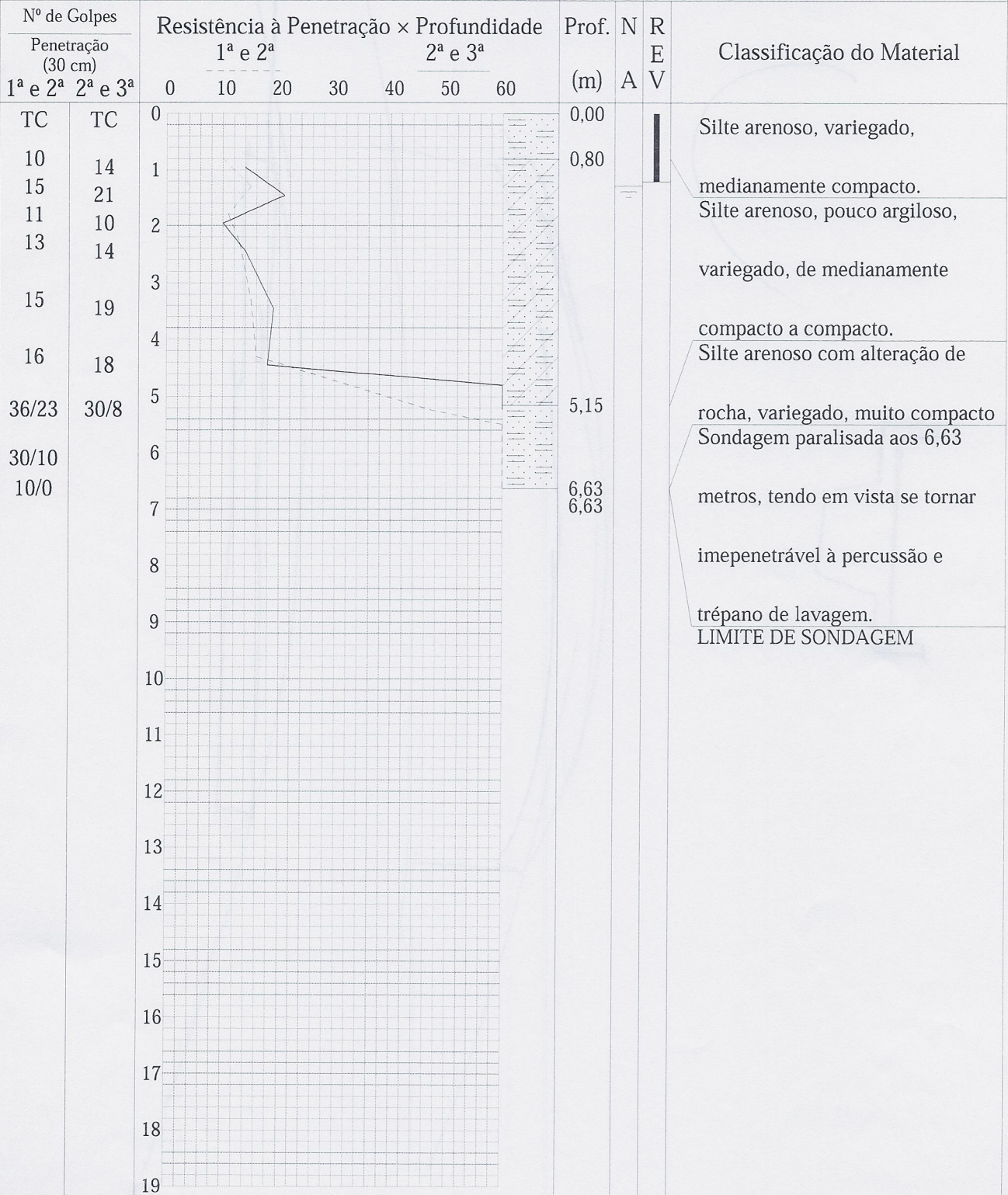
0018/11

SP - 008

Cliente: CONSTRUTORA CAMILO BRITO LTDA.

Local: Rodovia PE 60,
Construção de uma passarela, Cabo de Santo Agostinho-PE

Amostrador Externo: 2" Altura de queda: 75 cm Trado concha (TC): 0,50 m Revestimento: 1,20 m
 Interno: 1"3/8 Peso (PP): 65 kgf Cota do terreno: 0,72 m Data: 17/04/2011
 Revestimento (REV): 2"1/2 Escala vertical: 1:100 Prof. nível d'água (NA): 1,28 m Página: 1/1



SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

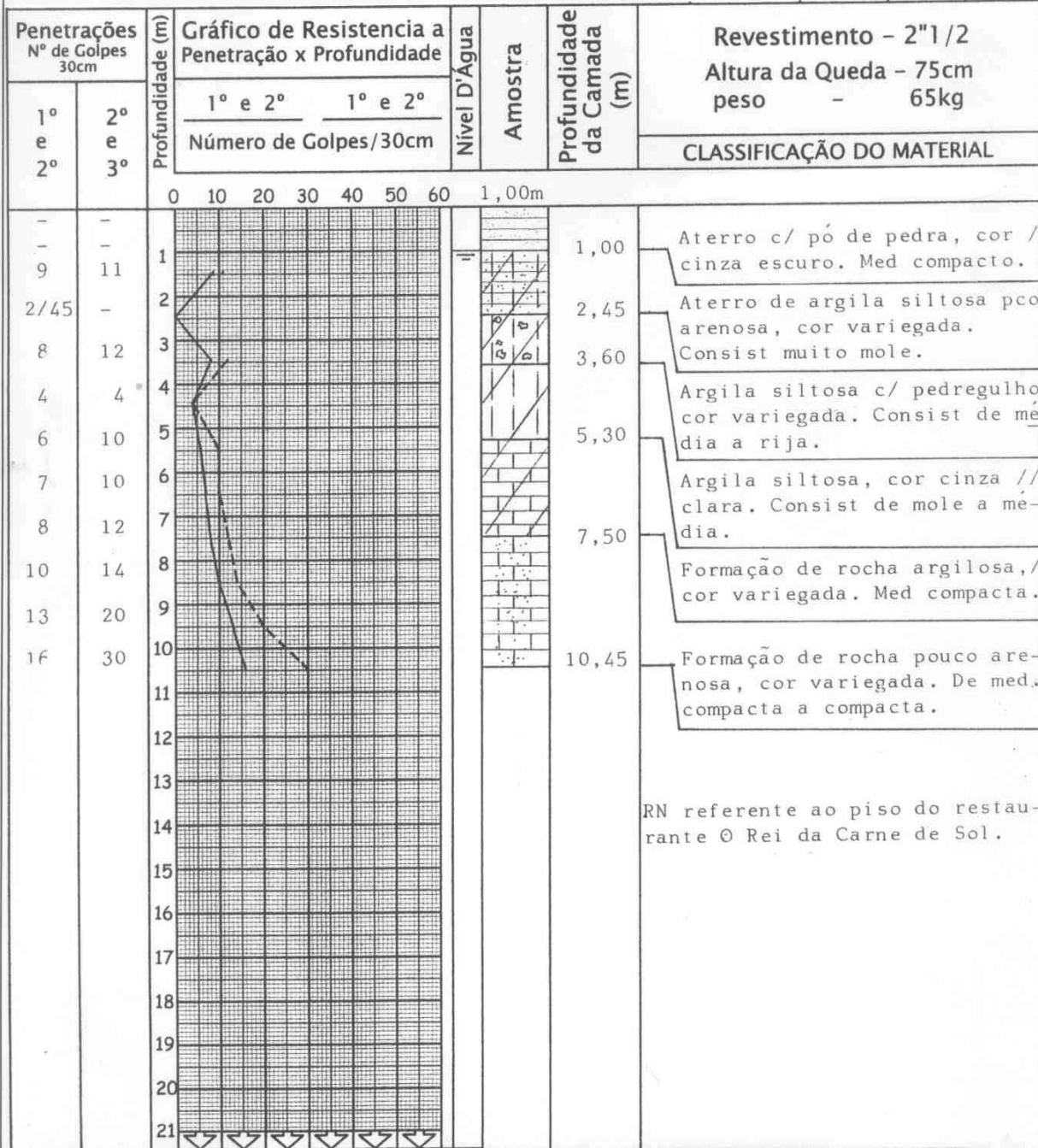


F - 01

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



RN referente ao piso do restaurante O Rei da Carne de Sol.

LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:	COTA: -0.20	OPERADOR:	DATA: 18/07/06	VISTO:
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RODOVIA: PE-60
TRECHO: ENTR.BR-101 (CABO) - ENTR.ACESSO A SUAPE
EXTENSÃO: 600m

PERFIL DE SONDAAGEM

QD-5.2

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

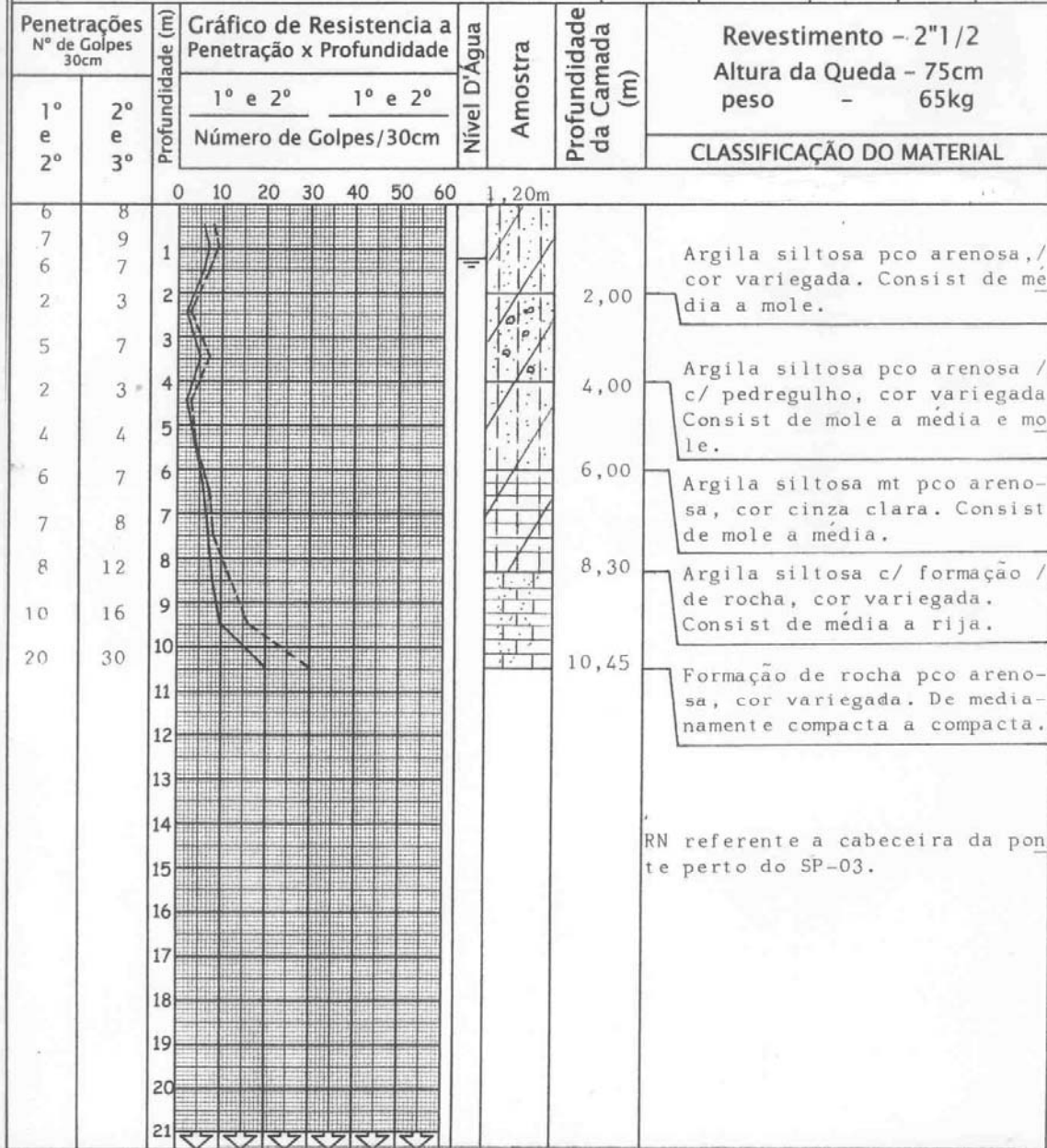


F - 02

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:

COTA:

-0.15

OPERADOR:

DATA:

19/07/06

VISTO:

RODOVIA: PE-60
TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO A SUAPE
EXTENSÃO: 600m

PERFIL DE SONDAAGEM

QD-5.3

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

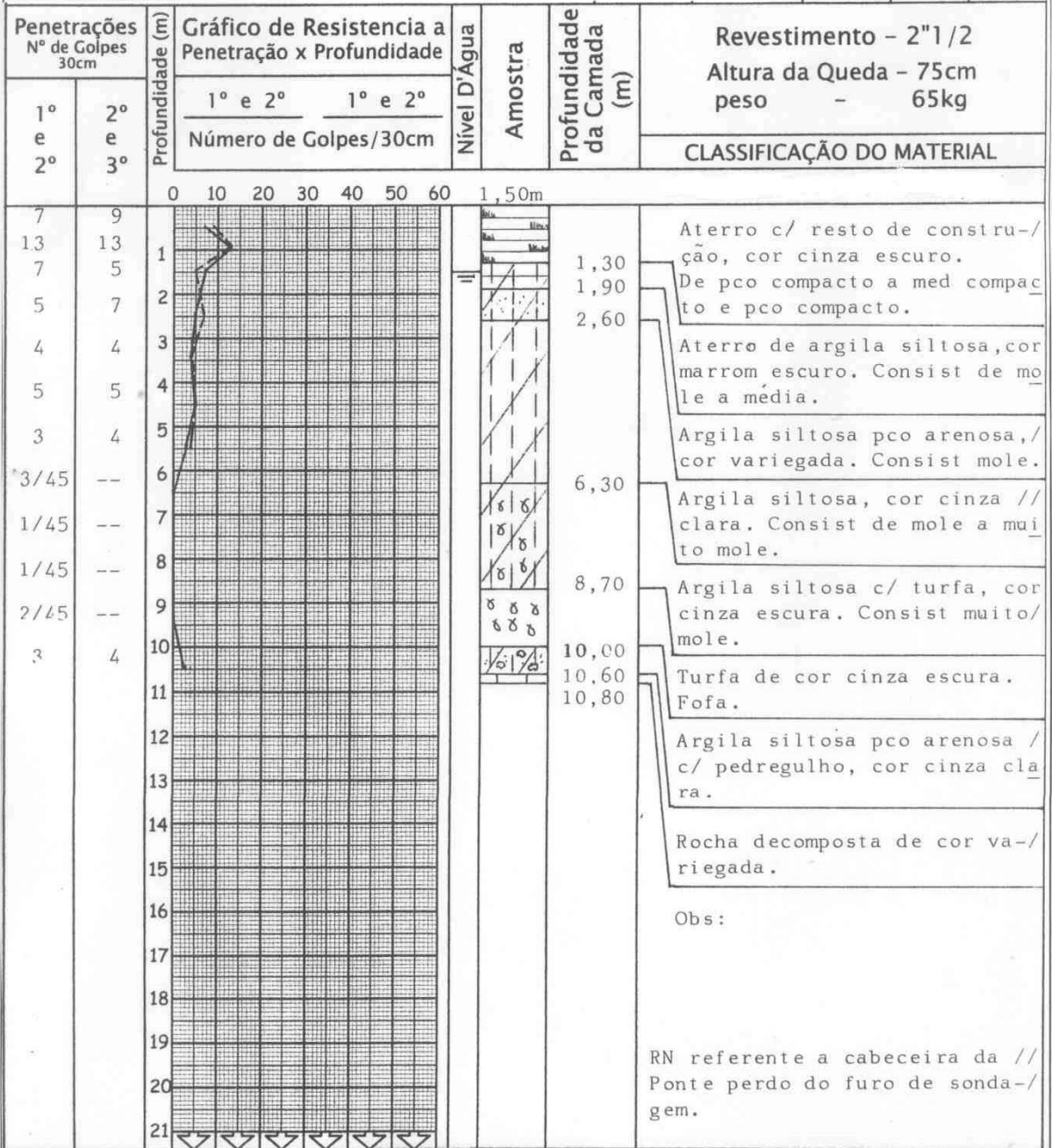

MAIA MELO ENGENHARIA LTDA.

F - 03

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:	COTA: -0.23	OPERADOR:	DATA: 18/07/06	VISTO:
RODOVIA: PE-60 TRECHO: ENTR.BR-101 (CABO) - ENTR.ACESSO A SUAPE EXTENSÃO: 600m				PERFIL DE SONDAAGEM QD-5.3

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

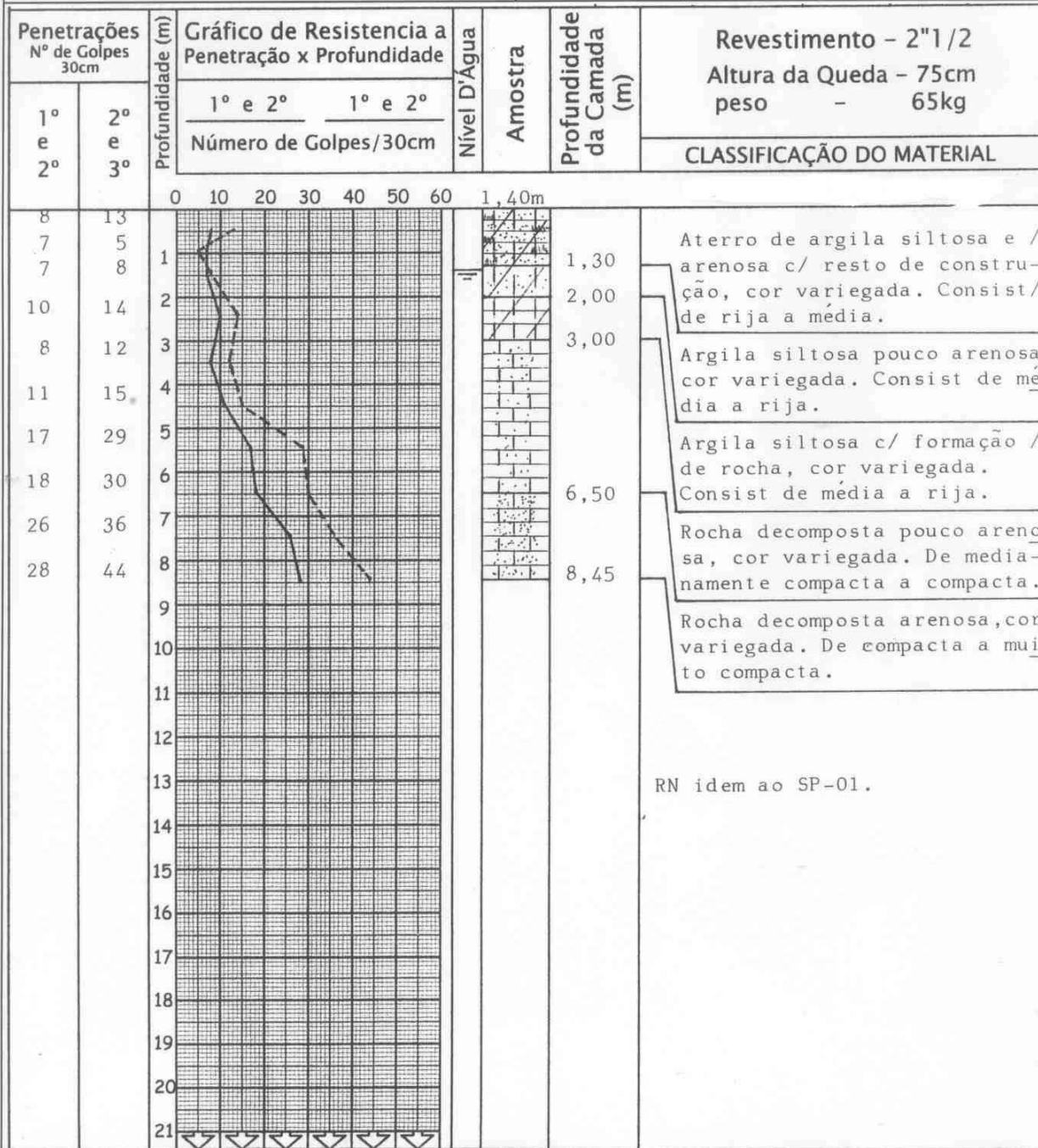


F - 04

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



RN idem ao SP-01.

LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:

COTA:

0.40

OPERADOR:

DATA:

18/07/06

VISTO:

RODOVIA: PE-60

TRECHO: ENTR.BR-101 (CABO) - ENTR.ACESSO A SUAPE

EXTENSÃO: 600m

PERFIL DE SONDAGEM

QD-5.4

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

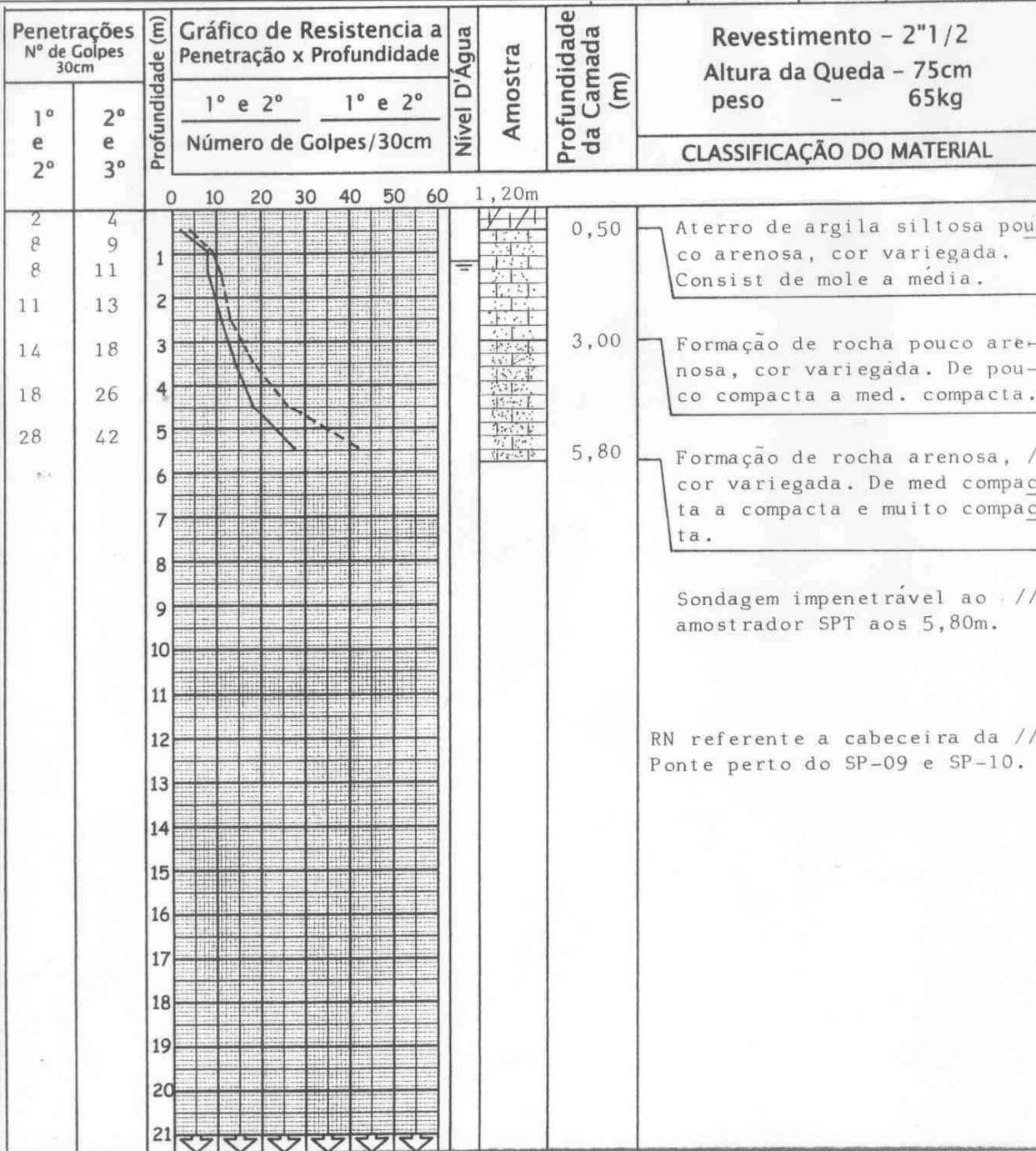

MAIA MELO ENGENHARIA LTDA.

F - 05

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:	COTA: 0.50	OPERADOR:	DATA: 11/07/06	VISTO:
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RODOVIA: PE-60 TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO A SUAPE EXTENSÃO: 600m	PERFIL DE SONDAGEM QD-5.5
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SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

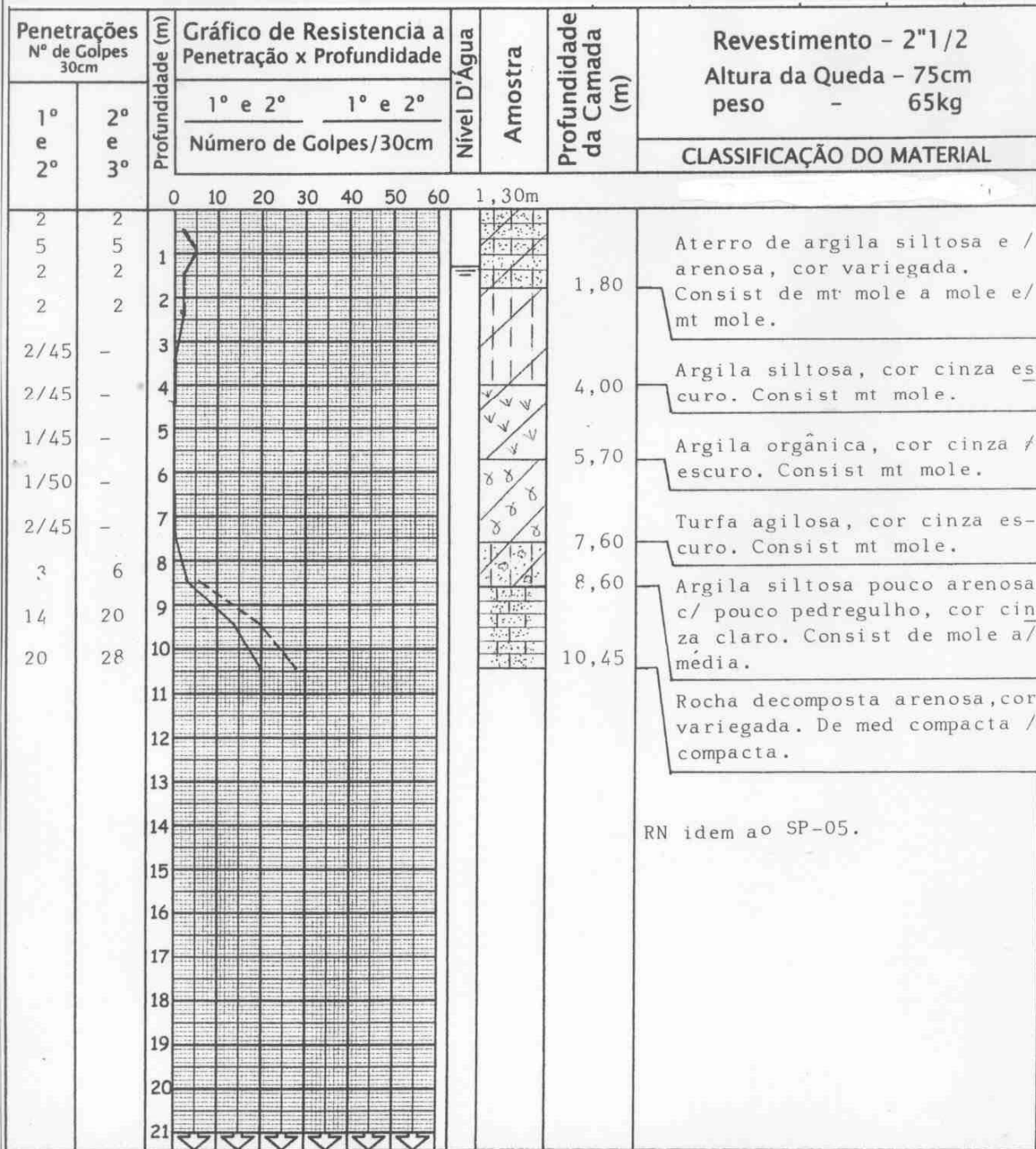


F - 06

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km.2.2 DA RODOVIA PE 60

COORDENADAS:

COTA:

0.40

OPERADOR:

DATA:

11/07/06

VISTO:

RODOVIA: PE-60
TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO A SUAPE
EXTENSÃO: 600m

PERFIL DE SONDAAGEM

QD-5.6

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

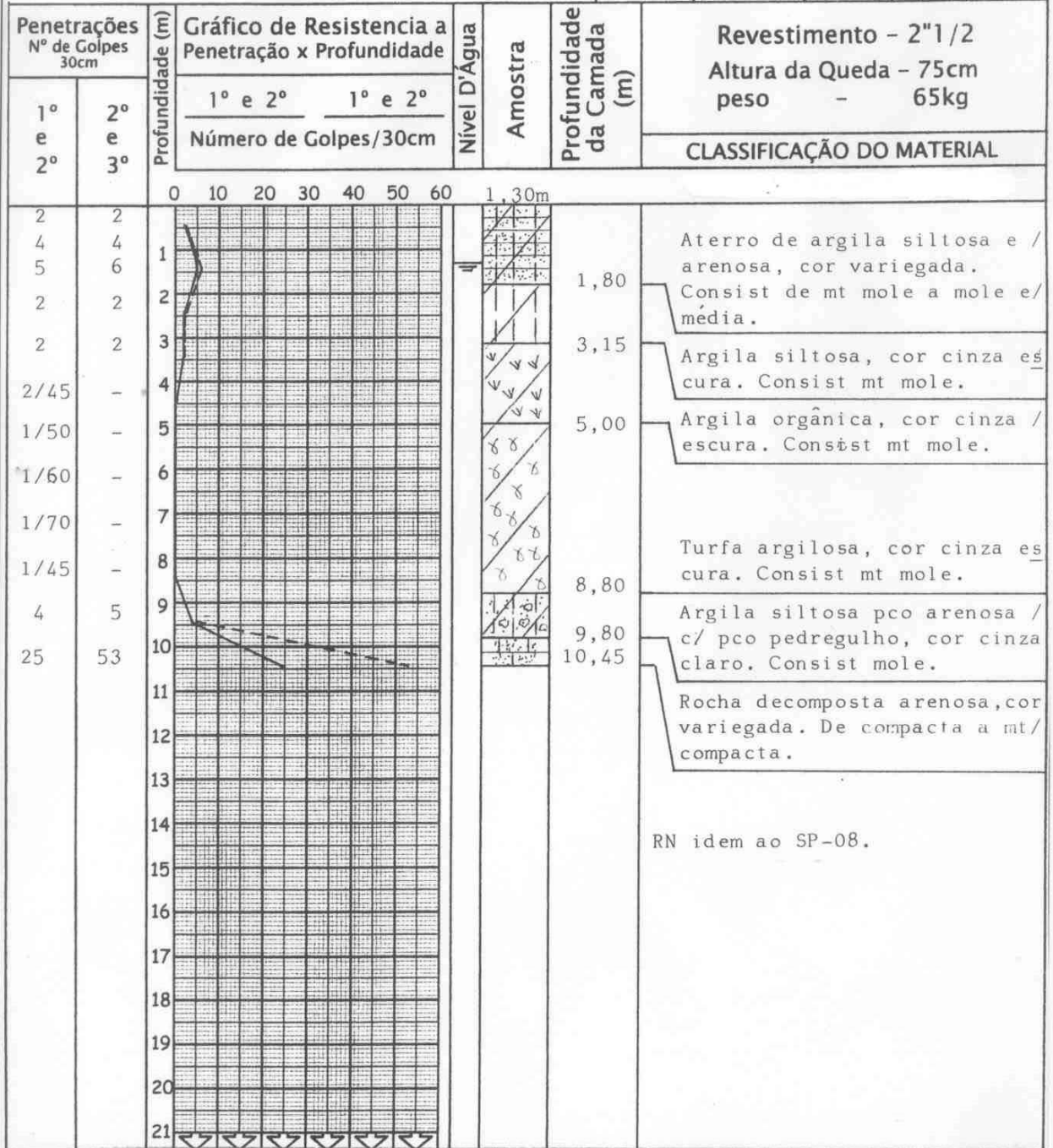


F - 07

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:

COTA:

-0.25

OPERADOR:

DATA:

10/07/06

VISTO:

RODOVIA: PE-60

TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO A SUAPE

EXTENSÃO: 600m

PERFIL DE SONDAAGEM

QD-5.7

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

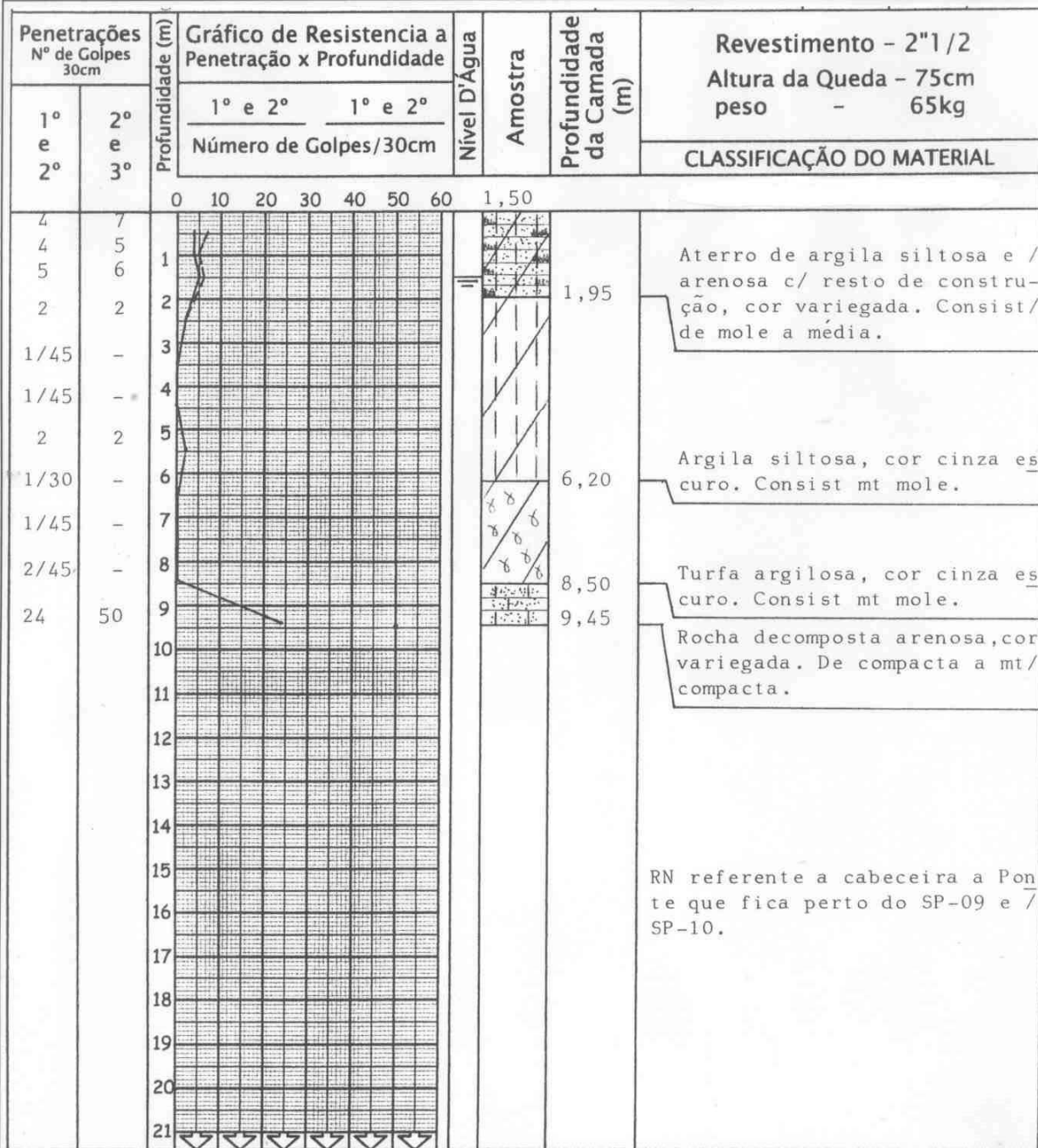

MAIA MELO ENGENHARIA LTDA.

F - 08

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:

COTA:

0.40

OPERADOR:

DATA:

10/07/06

VISTO:

RODOVIA: PE-60
TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO A SUAPE
EXTENSÃO: 600m

PERFIL DE SONDAAGEM

QD-5.8

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

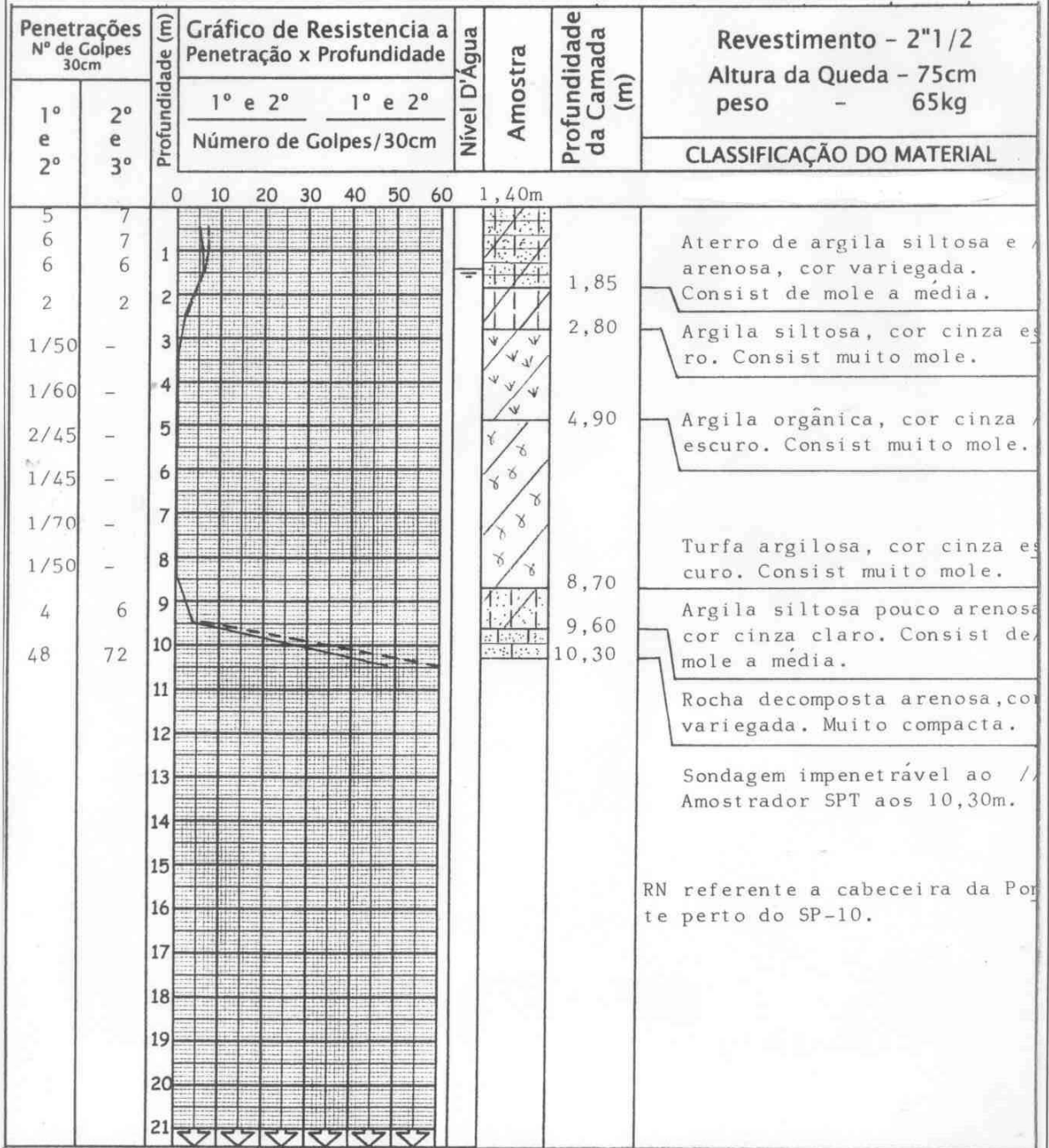


F - 09

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:

COTA:

-0.15

OPERADOR:

DATA:

07/07/06

VISTO:

RODOVIA: PE-60
TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO A SUAPE
EXTENSÃO: 600m

PERFIL DE SONDAGEM

QD-5.9

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

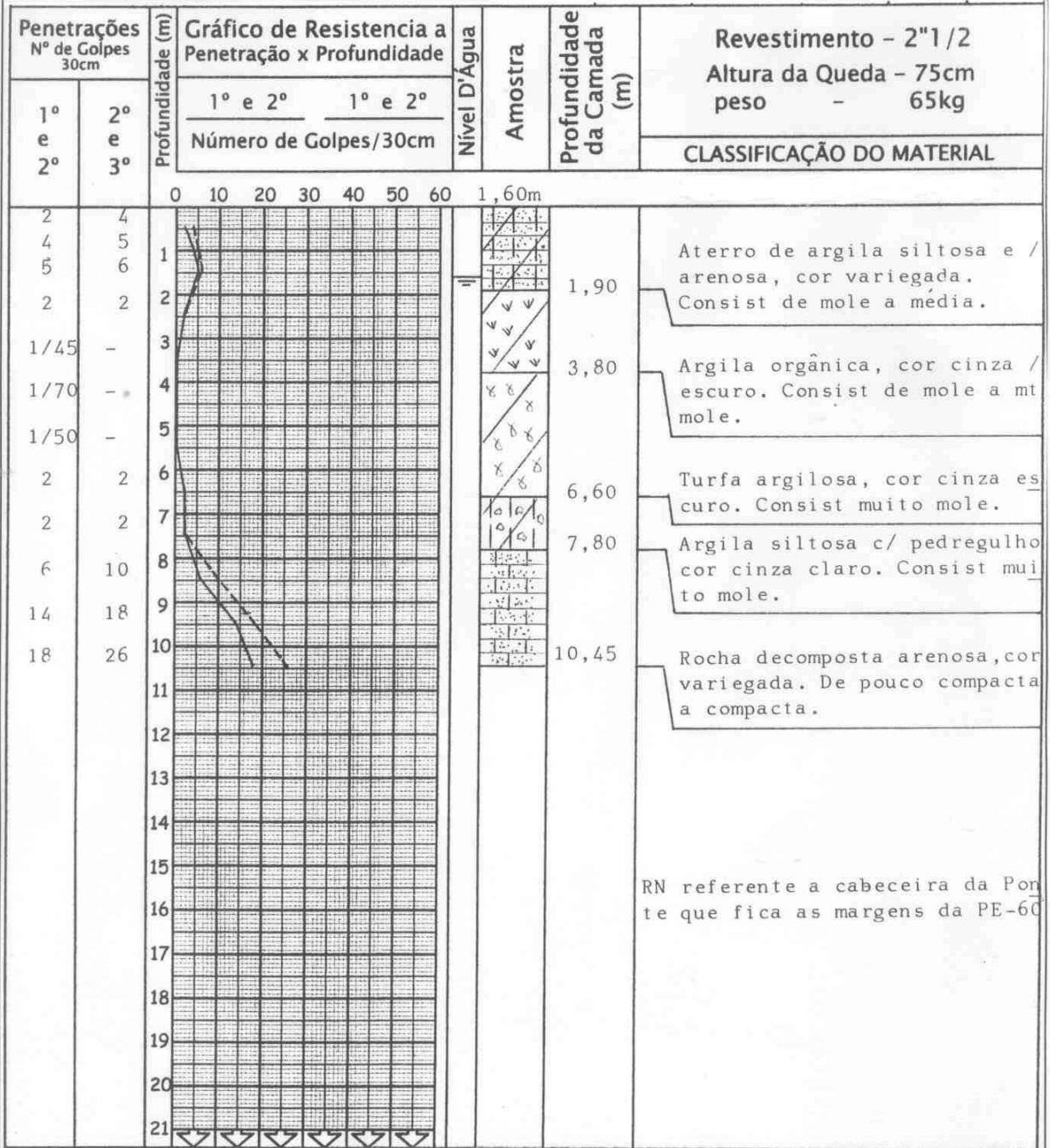

MAIA MELO ENGENHARIA LTDA.

F - 10

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



RN referente a cabeceira da Ponte que fica as margens da PE-60

LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:	COTA: -0.50	OPERADOR:	DATA: 07/07/06	VISTO:
RODOVIA: PE-60 TRECHO: ENTR. BR-101 (CABO) - ENTR. ACESSO A SUAPE EXTENSÃO: 600m				PERFIL DE SONDAAGEM
				QD-5.10

SONDAGEM DE RECONHECIMENTO A PERCUSSÃO

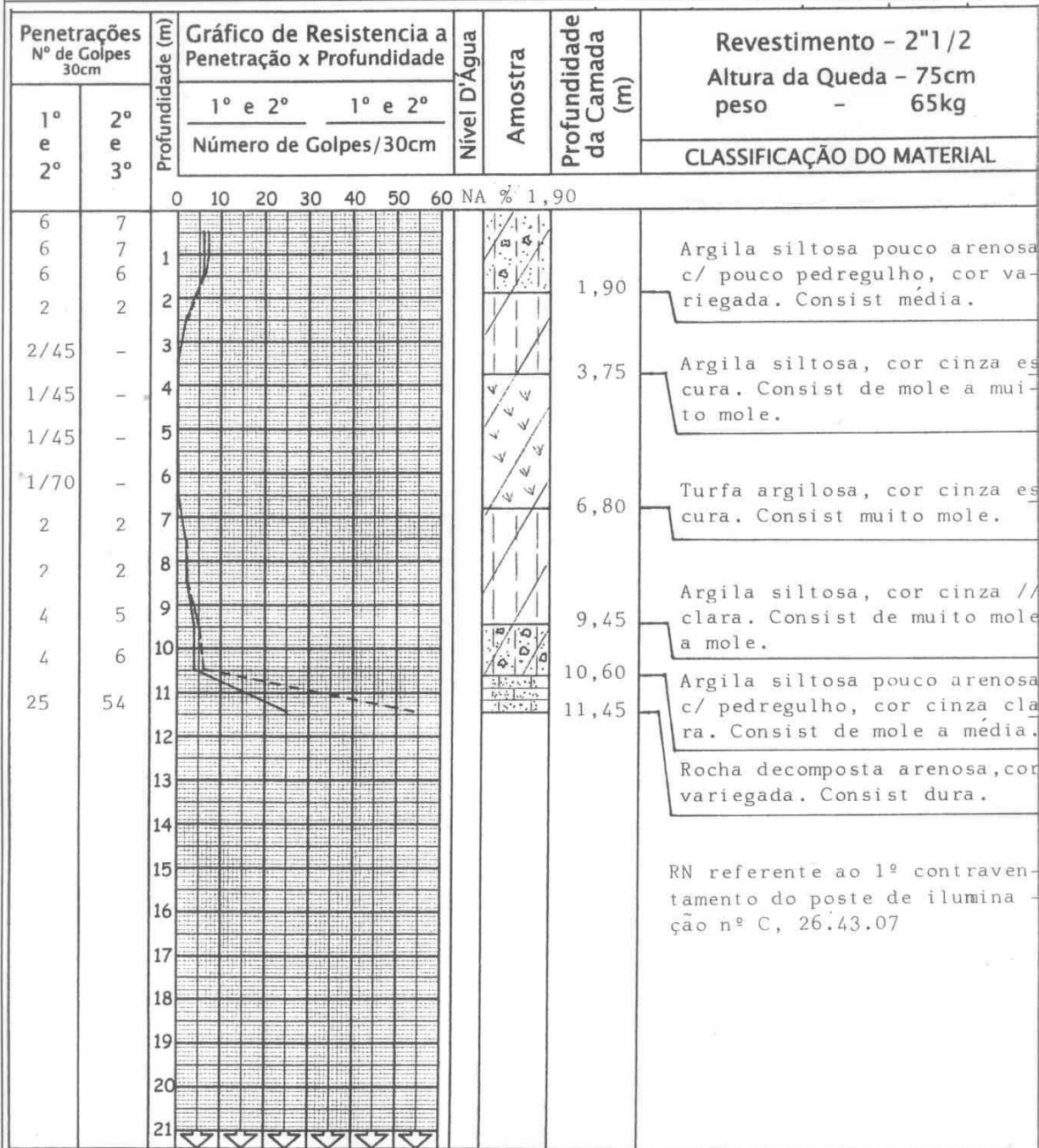


F - 11

ESCALA
VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm



LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:	COTA: -0.40	OPERADOR:	DATA: 06/07/06	VISTO:
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RODOVIA: PE-60 TRECHO: ENTR.BR-101 (CABO) - ENTR.ACESSO A SUAPE EXTENSÃO: 600m	PERFIL DE SONDAAGEM QD-5.11
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SONDAGEM DE RECONHECIMENTO A PERCUSSÃO



F - 12

ESCALA VERTICAL
1/100

EXTERNO
50.8 mm

INTERNO
36.9 mm

Penetrações Nº de Golpes 30cm		Profundidade (m)	Gráfico de Resistencia a Penetração x Profundidade		Nível D'Água	Amostra	Profundidade da Camada (m)	Revestimento - 2"1/2	
			1º e 2º	1º e 2º				Altura da Queda - 75cm	peso - 65kg
1º e 2º	2º e 3º		Número de Golpes/30cm					CLASSIFICAÇÃO DO MATERIAL	
			0 10 20 30 40 50 60					NA % 1,10	
2	3	1						<p>Aterro silte argiloso, cor / marrom escuro. Consist mole.</p> <hr/> <p>Argila siltosa, cor cinza escura. Consist muito mole.</p> <hr/> <p>Argila siltosa pouco arenosa cor cinza clara. Consist de/ muito mole a mole.</p> <hr/> <p>Areia média argilosa, cor // cinza clara. Consist média.</p> <hr/> <p>Argila siltosa c/ formação de rocha, cor cinza clara. Consist de rija a dura.</p> <hr/> <p>Rocha decomposta arenosa, cor variegada. Consist dura.</p> <p>RN, ídem ao SP-11</p>	
4	4	2,00							
2	3	3,80							
2	2	5,15							
2	2	6,20							
3	4	6,60							
6	10	8,45							
14	20								
24	34								
		9							
		10							
		11							
		12							
		13							
		14							
		15							
		16							
		17							
		18							
		19							
		20							
		21							

LOCALIZAÇÃO: km2.2 DA RODOVIA PE 60

COORDENADAS:

COTA:

-1.00

OPERADOR:

DATA:

06/07/06

VISTO:

RODOVIA: PE-60

TRECHO: ENTR.BR-101 (CABO) - ENTR.ACESSO A SUAPE

EXTENSÃO: 600m

PERFIL DE SONDAAGEM

QD-5.12

5. PROJETO DE OBRA DE ARTE ESPECIAL

5.1 MEMÓRIA DESCRITIVA

5.1 Memorial Descritivo

Tratam-se de dois viadutos paralelos na PE-060, cada um com largura de 11.30 m e 3 vãos, sendo dois vãos laterais com 33,0m cada um e um vão central com 37.00 m, com extensão total de 103,0m. Foi adotada a solução em vigas pré-moldadas por razões construtivas por se tratar de uma via bastante movimentada.

A superestrutura é formada por um tabuleiro com 5 vigas isostáticas de 36.80 m de comprimento, interligadas por laje de 20cm de espessura e 3 transversinas por vão . Nos apoios centrais será dada continuidade na laje, evitando com isso problemas de juntas. As vigas são protendidas longitudinalmente com cabos constituídos por 12 cordoalhas de 15.2 mm e as transversina, com cabos de 6 cordoalhas de 15.2mm.

A meso estrutura é composta de pilares de seção quadrada 1.00 m de lado nos apoios extremos, e nos apoios centrais, de pilares de seção retangular de 1.40x1.00m, aportcados transverslente por travessas em que se apoiam as vigas.

A infra-estrutura é composta de blocos em concreto armados assentes em estacas metálicas, perfil HP 310X110 em 3 apoios, e em tubulão, na outra extremidade.

Os aparelhos de apoios são em borracha de neoprene fretado.

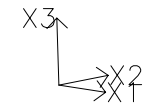
Materiais utilizados:

- Concreto estrutural laje e vigas $f_{ck}=35\text{Mpa}$
- demais elementos $f_{ck}=30\text{MPa}$
- tubulão $f_{ck}=25\text{MPa}$

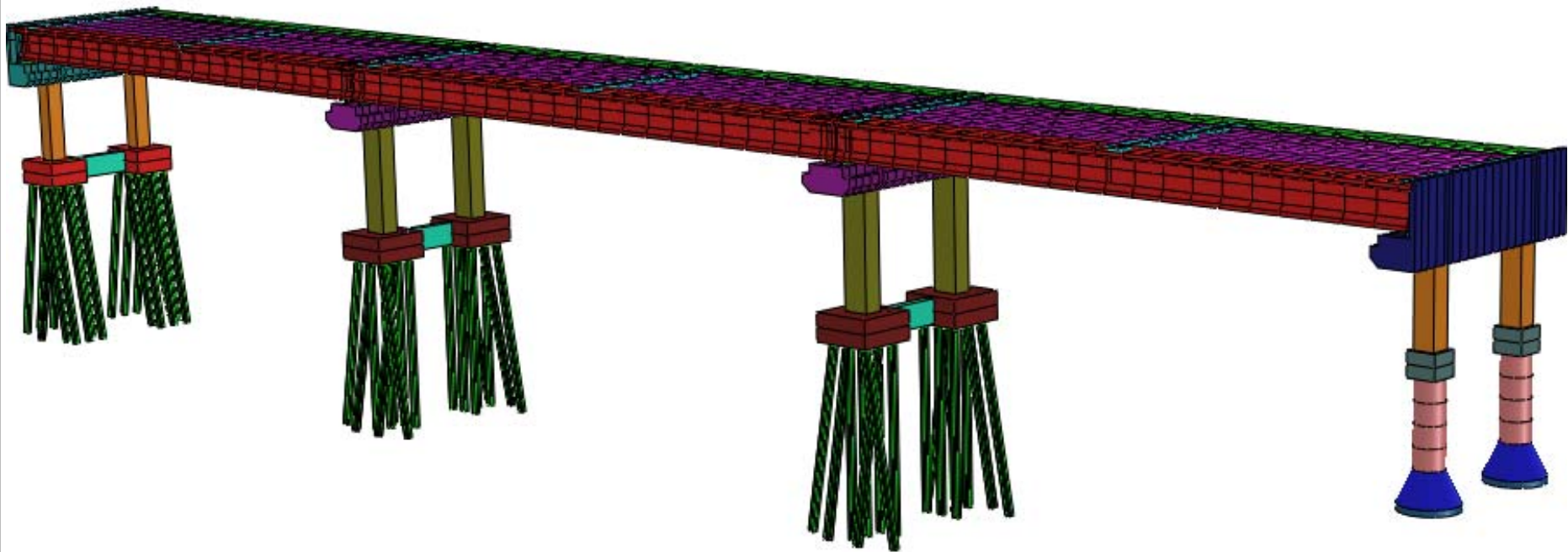
- Aço CA-50
- Aço para protensão CP – 190 RB cordoalha de 15.2mm
- Neoprene dureza Shore 60
- Estacas metálicas HP 310x110

A Memória de Calculo está apresentada no Volume 3C e as Plantas estão apresentadas no Volume 2.

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)



DATA:12/10/11



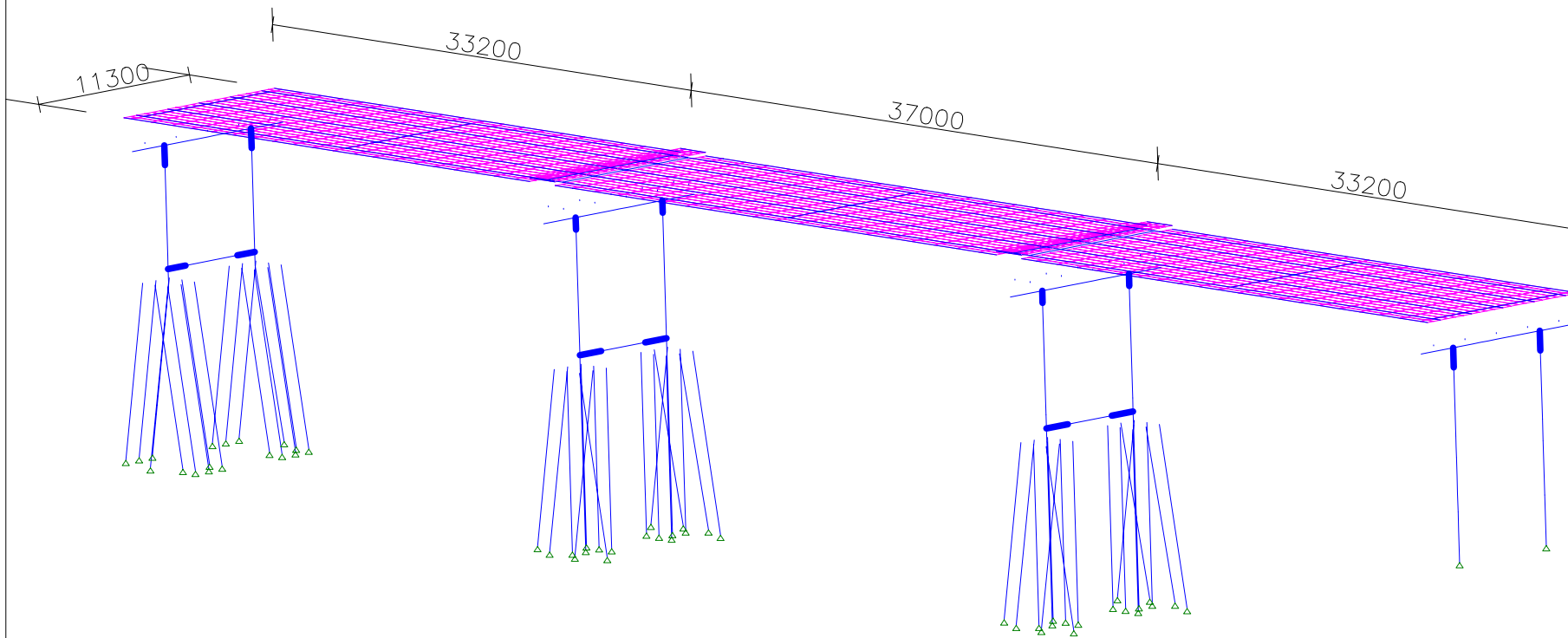
ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

dimensões



ESCALA= 1:357

DATA:12/10/11

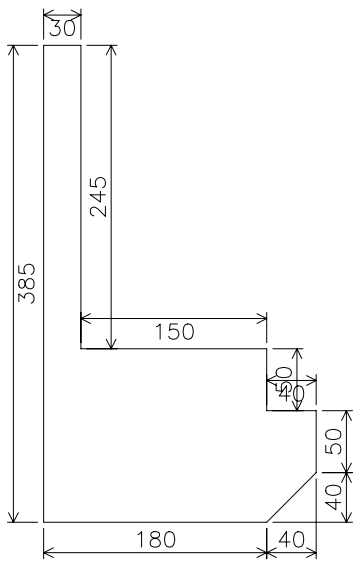


5.2 MEMÓRIA DE CÁLCULO DE ESTRUTURA

5.2.1 SUPERESTRUTURA

5.2.1.1 GEOMETRIA E MATERIAIS

**** PROPRIEDADES GEOMÉTRICAS ****

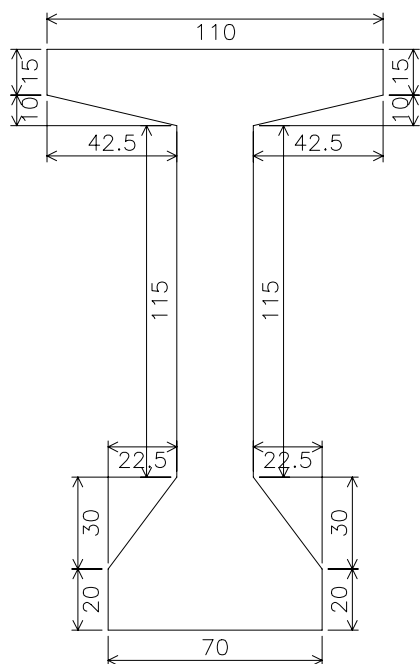


Área:	A=35350.		
Mom. de inércia:	lx=2.992E+008	ly=1.413E+008	J=1.036E+008
C.O.G :	xt=82.9679	yt=108.761	
	(da esquerda)	(de baixo)	
Módulo elástico:	Sx=1083185.4	Sy=1030904.2	
raio de giração.	rx=92.0024	ry=63.2158	

Propriedade em torno dos eixos princ. (ângulo = 26.0058)

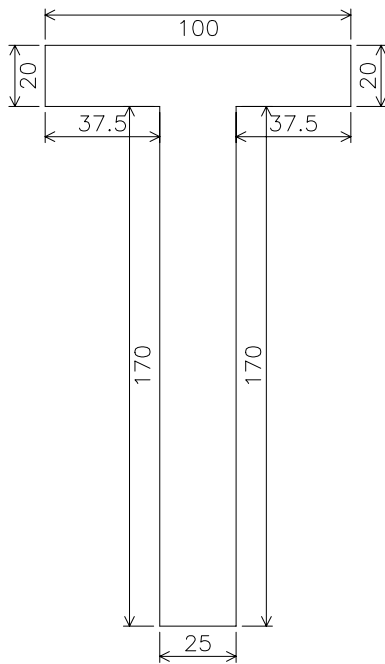
Mom. de inércia:	Iu=3.486E+008	Iv=91931104.	
C.O.G :	ut=140.294	vt=122.255	
Módulo elástico:	Su=1224508.6	Sv=751961.	
raio de giração.	ru=99.2979	rv=50.996	

**** PROPRIEDADES GEOMÉTRICAS ****



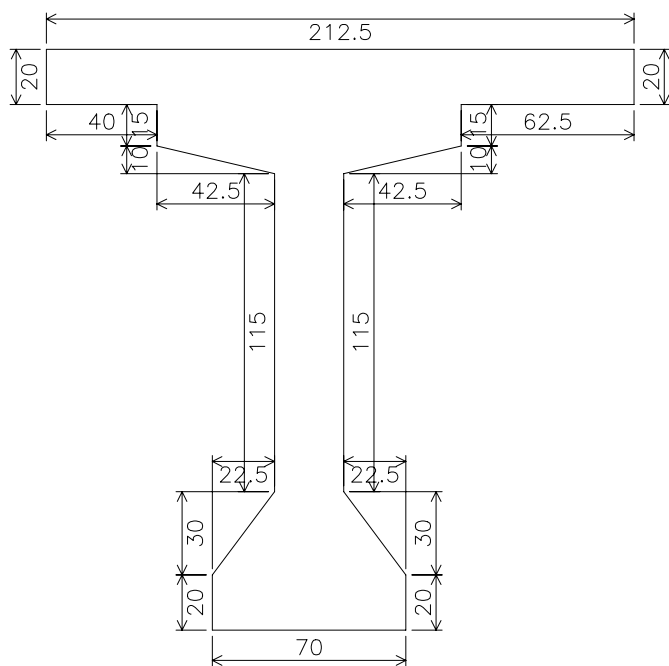
Área:	A=8025.		
Mom. de inércia:	Ix=35923364.	Iy=3071094.8	J=2282901.3
C.O.G :	xt=55.	yt=97.9622	
	(da esquerda)	(de baixo)	
Módulo elástico:	Sx=366706.6	Sy=55838.1	
raio de giração.	rx=66.9061	ry=19.5625	

**** PROPRIEDADES GEOMÉTRICAS ****



Área:	A=6250.		
Mom. de inércia:	Ix=22576054.	Iy=1888019.5	J=1150155.9
C.O.G :	xt=50.	yt=115.4	
	(da esquerda)	(de baixo)	
Módulo elástico:	Sx=195633.	Sy=37760.4	
raio de giração.	rx=60.1013	ry=17.3805	

**** PROPRIEDADES GEOMÉTRICAS ****

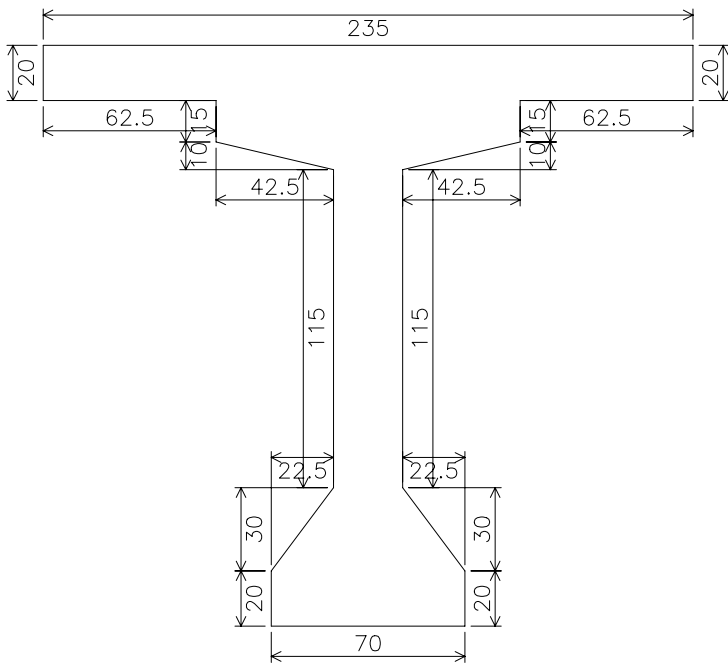


Área:	A=12275.		
Mom. de inércia:	lx=64994120.	ly=19415556.	J=4593535.
C.O.G :	xt=98.8951 (da esquerda)	yt=133.291 (de baixo)	
Módulo elástico:	Sx=487611.2	Sy=170904.3	
raio de giração.	rx=72.7656	ry=39.7708	

Propriedade em torno dos eixos princ. (ângulo = -3.98351)

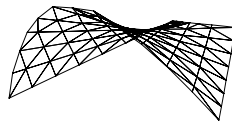
Mom. de inércia:	lu=65216236.	lv=19193444.
C.O.G :	ut=135.671	vt=103.985
Módulo elástico:	Su=480694.4	Sv=175457.5
raio de giração.	ru=72.8899	rv=39.5426

**** PROPRIEDADES GEOMÉTRICAS ****



Área:	A=12725.		
Mom. de inércia:	Ix=66940880.	Iy=24700842.	J=4642935.
C.O.G :	xt=117.5	yt=135.65	
	(da esquerda)	(de baixo)	
Módulo elástico:	Sx=493482.6	Sy=210220.	
raio de giração.	rx=72.5299	ry=44.0582	

STRAP



PROGRAMAS DE ANÁLISE ESTRUTURAL

BR AGENT
ATIR
S S K

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Prado - Recife - PE - CEP 50.720-140

Strap 2011.00

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
materiais e propriedades
Preparado por:

Página:1
Data:12/10/11

TABELA DE MATERIAIS (unidades - tf metros)

N.º	Nome	Módulo de Elasticidade	Coefic. Poisson	Densidade	Dilatação Térmica	Módulo Transv. (G)
1	C30	0.2607E+07	0.200	0.2500E+01	0.00001000	0.1086E+07
2	C35	0.2816E+07	0.200	0.2500E+01	0.00001000	0.1173E+07
3	neop	0.2680E+05	0.200	0.3000E+01	0.00001000	0.1000E+03
4	C25	0.2380E+07	0.200	0.2500E+01	0.00001000	0.9917E+06
5	STEE	0.2000E+08	0.300	0.7850E+01	0.00001200	0.7692E+07

TABELA DE PROPRIEDADES (unidades - cm.)

TABELA DE PROPRIEDADES (unidades - cm.)					
PROPRIEDADE N. 1					
A=0.8025E+04	I2=0.3592E+08	I3=0.3071E+07	J=0.2283E+07	SF2=0.500	SF3=0.500
Material = 2 - C35	Perímetro=642.321				
h2=110.000	h3=190.000	e2=55.000	e3=97.962		
__Solid iso					
PROPRIEDADE N. 2					
A=0.1228E+05	I2=0.6499E+08	I3=0.1942E+08	J=0.4594E+07	SF2=0.500	SF3=0.500
Material = 2 - C35	Perímetro=887.321				
h2=212.500	h3=210.000	e2=113.605	e3=133.291		
__Solid vex					
PROPRIEDADE N. 3					
A=0.1228E+05	I2=0.6499E+08	I3=0.1942E+08	J=0.4594E+07	SF2=0.500	SF3=0.500
Material = 2 - C35	Perímetro=887.321				
h2=212.500	h3=210.000	e2=113.605	e3=133.291		
__Solid vex					
PROPRIEDADE N. 4					
A=0.1272E+05	I2=0.6694E+08	I3=0.2470E+08	J=0.4643E+07	SF2=0.500	SF3=0.500
Material = 2 - C35	Perímetro=932.321				
h2=235.000	h3=210.000	e2=117.500	e3=135.650		
__Solid vin					
PROPRIEDADE N. 5					
A=0.6250E+04	I2=0.2258E+08	I3=0.1888E+07	J=0.1150E+07	SF2=0.500	SF3=0.500
Material = 2 - C35	Perímetro=580.000				
h2=100.000	h3=190.000	e2=50.000	e3=115.400		
__Solid tvc					

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 materiais e propriedades
Preparado por:

Página:2
Data:12/10/11

TABELA DE PROPRIEDADES (unidades - cm.)

PROPRIEDADE N. 6

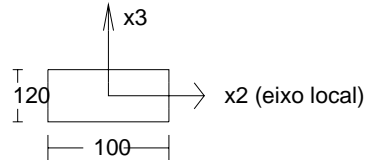
Espessura = 20.000
 Material = 2 - C35

PROPRIEDADE N. 7

A=0.3710E+05 I2=0.5462E+08 I3=0.2325E+09 J=0.1550E+09 SF2=0.500
 Material = 1 - C30 Perímetro=850.600 SF3=0.500
 h2=310.000 h3=140.000 e2=157.160 e3=72.710
 ___Solid tce

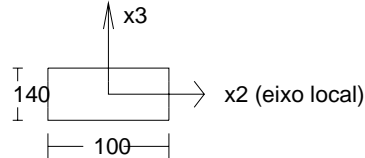
PROPRIEDADE N. 8

A=0.1200E+05 I2=0.1440E+08 I3=0.1000E+08 J=0.1984E+08 SF2=0.850
 Material = 1 - C30 Perímetro=440.000 SF3=0.850
 h2=100.000 h3=120.000 e2=50.000 e3=60.000



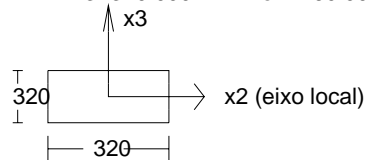
PROPRIEDADE N. 9

A=0.1400E+05 I2=0.2287E+08 I3=0.1167E+08 J=0.2612E+08 SF2=0.850
 Material = 1 - C30 Perímetro=480.000 SF3=0.850
 h2=100.000 h3=140.000 e2=50.000 e3=70.000



PROPRIEDADE N. 10

A=0.1024E+06 I2=0.8738E+09 I3=0.8738E+09 J=0.1477E+10 SF2=0.850
 Material = 1 - C30 Perímetro=1280.00 SF3=0.850
 h2=320.000 h3=320.000 e2=160.000 e3=160.000



PROPRIEDADE N. 11

A=0.3535E+05 I2=0.2992E+09 I3=0.1413E+09 J=0.1036E+09 SF2=0.500
 Material = 1 - C30 Perímetro=1186.56 SF3=0.500
 h2=220.000 h3=385.000 e2=137.032 e3=276.239
 ___Solid enc

PROPRIEDADE N. 12

A=0.3535E+05 I2=0.2992E+09 I3=0.1413E+09 J=0.1036E+09 SF2=0.500
 Material = 1 - C30 Perímetro=1186.56 SF3=0.500
 h2=220.000 h3=385.000 e2=137.032 e3=276.239
 ___Solid enc

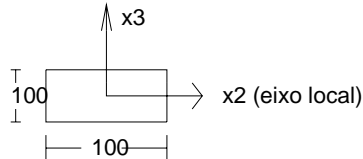
ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 materiais e propriedades
Preparado por:

Página:3
Data:12/10/11

TABELA DE PROPRIEDADES (unidades - cm.)

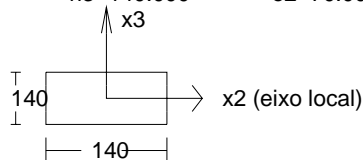
PROPRIEDADE N. 13

A=0.1000E+05 I2=0.8333E+07 I3=0.8333E+07 J=0.1408E+08 SF2=0.850
 Material = 1 - C30 Perímetro=400.000 SF3=0.850
 h2=100.000 h3=100.000 e2=50.000 e3=50.000



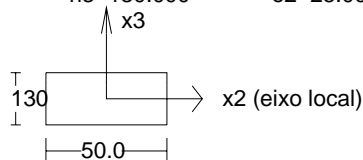
PROPRIEDADE N. 14

A=0.1960E+05 I2=0.3201E+08 I3=0.3201E+08 J=0.5410E+08 SF2=0.850
 Material = 1 - C30 Perímetro=560.000 SF3=0.850
 h2=140.000 h3=140.000 e2=70.000 e3=70.000



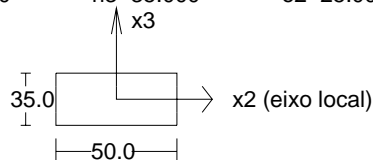
PROPRIEDADE N. 15

A=0.6500E+04 I2=0.9154E+07 I3=0.1354E+07 J=0.4107E+07 SF2=0.850
 Material = 1 - C30 Perímetro=360.000 SF3=0.850
 h2=50.000 h3=130.000 e2=25.000 e3=65.000



PROPRIEDADE N. 16

A=0.1750E+04 I2=0.1786E+06 I3=0.3646E+06 J=0.4058E+06 SF2=0.850
 Material = 3 - neop Perímetro=170.000 SF3=0.850
 h2=50.000 h3=35.000 e2=25.000 e3=17.500



PROPRIEDADE N. 17

Espessura = 18.000
 Material = 2 - C35

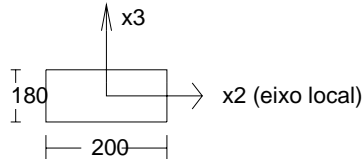
ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 materiais e propriedades
Preparado por:

Página:4
Data:12/10/11

TABELA DE PROPRIEDADES (unidades - cm.)

PROPRIEDADE N. 18

A=0.3600E+05 I2=0.9720E+08 I3=0.1200E+09 J=0.1804E+09 SF2=0.850
 Material = 1 - C30 Perímetro=760.000 SF3=0.850
 h2=200.000 h3=180.000 e2=100.000 e3=90.000



PROPRIEDADE N. 19

A=0.1539E+05 I2=0.1886E+08 I3=0.1886E+08 J=0.3771E+08 SF2=0.890
 Material = 4 - C25 Perímetro=439.823 SF3=0.890
 h2=140.000 h3=140.000 e2=70.000 e3=70.000
 Circ., Diâmetro= 140.000

PROPRIEDADE N. 20

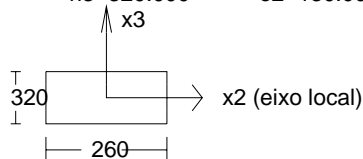
A=0.6158E+05 I2=0.3017E+09 I3=0.3017E+09 J=0.6034E+09 SF2=0.890
 Material = 4 - C25 Perímetro=879.646 SF3=0.890
 h2=280.000 h3=280.000 e2=140.000 e3=140.000
 Circ., Diâmetro= 280.000

PROPRIEDADE N. 21

Início:prop. nº = 20 H= 280.000 Fim: prop. nº.= 19 H=140.000

PROPRIEDADE N. 22

A=0.8320E+05 I2=0.7100E+09 I3=0.4687E+09 J=0.9500E+09 SF2=0.850
 Material = 1 - C30 Perímetro=1160.00 SF3=0.850
 h2=260.000 h3=320.000 e2=130.000 e3=160.000



PROPRIEDADE N. 23

A=0.1192E+03 I2=0.1968E+05 I3=0.6387E+04 J=0.7733E+02 SF2=0.292
 Material = 5 - STEE Perímetro=181.180 SF3=0.565
 h2=30.800 h3=30.300 e2=15.400 e3=15.150
 HP 310x93.0

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 materiais e propriedades
Preparado por:

Página:5
Data:12/10/11

TABELA DE OFFSETS DAS BARRAS (unidades - metros)							
N.º	Sistema	OFFSET em JA			OFFSET em JB		
		X1	X2	X3	X1	X2	X3
1	Global	0.000	0.000	0.000	0.000	0.000	-1.090
2	Global	0.000	0.000	0.000	0.000	0.000	-0.670
3	Global	0.000	1.300	0.000	0.000	-1.300	0.000
4	Global	0.000	1.600	0.000	0.000	-1.600	0.000

TABELA DE MOLAS (unidades - tf metros)						
Nº	S1	S2	S3	S4	S5	S6
1521	1000.0	1000.0	0.0	0.0	0.0	0.0
1522	1000.0	1000.0	0.0	0.0	0.0	0.0
1524	2000.0	2000.0	0.0	0.0	0.0	0.0
1526	2000.0	2000.0	0.0	0.0	0.0	0.0
2027	6000.0	6000.0	0.0	0.0	0.0	0.0
2028	7000.0	7000.0	0.0	0.0	0.0	0.0
2029	0.0	0.0	0.0	200000.0	200000.0	0.0
2030	6000.0	6000.0	0.0	0.0	0.0	0.0
2031	7000.0	7000.0	0.0	0.0	0.0	0.0
2032	0.0	0.0	0.0	200000.0	200000.0	0.0
2150	3000.0	3000.0	0.0	0.0	0.0	0.0
2151	4000.0	4000.0	0.0	0.0	0.0	0.0
2152	5000.0	5000.0	0.0	0.0	0.0	0.0
2153	3000.0	3000.0	0.0	0.0	0.0	0.0
2154	4000.0	4000.0	0.0	0.0	0.0	0.0
2155	5000.0	5000.0	0.0	0.0	0.0	0.0

5.2.1.2 CARREGAMENTO

CARREGAMENTO

OBRA : VIADUTO NA PE-060

CARREGAMENTO UNIDADES - T,M,T/M

1. PESO PROPRIO

1.1 CARGA CONCENTRADA

1.1 ALAS E DEFENSA S/ALA

$$\text{ALA PA1} := 5.54 \cdot 0.25 \cdot 2.5 + 3.5 \cdot 0.4 \cdot 0.15 \cdot 2.5 + 0.5 \cdot 0.15 \cdot 0.50 \cdot 1.92 \cdot 2.5$$

$$\text{PA2} := 0$$

$$\text{PA} := \text{PA1} + \text{PA2} \quad \text{PA} = 4.167 \quad \text{T}$$

$$\text{MPA} := \text{PA1} \cdot 1.496 + \text{PA2} \cdot 1.75 \quad \text{MPA} = 6.235 \quad \text{TM}$$

1.2 CARGA DISTRIBUIDA

TIRADO DIRETAMENTE PELO COMPUTADOR

2. PESO DE SOBRECARGA

2.1 LAJE DE APROXIMAÇÃO

$$\text{P. PRÓPRIO. PL1} := 0.3 \cdot 2.0 \cdot 2.5$$

$$\text{SOBRECARGA. PL2} := 0.3 \cdot 2.0 \cdot 1.80 + 0.10 \cdot 2.0 \cdot 2.4 \quad \text{PL} := \text{PL1} + \text{PL2}$$

$$\text{MPL} := \text{PL} \cdot 0.125$$

$$\text{PL} = 3.06 \quad \text{T / M}$$

$$\text{MPL} = 0.383 \quad \text{T M/M}$$

2.2 CARGA DISTRIBUIDA

$$\text{Q} := (0.07 + 0.19) \cdot 0.5 \cdot 2.4 + 0.2 \quad \text{Q} = 0.512 \quad \text{T / M}^2 \quad \text{PAV}$$

$$\text{QC1} := 0.235 \cdot 2.5 \quad \text{QC1} = 0.587 \quad \text{T / M} \quad \text{DEFENSA}$$

3. CARGA MOVEL TB-450KN GERADO DIRETAMENTE NO PROGRAMA STRAP

PARA TODA LARGURA DA OBRA

4. FRENAGEM $L := 103 \text{ M}$ $Bp := 10.5 \text{ M}$

$$Fh := \max(0.30 \cdot 45, 0.05 \cdot 0.5 \cdot L \cdot Bp) \quad Fh = 27.038 \quad T$$

5. VENTO (c/ ponte carregada)

$h_v := 2.1 \text{ M}$ $h_p := 0.10 \text{ M}$

$$F_v := 0.10 \cdot (h_v + h_p + 2) \quad F_v = 0.42 \quad T/M$$

6. EMPUXO $\gamma := 1.80 \text{ T/M}^3$ $q := 0.5 \text{ T/M}^2$ $yc := 1.09$

$ka := 0.333$ $hc := 3.85$

$$E_a := ka \cdot \gamma \cdot \frac{hc^2}{2} + ka \cdot q \cdot hc$$

$E_a = 5.083 \quad T/M$

$$m_{E_a} := ka \cdot \gamma \cdot \frac{hc^2}{2} \left(\frac{hc}{3} - yc \right) + ka \cdot q \cdot hc \cdot \left(\frac{hc}{2} - yc \right)$$

$m_{E_a} = 1.394$

7. TEMPERATURA+RETRAÇÃO+PROTENSÃO (DEF. LENTA)

TEMPERATURA	-	15 GRAUS
RETRAÇÃO	-	10 GRAUS
DEFORMAÇÃO LENTA PROT.	-	30 GRAUS
TOMADO EQUIVALENTE A 55 GRAUS		

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
lista de carregamento
Preparado por:

Página:9
Data:12/10/11

LISTA DE CARREGAMENTOS		
Nº	Nº nos result.	nome
1	1	peso proprio viga+laje g1+g2
2	2	peso da pavimentação + defesa g3
3	3	empuxo 1
4	4	empuxo 2
5	5	frenagem 1
6	6	frenagem 2
7	7	vento 1
8	8	vento 2
9	9	temperatura 55
10	10	Pontes: Maxima envoltori
11	11	Pontes: Minima envoltori

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
cargas
Preparado por:

Página:6
Data:12/10/11

Comandos de cargas

Carga n.º 1: peso proprio viga+laje g1+g2

/ BEAM LOADS
/ BEAM LOADS
/ BEAM LOADS

SELF X3 -1. B 23 TO 43 45 TO 65 67 TO 87 89 TO 109 111 TO 131 133 TO 153
155 TO 175 177 TO 192 209 TO 224 667 TO 686 689 TO 708 711 TO 730 733 TO 752
755 TO 774 777 TO 796 799 TO 818 835 TO 868 887 888 890 1308 TO 1417
1419 TO 1439 1441 TO 1509 1949 TO 1990 1992 TO 2021 2034 TO 2057
2066 TO 2095 2456 TO 2533 2575 TO 2584 2654 TO 2659

/ BEAM LOADS
SELF X3 -1. B 2585 TO 2587 2589 TO 2635
/ BEAM LOADS
SELF X3 -1. B 2636 TO 2648 2650 TO 2653
/ BEAM LOADS

SELF X3 -1. B 2649
/ BEAM LOADS
SELF X3 -1. B 2588
/ BEAM LOADS
/ END

SOMATÓRIO DE CARGAS

FX1=0.
FX2=0.
FX3=-2656.3

Carga n.º 2: peso da pavimentação + defesa g3

/ BEAM LOADS

/ PRESSURE
/ BEAM LOADS
DIST GL FX3 -0.375 B 133 TO 153 777 TO 795 888 1419 1420 TO 1439
2486 TO 2489 2498 TO 2501 155 TO 175 799 TO 817 890 1441 1442 TO 1460
1509 2490 2491 TO 2497

/ PRESSURE
FX3P GL -0.512 E 225 TO 244 247 TO 266 269 TO 288 291 TO 310 313 TO 332
335 TO 354 357 TO 376 379 TO 398 401 TO 420 423 TO 442 445 TO 464
467 TO 486 489 TO 508 511 TO 530 533 TO 552 555 TO 574 577 TO 596
599 TO 618 621 TO 640 643 TO 662 869 TO 886 891 TO 908 913 TO 930

935 TO 952 957 TO 974 979 TO 996 1001 TO 1018 1023 TO 1040 1045 TO 1062
1067 TO 1084 1089 TO 1106 1111 TO 1128 1133 TO 1150 1155 TO 1172
1177 TO 1194 1199 TO 1216 1221 TO 1238 1243 TO 1260 1265 TO 1282
1287 TO 1304 1511 TO 1530 1533 TO 1552 1555 TO 1574 1577 TO 1596
1599 TO 1618 1621 TO 1640 1643 TO 1662 1665 TO 1684 1687 TO 1706

1709 TO 1728 1731 TO 1750 1753 TO 1772 1775 TO 1794 1797 TO 1816
1819 TO 1838 1841 TO 1860 1863 TO 1882 1885 TO 1904 1907 TO 1926
1929 TO 1948 2214 TO 2453
/ END

SOMATÓRIO DE CARGAS

FX1=0.
FX2=0.
FX3=-675.78

Carga n.º 3: empuxo 1

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
cargas
Preparado por:

Página:7
Data:12/10/11

Comandos de cargas

/ BEAM LOADS
/ JOINT LOADS
FX3 -83.16 N 2033 2035
/ BEAM LOADS
DIST MX1 1.393 B 1998 TO 2017 2020 2021

DIST GL FX1 5.082 B 1998 TO 2017 2020 2021
/ END

SOMATÓRIO DE CARGAS

FX1=57.427
FX2=0.
FX3=-166.32

Carga n.º 4: empuxo 2

/ BEAM LOADS

/ JOINT LOADS
FX3 -83.16 N 2033 2035
/ BEAM LOADS

DIST MX1 -1.393 B 2034 TO 2053 2056 2057
DIST GL FX1 -5.082 B 2034 TO 2053 2056 2057

/ END

SOMATÓRIO DE CARGAS

FX1=-57.427
FX2=0.
FX3=-166.32

Carga n.º 5: frenagem 1

/ JOINT LOADS

/ JOINT LOADS
FX1 1.8 N 58 TO 426 BY 92 538 TO 802 BY 88 868 1000 1088 TO 1352 BY 88
/ END

SOMATÓRIO DE CARGAS

FX1=27.
FX2=0.
FX3=0.

Carga n.º 6: frenagem 2

/ JOINT LOADS

/ JOINT LOADS
FX1 -1.8 N 58 TO 426 BY 92 538 TO 890 BY 88 1000 TO 1352 BY 88
/ END

SOMATÓRIO DE CARGAS

FX1=-27.
FX2=0.
FX3=0.

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
cargas
Preparado por:

Página:8
Data:12/10/11

Comandos de cargas

Carga n.º 7: vento 1

/ BEAM LOADS

DIST GL FX2 0.42 B 155 TO 175 799 TO 817 890 1441 1442 TO 1460 1509 2490

2491 TO 2497

/ END

SOMATÓRIO DE CARGAS

FX1=0.

FX2=43.428

FX3=0.

Carga n.º 8: vento 2

/ BEAM LOADS

DIST GL FX2 -0.42 B 133 TO 153 777 TO 795 888 1419 1420 TO 1439 2486 TO 2489

2498 TO 2501

/ END

SOMATÓRIO DE CARGAS

FX1=0.

FX2=-43.428

FX3=0.

Carga n.º 9: temperatura 55

/ PRESSURE

TA -55. E 225 TO 244 247 TO 266 269 TO 288 291 TO 310 313 TO 332 335 TO 354
357 TO 376 379 TO 398 401 TO 420 423 TO 442 445 TO 464 467 TO 486
489 TO 508 511 TO 530 533 TO 552 555 TO 574 577 TO 596 599 TO 618
621 TO 640 643 TO 662 869 TO 886 891 TO 908 913 TO 930 935 TO 952
957 TO 974 979 TO 996 1001 TO 1018 1023 TO 1040 1045 TO 1062 1067 TO 1084

1089 TO 1106 1111 TO 1128 1133 TO 1150 1155 TO 1172 1177 TO 1194
1199 TO 1216 1221 TO 1238 1243 TO 1260 1265 TO 1282 1287 TO 1304
1511 TO 1530 1533 TO 1552 1555 TO 1574 1577 TO 1596 1599 TO 1618
1621 TO 1640 1643 TO 1662 1665 TO 1684 1687 TO 1706 1709 TO 1728
1731 TO 1750 1753 TO 1772 1775 TO 1794 1797 TO 1816 1819 TO 1838

1841 TO 1860 1863 TO 1882 1885 TO 1904 1907 TO 1926 1929 TO 1948
2214 TO 2453

/ BEAM LOADS

T1 -55. B 23 TO 43 45 TO 65 67 TO 87 89 TO 109 111 TO 131 133 TO 153
155 TO 175 177 TO 192 209 TO 224 667 TO 686 689 TO 708 711 TO 730

733 TO 752 755 TO 774 777 TO 796 799 TO 818 835 TO 868 887 888 890 1308
1309 TO 1417 1419 TO 1439 1441 TO 1509 2456 TO 2485 2502 TO 2533
/ END

SOMATÓRIO DE CARGAS

FX1=0.0031

FX2=0.0003

FX3=0.

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

SAIDAS TABELADAS

Preparado por:

Unid.: tf

Pág.: 10

Data: 12/10/11

TABELA DE FAIXAS DE ROLAMENTO (Unid.: metro)								
segm. no.	nó início	nó final	larg.	excent.	no. de div.	tamanho retângulo	compr. do segm.	tolerância vertical
FAIXA Nº1								
1	1	967	2.10	1.45	444	0.23	103.40	1
FAIXA Nº2								
1	1	967	2.10	3.55	444	0.23	103.40	1
FAIXA Nº3								
1	1	967	2.10	5.65	444	0.23	103.40	1
FAIXA Nº4								
1	1	967	2.10	7.75	444	0.23	103.40	1
FAIXA Nº5								
1	1	967	2.10	9.85	444	0.23	103.40	1

TABELA DE VEÍCULOS (Unid.: tf)				
TB450s				
Peso:	6.00	6.00	6.00	Total =36.00
2.00				

TABELA DE CARGAS NAS FAIXAS (Unid.: tf)							
carga	carga uniforme máx.		knife edge		carga de veículo		
	compr.	fator	cortante	momento	veículo/grupo nome	fator	dir.
veículo	1.21	0.00	nenhum	0.00	0.00	TB450s	1.15 +,-
multidão	1.21	0.00	nenhum	0.00	0.00		

TABELA DE CARREGAMENTOS	
faixa nº	carga

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
SAIDAS TABELADAS

Preparado por:

Unid.: tf

Pág.: 11

Data: 12/10/11

TABELA DE CARREGAMENTOS

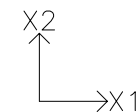
<i>faixa nº</i>	<i>carga</i>
carregamento n1.	
1	veiculo
2	multidão
3	multidão
4	multidão
5	multidão
Permutar da faixa 1 a faixa 5.	

5.2.1.3 VIGA

5.2.1.3.1 VIGA (TRECHO DE 37M)

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m

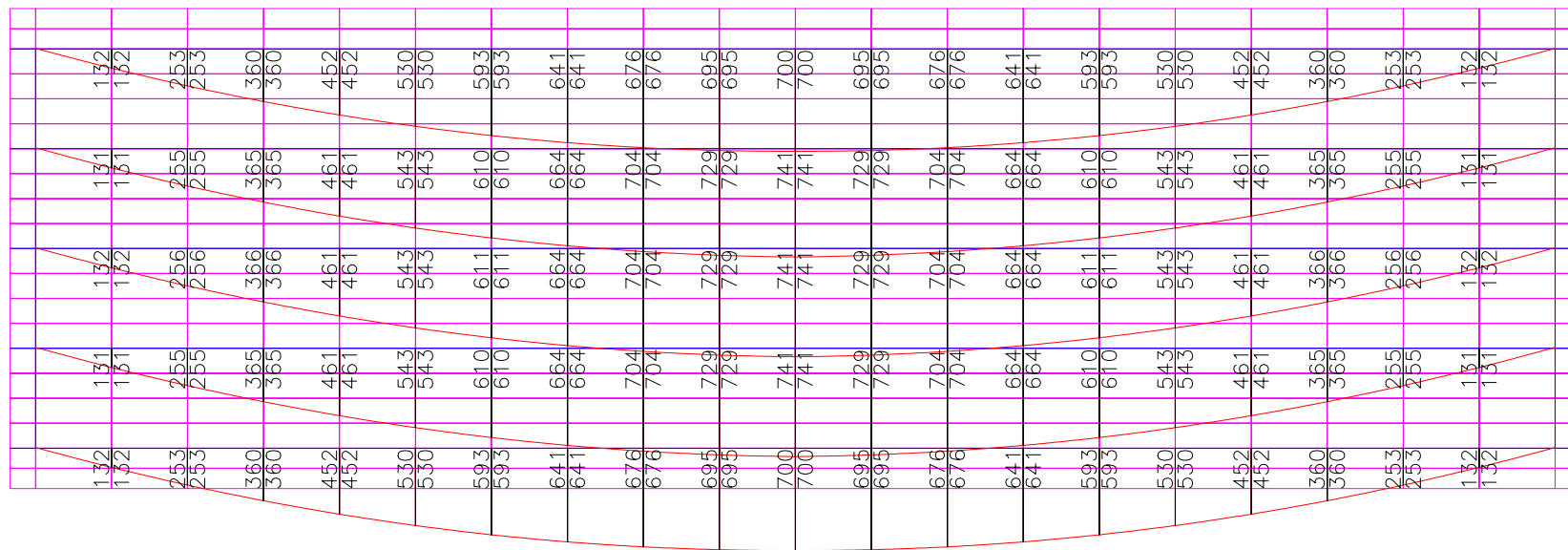
viga 37m mom g1+g2+g3



ESCALA= 1:170

UNIDS: tf*m

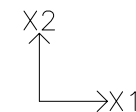
DATA: 5/10/11



MOM. FLETOR M2 COMB. N° 3 g1+g2+g3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m

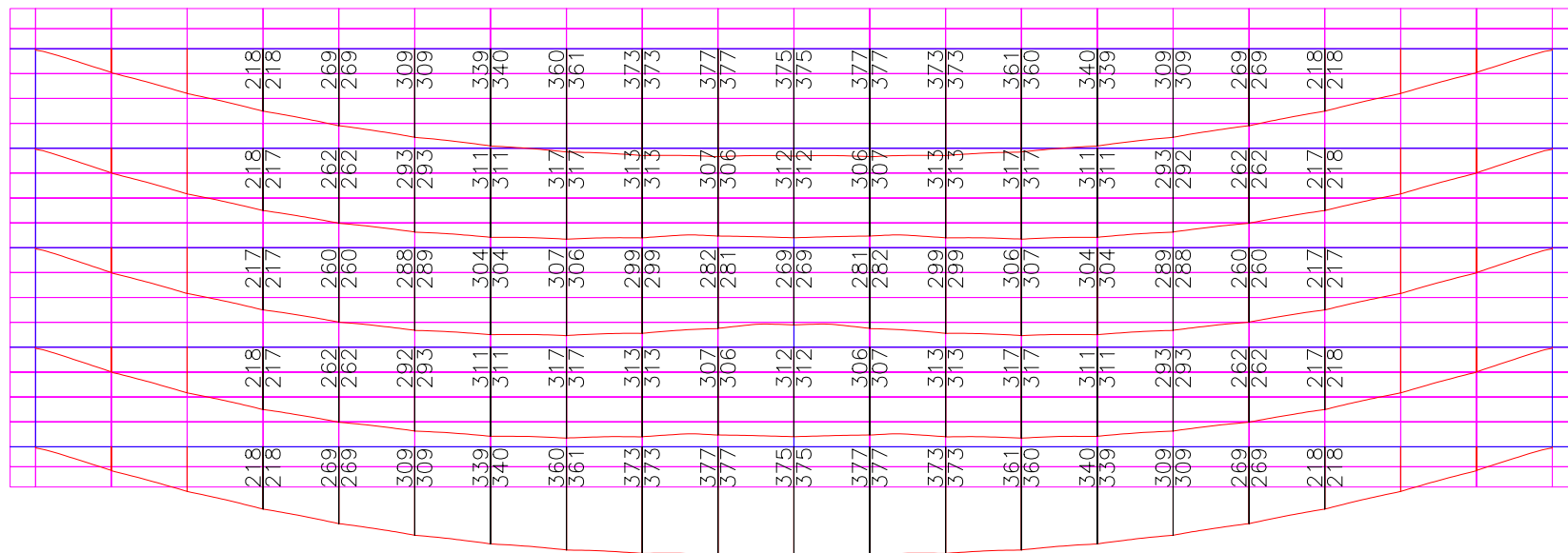
viga 37m mom 100%cmovel+



ESCALA= 1:170

UNIDS: tf*m

DATA: 5/10/11

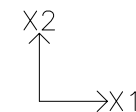


MOM. FLETOR M2

CARREG. N°23 100%cmovel+

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m

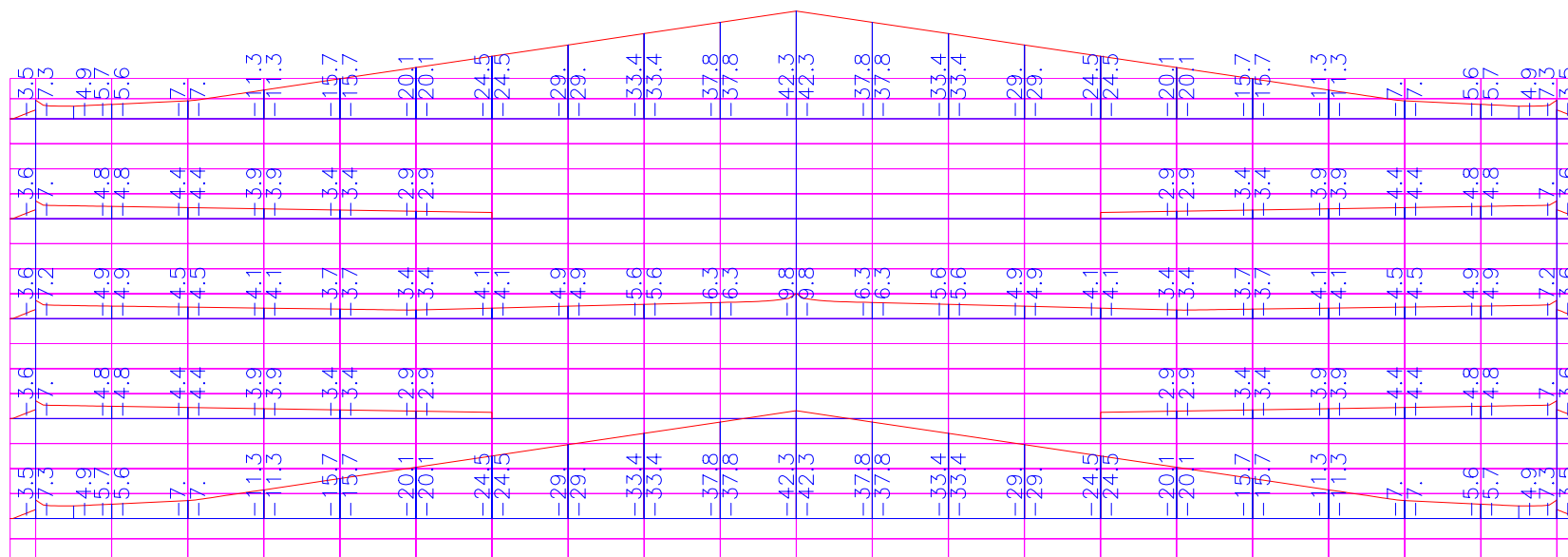
viga 37m mom 100%cmovel-



ESCALA= 1:169

UNIDS: tf*m

DATA: 5/10/11

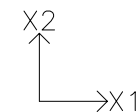


MOM. FLETOR M2

CARREG. N°24 100%cmovel-

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m

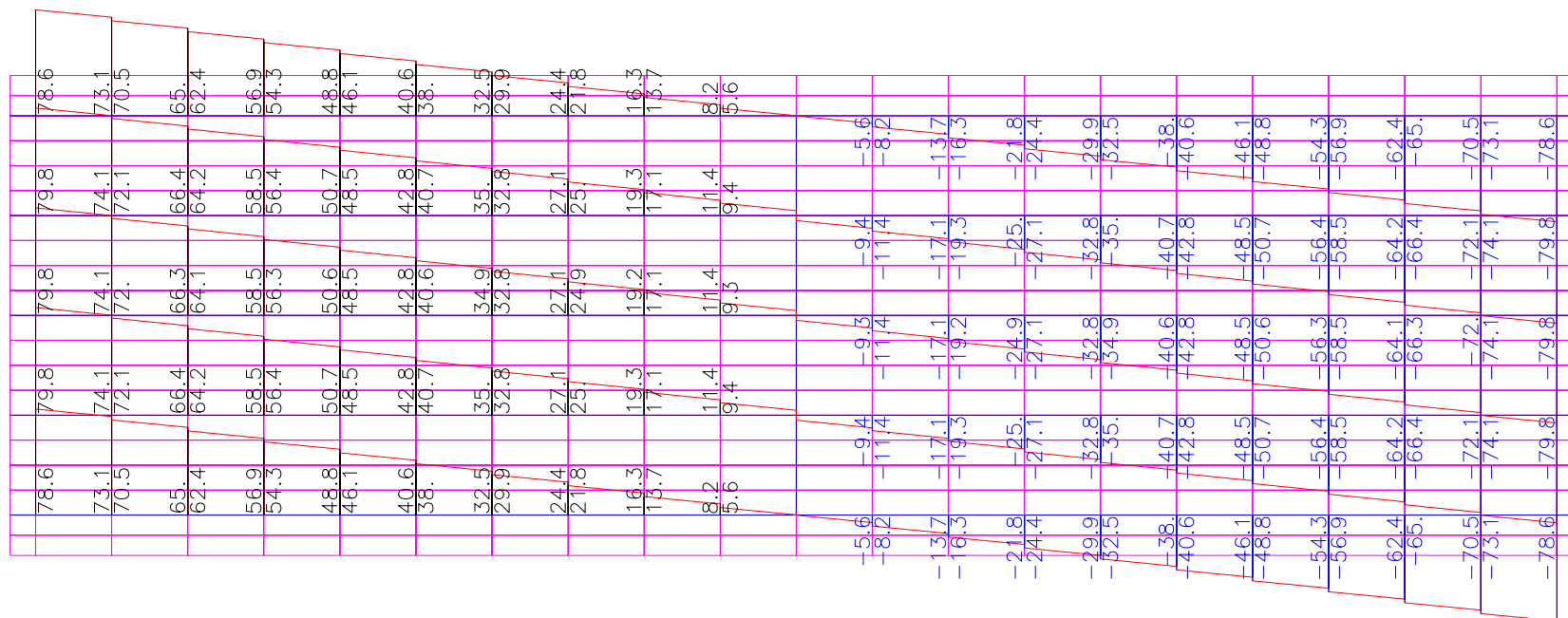
viga 37m cort g1+g2+g3



ESCALA= 1:169

UNIDS: tf

DATA: 5/10/11

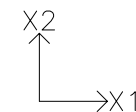


CORTANTE V3

COMB. N° 3 g1+g2+g3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m

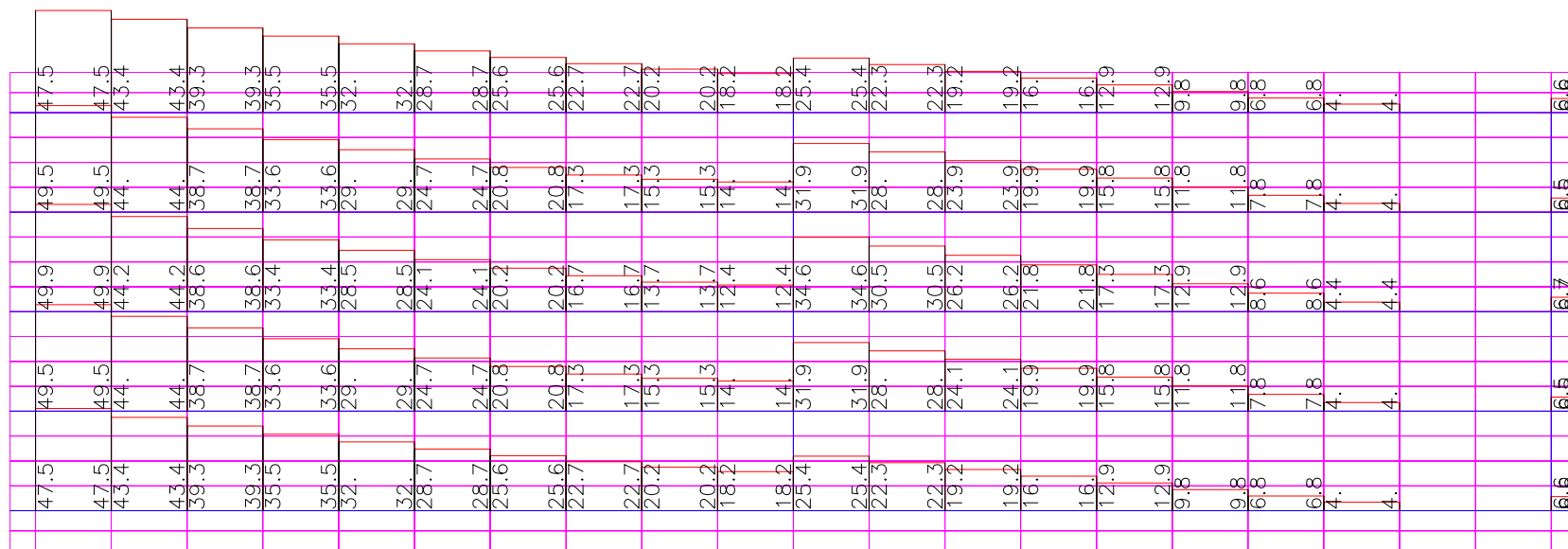
viga 37m cort 100%cmovel+



ESCALA= 1:169

UNIDS: tf

DATA: 5/10/11

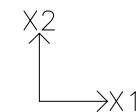


CORTANTE V3

CARREG. N°23 100%cmovel+

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m

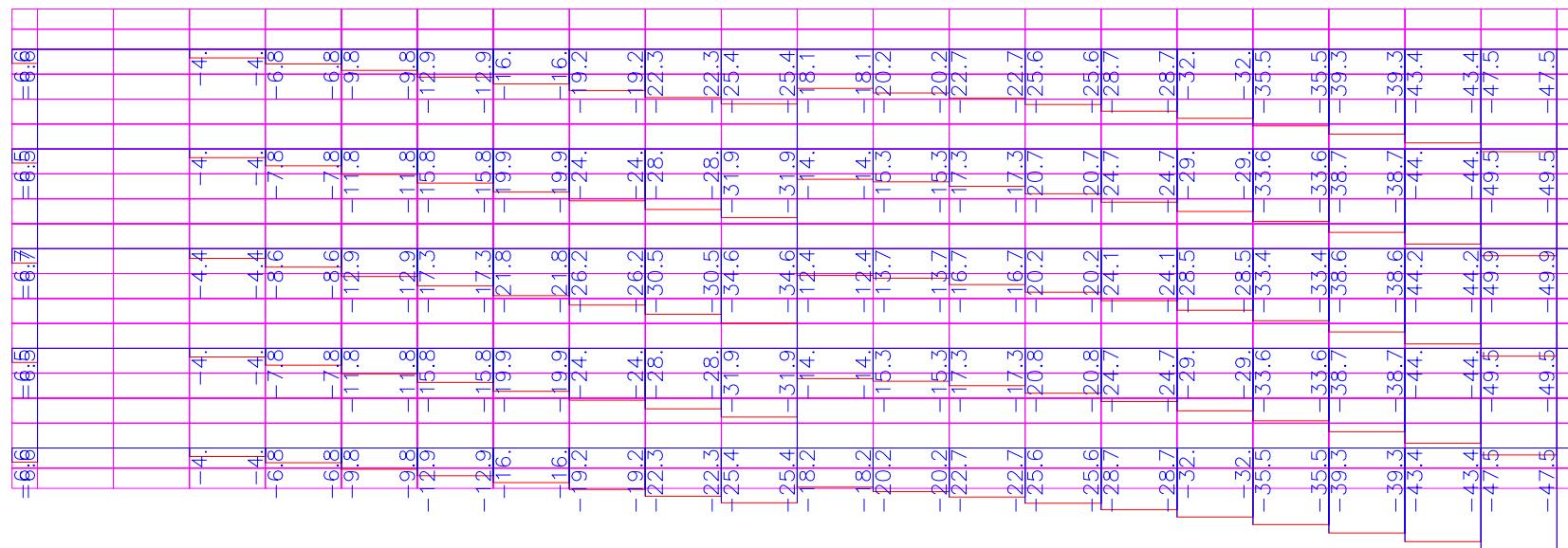
viga 37m cort 100%cmovel-



ESCALA= 1:169

UNIDS: tf

DATA: 5/10/11

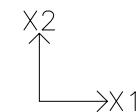


CORTANTE V3

CARREG. N°24 100%cmovel-

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m

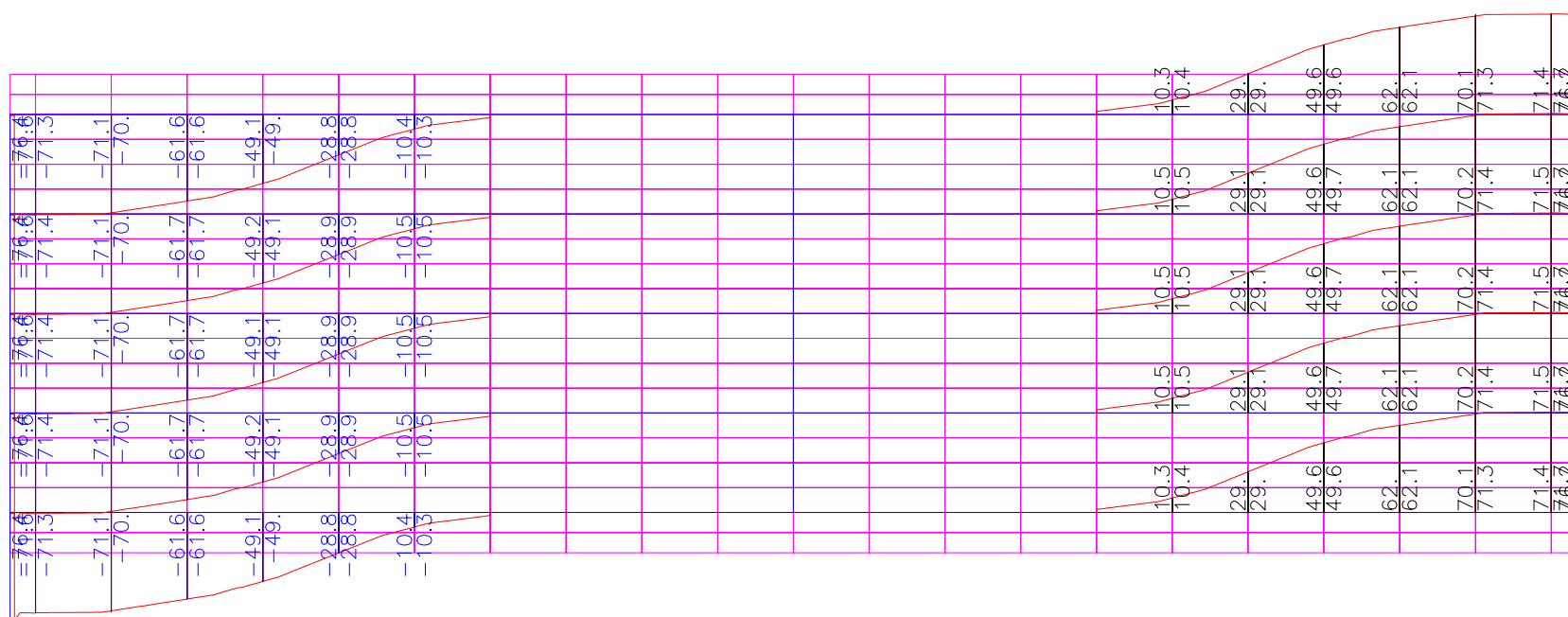
viga 37m cort 100%cmovel+



ESCALA= 1:169

UNIDS: tf

DATA: 5/10/11



CORTANTE V3

CARREG. N°20 %PTEN% Prestress load at time = 30000.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m project data table

Prepared by:

Units: ton meter

Code: EuroCode

Page: 94

Date: 7/10/11

PROJECT DATA TABLE

STAGES

Name	Start time (days)	Allow. tens. (MPa)	Allow. compr. (MPa)	model stage	add creep forces after schm. cng.
TRANSFER	14	1.	20.	pre-moldado	not relevant
conclaje	30	2.3	25.	pre-moldado	not relevant
ligação	33	2.3	25.	Whole model	Yes
pavimentação	80	2.3	25.	Whole model	not relevant
serviço	100	2.3	25.	Whole model	not relevant

TIME STEPS IN ADDITION TO THE TIME OF THE STAGES (DAYS)

time = 0
 time = 30
 time = 33
 time = 50
 time = 60
 time = 80
 time = 100
 time = 120
 time = 365
 time = 730
 time = 30000

LOAD COMBINATIONS

Name	Start time (days)	End time (days)	perman.	type
g1	14	30	Yes	fact. & serv.
g1+g2	30	80	Yes	fact. & serv.
g1+g2+g3	80	infinity	Yes	fact. & serv.
g1+g2+g3+cm	100	infinity	No	fact. & serv.

STRAND TYPES

Name	Strand area (mm ²)	Max. stress (MPa)	Steel type
7WS15.2MM	143.4	1400.	TYPE-1860

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga ext=int 37m stages data table

Prepared by:

Units: ton meter

Code: EuroCode

Page: 211

Date: 7/10/11

STAGES DATA TABLE

BEAM NO. 1

Stage 1: TRANSFER, $t = 14$.

Combinations that start at this stage:

Comb. no.1: g1

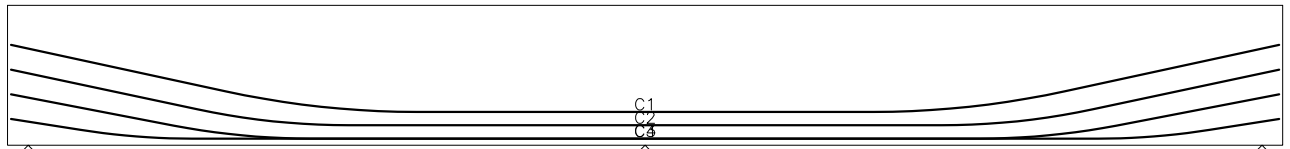
Cables jacked at this stage:

Cable no. 1: force = 240.91[t]

Cable no. 2: force = 240.91[t]

Cable no. 3: force = 240.91[t]

Cable no. 4: force = 240.91[t]



Stage 2: conclaje, $t = 30$.

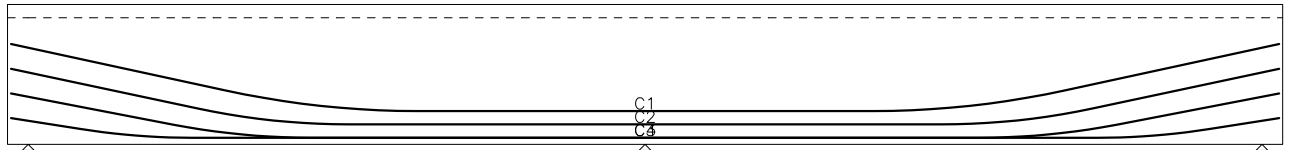
Combinations that start at this stage:

Comb. no.2: g1+g2

Combinations, that end at this stage:

Comb. no.1: g1

Stage 3: ligação, $t = 33$.



Stage 4: pavimentação, $t = 80$.

Combinations that start at this stage:

Comb. no.3: g1+g2+g3

Combinations, that end at this stage:

Comb. no.2: g1+g2

Stage 5: serviço, $t = 100$.

Combinations that start at this stage:

Comb. no.4: g1+g2+g3+cm

5.2.1.3.2 VIGA EXTERNA (TRECHO DE 37M)

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m geometry data table

Code: EuroCode
Page: 97
Date: 7/10/11

Prepared by:

Units: ton meter

x	29600	30100	30600	31100	31650	32100	32600	33100	33600	34100	34600	35100
y	-2000	-2000	-2000	-2000	-2000	-1997	-1989	-1973	-1952	-1924	-1890	-1850
x	35600	36100	36600	36900								
y	-1810	-1770	-1729	-1705								

CABLE NO. = 4

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

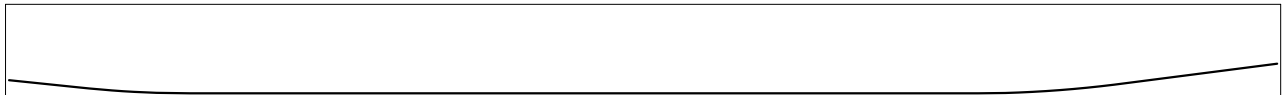
Cable is bonded

JACKING SEQUENCE :

Stage 1/3: TRANSFER

Strands 1-12 jacked from right side to 100.%, Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5350
y	-1705	-1745	-1786	-1826	-1866	-1904	-1936	-1961	-1980	-1993	-1999	-2000
x	5600	6100	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	23100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23600	24100	24600	25100	25600	26100	26600	27100	27600	28100	28220	28600
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-1998
x	29100	29600	30100	30600	31100	31600	32100	32600	33100	33600	34100	34600
y	-1990	-1976	-1956	-1929	-1896	-1857	-1812	-1762	-1713	-1663	-1613	-1564
x	35100	35600	36100	36600	36900							
y	-1514	-1464	-1414	-1365	-1335							

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

Page: 109

Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
45	0.00	4	0.58	3	-0.25	3	0.57	4	-0.26
	0.03	4	0.70	3	-0.54	3	0.69	4	-0.54
	0.06	4	0.82	3	-0.82	3	0.82	4	-0.82
	0.09	4	0.94	3	-1.10	3	0.94	4	-1.11
	0.10	4	1.97	3	4.47	3	1.97	4	4.47
	0.12	4	4.04	3	15.61	3	4.04	4	15.61
	0.15	4	4.08	3	15.15	3	4.08	4	15.15
	0.18	4	4.13	3	14.68	3	4.13	4	14.68
	0.21	4	4.18	3	14.22	3	4.18	4	14.22
	0.24	4	4.23	3	13.75	3	4.23	4	13.75
	0.27	4	4.32	3	13.52	3	4.32	4	13.52
	0.30	4	4.41	3	13.29	3	4.41	4	13.29
	0.33	4	4.50	3	13.06	3	4.50	4	13.06
	0.36	4	4.59	3	12.84	3	4.59	4	12.83
	0.39	4	4.68	3	12.61	3	4.67	4	12.61
	0.42	4	4.76	3	12.38	3	4.76	4	12.38
	0.45	4	4.85	3	12.15	3	4.85	4	12.15
	0.48	4	4.94	3	11.92	3	4.94	4	11.92
	0.51	4	5.03	3	11.70	3	5.03	4	11.70
	0.54	4	5.12	3	11.47	3	5.12	4	11.47
	0.57	4	5.21	3	11.24	3	5.21	4	11.24
	0.60	4	5.30	3	11.01	3	5.30	4	11.01
46	0.60	4	5.33	3	10.87	3	5.29	4	10.80
	0.69	4	5.34	3	10.86	3	5.28	4	10.75
	0.78	4	5.34	3	10.85	3	5.27	4	10.70
	0.87	4	5.36	3	10.84	3	5.27	4	10.63
	0.96	4	5.38	3	10.83	3	5.26	4	10.57
	1.05	4	5.40	3	10.82	3	5.25	4	10.49
	1.14	4	5.42	3	10.81	3	5.24	4	10.42
	1.23	4	5.44	3	10.80	3	5.23	4	10.34
	1.32	4	5.46	3	10.79	3	5.23	4	10.27
	1.41	4	5.48	3	10.78	3	5.22	4	10.19
	1.50	4	5.49	3	10.77	3	5.21	4	10.12
	1.58	4	5.51	3	10.76	3	5.20	4	10.04
	1.67	4	5.53	3	10.76	3	5.19	4	9.97
	1.76	4	5.55	3	10.75	3	5.18	4	9.89
	1.85	4	5.57	3	10.74	3	5.17	4	9.81
	1.94	4	5.59	3	10.74	3	5.15	4	9.74
	2.03	4	5.61	3	10.73	3	5.14	4	9.66
	2.12	4	5.62	3	10.72	3	5.13	4	9.58
	2.21	4	5.64	3	10.72	3	5.12	4	9.51
	2.30	4	5.66	3	10.72	3	5.10	4	9.44
	2.39	4	5.67	3	10.72	3	5.09	4	9.37

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 110
 Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
47	2.39	4	5.68	3	10.72	3	5.09	4	9.35
	2.48	4	5.69	3	10.72	3	5.08	4	9.29
	2.57	4	5.70	3	10.72	3	5.06	4	9.24
	2.66	4	5.71	3	10.72	3	5.05	4	9.19
	2.75	4	5.72	3	10.72	3	5.03	4	9.14
	2.84	4	5.73	3	10.72	3	5.02	4	9.08
	2.93	4	5.74	3	10.72	3	5.00	4	9.02
	3.02	4	5.75	3	10.72	3	4.99	4	8.97
	3.11	4	5.76	3	10.72	3	4.98	4	8.91
	3.20	4	5.77	3	10.72	3	4.96	4	8.85
	3.28	4	5.78	3	10.71	3	4.95	4	8.78
	3.37	4	5.79	3	10.71	3	4.94	4	8.72
	3.46	4	5.81	3	10.71	3	4.93	4	8.66
	3.55	4	5.82	3	10.70	3	4.91	4	8.59
	3.64	4	5.84	3	10.70	3	4.90	4	8.52
	3.73	4	5.85	3	10.70	3	4.89	4	8.46
	3.82	4	5.87	3	10.69	3	4.88	4	8.39
	3.91	4	5.88	3	10.68	3	4.87	4	8.32
	4.00	4	5.90	3	10.68	3	4.86	4	8.25
	4.09	4	5.91	3	10.67	3	4.85	4	8.18
	4.18	4	5.93	3	10.66	3	4.84	4	8.11
48	4.18	4	5.94	3	10.67	3	4.84	4	8.11
	4.27	4	5.95	3	10.67	3	4.83	4	8.06
	4.36	4	5.96	3	10.66	3	4.82	4	8.01
	4.45	4	5.96	3	10.66	3	4.81	4	7.96
	4.54	4	5.97	3	10.65	3	4.80	4	7.91
	4.63	4	5.98	3	10.65	3	4.78	4	7.87
	4.72	4	5.99	3	10.65	3	4.77	4	7.82
	4.81	4	6.00	3	10.65	3	4.76	4	7.77
	4.90	4	6.01	3	10.63	3	4.75	4	7.70
	4.99	4	6.02	3	10.63	3	4.74	4	7.65
	5.07	4	6.03	3	10.63	3	4.73	4	7.60
	5.16	4	6.04	3	10.62	3	4.72	4	7.54
	5.25	4	6.06	3	10.61	3	4.71	4	7.48
	5.34	4	6.07	3	10.61	3	4.71	4	7.42
	5.43	4	6.09	3	10.61	3	4.70	4	7.37
	5.52	4	6.11	3	10.58	3	4.69	4	7.29
	5.61	4	6.12	3	10.57	3	4.69	4	7.23
	5.70	4	6.14	3	10.56	3	4.68	4	7.16
	5.79	4	6.16	3	10.55	3	4.68	4	7.10
	5.88	4	6.18	3	10.54	3	4.68	4	7.03
	5.97	4	6.20	3	10.53	3	4.67	4	6.96

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
49	5.97	4	6.21	3	10.54	3	4.69	4	6.98
	6.06	4	6.22	3	10.53	3	4.68	4	6.93
	6.15	4	6.24	3	10.52	3	4.68	4	6.88
	6.24	4	6.25	3	10.51	3	4.68	4	6.83
	6.33	4	6.27	3	10.49	3	4.68	4	6.78
	6.42	4	6.28	3	10.48	3	4.67	4	6.73
	6.51	4	6.30	3	10.47	3	4.67	4	6.68
	6.60	4	6.32	3	10.45	3	4.68	4	6.62
	6.69	4	6.33	3	10.44	3	4.68	4	6.57
	6.78	4	6.35	3	10.42	3	4.68	4	6.51
	6.86	4	6.38	3	10.40	3	4.69	4	6.45
	6.95	4	6.40	3	10.38	3	4.69	4	6.39
	7.04	4	6.42	3	10.36	3	4.70	4	6.33
	7.13	4	6.45	3	10.34	3	4.70	4	6.26
	7.22	4	6.48	3	10.32	3	4.71	4	6.19
	7.31	4	6.51	3	10.29	3	4.72	4	6.12
	7.40	4	6.54	3	10.27	3	4.73	4	6.05
	7.49	4	6.57	3	10.24	3	4.75	4	5.98
	7.58	4	6.60	3	10.21	3	4.76	4	5.90
	7.67	4	6.63	3	10.18	3	4.77	4	5.83
	7.76	4	6.67	3	10.15	3	4.79	4	5.75
50	7.76	4	6.68	3	10.16	3	4.80	4	5.76
	7.85	4	6.71	3	10.14	3	4.82	4	5.71
	7.94	4	6.73	3	10.11	3	4.83	4	5.65
	8.03	4	6.76	3	10.08	3	4.85	4	5.59
	8.12	4	6.79	3	10.04	3	4.86	4	5.53
	8.21	4	6.82	3	10.01	3	4.88	4	5.47
	8.30	4	6.86	3	9.98	3	4.90	4	5.41
	8.39	4	6.89	3	9.95	3	4.92	4	5.34
	8.48	4	6.93	3	9.91	3	4.94	4	5.27
	8.57	4	6.96	3	9.87	3	4.97	4	5.20
	8.66	4	7.00	3	9.82	3	4.99	4	5.12
	8.74	4	7.04	3	9.78	3	5.02	4	5.04
	8.83	4	7.08	3	9.75	3	5.04	4	4.99
	8.92	4	7.12	3	9.71	3	5.07	4	4.91
	9.01	4	7.16	3	9.67	3	5.10	4	4.83
	9.10	4	7.21	3	9.62	3	5.13	4	4.75
	9.19	4	7.25	3	9.57	3	5.15	4	4.66
	9.28	4	7.30	3	9.53	3	5.18	4	4.58
	9.37	4	7.34	3	9.48	3	5.21	4	4.49
	9.46	4	7.39	3	9.43	3	5.24	4	4.41
	9.55	4	7.44	3	9.38	3	5.28	4	4.32

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
51	9.55	4	7.45	3	9.39	3	5.28	4	4.32
	9.64	4	7.49	3	9.34	3	5.31	4	4.25
	9.73	4	7.52	3	9.29	3	5.34	4	4.19
	9.82	4	7.56	3	9.24	3	5.38	4	4.12
	9.91	4	7.60	3	9.21	3	5.40	4	4.07
	10.00	4	7.64	3	9.16	3	5.44	4	4.00
	10.09	4	7.68	3	9.11	3	5.47	4	3.93
	10.18	4	7.73	3	9.06	3	5.50	4	3.85
	10.27	4	7.77	3	9.01	3	5.53	4	3.78
	10.36	4	7.81	3	8.96	3	5.57	4	3.71
	10.44	4	7.85	3	8.91	3	5.60	4	3.63
	10.53	4	7.90	3	8.87	3	5.63	4	3.56
	10.62	4	7.94	3	8.82	3	5.66	4	3.48
	10.71	4	7.98	3	8.77	3	5.70	4	3.41
	10.80	4	8.03	3	8.72	3	5.73	4	3.33
	10.89	4	8.07	3	8.67	3	5.76	4	3.26
	10.98	4	8.12	3	8.62	3	5.79	4	3.18
	11.07	4	8.16	3	8.57	3	5.83	4	3.10
	11.16	4	8.21	3	8.52	3	5.86	4	3.02
	11.25	4	8.26	3	8.47	3	5.89	4	2.94
	11.34	4	8.30	3	8.42	3	5.93	4	2.86
52	11.34	4	8.31	3	8.43	3	5.93	4	2.86
	11.43	4	8.34	3	8.38	3	5.96	4	2.81
	11.52	4	8.38	3	8.34	3	5.99	4	2.75
	11.61	4	8.42	3	8.30	3	6.02	4	2.70
	11.70	4	8.45	3	8.25	3	6.06	4	2.64
	11.79	4	8.49	3	8.20	3	6.09	4	2.58
	11.88	4	8.53	3	8.16	3	6.12	4	2.53
	11.97	4	8.56	3	8.12	3	6.15	4	2.47
	12.06	4	8.60	3	8.07	3	6.18	4	2.41
	12.15	4	8.64	3	8.03	3	6.21	4	2.35
	12.24	4	8.68	3	7.98	3	6.24	4	2.28
	12.32	4	8.72	3	7.94	3	6.27	4	2.22
	12.41	4	8.75	3	7.90	3	6.30	4	2.16
	12.50	4	8.79	3	7.85	3	6.33	4	2.09
	12.59	4	8.83	3	7.81	3	6.36	4	2.03
	12.68	4	8.87	3	7.76	3	6.39	4	1.96
	12.77	4	8.90	3	7.72	3	6.42	4	1.90
	12.86	4	8.94	3	7.67	3	6.45	4	1.83
	12.95	4	8.98	3	7.63	3	6.48	4	1.77
	13.04	4	9.02	3	7.59	3	6.50	4	1.71
	13.13	4	9.05	3	7.54	3	6.53	4	1.64

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
53	13.13	4	9.06	3	7.55	3	6.53	4	1.64
	13.22	4	9.08	3	7.51	3	6.56	4	1.60
	13.31	4	9.11	3	7.47	3	6.58	4	1.56
	13.40	4	9.13	3	7.44	3	6.61	4	1.52
	13.49	4	9.16	3	7.40	3	6.63	4	1.48
	13.58	4	9.19	3	7.37	3	6.65	4	1.44
	13.67	4	9.21	3	7.33	3	6.68	4	1.39
	13.76	4	9.24	3	7.29	3	6.70	4	1.35
	13.85	4	9.26	3	7.26	3	6.72	4	1.31
	13.94	4	9.29	3	7.22	3	6.74	4	1.26
	14.02	4	9.31	3	7.19	3	6.77	4	1.22
	14.11	4	9.34	3	7.15	3	6.79	4	1.17
	14.20	4	9.37	3	7.12	3	6.81	4	1.13
	14.29	4	9.39	3	7.08	3	6.83	4	1.08
	14.38	4	9.42	3	7.05	3	6.85	4	1.03
	14.47	4	9.45	3	7.01	3	6.87	4	0.98
	14.56	4	9.47	3	6.98	3	6.89	4	0.93
	14.65	4	9.50	3	6.94	3	6.91	4	0.88
	14.74	4	9.52	3	6.91	3	6.93	4	0.84
	14.83	4	9.55	3	6.87	3	6.95	4	0.79
	14.92	4	9.58	3	6.84	3	6.97	4	0.74
54	14.92	4	9.58	3	6.84	3	6.97	4	0.74
	15.01	4	9.60	3	6.82	3	6.99	4	0.71
	15.10	4	9.61	3	6.79	3	7.01	4	0.69
	15.19	4	9.63	3	6.76	3	7.02	4	0.66
	15.28	4	9.64	3	6.73	3	7.04	4	0.64
	15.37	4	9.65	3	6.71	3	7.05	4	0.61
	15.46	4	9.67	3	6.68	3	7.07	4	0.59
	15.55	4	9.68	3	6.66	3	7.08	4	0.56
	15.64	4	9.70	3	6.63	3	7.10	4	0.54
	15.73	4	9.71	3	6.61	3	7.11	4	0.51
	15.81	4	9.73	3	6.58	3	7.12	4	0.48
	15.90	4	9.74	3	6.56	3	7.14	4	0.46
	15.99	4	9.76	3	6.54	3	7.15	4	0.43
	16.08	4	9.77	3	6.52	3	7.16	4	0.40
	16.17	4	9.79	3	6.50	3	7.17	4	0.37
	16.26	4	9.80	3	6.47	3	7.18	4	0.34
	16.35	4	9.82	3	6.45	3	7.20	4	0.32
	16.44	4	9.83	3	6.43	3	7.21	4	0.29
	16.53	4	9.85	3	6.41	3	7.22	4	0.26
	16.62	4	9.86	3	6.40	3	7.23	4	0.23
	16.71	4	9.87	3	6.38	3	7.24	4	0.20

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
55	16.71	4	9.87	3	6.38	3	7.24	4	0.21
	16.80	4	9.88	3	6.37	3	7.25	4	0.20
	16.89	4	9.88	3	6.35	3	7.25	4	0.20
	16.98	4	9.88	3	6.34	3	7.26	4	0.19
	17.07	4	9.89	3	6.33	3	7.27	4	0.19
	17.16	4	9.89	3	6.32	3	7.27	4	0.18
	17.25	4	9.90	3	6.30	3	7.28	4	0.18
	17.34	4	9.90	3	6.29	3	7.29	4	0.17
	17.43	4	9.90	3	6.28	3	7.29	4	0.17
	17.52	4	9.91	3	6.27	3	7.30	4	0.16
	17.60	4	9.91	3	6.27	3	7.30	4	0.15
	17.69	4	9.91	3	6.26	3	7.30	4	0.15
	17.78	4	9.92	3	6.25	3	7.31	4	0.14
	17.87	4	9.92	3	6.24	3	7.31	4	0.13
	17.96	4	9.93	3	6.23	3	7.31	4	0.12
	18.05	4	9.93	3	6.23	3	7.32	4	0.11
	18.14	4	9.93	3	6.22	3	7.32	4	0.10
	18.23	4	9.94	3	6.22	3	7.32	4	0.09
	18.32	4	9.94	3	6.21	3	7.32	4	0.08
	18.41	4	9.94	3	6.21	3	7.33	4	0.07
	18.50	4	9.95	3	6.20	3	7.33	4	0.06
56	18.59	4	9.94	3	6.21	3	7.33	4	0.07
	18.68	4	9.94	3	6.21	3	7.32	4	0.08
	18.77	4	9.94	3	6.22	3	7.32	4	0.09
	18.86	4	9.93	3	6.22	3	7.32	4	0.10
	18.95	4	9.93	3	6.23	3	7.32	4	0.11
	19.04	4	9.93	3	6.23	3	7.31	4	0.12
	19.13	4	9.92	3	6.24	3	7.31	4	0.13
	19.22	4	9.92	3	6.25	3	7.31	4	0.14
	19.31	4	9.91	3	6.25	3	7.30	4	0.14
	19.40	4	9.91	3	6.26	3	7.30	4	0.15
	19.48	4	9.91	3	6.27	3	7.30	4	0.16
	19.57	4	9.90	3	6.28	3	7.29	4	0.16
	19.66	4	9.90	3	6.29	3	7.29	4	0.17
	19.75	4	9.90	3	6.30	3	7.28	4	0.18
	19.84	4	9.89	3	6.31	3	7.27	4	0.18
	19.93	4	9.89	3	6.32	3	7.27	4	0.18
	20.02	4	9.89	3	6.34	3	7.26	4	0.19
	20.11	4	9.88	3	6.35	3	7.25	4	0.20
	20.20	4	9.88	3	6.36	3	7.25	4	0.20
	20.29	4	9.87	3	6.38	3	7.24	4	0.21

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
57	20.29	4	9.87	3	6.37	3	7.24	4	0.20
	20.38	4	9.86	3	6.39	3	7.23	4	0.23
	20.47	4	9.85	3	6.41	3	7.22	4	0.25
	20.56	4	9.83	3	6.43	3	7.21	4	0.28
	20.65	4	9.82	3	6.45	3	7.20	4	0.31
	20.74	4	9.80	3	6.47	3	7.19	4	0.34
	20.83	4	9.79	3	6.49	3	7.17	4	0.37
	20.92	4	9.77	3	6.51	3	7.16	4	0.40
	21.01	4	9.76	3	6.53	3	7.15	4	0.42
	21.10	4	9.74	3	6.56	3	7.14	4	0.45
	21.19	4	9.73	3	6.58	3	7.12	4	0.48
	21.27	4	9.71	3	6.60	3	7.11	4	0.50
	21.36	4	9.70	3	6.63	3	7.10	4	0.53
	21.45	4	9.68	3	6.65	3	7.08	4	0.56
	21.54	4	9.67	3	6.68	3	7.07	4	0.58
	21.63	4	9.66	3	6.70	3	7.05	4	0.60
	21.72	4	9.64	3	6.73	3	7.04	4	0.63
	21.81	4	9.63	3	6.75	3	7.02	4	0.65
	21.90	4	9.61	3	6.78	3	7.01	4	0.68
	21.99	4	9.60	3	6.81	3	6.99	4	0.70
	22.08	4	9.58	3	6.84	3	6.97	4	0.73
58	22.08	4	9.58	3	6.83	3	6.97	4	0.73
	22.17	4	9.55	3	6.87	3	6.95	4	0.78
	22.26	4	9.53	3	6.90	3	6.93	4	0.83
	22.35	4	9.50	3	6.94	3	6.91	4	0.88
	22.44	4	9.47	3	6.97	3	6.89	4	0.93
	22.53	4	9.45	3	7.01	3	6.87	4	0.97
	22.62	4	9.42	3	7.04	3	6.85	4	1.02
	22.71	4	9.39	3	7.08	3	6.83	4	1.07
	22.80	4	9.37	3	7.11	3	6.81	4	1.12
	22.89	4	9.34	3	7.15	3	6.79	4	1.17
	22.98	4	9.32	3	7.18	3	6.77	4	1.21
	23.06	4	9.29	3	7.21	3	6.75	4	1.26
	23.15	4	9.26	3	7.25	3	6.72	4	1.30
	23.24	4	9.24	3	7.29	3	6.70	4	1.34
	23.33	4	9.21	3	7.32	3	6.68	4	1.39
	23.42	4	9.19	3	7.36	3	6.65	4	1.43
	23.51	4	9.16	3	7.40	3	6.63	4	1.47
	23.60	4	9.14	3	7.43	3	6.61	4	1.51
	23.69	4	9.11	3	7.47	3	6.58	4	1.55
	23.78	4	9.08	3	7.50	3	6.56	4	1.59
	23.87	4	9.06	3	7.54	3	6.54	4	1.63

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
59	23.87	4	9.05	3	7.54	3	6.53	4	1.63
	23.96	4	9.02	3	7.58	3	6.51	4	1.70
	24.05	4	8.98	3	7.62	3	6.48	4	1.76
	24.14	4	8.94	3	7.66	3	6.45	4	1.83
	24.23	4	8.91	3	7.71	3	6.42	4	1.89
	24.32	4	8.87	3	7.75	3	6.39	4	1.96
	24.41	4	8.83	3	7.80	3	6.36	4	2.02
	24.50	4	8.79	3	7.84	3	6.33	4	2.09
	24.59	4	8.75	3	7.89	3	6.30	4	2.15
	24.68	4	8.72	3	7.93	3	6.27	4	2.21
	24.76	4	8.68	3	7.97	3	6.24	4	2.28
	24.85	4	8.64	3	8.02	3	6.21	4	2.34
	24.94	4	8.60	3	8.06	3	6.18	4	2.40
	25.03	4	8.56	3	8.11	3	6.15	4	2.46
	25.12	4	8.53	3	8.16	3	6.12	4	2.53
	25.21	4	8.49	3	8.20	3	6.09	4	2.58
	25.30	4	8.45	3	8.24	3	6.06	4	2.63
	25.39	4	8.42	3	8.29	3	6.03	4	2.69
	25.48	4	8.38	3	8.33	3	5.99	4	2.74
	25.57	4	8.34	3	8.38	3	5.96	4	2.80
	25.66	4	8.31	3	8.42	3	5.93	4	2.85
60	25.66	4	8.30	3	8.42	3	5.93	4	2.85
	25.75	4	8.26	3	8.47	3	5.89	4	2.94
	25.84	4	8.21	3	8.51	3	5.86	4	3.02
	25.93	4	8.16	3	8.56	3	5.83	4	3.09
	26.02	4	8.12	3	8.61	3	5.80	4	3.17
	26.11	4	8.07	3	8.66	3	5.76	4	3.25
	26.20	4	8.03	3	8.71	3	5.73	4	3.32
	26.29	4	7.99	3	8.76	3	5.70	4	3.40
	26.38	4	7.94	3	8.81	3	5.66	4	3.48
	26.47	4	7.90	3	8.86	3	5.63	4	3.55
	26.56	4	7.85	3	8.91	3	5.60	4	3.63
	26.64	4	7.81	3	8.95	3	5.57	4	3.70
	26.73	4	7.77	3	9.00	3	5.53	4	3.77
	26.82	4	7.73	3	9.06	3	5.50	4	3.85
	26.91	4	7.68	3	9.11	3	5.47	4	3.92
	27.00	4	7.64	3	9.16	3	5.44	4	4.00
	27.09	4	7.60	3	9.21	3	5.40	4	4.07
	27.18	4	7.56	3	9.24	3	5.37	4	4.12
	27.27	4	7.52	3	9.29	3	5.34	4	4.19
	27.36	4	7.49	3	9.34	3	5.31	4	4.25
	27.45	4	7.45	3	9.38	3	5.28	4	4.31

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
61	27.45	4	7.44	3	9.37	3	5.28	4	4.31
	27.54	4	7.39	3	9.42	3	5.25	4	4.40
	27.63	4	7.34	3	9.47	3	5.21	4	4.49
	27.72	4	7.30	3	9.52	3	5.18	4	4.57
	27.81	4	7.25	3	9.56	3	5.16	4	4.66
	27.90	4	7.21	3	9.61	3	5.13	4	4.74
	27.99	4	7.17	3	9.66	3	5.10	4	4.82
	28.08	4	7.12	3	9.70	3	5.07	4	4.90
	28.17	4	7.08	3	9.75	3	5.04	4	4.98
	28.26	4	7.04	3	9.79	3	5.02	4	5.05
	28.35	4	7.00	3	9.83	3	4.99	4	5.12
	28.43	4	6.96	3	9.86	3	4.97	4	5.20
	28.52	4	6.93	3	9.90	3	4.95	4	5.26
	28.61	4	6.89	3	9.94	3	4.92	4	5.33
	28.70	4	6.86	3	9.97	3	4.90	4	5.40
	28.79	4	6.83	3	10.01	3	4.88	4	5.46
	28.88	4	6.79	3	10.04	3	4.87	4	5.53
	28.97	4	6.76	3	10.07	3	4.85	4	5.59
	29.06	4	6.74	3	10.10	3	4.83	4	5.65
	29.15	4	6.71	3	10.13	3	4.82	4	5.70
	29.24	4	6.68	3	10.15	3	4.80	4	5.75
62	29.24	4	6.67	3	10.14	3	4.79	4	5.74
	29.33	4	6.64	3	10.17	3	4.77	4	5.82
	29.42	4	6.60	3	10.20	3	4.76	4	5.90
	29.51	4	6.57	3	10.23	3	4.75	4	5.97
	29.60	4	6.54	3	10.26	3	4.74	4	6.04
	29.69	4	6.51	3	10.28	3	4.73	4	6.12
	29.78	4	6.48	3	10.31	3	4.72	4	6.19
	29.87	4	6.45	3	10.33	3	4.71	4	6.25
	29.96	4	6.43	3	10.35	3	4.70	4	6.32
	30.05	4	6.40	3	10.37	3	4.70	4	6.38
	30.14	4	6.38	3	10.39	3	4.69	4	6.44
	30.22	4	6.36	3	10.41	3	4.69	4	6.50
	30.31	4	6.34	3	10.43	3	4.68	4	6.55
	30.40	4	6.32	3	10.44	3	4.68	4	6.61
	30.49	4	6.30	3	10.46	3	4.68	4	6.67
	30.58	4	6.29	3	10.47	3	4.68	4	6.72
	30.67	4	6.27	3	10.49	3	4.68	4	6.77
	30.76	4	6.26	3	10.49	3	4.69	4	6.81
	30.85	4	6.25	3	10.50	3	4.69	4	6.87
	30.94	4	6.23	3	10.51	3	4.69	4	6.91
	31.03	4	6.22	3	10.52	3	4.70	4	6.96

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 118
 Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
63	31.03	4	6.21	3	10.51	3	4.68	4	6.94
	31.12	4	6.19	3	10.52	3	4.69	4	7.01
	31.21	4	6.17	3	10.54	3	4.69	4	7.08
	31.30	4	6.15	3	10.55	3	4.70	4	7.14
	31.39	4	6.13	3	10.56	3	4.70	4	7.21
	31.48	4	6.12	3	10.56	3	4.71	4	7.26
	31.57	4	6.10	3	10.57	3	4.72	4	7.33
	31.66	4	6.09	3	10.59	3	4.72	4	7.40
	31.75	4	6.07	3	10.59	3	4.73	4	7.46
	31.84	4	6.06	3	10.60	3	4.74	4	7.52
	31.92	4	6.05	3	10.60	3	4.75	4	7.57
	32.01	4	6.04	3	10.61	3	4.76	4	7.63
	32.10	4	6.03	3	10.61	3	4.77	4	7.68
	32.19	4	6.02	3	10.61	3	4.78	4	7.73
	32.28	4	6.01	3	10.62	3	4.79	4	7.78
	32.37	4	6.00	3	10.62	3	4.80	4	7.83
	32.46	4	5.99	3	10.62	3	4.82	4	7.88
	32.55	4	5.98	3	10.63	3	4.83	4	7.93
	32.64	4	5.98	3	10.63	3	4.84	4	7.98
	32.73	4	5.97	3	10.64	3	4.85	4	8.03
	32.82	4	5.96	3	10.64	3	4.86	4	8.08
64	32.82	4	5.95	3	10.63	3	4.86	4	8.08
	32.91	4	5.94	3	10.64	3	4.87	4	8.15
	33.00	4	5.92	3	10.64	3	4.88	4	8.22
	33.09	4	5.91	3	10.65	3	4.89	4	8.29
	33.18	4	5.89	3	10.66	3	4.90	4	8.35
	33.27	4	5.87	3	10.66	3	4.91	4	8.42
	33.36	4	5.86	3	10.67	3	4.92	4	8.49
	33.45	4	5.85	3	10.67	3	4.94	4	8.55
	33.54	4	5.83	3	10.67	3	4.95	4	8.62
	33.63	4	5.82	3	10.68	3	4.96	4	8.68
	33.72	4	5.81	3	10.68	3	4.97	4	8.75
	33.80	4	5.79	3	10.68	3	4.99	4	8.81
	33.89	4	5.78	3	10.68	3	5.00	4	8.87
	33.98	4	5.77	3	10.68	3	5.01	4	8.93
	34.07	4	5.76	3	10.69	3	5.03	4	8.99
	34.16	4	5.75	3	10.69	3	5.04	4	9.04
	34.25	4	5.74	3	10.69	3	5.06	4	9.10
	34.34	4	5.73	3	10.69	3	5.07	4	9.15
	34.43	4	5.72	3	10.69	3	5.08	4	9.21
	34.52	4	5.71	3	10.68	3	5.10	4	9.26
	34.61	4	5.71	3	10.68	3	5.11	4	9.31

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m 80% cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 119
 Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
65	34.61	4	5.70	3	10.68	3	5.11	4	9.33
	34.70	4	5.68	3	10.68	3	5.13	4	9.41
	34.79	4	5.66	3	10.69	3	5.14	4	9.48
	34.88	4	5.65	3	10.69	3	5.15	4	9.55
	34.97	4	5.63	3	10.69	3	5.16	4	9.62
	35.06	4	5.61	3	10.70	3	5.18	4	9.70
	35.15	4	5.59	3	10.71	3	5.19	4	9.78
	35.24	4	5.57	3	10.72	3	5.20	4	9.85
	35.33	4	5.55	3	10.72	3	5.21	4	9.93
	35.42	4	5.54	3	10.73	3	5.22	4	10.01
	35.51	4	5.52	3	10.74	3	5.23	4	10.08
	35.59	4	5.50	3	10.75	3	5.24	4	10.16
	35.68	4	5.48	3	10.76	3	5.25	4	10.24
	35.77	4	5.46	3	10.77	3	5.26	4	10.31
	35.86	4	5.44	3	10.77	3	5.26	4	10.39
	35.95	4	5.42	3	10.78	3	5.27	4	10.46
	36.04	4	5.40	3	10.79	3	5.28	4	10.53
	36.13	4	5.38	3	10.80	3	5.29	4	10.60
	36.22	4	5.36	3	10.82	3	5.29	4	10.67
	36.31	4	5.35	3	10.83	3	5.30	4	10.72
	36.40	4	5.35	3	10.84	3	5.31	4	10.77
66	36.40	4	5.32	3	10.98	3	5.32	4	10.98
	36.43	4	5.23	3	11.21	3	5.23	4	11.21
	36.46	4	5.14	3	11.44	3	5.14	4	11.44
	36.49	4	5.05	3	11.66	3	5.05	4	11.66
	36.52	4	4.96	3	11.89	3	4.96	4	11.89
	36.55	4	4.87	3	12.12	3	4.87	4	12.12
	36.58	4	4.78	3	12.35	3	4.78	4	12.35
	36.61	4	4.70	3	12.58	3	4.69	4	12.57
	36.64	4	4.61	3	12.80	3	4.61	4	12.80
	36.67	4	4.52	3	13.03	3	4.52	4	13.03
	36.70	4	4.43	3	13.26	3	4.43	4	13.26
	36.73	4	4.34	3	13.49	3	4.34	4	13.49
	36.76	4	4.25	3	13.72	3	4.25	4	13.72
	36.79	4	4.16	3	13.95	3	4.16	4	13.95
	36.82	4	4.07	3	14.18	3	4.07	4	14.17
	36.85	4	3.98	3	14.40	3	3.98	4	14.40
	36.88	4	3.89	3	14.63	3	3.89	4	14.63
	36.90	4	1.92	3	4.14	3	1.92	4	4.14
	36.91	4	0.94	3	-1.10	3	0.94	4	-1.11
	36.94	4	0.82	3	-0.82	3	0.82	4	-0.82
	36.97	4	0.70	3	-0.54	3	0.69	4	-0.54
	37.00	4	0.58	3	-0.25	3	0.57	4	-0.26

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
45	0.00	1	0.00	1	-0.00	1	0.00	1	-0.00
	0.03	1	-0.00	1	0.00	1	-0.00	1	0.00
	0.06	1	-0.00	1	0.00	1	-0.00	1	0.00
	0.09	1	-0.00	1	0.00	1	-0.00	1	0.00
	0.10	1	3.24	1	3.65	1	3.24	1	3.65
	0.12	1	9.72	1	10.96	1	9.72	1	10.96
	0.15	1	9.63	1	11.00	1	9.63	1	11.00
	0.18	1	9.54	1	11.04	1	9.54	1	11.04
	0.21	1	9.45	1	11.07	1	9.45	1	11.07
	0.24	1	9.36	1	11.11	1	9.36	1	11.11
	0.27	1	9.30	1	11.18	1	9.30	1	11.18
	0.30	1	9.23	1	11.25	1	9.23	1	11.25
	0.33	1	9.17	1	11.32	1	9.17	1	11.32
	0.36	1	9.11	1	11.38	1	9.11	1	11.38
	0.39	1	9.05	1	11.45	1	9.05	1	11.45
	0.42	1	8.98	1	11.52	1	8.98	1	11.52
	0.45	1	8.92	1	11.59	1	8.92	1	11.59
	0.48	1	8.86	1	11.66	1	8.86	1	11.66
	0.51	1	8.79	1	11.73	1	8.79	1	11.73
	0.54	1	8.73	1	11.80	1	8.73	1	11.80
	0.57	1	8.67	1	11.87	1	8.67	1	11.87
	0.60	1	8.60	1	11.94	1	8.60	1	11.94
46	0.60	1	8.71	1	11.71	1	8.71	1	11.71
	0.69	1	8.61	1	11.82	1	8.61	1	11.82
	0.78	1	8.50	1	11.94	1	8.50	1	11.94
	0.87	1	8.40	1	12.05	1	8.40	1	12.05
	0.96	1	8.29	1	12.17	1	8.29	1	12.17
	1.05	1	8.18	1	12.29	1	8.18	1	12.29
	1.14	1	8.08	1	12.41	1	8.08	1	12.41
	1.23	1	7.97	1	12.52	1	7.97	1	12.52
	1.32	1	7.86	1	12.64	1	7.86	1	12.64
	1.41	1	7.75	1	12.76	1	7.75	1	12.76
	1.50	1	7.64	1	12.88	1	7.64	1	12.88
	1.58	1	7.53	1	13.00	1	7.53	1	13.00
	1.67	1	7.42	1	13.12	1	7.42	1	13.12
	1.76	1	7.31	1	13.24	1	7.31	1	13.24
	1.85	1	7.20	1	13.36	1	7.20	1	13.36
	1.94	1	7.09	1	13.48	1	7.09	1	13.48
	2.03	1	6.98	1	13.61	1	6.98	1	13.61
	2.12	1	6.86	1	13.73	1	6.86	1	13.73
	2.21	1	6.75	1	13.85	1	6.75	1	13.85
	2.30	1	6.63	1	13.98	1	6.63	1	13.98
	2.39	1	6.52	1	14.11	1	6.52	1	14.11

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
47	2.39	1	6.53	1	14.11	1	6.53	1	14.11
	2.48	1	6.41	1	14.23	1	6.41	1	14.23
	2.57	1	6.30	1	14.36	1	6.30	1	14.36
	2.66	1	6.19	1	14.48	1	6.19	1	14.48
	2.75	1	6.08	1	14.60	1	6.08	1	14.60
	2.84	1	5.97	1	14.72	1	5.97	1	14.72
	2.93	1	5.86	1	14.84	1	5.86	1	14.84
	3.02	1	5.75	1	14.96	1	5.75	1	14.96
	3.11	1	5.64	1	15.08	1	5.64	1	15.08
	3.20	1	5.53	1	15.20	1	5.53	1	15.20
	3.28	1	5.42	1	15.32	1	5.42	1	15.32
	3.37	1	5.32	1	15.43	1	5.32	1	15.43
	3.46	1	5.21	1	15.55	1	5.21	1	15.55
	3.55	1	5.10	1	15.66	1	5.10	1	15.66
	3.64	1	5.00	1	15.78	1	5.00	1	15.78
	3.73	1	4.89	1	15.89	1	4.89	1	15.89
	3.82	1	4.79	1	16.00	1	4.79	1	16.00
	3.91	1	4.69	1	16.11	1	4.69	1	16.11
	4.00	1	4.59	1	16.22	1	4.59	1	16.22
	4.09	1	4.48	1	16.33	1	4.48	1	16.33
	4.18	1	4.38	1	16.44	1	4.38	1	16.44
48	4.18	1	4.39	1	16.45	1	4.39	1	16.45
	4.27	1	4.29	1	16.56	1	4.29	1	16.56
	4.36	1	4.19	1	16.66	1	4.19	1	16.66
	4.45	1	4.09	1	16.77	1	4.09	1	16.77
	4.54	1	3.99	1	16.87	1	3.99	1	16.87
	4.63	1	3.90	1	16.98	1	3.90	1	16.98
	4.72	1	3.80	1	17.09	1	3.80	1	17.09
	4.81	1	3.70	1	17.19	1	3.70	1	17.19
	4.90	1	3.61	1	17.29	1	3.61	1	17.29
	4.99	1	3.51	1	17.40	1	3.51	1	17.40
	5.07	1	3.42	1	17.50	1	3.42	1	17.50
	5.16	1	3.33	1	17.60	1	3.33	1	17.60
	5.25	1	3.24	1	17.70	1	3.24	1	17.70
	5.34	1	3.16	1	17.79	1	3.16	1	17.79
	5.43	1	3.07	1	17.89	1	3.07	1	17.89
	5.52	1	2.98	1	17.97	1	2.98	1	17.97
	5.61	1	2.90	1	18.07	1	2.90	1	18.07
	5.70	1	2.82	1	18.16	1	2.82	1	18.16
	5.79	1	2.74	1	18.25	1	2.74	1	18.25
	5.88	1	2.66	1	18.33	1	2.66	1	18.33
	5.97	1	2.58	1	18.42	1	2.58	1	18.42

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
49	5.97	1	2.60	1	18.44	1	2.60	1	18.44
	6.06	1	2.53	1	18.52	1	2.53	1	18.52
	6.15	1	2.45	1	18.60	1	2.45	1	18.60
	6.24	1	2.38	1	18.68	1	2.38	1	18.68
	6.33	1	2.31	1	18.76	1	2.31	1	18.76
	6.42	1	2.24	1	18.84	1	2.24	1	18.84
	6.51	1	2.18	1	18.92	1	2.18	1	18.92
	6.60	1	2.11	1	18.99	1	2.11	1	18.99
	6.69	1	2.05	1	19.06	1	2.05	1	19.06
	6.78	1	1.99	1	19.13	1	1.99	1	19.13
	6.86	1	1.94	1	19.20	1	1.94	1	19.20
	6.95	1	1.89	1	19.26	1	1.89	1	19.26
	7.04	1	1.83	1	19.32	1	1.83	1	19.32
	7.13	1	1.79	1	19.38	1	1.79	1	19.38
	7.22	1	1.74	1	19.44	1	1.74	1	19.44
	7.31	1	1.70	1	19.49	1	1.70	1	19.49
	7.40	1	1.66	1	19.54	1	1.66	1	19.54
	7.49	1	1.62	1	19.59	1	1.62	1	19.59
	7.58	1	1.58	1	19.64	1	1.58	1	19.64
	7.67	1	1.55	1	19.68	1	1.55	1	19.68
	7.76	1	1.52	1	19.72	1	1.52	1	19.72
50	7.76	1	1.53	1	19.74	1	1.53	1	19.74
	7.85	1	1.50	1	19.78	1	1.50	1	19.78
	7.94	1	1.48	1	19.82	1	1.48	1	19.82
	8.03	1	1.45	1	19.85	1	1.45	1	19.85
	8.12	1	1.43	1	19.88	1	1.43	1	19.88
	8.21	1	1.41	1	19.91	1	1.41	1	19.91
	8.30	1	1.40	1	19.94	1	1.40	1	19.94
	8.39	1	1.38	1	19.96	1	1.38	1	19.96
	8.48	1	1.37	1	19.99	1	1.37	1	19.99
	8.57	1	1.36	1	20.00	1	1.36	1	20.00
	8.66	1	1.36	1	20.01	1	1.36	1	20.01
	8.74	1	1.36	1	20.02	1	1.36	1	20.02
	8.83	1	1.35	1	20.05	1	1.35	1	20.05
	8.92	1	1.35	1	20.05	1	1.35	1	20.05
	9.01	1	1.36	1	20.06	1	1.36	1	20.06
	9.10	1	1.36	1	20.06	1	1.36	1	20.06
	9.19	1	1.37	1	20.07	1	1.37	1	20.07
	9.28	1	1.37	1	20.07	1	1.37	1	20.07
	9.37	1	1.38	1	20.07	1	1.38	1	20.07
	9.46	1	1.39	1	20.06	1	1.39	1	20.06
	9.55	1	1.40	1	20.06	1	1.40	1	20.06

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
51	9.55	1	1.41	1	20.07	1	1.41	1	20.07
	9.64	1	1.42	1	20.06	1	1.42	1	20.06
	9.73	1	1.44	1	20.05	1	1.44	1	20.05
	9.82	1	1.45	1	20.04	1	1.45	1	20.04
	9.91	1	1.47	1	20.04	1	1.47	1	20.04
	10.00	1	1.49	1	20.03	1	1.49	1	20.03
	10.09	1	1.51	1	20.01	1	1.51	1	20.01
	10.18	1	1.53	1	20.00	1	1.53	1	20.00
	10.27	1	1.55	1	19.98	1	1.55	1	19.98
	10.36	1	1.57	1	19.97	1	1.57	1	19.97
	10.44	1	1.59	1	19.95	1	1.59	1	19.95
	10.53	1	1.61	1	19.94	1	1.61	1	19.94
	10.62	1	1.63	1	19.92	1	1.63	1	19.92
	10.71	1	1.65	1	19.90	1	1.65	1	19.90
	10.80	1	1.68	1	19.89	1	1.68	1	19.89
	10.89	1	1.70	1	19.87	1	1.70	1	19.87
	10.98	1	1.73	1	19.85	1	1.73	1	19.85
	11.07	1	1.75	1	19.83	1	1.75	1	19.83
	11.16	1	1.77	1	19.81	1	1.77	1	19.81
	11.25	1	1.80	1	19.79	1	1.80	1	19.79
	11.34	1	1.83	1	19.77	1	1.83	1	19.77
52	11.34	1	1.83	1	19.78	1	1.83	1	19.78
	11.43	1	1.85	1	19.76	1	1.85	1	19.76
	11.52	1	1.88	1	19.73	1	1.88	1	19.73
	11.61	1	1.91	1	19.71	1	1.91	1	19.71
	11.70	1	1.94	1	19.69	1	1.94	1	19.69
	11.79	1	1.96	1	19.66	1	1.96	1	19.66
	11.88	1	1.99	1	19.65	1	1.99	1	19.65
	11.97	1	2.02	1	19.62	1	2.02	1	19.62
	12.06	1	2.05	1	19.60	1	2.05	1	19.60
	12.15	1	2.08	1	19.57	1	2.08	1	19.57
	12.24	1	2.11	1	19.55	1	2.11	1	19.55
	12.32	1	2.13	1	19.53	1	2.13	1	19.53
	12.41	1	2.16	1	19.51	1	2.16	1	19.51
	12.50	1	2.19	1	19.48	1	2.19	1	19.48
	12.59	1	2.21	1	19.46	1	2.21	1	19.46
	12.68	1	2.24	1	19.43	1	2.24	1	19.43
	12.77	1	2.26	1	19.41	1	2.26	1	19.41
	12.86	1	2.29	1	19.39	1	2.29	1	19.39
	12.95	1	2.31	1	19.36	1	2.31	1	19.36
	13.04	1	2.34	1	19.34	1	2.34	1	19.34
	13.13	1	2.36	1	19.32	1	2.36	1	19.32

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
53	13.22	1	2.38	1	19.30	1	2.38	1	19.30
	13.31	1	2.40	1	19.28	1	2.40	1	19.28
	13.40	1	2.43	1	19.25	1	2.43	1	19.25
	13.49	1	2.45	1	19.23	1	2.45	1	19.23
	13.58	1	2.47	1	19.21	1	2.47	1	19.21
	13.67	1	2.49	1	19.19	1	2.49	1	19.19
	13.76	1	2.51	1	19.16	1	2.51	1	19.16
	13.85	1	2.53	1	19.14	1	2.53	1	19.14
	13.94	1	2.55	1	19.12	1	2.55	1	19.12
	14.02	1	2.57	1	19.10	1	2.57	1	19.10
	14.11	1	2.59	1	19.08	1	2.59	1	19.08
	14.20	1	2.61	1	19.06	1	2.61	1	19.06
	14.29	1	2.63	1	19.04	1	2.63	1	19.04
	14.38	1	2.65	1	19.01	1	2.65	1	19.01
	14.47	1	2.67	1	18.99	1	2.67	1	18.99
	14.56	1	2.69	1	18.97	1	2.69	1	18.97
	14.65	1	2.71	1	18.95	1	2.71	1	18.95
	14.74	1	2.72	1	18.93	1	2.72	1	18.93
	14.83	1	2.74	1	18.90	1	2.74	1	18.90
	14.92	1	2.76	1	18.88	1	2.76	1	18.88
54	15.01	1	2.77	1	18.86	1	2.77	1	18.86
	15.10	1	2.79	1	18.84	1	2.79	1	18.84
	15.19	1	2.81	1	18.82	1	2.81	1	18.82
	15.28	1	2.82	1	18.80	1	2.82	1	18.80
	15.37	1	2.84	1	18.78	1	2.84	1	18.78
	15.46	1	2.85	1	18.76	1	2.85	1	18.76
	15.55	1	2.87	1	18.75	1	2.87	1	18.75
	15.64	1	2.88	1	18.73	1	2.88	1	18.73
	15.73	1	2.89	1	18.71	1	2.89	1	18.71
	15.81	1	2.90	1	18.69	1	2.90	1	18.69
	15.90	1	2.92	1	18.68	1	2.92	1	18.68
	15.99	1	2.93	1	18.66	1	2.93	1	18.66
	16.08	1	2.94	1	18.65	1	2.94	1	18.65
	16.17	1	2.95	1	18.63	1	2.95	1	18.63
	16.26	1	2.96	1	18.62	1	2.96	1	18.62
	16.35	1	2.97	1	18.60	1	2.97	1	18.60
	16.44	1	2.98	1	18.59	1	2.98	1	18.59
	16.53	1	2.99	1	18.58	1	2.99	1	18.58
	16.62	1	3.00	1	18.56	1	3.00	1	18.56
	16.71	1	3.01	1	18.55	1	3.01	1	18.55

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 125
 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
55	16.80	1	3.02	1	18.54	1	3.02	1	18.54
	16.89	1	3.03	1	18.53	1	3.03	1	18.53
	16.98	1	3.03	1	18.52	1	3.03	1	18.52
	17.07	1	3.04	1	18.51	1	3.04	1	18.51
	17.16	1	3.05	1	18.50	1	3.05	1	18.50
	17.25	1	3.05	1	18.49	1	3.05	1	18.49
	17.34	1	3.06	1	18.48	1	3.06	1	18.48
	17.43	1	3.07	1	18.47	1	3.07	1	18.47
	17.52	1	3.07	1	18.46	1	3.07	1	18.46
	17.60	1	3.08	1	18.45	1	3.08	1	18.45
	17.69	1	3.08	1	18.44	1	3.08	1	18.44
	17.78	1	3.08	1	18.44	1	3.08	1	18.44
	17.87	1	3.09	1	18.43	1	3.09	1	18.43
	17.96	1	3.09	1	18.42	1	3.09	1	18.42
	18.05	1	3.09	1	18.42	1	3.09	1	18.42
	18.14	1	3.09	1	18.41	1	3.09	1	18.41
	18.23	1	3.10	1	18.41	1	3.10	1	18.41
	18.32	1	3.10	1	18.40	1	3.10	1	18.40
	18.41	1	3.10	1	18.40	1	3.10	1	18.40
	18.50	1	3.10	1	18.40	1	3.10	1	18.40
56	18.59	1	3.10	1	18.40	1	3.10	1	18.40
	18.68	1	3.10	1	18.40	1	3.10	1	18.40
	18.77	1	3.10	1	18.41	1	3.10	1	18.41
	18.86	1	3.09	1	18.41	1	3.09	1	18.41
	18.95	1	3.09	1	18.42	1	3.09	1	18.42
	19.04	1	3.09	1	18.42	1	3.09	1	18.42
	19.13	1	3.09	1	18.43	1	3.09	1	18.43
	19.22	1	3.08	1	18.44	1	3.08	1	18.44
	19.31	1	3.08	1	18.44	1	3.08	1	18.44
	19.40	1	3.08	1	18.45	1	3.08	1	18.45
	19.48	1	3.07	1	18.46	1	3.07	1	18.46
	19.57	1	3.07	1	18.47	1	3.07	1	18.47
	19.66	1	3.06	1	18.47	1	3.06	1	18.47
	19.75	1	3.05	1	18.48	1	3.05	1	18.48
	19.84	1	3.05	1	18.49	1	3.05	1	18.49
	19.93	1	3.04	1	18.50	1	3.04	1	18.50
	20.02	1	3.04	1	18.51	1	3.04	1	18.51
	20.11	1	3.03	1	18.52	1	3.03	1	18.52
	20.20	1	3.02	1	18.54	1	3.02	1	18.54
	20.29	1	3.01	1	18.55	1	3.01	1	18.55

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
57	20.38	1	3.00	1	18.56	1	3.00	1	18.56
	20.47	1	2.99	1	18.57	1	2.99	1	18.57
	20.56	1	2.98	1	18.59	1	2.98	1	18.59
	20.65	1	2.97	1	18.60	1	2.97	1	18.60
	20.74	1	2.96	1	18.61	1	2.96	1	18.61
	20.83	1	2.95	1	18.63	1	2.95	1	18.63
	20.92	1	2.94	1	18.64	1	2.94	1	18.64
	21.01	1	2.93	1	18.66	1	2.93	1	18.66
	21.10	1	2.92	1	18.67	1	2.92	1	18.67
	21.19	1	2.91	1	18.69	1	2.91	1	18.69
	21.27	1	2.89	1	18.71	1	2.89	1	18.71
	21.36	1	2.88	1	18.72	1	2.88	1	18.72
	21.45	1	2.87	1	18.74	1	2.87	1	18.74
	21.54	1	2.85	1	18.76	1	2.85	1	18.76
	21.63	1	2.84	1	18.78	1	2.84	1	18.78
	21.72	1	2.82	1	18.80	1	2.82	1	18.80
	21.81	1	2.81	1	18.82	1	2.81	1	18.82
	21.90	1	2.79	1	18.84	1	2.79	1	18.84
	21.99	1	2.78	1	18.86	1	2.78	1	18.86
	22.08	1	2.76	1	18.88	1	2.76	1	18.88
58	22.17	1	2.74	1	18.90	1	2.74	1	18.90
	22.26	1	2.73	1	18.92	1	2.73	1	18.92
	22.35	1	2.71	1	18.94	1	2.71	1	18.94
	22.44	1	2.69	1	18.96	1	2.69	1	18.96
	22.53	1	2.67	1	18.98	1	2.67	1	18.98
	22.62	1	2.65	1	19.01	1	2.65	1	19.01
	22.71	1	2.63	1	19.03	1	2.63	1	19.03
	22.80	1	2.61	1	19.05	1	2.61	1	19.05
	22.89	1	2.60	1	19.07	1	2.60	1	19.07
	22.98	1	2.58	1	19.09	1	2.58	1	19.09
	23.06	1	2.56	1	19.11	1	2.56	1	19.11
	23.15	1	2.54	1	19.13	1	2.54	1	19.13
	23.24	1	2.52	1	19.16	1	2.52	1	19.16
	23.33	1	2.49	1	19.18	1	2.49	1	19.18
	23.42	1	2.47	1	19.20	1	2.47	1	19.20
	23.51	1	2.45	1	19.23	1	2.45	1	19.23
	23.60	1	2.43	1	19.25	1	2.43	1	19.25
	23.69	1	2.41	1	19.27	1	2.41	1	19.27
	23.78	1	2.38	1	19.29	1	2.38	1	19.29
	23.87	1	2.36	1	19.31	1	2.36	1	19.31

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
59	23.96	1	2.34	1	19.33	1	2.34	1	19.33
	24.05	1	2.31	1	19.36	1	2.31	1	19.36
	24.14	1	2.29	1	19.38	1	2.29	1	19.38
	24.23	1	2.26	1	19.40	1	2.26	1	19.40
	24.32	1	2.24	1	19.42	1	2.24	1	19.42
	24.41	1	2.21	1	19.45	1	2.21	1	19.45
	24.50	1	2.19	1	19.47	1	2.19	1	19.47
	24.59	1	2.16	1	19.50	1	2.16	1	19.50
	24.68	1	2.14	1	19.52	1	2.14	1	19.52
	24.76	1	2.11	1	19.54	1	2.11	1	19.54
	24.85	1	2.08	1	19.57	1	2.08	1	19.57
	24.94	1	2.05	1	19.59	1	2.05	1	19.59
	25.03	1	2.02	1	19.62	1	2.02	1	19.62
	25.12	1	2.00	1	19.64	1	2.00	1	19.64
	25.21	1	1.97	1	19.66	1	1.97	1	19.66
	25.30	1	1.94	1	19.68	1	1.94	1	19.68
	25.39	1	1.91	1	19.71	1	1.91	1	19.71
	25.48	1	1.88	1	19.73	1	1.88	1	19.73
	25.57	1	1.86	1	19.75	1	1.86	1	19.75
	25.66	1	1.83	1	19.77	1	1.83	1	19.77
60	25.66	1	1.83	1	19.77	1	1.83	1	19.77
	25.75	1	1.80	1	19.79	1	1.80	1	19.79
	25.84	1	1.78	1	19.81	1	1.78	1	19.81
	25.93	1	1.75	1	19.83	1	1.75	1	19.83
	26.02	1	1.73	1	19.84	1	1.73	1	19.84
	26.11	1	1.70	1	19.86	1	1.70	1	19.86
	26.20	1	1.68	1	19.88	1	1.68	1	19.88
	26.29	1	1.66	1	19.90	1	1.66	1	19.90
	26.38	1	1.63	1	19.91	1	1.63	1	19.91
	26.47	1	1.61	1	19.93	1	1.61	1	19.93
	26.56	1	1.59	1	19.95	1	1.59	1	19.95
	26.64	1	1.57	1	19.96	1	1.57	1	19.96
	26.73	1	1.55	1	19.98	1	1.55	1	19.98
	26.82	1	1.53	1	19.99	1	1.53	1	19.99
	26.91	1	1.51	1	20.01	1	1.51	1	20.01
	27.00	1	1.49	1	20.02	1	1.49	1	20.02
	27.09	1	1.47	1	20.04	1	1.47	1	20.04
	27.18	1	1.45	1	20.04	1	1.45	1	20.04
	27.27	1	1.44	1	20.05	1	1.44	1	20.05
	27.36	1	1.42	1	20.05	1	1.42	1	20.05
	27.45	1	1.41	1	20.06	1	1.41	1	20.06

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 128
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
61	27.45	1	1.40	1	20.05	1	1.40	1	20.05
	27.54	1	1.39	1	20.06	1	1.39	1	20.06
	27.63	1	1.38	1	20.06	1	1.38	1	20.06
	27.72	1	1.37	1	20.06	1	1.37	1	20.06
	27.81	1	1.37	1	20.06	1	1.37	1	20.06
	27.90	1	1.36	1	20.06	1	1.36	1	20.06
	27.99	1	1.36	1	20.05	1	1.36	1	20.05
	28.08	1	1.35	1	20.05	1	1.35	1	20.05
	28.17	1	1.35	1	20.04	1	1.35	1	20.04
	28.26	1	1.35	1	20.03	1	1.35	1	20.03
	28.35	1	1.36	1	20.01	1	1.36	1	20.01
	28.43	1	1.36	1	20.00	1	1.36	1	20.00
	28.52	1	1.37	1	19.98	1	1.37	1	19.98
	28.61	1	1.38	1	19.96	1	1.38	1	19.96
	28.70	1	1.40	1	19.93	1	1.40	1	19.93
	28.79	1	1.42	1	19.90	1	1.42	1	19.90
	28.88	1	1.43	1	19.87	1	1.43	1	19.87
	28.97	1	1.46	1	19.84	1	1.46	1	19.84
	29.06	1	1.48	1	19.81	1	1.48	1	19.81
	29.15	1	1.51	1	19.77	1	1.51	1	19.77
	29.24	1	1.54	1	19.73	1	1.54	1	19.73
62	29.24	1	1.52	1	19.72	1	1.52	1	19.72
	29.33	1	1.55	1	19.67	1	1.55	1	19.67
	29.42	1	1.59	1	19.63	1	1.59	1	19.63
	29.51	1	1.62	1	19.58	1	1.62	1	19.58
	29.60	1	1.66	1	19.53	1	1.66	1	19.53
	29.69	1	1.70	1	19.48	1	1.70	1	19.48
	29.78	1	1.75	1	19.43	1	1.75	1	19.43
	29.87	1	1.79	1	19.37	1	1.79	1	19.37
	29.96	1	1.84	1	19.31	1	1.84	1	19.31
	30.05	1	1.89	1	19.25	1	1.89	1	19.25
	30.14	1	1.95	1	19.18	1	1.95	1	19.18
	30.22	1	2.01	1	19.12	1	2.01	1	19.12
	30.31	1	2.06	1	19.05	1	2.06	1	19.05
	30.40	1	2.13	1	18.98	1	2.13	1	18.98
	30.49	1	2.19	1	18.91	1	2.19	1	18.91
	30.58	1	2.26	1	18.83	1	2.26	1	18.83
	30.67	1	2.33	1	18.76	1	2.33	1	18.76
	30.76	1	2.40	1	18.66	1	2.40	1	18.66
	30.85	1	2.47	1	18.58	1	2.47	1	18.58
	30.94	1	2.54	1	18.50	1	2.54	1	18.50
	31.03	1	2.62	1	18.41	1	2.62	1	18.41

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
63	31.03	1	2.60	1	18.40	1	2.60	1	18.40
	31.12	1	2.68	1	18.31	1	2.68	1	18.31
	31.21	1	2.76	1	18.22	1	2.76	1	18.22
	31.30	1	2.84	1	18.13	1	2.84	1	18.13
	31.39	1	2.93	1	18.04	1	2.93	1	18.04
	31.48	1	3.01	1	17.95	1	3.01	1	17.95
	31.57	1	3.10	1	17.85	1	3.10	1	17.85
	31.66	1	3.18	1	17.76	1	3.18	1	17.76
	31.75	1	3.27	1	17.66	1	3.27	1	17.66
	31.84	1	3.36	1	17.56	1	3.36	1	17.56
	31.92	1	3.45	1	17.46	1	3.45	1	17.46
	32.01	1	3.55	1	17.36	1	3.55	1	17.36
	32.10	1	3.64	1	17.26	1	3.64	1	17.26
	32.19	1	3.74	1	17.15	1	3.74	1	17.15
	32.28	1	3.84	1	17.04	1	3.84	1	17.04
	32.37	1	3.93	1	16.94	1	3.93	1	16.94
	32.46	1	4.03	1	16.83	1	4.03	1	16.83
	32.55	1	4.13	1	16.73	1	4.13	1	16.73
	32.64	1	4.23	1	16.62	1	4.23	1	16.62
	32.73	1	4.33	1	16.51	1	4.33	1	16.51
	32.82	1	4.43	1	16.40	1	4.43	1	16.40
64	32.82	1	4.42	1	16.40	1	4.42	1	16.40
	32.91	1	4.53	1	16.29	1	4.53	1	16.29
	33.00	1	4.63	1	16.18	1	4.63	1	16.18
	33.09	1	4.73	1	16.07	1	4.73	1	16.07
	33.18	1	4.83	1	15.96	1	4.83	1	15.96
	33.27	1	4.94	1	15.84	1	4.94	1	15.84
	33.36	1	5.04	1	15.73	1	5.04	1	15.73
	33.45	1	5.15	1	15.62	1	5.15	1	15.62
	33.54	1	5.25	1	15.50	1	5.25	1	15.50
	33.63	1	5.36	1	15.39	1	5.36	1	15.39
	33.72	1	5.47	1	15.27	1	5.47	1	15.27
	33.80	1	5.57	1	15.15	1	5.57	1	15.15
	33.89	1	5.68	1	15.03	1	5.68	1	15.03
	33.98	1	5.79	1	14.91	1	5.79	1	14.91
	34.07	1	5.90	1	14.80	1	5.90	1	14.80
	34.16	1	6.01	1	14.67	1	6.01	1	14.67
	34.25	1	6.12	1	14.55	1	6.12	1	14.55
	34.34	1	6.23	1	14.43	1	6.23	1	14.43
	34.43	1	6.34	1	14.31	1	6.34	1	14.31
	34.52	1	6.46	1	14.19	1	6.46	1	14.19
	34.61	1	6.57	1	14.06	1	6.57	1	14.06

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext=int 37m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 130
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
65	34.61	1	6.56	1	14.06	1	6.56	1	14.06
	34.70	1	6.68	1	13.94	1	6.68	1	13.94
	34.79	1	6.79	1	13.81	1	6.79	1	13.81
	34.88	1	6.90	1	13.69	1	6.90	1	13.69
	34.97	1	7.02	1	13.56	1	7.02	1	13.56
	35.06	1	7.13	1	13.44	1	7.13	1	13.44
	35.15	1	7.24	1	13.32	1	7.24	1	13.32
	35.24	1	7.35	1	13.20	1	7.35	1	13.20
	35.33	1	7.46	1	13.08	1	7.46	1	13.08
	35.42	1	7.57	1	12.96	1	7.57	1	12.96
	35.51	1	7.68	1	12.84	1	7.68	1	12.84
	35.59	1	7.79	1	12.72	1	7.79	1	12.72
	35.68	1	7.90	1	12.60	1	7.90	1	12.60
	35.77	1	8.01	1	12.48	1	8.01	1	12.48
	35.86	1	8.12	1	12.36	1	8.12	1	12.36
	35.95	1	8.22	1	12.25	1	8.22	1	12.25
	36.04	1	8.33	1	12.13	1	8.33	1	12.13
	36.13	1	8.44	1	12.01	1	8.44	1	12.01
	36.22	1	8.54	1	11.90	1	8.54	1	11.90
	36.31	1	8.65	1	11.78	1	8.65	1	11.78
	36.40	1	8.75	1	11.67	1	8.75	1	11.67
66	36.40	1	8.64	1	11.89	1	8.64	1	11.89
	36.43	1	8.70	1	11.82	1	8.70	1	11.82
	36.46	1	8.77	1	11.76	1	8.77	1	11.76
	36.49	1	8.83	1	11.69	1	8.83	1	11.69
	36.52	1	8.89	1	11.62	1	8.89	1	11.62
	36.55	1	8.96	1	11.55	1	8.96	1	11.55
	36.58	1	9.02	1	11.48	1	9.02	1	11.48
	36.61	1	9.08	1	11.41	1	9.08	1	11.41
	36.64	1	9.15	1	11.34	1	9.15	1	11.34
	36.67	1	9.21	1	11.27	1	9.21	1	11.27
	36.70	1	9.27	1	11.21	1	9.27	1	11.21
	36.73	1	9.33	1	11.14	1	9.33	1	11.14
	36.76	1	9.40	1	11.07	1	9.40	1	11.07
	36.79	1	9.46	1	11.00	1	9.46	1	11.00
	36.82	1	9.52	1	10.93	1	9.52	1	10.93
	36.85	1	9.58	1	10.86	1	9.58	1	10.86
	36.88	1	9.65	1	10.80	1	9.65	1	10.80
	36.90	1	3.22	1	3.60	1	3.22	1	3.60
	36.91	1	-0.00	1	0.00	1	-0.00	1	0.00
	36.94	1	-0.00	1	0.00	1	-0.00	1	0.00
	36.97	1	-0.00	1	0.00	1	-0.00	1	0.00
	37.00	1	0.00	1	-0.00	1	0.00	1	-0.00

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 164
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	0.0	8.8	0.0	10.4	221.7
2	0.10	29.1	0.0	8.4	4.8	5.4	193.2
3	0.12	29.1	0.0	8.4	13.1	4.7	185.6
4	0.15	29.1	0.0	8.4	13.1	4.7	185.6
5	0.18	29.1	0.0	8.4	13.0	4.7	185.7
6	0.21	29.0	0.0	8.4	13.0	4.7	185.8
7	0.24	29.0	0.0	8.4	12.9	4.7	185.8
8	0.27	29.0	0.0	8.4	13.0	4.7	185.8
9	0.30	29.0	0.0	8.4	13.0	4.7	185.8
10	0.33	29.0	0.0	8.4	13.0	4.7	185.8
11	0.36	28.9	0.0	8.4	13.1	4.7	185.8
12	0.39	28.9	0.0	8.4	13.1	4.7	185.7
13	0.42	28.9	0.0	8.4	13.1	4.7	185.7
14	0.45	28.9	0.0	8.4	13.2	4.7	185.7
15	0.48	28.9	0.0	8.4	13.2	4.7	185.7
16	0.51	28.8	0.0	8.4	13.2	4.7	185.7
17	0.54	28.8	0.0	8.4	13.3	4.7	185.7
18	0.57	28.8	0.0	8.4	13.3	4.7	185.7
19	0.60	28.8	0.0	8.4	13.3	4.7	185.7
20	0.60	28.8	0.0	8.4	13.2	4.7	185.8
21	0.69	28.7	0.0	8.4	13.3	4.7	185.8
22	0.78	28.6	0.0	8.4	13.4	4.7	185.8
23	0.87	28.6	0.0	8.4	13.4	4.7	185.8
24	0.96	28.5	0.0	8.4	13.5	4.7	185.8
25	1.05	28.4	0.0	8.4	13.6	4.7	185.7
26	1.14	28.4	0.0	8.4	13.7	4.7	185.7
27	1.23	28.3	0.0	8.4	13.8	4.7	185.7
28	1.32	28.2	0.0	8.4	13.9	4.7	185.7
29	1.41	28.2	0.0	8.4	13.9	4.7	185.7
30	1.50	28.1	0.0	8.4	14.0	4.7	185.7
31	1.58	28.1	0.0	8.4	14.1	4.7	185.6
32	1.67	28.0	0.0	8.4	14.2	4.7	185.6
33	1.76	27.9	0.0	8.4	14.3	4.7	185.6
34	1.85	27.9	0.0	8.4	14.3	4.7	185.6
35	1.94	27.8	0.0	8.4	14.4	4.7	185.6
36	2.03	27.7	0.0	8.4	14.5	4.7	185.6
37	2.12	27.7	0.0	8.4	14.6	4.7	185.6
38	2.21	27.6	0.0	8.4	14.6	4.7	185.6
39	2.30	27.5	0.0	8.3	14.7	4.7	185.6
40	2.39	27.5	0.0	8.3	14.8	4.7	185.6
41	2.39	27.5	0.0	8.3	14.8	4.7	185.6
42	2.48	27.4	0.0	8.3	14.9	4.7	185.6
43	2.57	27.3	0.0	8.3	14.9	4.8	185.5
44	2.66	27.3	0.0	8.3	15.0	4.8	185.5
45	2.75	27.2	0.0	8.3	15.1	4.8	185.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 165
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	27.2	0.0	8.3	15.2	4.8	185.5
47	2.93	27.1	0.0	8.3	15.2	4.8	185.5
48	3.02	27.0	0.0	8.3	15.3	4.8	185.5
49	3.11	27.0	0.0	8.3	15.4	4.8	185.5
50	3.20	26.9	0.0	8.3	15.5	4.8	185.5
51	3.28	26.8	0.0	8.3	15.5	4.8	185.5
52	3.37	26.8	0.0	8.3	15.6	4.8	185.5
53	3.46	26.7	0.0	8.3	15.7	4.8	185.5
54	3.55	26.6	0.0	8.3	15.8	4.8	185.5
55	3.64	26.6	0.0	8.3	15.8	4.8	185.4
56	3.73	26.5	0.0	8.3	15.9	4.8	185.4
57	3.82	26.5	0.0	8.3	16.0	4.8	185.4
58	3.91	26.4	0.0	8.3	16.0	4.8	185.4
59	4.00	26.3	0.0	8.3	16.1	4.8	185.4
60	4.09	26.3	0.0	8.2	16.2	4.8	185.4
61	4.18	26.2	0.0	8.2	16.3	4.8	185.4
62	4.18	26.2	0.0	8.2	16.3	4.8	185.4
63	4.27	26.1	0.0	8.2	16.3	4.8	185.4
64	4.36	26.1	0.0	8.2	16.4	4.8	185.4
65	4.45	26.0	0.0	8.2	16.5	4.8	185.4
66	4.54	25.9	0.0	8.2	16.5	4.8	185.4
67	4.63	25.9	0.0	8.2	16.6	4.8	185.4
68	4.72	25.8	0.0	8.2	16.7	4.8	185.4
69	4.81	25.7	0.0	8.2	16.8	4.8	185.4
70	4.90	25.7	0.0	8.2	16.8	4.8	185.4
71	4.99	25.6	0.0	8.2	16.9	4.8	185.4
72	5.07	25.6	0.0	8.2	17.0	4.9	185.4
73	5.16	25.5	0.0	8.2	17.0	4.9	185.4
74	5.25	25.4	0.0	8.2	17.1	4.9	185.4
75	5.34	25.4	0.0	8.1	17.2	4.9	185.4
76	5.43	25.3	0.0	8.1	17.2	4.9	185.4
77	5.52	25.2	0.0	8.1	17.3	4.9	185.4
78	5.61	25.2	0.0	8.1	17.4	4.9	185.4
79	5.70	25.1	0.0	8.1	17.4	4.9	185.4
80	5.79	25.0	0.0	8.1	17.5	4.9	185.4
81	5.88	25.0	0.0	8.1	17.6	4.9	185.4
82	5.97	24.9	0.0	8.1	17.6	4.9	185.4
83	5.97	24.9	0.0	8.1	17.7	4.9	185.3
84	6.06	24.9	0.0	8.1	17.7	4.9	185.3
85	6.15	24.8	0.0	8.1	17.8	4.9	185.3
86	6.24	24.7	0.0	8.1	17.8	4.9	185.3
87	6.33	24.7	0.0	8.1	17.9	4.9	185.3
88	6.42	24.5	0.0	8.1	18.0	5.0	185.4
89	6.51	24.3	0.0	8.0	18.0	5.0	185.5
90	6.60	24.2	0.0	8.0	18.1	5.0	185.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 166
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	24.0	0.0	8.0	18.1	5.0	185.7
92	6.78	23.9	0.0	8.0	18.2	5.0	185.8
93	6.86	23.7	0.0	8.0	18.2	5.0	185.9
94	6.95	23.6	0.0	8.0	18.3	5.1	186.0
95	7.04	23.4	0.0	8.0	18.3	5.1	186.1
96	7.13	23.2	0.0	8.0	18.4	5.1	186.2
97	7.22	23.1	0.0	8.0	18.4	5.1	186.3
98	7.31	22.9	0.0	8.0	18.5	5.1	186.4
99	7.40	22.8	0.0	8.0	18.5	5.1	186.5
100	7.49	22.6	0.0	8.0	18.5	5.2	186.7
101	7.58	22.4	0.0	8.0	18.5	5.2	186.8
102	7.67	22.3	0.0	8.0	18.6	5.2	186.9
103	7.76	22.1	0.0	7.9	18.6	5.2	187.0
104	7.76	22.1	0.0	7.9	18.6	5.2	187.0
105	7.85	22.0	0.0	7.9	18.7	5.2	187.1
106	7.94	21.8	0.0	7.9	18.7	5.3	187.2
107	8.03	21.7	0.0	7.9	18.7	5.3	187.3
108	8.12	21.5	0.0	7.9	18.7	5.3	187.5
109	8.21	21.3	0.0	7.9	18.7	5.3	187.6
110	8.30	21.2	0.0	7.9	18.7	5.3	187.7
111	8.39	21.0	0.0	7.9	18.8	5.4	187.9
112	8.48	20.9	0.0	7.9	18.8	5.4	188.0
113	8.57	20.7	0.0	7.9	18.8	5.4	188.1
114	8.66	20.6	0.0	7.9	18.8	5.4	188.2
115	8.74	20.4	0.0	7.9	18.8	5.5	188.4
116	8.83	20.2	0.0	7.9	18.8	5.5	188.5
117	8.92	20.1	0.0	7.9	18.8	5.5	188.6
118	9.01	19.9	0.0	7.9	18.8	5.5	188.8
119	9.10	19.8	0.0	7.9	18.8	5.5	188.9
120	9.19	19.6	0.0	7.9	18.8	5.6	189.0
121	9.28	19.5	0.0	7.9	18.8	5.6	189.2
122	9.37	19.3	0.0	7.9	18.8	5.6	189.3
123	9.46	19.1	0.0	7.9	18.8	5.6	189.4
124	9.55	19.0	0.0	7.9	18.8	5.7	189.6
125	9.55	19.0	0.0	7.9	18.9	5.7	189.6
126	9.64	18.8	0.0	7.8	18.8	5.7	189.7
127	9.73	18.7	0.0	7.8	18.8	5.7	189.8
128	9.82	18.5	0.0	7.8	18.8	5.7	190.0
129	9.91	18.4	0.0	7.8	18.8	5.7	190.1
130	10.00	18.2	0.0	7.8	18.8	5.8	190.3
131	10.09	18.1	0.0	7.8	18.8	5.8	190.4
132	10.18	17.9	0.0	7.8	18.8	5.8	190.6
133	10.27	17.7	0.0	7.8	18.8	5.8	190.7
134	10.36	17.6	0.0	7.8	18.7	5.9	190.9
135	10.44	17.4	0.0	7.8	18.7	5.9	191.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	17.3	0.0	7.8	18.7	5.9	191.2
137	10.62	17.1	0.0	7.8	18.7	5.9	191.4
138	10.71	17.0	0.0	7.8	18.7	6.0	191.5
139	10.80	16.8	0.0	7.8	18.6	6.0	191.7
140	10.89	16.6	0.0	7.8	18.6	6.0	191.8
141	10.98	16.5	0.0	7.8	18.6	6.0	192.0
142	11.07	16.3	0.0	7.8	18.5	6.1	192.1
143	11.16	16.2	0.0	7.8	18.5	6.1	192.3
144	11.25	16.0	0.0	7.8	18.5	6.1	192.5
145	11.34	15.9	0.0	7.8	18.5	6.2	192.6
146	11.34	15.9	0.0	7.8	18.5	6.2	192.6
147	11.43	15.7	0.0	7.8	18.4	6.2	192.8
148	11.52	15.6	0.0	7.8	18.4	6.2	192.9
149	11.61	15.4	0.0	7.8	18.4	6.2	193.1
150	11.70	15.2	0.0	7.8	18.3	6.3	193.3
151	11.79	15.1	0.0	7.8	18.3	6.3	193.4
152	11.88	14.9	0.0	7.8	18.3	6.3	193.6
153	11.97	14.9	0.0	7.8	18.2	6.3	193.7
154	12.06	14.8	0.0	7.8	18.2	6.3	193.7
155	12.15	14.7	0.0	7.8	18.2	6.3	193.8
156	12.24	14.7	0.0	7.8	18.2	6.4	193.9
157	12.32	14.6	0.0	7.8	18.1	6.4	194.0
158	12.41	14.6	0.0	7.8	18.1	6.4	194.1
159	12.50	14.6	0.0	7.8	18.1	6.4	194.0
160	12.59	14.7	0.0	7.8	18.0	6.4	194.0
161	12.68	14.8	0.0	7.8	18.0	6.4	194.0
162	12.77	14.8	0.0	7.8	18.0	6.4	193.9
163	12.86	14.9	0.0	7.8	17.9	6.4	193.9
164	12.95	14.9	0.0	7.8	17.9	6.4	193.9
165	13.04	15.0	0.0	7.8	17.9	6.4	193.9
166	13.13	15.1	0.0	7.8	17.8	6.4	193.8
167	13.13	15.1	0.0	7.8	17.8	6.4	193.8
168	13.22	15.1	0.0	7.8	17.8	6.4	193.8
169	13.31	15.2	0.0	7.8	17.8	6.4	193.8
170	13.40	15.2	0.0	7.8	17.7	6.4	193.7
171	13.49	15.3	0.0	7.8	17.7	6.4	193.7
172	13.58	15.4	0.0	7.8	17.7	6.4	193.7
173	13.67	15.4	0.0	7.8	17.7	6.4	193.6
174	13.76	15.5	0.0	7.8	17.6	6.4	193.6
175	13.85	15.6	0.0	7.8	17.6	6.4	193.6
176	13.94	15.6	0.0	7.8	17.6	6.4	193.5
177	14.02	15.7	0.0	7.8	17.5	6.4	193.5
178	14.11	15.7	0.0	7.8	17.5	6.4	193.5
179	14.20	15.8	0.0	7.8	17.5	6.4	193.4
180	14.29	15.9	0.0	7.8	17.4	6.4	193.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	15.9	0.0	7.8	17.4	6.4	193.4
182	14.47	16.0	0.0	7.8	17.4	6.4	193.3
183	14.56	16.1	0.0	7.8	17.4	6.4	193.3
184	14.65	16.1	0.0	7.8	17.3	6.4	193.3
185	14.74	16.2	0.0	7.8	17.3	6.4	193.3
186	14.83	16.2	0.0	7.8	17.3	6.4	193.2
187	14.92	16.3	0.0	7.8	17.2	6.4	193.2
188	14.92	16.3	0.0	7.8	17.2	6.4	193.2
189	15.01	16.4	0.0	7.8	17.2	6.4	193.2
190	15.10	16.4	0.0	7.8	17.2	6.4	193.1
191	15.19	16.5	0.0	7.8	17.2	6.4	193.1
192	15.28	16.5	0.0	7.8	17.1	6.4	193.1
193	15.37	16.6	0.0	7.8	17.1	6.3	193.0
194	15.46	16.7	0.0	7.8	17.1	6.3	193.0
195	15.55	16.7	0.0	7.8	17.1	6.3	192.9
196	15.64	16.8	0.0	7.8	17.1	6.3	192.9
197	15.73	16.9	0.0	7.8	17.0	6.3	192.9
198	15.81	16.9	0.0	7.8	17.0	6.3	192.8
199	15.90	17.0	0.0	7.8	17.0	6.3	192.8
200	15.99	17.0	0.0	7.8	17.0	6.3	192.8
201	16.08	17.1	0.0	7.8	17.0	6.3	192.7
202	16.17	17.2	0.0	7.8	16.9	6.3	192.7
203	16.26	17.2	0.0	7.8	16.9	6.3	192.6
204	16.35	17.3	0.0	7.8	16.9	6.3	192.6
205	16.44	17.4	0.0	7.8	16.9	6.3	192.6
206	16.53	17.4	0.0	7.8	16.9	6.3	192.5
207	16.62	17.5	0.0	7.8	16.8	6.3	192.5
208	16.71	17.5	0.0	7.8	16.8	6.3	192.4
209	16.71	17.5	0.0	7.8	16.8	6.3	192.4
210	16.80	17.6	0.0	7.8	16.8	6.3	192.4
211	16.89	17.7	0.0	7.8	16.8	6.3	192.4
212	16.98	17.7	0.0	7.8	16.8	6.3	192.3
213	17.07	17.8	0.0	7.8	16.8	6.3	192.3
214	17.16	17.8	0.0	7.8	16.8	6.3	192.2
215	17.25	17.9	0.0	7.8	16.7	6.3	192.2
216	17.34	18.0	0.0	7.8	16.7	6.3	192.1
217	17.43	18.0	0.0	7.8	16.7	6.3	192.1
218	17.52	18.1	0.0	7.8	16.7	6.2	192.0
219	17.60	18.2	0.0	7.8	16.7	6.2	192.0
220	17.69	18.2	0.0	7.8	16.7	6.2	192.0
221	17.78	18.3	0.0	7.8	16.7	6.2	191.9
222	17.87	18.3	0.0	7.8	16.7	6.2	191.9
223	17.96	18.4	0.0	7.8	16.7	6.2	191.8
224	18.05	18.5	0.0	7.8	16.7	6.2	191.8
225	18.14	18.5	0.0	7.8	16.7	6.2	191.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	18.6	0.0	7.8	16.6	6.2	191.7
227	18.32	18.6	0.0	7.8	16.6	6.2	191.6
228	18.41	18.7	0.0	7.8	16.6	6.2	191.6
229	18.50	18.8	0.0	7.8	16.6	6.2	191.5
230	18.50	18.8	0.0	7.8	16.6	6.2	191.5
231	18.59	18.7	0.0	7.8	16.6	6.2	191.6
232	18.68	18.6	0.0	7.8	16.6	6.2	191.6
233	18.77	18.6	0.0	7.8	16.6	6.2	191.7
234	18.86	18.5	0.0	7.8	16.7	6.2	191.7
235	18.95	18.5	0.0	7.8	16.7	6.2	191.8
236	19.04	18.4	0.0	7.8	16.7	6.2	191.8
237	19.13	18.3	0.0	7.8	16.7	6.2	191.9
238	19.22	18.3	0.0	7.8	16.7	6.2	191.9
239	19.31	18.2	0.0	7.8	16.7	6.2	192.0
240	19.40	18.2	0.0	7.8	16.7	6.2	192.0
241	19.48	18.1	0.0	7.8	16.7	6.2	192.1
242	19.57	18.0	0.0	7.8	16.7	6.3	192.1
243	19.66	18.0	0.0	7.8	16.7	6.3	192.1
244	19.75	17.9	0.0	7.8	16.7	6.3	192.2
245	19.84	17.8	0.0	7.8	16.8	6.3	192.2
246	19.93	17.8	0.0	7.8	16.8	6.3	192.3
247	20.02	17.7	0.0	7.8	16.8	6.3	192.3
248	20.11	17.7	0.0	7.8	16.8	6.3	192.4
249	20.20	17.6	0.0	7.8	16.8	6.3	192.4
250	20.29	17.5	0.0	7.8	16.8	6.3	192.4
251	20.29	17.5	0.0	7.8	16.8	6.3	192.5
252	20.38	17.5	0.0	7.8	16.8	6.3	192.5
253	20.47	17.4	0.0	7.8	16.9	6.3	192.5
254	20.56	17.4	0.0	7.8	16.9	6.3	192.6
255	20.65	17.3	0.0	7.8	16.9	6.3	192.6
256	20.74	17.2	0.0	7.8	16.9	6.3	192.7
257	20.83	17.2	0.0	7.8	16.9	6.3	192.7
258	20.92	17.1	0.0	7.8	16.9	6.3	192.7
259	21.01	17.0	0.0	7.8	17.0	6.3	192.8
260	21.10	17.0	0.0	7.8	17.0	6.3	192.8
261	21.19	16.9	0.0	7.8	17.0	6.3	192.8
262	21.27	16.9	0.0	7.8	17.0	6.3	192.9
263	21.36	16.8	0.0	7.8	17.0	6.3	192.9
264	21.45	16.7	0.0	7.8	17.1	6.3	193.0
265	21.54	16.7	0.0	7.8	17.1	6.3	193.0
266	21.63	16.6	0.0	7.8	17.1	6.4	193.0
267	21.72	16.5	0.0	7.8	17.1	6.4	193.1
268	21.81	16.5	0.0	7.8	17.2	6.4	193.1
269	21.90	16.4	0.0	7.8	17.2	6.4	193.1
270	21.99	16.4	0.0	7.8	17.2	6.4	193.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	16.3	0.0	7.8	17.2	6.4	193.2
272	22.08	16.3	0.0	7.8	17.2	6.4	193.2
273	22.17	16.2	0.0	7.8	17.3	6.4	193.2
274	22.26	16.2	0.0	7.8	17.3	6.4	193.3
275	22.35	16.1	0.0	7.8	17.3	6.4	193.3
276	22.44	16.1	0.0	7.8	17.4	6.4	193.3
277	22.53	16.0	0.0	7.8	17.4	6.4	193.4
278	22.62	15.9	0.0	7.8	17.4	6.4	193.4
279	22.71	15.9	0.0	7.8	17.4	6.4	193.4
280	22.80	15.8	0.0	7.8	17.5	6.4	193.5
281	22.89	15.7	0.0	7.8	17.5	6.4	193.5
282	22.98	15.7	0.0	7.8	17.5	6.4	193.5
283	23.06	15.6	0.0	7.8	17.6	6.4	193.5
284	23.15	15.6	0.0	7.8	17.6	6.4	193.6
285	23.24	15.5	0.0	7.8	17.6	6.4	193.6
286	23.33	15.4	0.0	7.8	17.6	6.4	193.6
287	23.42	15.4	0.0	7.8	17.7	6.4	193.7
288	23.51	15.3	0.0	7.8	17.7	6.4	193.7
289	23.60	15.2	0.0	7.8	17.7	6.4	193.7
290	23.69	15.2	0.0	7.8	17.8	6.4	193.8
291	23.78	15.1	0.0	7.8	17.8	6.4	193.8
292	23.87	15.1	0.0	7.8	17.8	6.4	193.8
293	23.87	15.1	0.0	7.8	17.8	6.4	193.8
294	23.96	15.0	0.0	7.8	17.8	6.4	193.9
295	24.05	14.9	0.0	7.8	17.9	6.4	193.9
296	24.14	14.9	0.0	7.8	17.9	6.4	193.9
297	24.23	14.8	0.0	7.8	17.9	6.4	194.0
298	24.32	14.8	0.0	7.8	18.0	6.4	194.0
299	24.41	14.7	0.0	7.8	18.0	6.4	194.0
300	24.50	14.6	0.0	7.8	18.0	6.4	194.0
301	24.59	14.6	0.0	7.8	18.1	6.4	194.1
302	24.68	14.6	0.0	7.8	18.1	6.4	194.0
303	24.76	14.7	0.0	7.8	18.1	6.4	193.9
304	24.85	14.7	0.0	7.8	18.2	6.3	193.8
305	24.94	14.8	0.0	7.8	18.2	6.3	193.7
306	25.03	14.9	0.0	7.8	18.2	6.3	193.7
307	25.12	14.9	0.0	7.8	18.3	6.3	193.6
308	25.21	15.1	0.0	7.8	18.3	6.3	193.4
309	25.30	15.2	0.0	7.8	18.3	6.3	193.3
310	25.39	15.4	0.0	7.8	18.4	6.2	193.1
311	25.48	15.6	0.0	7.8	18.4	6.2	192.9
312	25.57	15.7	0.0	7.8	18.4	6.2	192.8
313	25.66	15.9	0.0	7.8	18.5	6.2	192.6
314	25.66	15.9	0.0	7.8	18.5	6.2	192.6
315	25.75	16.0	0.0	7.8	18.5	6.1	192.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	16.2	0.0	7.8	18.5	6.1	192.3
317	25.93	16.3	0.0	7.8	18.5	6.1	192.1
318	26.02	16.5	0.0	7.8	18.6	6.1	192.0
319	26.11	16.6	0.0	7.8	18.6	6.0	191.8
320	26.20	16.8	0.0	7.8	18.6	6.0	191.7
321	26.29	17.0	0.0	7.8	18.6	6.0	191.5
322	26.38	17.1	0.0	7.8	18.7	5.9	191.4
323	26.47	17.3	0.0	7.8	18.7	5.9	191.2
324	26.56	17.4	0.0	7.8	18.7	5.9	191.0
325	26.64	17.6	0.0	7.8	18.7	5.9	190.9
326	26.73	17.7	0.0	7.8	18.8	5.8	190.7
327	26.82	17.9	0.0	7.8	18.8	5.8	190.6
328	26.91	18.1	0.0	7.8	18.8	5.8	190.4
329	27.00	18.2	0.0	7.8	18.8	5.8	190.3
330	27.09	18.4	0.0	7.8	18.8	5.7	190.1
331	27.18	18.5	0.0	7.8	18.8	5.7	190.0
332	27.27	18.7	0.0	7.8	18.8	5.7	189.9
333	27.36	18.8	0.0	7.8	18.8	5.7	189.7
334	27.45	19.0	0.0	7.9	18.8	5.7	189.6
335	27.45	19.0	0.0	7.9	18.8	5.7	189.6
336	27.54	19.1	0.0	7.9	18.8	5.6	189.4
337	27.63	19.3	0.0	7.9	18.8	5.6	189.3
338	27.72	19.5	0.0	7.9	18.8	5.6	189.2
339	27.81	19.6	0.0	7.9	18.8	5.6	189.0
340	27.90	19.8	0.0	7.9	18.8	5.5	188.9
341	27.99	19.9	0.0	7.9	18.8	5.5	188.8
342	28.08	20.1	0.0	7.9	18.8	5.5	188.6
343	28.17	20.2	0.0	7.9	18.8	5.5	188.5
344	28.26	20.4	0.0	7.9	18.8	5.5	188.4
345	28.35	20.6	0.0	7.9	18.8	5.4	188.2
346	28.43	20.7	0.0	7.9	18.8	5.4	188.1
347	28.52	20.9	0.0	7.9	18.8	5.4	188.0
348	28.61	21.0	0.0	7.9	18.7	5.4	187.9
349	28.70	21.2	0.0	7.9	18.7	5.3	187.7
350	28.79	21.3	0.0	7.9	18.7	5.3	187.6
351	28.88	21.5	0.0	7.9	18.7	5.3	187.5
352	28.97	21.7	0.0	7.9	18.7	5.3	187.4
353	29.06	21.8	0.0	7.9	18.7	5.3	187.2
354	29.15	22.0	0.0	7.9	18.6	5.2	187.1
355	29.24	22.1	0.0	7.9	18.6	5.2	187.0
356	29.24	22.1	0.0	7.9	18.6	5.2	187.0
357	29.33	22.3	0.0	8.0	18.6	5.2	186.9
358	29.42	22.4	0.0	8.0	18.5	5.2	186.8
359	29.51	22.6	0.0	8.0	18.5	5.2	186.7
360	29.60	22.8	0.0	8.0	18.5	5.1	186.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	22.9	0.0	8.0	18.4	5.1	186.4
362	29.78	23.1	0.0	8.0	18.4	5.1	186.3
363	29.87	23.2	0.0	8.0	18.4	5.1	186.2
364	29.96	23.4	0.0	8.0	18.3	5.1	186.1
365	30.05	23.6	0.0	8.0	18.3	5.1	186.0
366	30.14	23.7	0.0	8.0	18.2	5.0	185.9
367	30.22	23.9	0.0	8.0	18.2	5.0	185.8
368	30.31	24.0	0.0	8.0	18.1	5.0	185.7
369	30.40	24.2	0.0	8.0	18.1	5.0	185.6
370	30.49	24.3	0.0	8.0	18.0	5.0	185.5
371	30.58	24.5	0.0	8.1	18.0	5.0	185.4
372	30.67	24.7	0.0	8.1	17.9	4.9	185.3
373	30.76	24.7	0.0	8.1	17.8	4.9	185.3
374	30.85	24.8	0.0	8.1	17.8	4.9	185.3
375	30.94	24.9	0.0	8.1	17.7	4.9	185.3
376	31.03	24.9	0.0	8.1	17.6	4.9	185.3
377	31.03	24.9	0.0	8.1	17.6	4.9	185.4
378	31.12	25.0	0.0	8.1	17.6	4.9	185.4
379	31.21	25.0	0.0	8.1	17.5	4.9	185.4
380	31.30	25.1	0.0	8.1	17.4	4.9	185.4
381	31.39	25.2	0.0	8.1	17.4	4.9	185.4
382	31.48	25.2	0.0	8.1	17.3	4.9	185.4
383	31.57	25.3	0.0	8.1	17.2	4.9	185.4
384	31.66	25.4	0.0	8.1	17.2	4.9	185.4
385	31.75	25.4	0.0	8.2	17.1	4.9	185.4
386	31.84	25.5	0.0	8.2	17.0	4.9	185.4
387	31.92	25.6	0.0	8.2	17.0	4.9	185.4
388	32.01	25.6	0.0	8.2	16.9	4.8	185.4
389	32.10	25.7	0.0	8.2	16.8	4.8	185.4
390	32.19	25.7	0.0	8.2	16.7	4.8	185.4
391	32.28	25.8	0.0	8.2	16.7	4.8	185.4
392	32.37	25.9	0.0	8.2	16.6	4.8	185.4
393	32.46	25.9	0.0	8.2	16.5	4.8	185.4
394	32.55	26.0	0.0	8.2	16.5	4.8	185.4
395	32.64	26.1	0.0	8.2	16.4	4.8	185.4
396	32.73	26.1	0.0	8.2	16.3	4.8	185.4
397	32.82	26.2	0.0	8.2	16.3	4.8	185.4
398	32.82	26.2	0.0	8.2	16.3	4.8	185.4
399	32.91	26.3	0.0	8.2	16.2	4.8	185.4
400	33.00	26.3	0.0	8.3	16.1	4.8	185.4
401	33.09	26.4	0.0	8.3	16.0	4.8	185.4
402	33.18	26.5	0.0	8.3	16.0	4.8	185.4
403	33.27	26.5	0.0	8.3	15.9	4.8	185.4
404	33.36	26.6	0.0	8.3	15.8	4.8	185.5
405	33.45	26.6	0.0	8.3	15.8	4.8	185.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	26.7	0.0	8.3	15.7	4.8	185.5
407	33.63	26.8	0.0	8.3	15.6	4.8	185.5
408	33.72	26.8	0.0	8.3	15.5	4.8	185.5
409	33.80	26.9	0.0	8.3	15.5	4.8	185.5
410	33.89	27.0	0.0	8.3	15.4	4.8	185.5
411	33.98	27.0	0.0	8.3	15.3	4.8	185.5
412	34.07	27.1	0.0	8.3	15.2	4.8	185.5
413	34.16	27.2	0.0	8.3	15.2	4.8	185.5
414	34.25	27.2	0.0	8.3	15.1	4.8	185.5
415	34.34	27.3	0.0	8.3	15.0	4.8	185.5
416	34.43	27.3	0.0	8.3	14.9	4.8	185.5
417	34.52	27.4	0.0	8.3	14.9	4.7	185.6
418	34.61	27.5	0.0	8.3	14.8	4.7	185.6
419	34.61	27.5	0.0	8.3	14.8	4.7	185.5
420	34.70	27.5	0.0	8.3	14.7	4.7	185.6
421	34.79	27.6	0.0	8.4	14.6	4.7	185.6
422	34.88	27.7	0.0	8.4	14.6	4.7	185.6
423	34.97	27.7	0.0	8.4	14.5	4.7	185.6
424	35.06	27.8	0.0	8.4	14.4	4.7	185.6
425	35.15	27.9	0.0	8.4	14.3	4.7	185.6
426	35.24	27.9	0.0	8.4	14.3	4.7	185.6
427	35.33	28.0	0.0	8.4	14.2	4.7	185.6
428	35.42	28.1	0.0	8.4	14.1	4.7	185.6
429	35.51	28.1	0.0	8.4	14.0	4.7	185.7
430	35.59	28.2	0.0	8.4	13.9	4.7	185.7
431	35.68	28.2	0.0	8.4	13.9	4.7	185.7
432	35.77	28.3	0.0	8.4	13.8	4.7	185.7
433	35.86	28.4	0.0	8.4	13.7	4.7	185.7
434	35.95	28.4	0.0	8.4	13.6	4.7	185.7
435	36.04	28.5	0.0	8.4	13.5	4.7	185.7
436	36.13	28.6	0.0	8.4	13.5	4.7	185.8
437	36.22	28.6	0.0	8.4	13.4	4.7	185.8
438	36.31	28.7	0.0	8.4	13.3	4.7	185.8
439	36.40	28.8	0.0	8.4	13.2	4.7	185.8
440	36.40	28.8	0.0	8.4	13.3	4.7	185.7
441	36.43	28.8	0.0	8.4	13.3	4.7	185.7
442	36.46	28.8	0.0	8.4	13.3	4.7	185.7
443	36.49	28.8	0.0	8.4	13.3	4.7	185.7
444	36.52	28.9	0.0	8.4	13.2	4.7	185.7
445	36.55	28.9	0.0	8.4	13.2	4.7	185.7
446	36.58	28.9	0.0	8.4	13.2	4.7	185.7
447	36.61	28.9	0.0	8.4	13.1	4.7	185.7
448	36.64	28.9	0.0	8.4	13.1	4.7	185.7
449	36.67	29.0	0.0	8.4	13.1	4.7	185.8
450	36.70	29.0	0.0	8.4	13.0	4.7	185.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	29.0	0.0	8.4	13.0	4.7	185.8
452	36.76	29.0	0.0	8.4	13.0	4.7	185.8
453	36.79	29.0	0.0	8.4	12.9	4.7	185.8
454	36.82	29.1	0.0	8.4	12.9	4.7	185.8
455	36.85	29.1	0.0	8.4	12.8	4.7	185.9
456	36.88	29.1	0.0	8.4	12.8	4.7	185.9
457	36.90	29.1	0.0	8.4	4.7	5.4	193.3

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	30.3	3.0	8.3	5.6	4.9	188.8
3	0.12	30.3	8.9	8.3	16.5	3.7	173.2
4	0.15	30.3	8.9	8.3	16.4	3.7	173.4
5	0.18	30.3	8.9	8.3	16.2	3.7	173.5
6	0.21	30.2	8.9	8.3	16.1	3.7	173.7
7	0.24	30.2	8.9	8.3	16.0	3.7	173.8
8	0.27	30.2	8.9	8.3	15.9	3.7	173.9
9	0.30	30.2	8.9	8.3	15.9	3.7	173.9
10	0.33	30.2	8.9	8.3	15.9	3.7	174.0
11	0.36	30.1	8.9	8.3	15.9	3.7	174.0
12	0.39	30.1	8.9	8.3	15.8	3.7	174.0
13	0.42	30.1	8.9	8.3	15.8	3.7	174.1
14	0.45	30.1	8.9	8.3	15.8	3.7	174.1
15	0.48	30.1	8.9	8.3	15.8	3.7	174.2
16	0.51	30.0	8.9	8.3	15.7	3.7	174.2
17	0.54	30.0	8.9	8.3	15.7	3.7	174.3
18	0.57	30.0	8.9	8.3	15.7	3.7	174.3
19	0.60	30.0	8.9	8.3	15.7	3.7	174.4
20	0.60	30.0	8.8	8.3	15.5	3.7	174.6
21	0.69	29.9	8.9	8.3	15.5	3.7	174.6
22	0.78	29.8	8.9	8.3	15.6	3.7	174.6
23	0.87	29.8	8.9	8.3	15.7	3.7	174.5
24	0.96	29.7	8.9	8.3	15.8	3.7	174.5
25	1.05	29.6	8.9	8.3	15.9	3.7	174.5
26	1.14	29.6	9.0	8.3	15.9	3.7	174.4
27	1.23	29.5	9.0	8.3	16.0	3.7	174.4
28	1.32	29.4	9.0	8.3	16.1	3.7	174.3
29	1.41	29.4	9.1	8.3	16.1	3.7	174.3
30	1.50	29.3	9.1	8.3	16.2	3.7	174.3
31	1.58	29.3	9.2	8.2	16.3	3.7	174.2
32	1.67	29.2	9.2	8.2	16.4	3.7	174.2
33	1.76	29.1	9.3	8.2	16.4	3.7	174.1
34	1.85	29.1	9.3	8.2	16.5	3.7	174.0
35	1.94	29.0	9.4	8.2	16.6	3.7	174.0
36	2.03	28.9	9.5	8.2	16.7	3.7	173.9
37	2.12	28.9	9.5	8.2	16.7	3.7	173.8
38	2.21	28.8	9.6	8.2	16.8	3.7	173.8
39	2.30	28.7	9.7	8.2	16.9	3.7	173.7
40	2.39	28.7	9.8	8.2	17.0	3.7	173.6
41	2.39	28.7	9.8	8.2	16.9	3.7	173.6
42	2.48	28.6	9.8	8.2	17.0	3.7	173.5
43	2.57	28.5	9.9	8.2	17.1	3.7	173.4
44	2.66	28.5	10.0	8.2	17.2	3.7	173.3
45	2.75	28.4	10.1	8.2	17.2	3.7	173.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	28.4	10.2	8.2	17.3	3.7	173.2
47	2.93	28.3	10.3	8.2	17.4	3.7	173.1
48	3.02	28.2	10.4	8.2	17.5	3.7	173.0
49	3.11	28.2	10.5	8.1	17.5	3.7	172.8
50	3.20	28.1	10.6	8.1	17.6	3.7	172.7
51	3.28	28.0	10.8	8.1	17.7	3.7	172.6
52	3.37	28.0	10.9	8.1	17.7	3.7	172.5
53	3.46	27.9	11.0	8.1	17.8	3.7	172.4
54	3.55	27.8	11.1	8.1	17.9	3.7	172.3
55	3.64	27.8	11.2	8.1	17.9	3.7	172.2
56	3.73	27.7	11.4	8.1	18.0	3.7	172.0
57	3.82	27.7	11.5	8.1	18.1	3.7	171.9
58	3.91	27.6	11.6	8.1	18.2	3.7	171.8
59	4.00	27.5	11.8	8.1	18.2	3.7	171.7
60	4.09	27.5	11.9	8.1	18.3	3.6	171.5
61	4.18	27.4	12.1	8.1	18.3	3.6	171.4
62	4.18	27.4	12.1	8.1	18.4	3.6	171.4
63	4.27	27.3	12.2	8.0	18.4	3.6	171.3
64	4.36	27.3	12.4	8.0	18.5	3.6	171.1
65	4.45	27.2	12.5	8.0	18.6	3.6	171.0
66	4.54	27.1	12.7	8.0	18.6	3.6	170.8
67	4.63	27.1	12.8	8.0	18.7	3.6	170.7
68	4.72	27.0	13.0	8.0	18.8	3.6	170.6
69	4.81	26.9	13.1	8.0	18.8	3.6	170.4
70	4.90	26.9	13.3	8.0	18.9	3.6	170.3
71	4.99	26.8	13.5	8.0	18.9	3.6	170.1
72	5.07	26.8	13.6	8.0	19.0	3.6	169.9
73	5.16	26.7	13.8	8.0	19.1	3.6	169.8
74	5.25	26.6	14.0	8.0	19.1	3.6	169.6
75	5.34	26.6	14.2	7.9	19.2	3.6	169.5
76	5.43	26.5	14.3	7.9	19.2	3.6	169.3
77	5.52	26.4	14.5	7.9	19.3	3.6	169.2
78	5.61	26.2	14.7	7.9	19.4	3.6	169.2
79	5.70	26.0	14.9	7.9	19.4	3.6	169.1
80	5.79	25.9	15.0	7.9	19.5	3.6	169.1
81	5.88	25.7	15.2	7.9	19.5	3.6	169.0
82	5.97	25.5	15.4	7.9	19.6	3.6	169.0
83	5.97	25.5	15.4	7.9	19.6	3.6	169.0
84	6.06	25.3	15.6	7.9	19.6	3.6	168.9
85	6.15	25.1	15.7	7.9	19.7	3.6	168.9
86	6.24	25.0	15.9	7.9	19.7	3.6	168.9
87	6.33	24.8	16.1	7.9	19.8	3.6	168.8
88	6.42	24.6	16.3	7.8	19.8	3.6	168.8
89	6.51	24.4	16.4	7.8	19.9	3.6	168.8
90	6.60	24.2	16.6	7.8	19.9	3.6	168.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	24.1	16.7	7.8	19.9	3.6	168.7
92	6.78	23.9	16.9	7.8	20.0	3.6	168.7
93	6.86	23.7	17.1	7.8	20.0	3.6	168.7
94	6.95	23.5	17.2	7.8	20.1	3.6	168.7
95	7.04	23.3	17.4	7.8	20.1	3.6	168.7
96	7.13	23.2	17.5	7.8	20.1	3.6	168.7
97	7.22	23.0	17.7	7.8	20.2	3.6	168.7
98	7.31	22.8	17.8	7.8	20.2	3.6	168.7
99	7.40	22.6	17.9	7.8	20.2	3.6	168.7
100	7.49	22.4	18.1	7.8	20.2	3.7	168.7
101	7.58	22.2	18.2	7.8	20.3	3.7	168.8
102	7.67	22.1	18.3	7.8	20.3	3.7	168.8
103	7.76	21.9	18.5	7.8	20.3	3.7	168.8
104	7.76	21.9	18.5	7.8	20.3	3.7	168.8
105	7.85	21.7	18.6	7.7	20.3	3.7	168.8
106	7.94	21.5	18.7	7.7	20.4	3.7	168.9
107	8.03	21.3	18.8	7.7	20.4	3.7	168.9
108	8.12	21.2	18.9	7.7	20.4	3.7	169.0
109	8.21	21.0	19.0	7.7	20.4	3.7	169.0
110	8.30	20.8	19.1	7.7	20.4	3.7	169.1
111	8.39	20.6	19.2	7.7	20.4	3.7	169.2
112	8.48	20.4	19.3	7.7	20.4	3.8	169.3
113	8.57	20.3	19.4	7.7	20.4	3.8	169.4
114	8.66	20.1	19.5	7.7	20.3	3.8	169.5
115	8.74	19.9	19.6	7.7	20.3	3.8	169.6
116	8.83	19.7	19.7	7.7	20.3	3.8	169.7
117	8.92	19.6	19.7	7.7	20.3	3.8	169.8
118	9.01	19.4	19.8	7.7	20.3	3.8	169.9
119	9.10	19.2	19.9	7.7	20.2	3.8	170.1
120	9.19	19.0	19.9	7.7	20.2	3.9	170.2
121	9.28	18.8	20.0	7.7	20.2	3.9	170.3
122	9.37	18.7	20.0	7.7	20.1	3.9	170.5
123	9.46	18.5	20.1	7.7	20.1	3.9	170.6
124	9.55	18.3	20.1	7.7	20.1	3.9	170.8
125	9.55	18.3	20.1	7.7	20.1	3.9	170.8
126	9.64	18.1	20.2	7.7	20.0	3.9	171.0
127	9.73	17.9	20.2	7.7	20.0	4.0	171.1
128	9.82	17.8	20.2	7.7	20.0	4.0	171.3
129	9.91	17.6	20.2	7.7	19.9	4.0	171.5
130	10.00	17.5	20.3	7.7	19.9	4.0	171.5
131	10.09	17.5	20.3	7.7	19.8	4.0	171.6
132	10.18	17.4	20.3	7.7	19.8	4.0	171.7
133	10.27	17.4	20.3	7.7	19.7	4.0	171.7
134	10.36	17.3	20.4	7.7	19.7	4.1	171.8
135	10.44	17.2	20.4	7.7	19.7	4.1	171.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	17.2	20.4	7.7	19.6	4.1	172.0
137	10.62	17.1	20.4	7.7	19.6	4.1	172.1
138	10.71	17.0	20.4	7.7	19.5	4.1	172.1
139	10.80	17.0	20.5	7.7	19.5	4.1	172.2
140	10.89	16.9	20.5	7.7	19.4	4.1	172.3
141	10.98	16.9	20.5	7.7	19.4	4.1	172.4
142	11.07	16.8	20.5	7.7	19.3	4.1	172.5
143	11.16	16.7	20.5	7.7	19.3	4.1	172.5
144	11.25	16.7	20.5	7.7	19.2	4.2	172.6
145	11.34	16.6	20.6	7.7	19.2	4.2	172.7
146	11.34	16.6	20.6	7.7	19.2	4.2	172.7
147	11.43	16.5	20.6	7.7	19.1	4.2	172.8
148	11.52	16.5	20.6	7.7	19.1	4.2	172.9
149	11.61	16.4	20.6	7.7	19.1	4.2	173.0
150	11.70	16.4	20.6	7.7	19.0	4.2	173.1
151	11.79	16.3	20.6	7.7	19.0	4.2	173.2
152	11.88	16.2	20.6	7.7	18.9	4.2	173.2
153	11.97	16.2	20.6	7.7	18.9	4.2	173.3
154	12.06	16.1	20.6	7.7	18.8	4.3	173.4
155	12.15	16.0	20.6	7.7	18.8	4.3	173.5
156	12.24	16.0	20.6	7.7	18.7	4.3	173.6
157	12.32	15.9	20.6	7.7	18.7	4.3	173.7
158	12.41	15.9	20.7	7.7	18.7	4.3	173.8
159	12.50	15.8	20.7	7.7	18.6	4.3	173.9
160	12.59	15.7	20.7	7.7	18.6	4.3	174.0
161	12.68	15.7	20.7	7.7	18.5	4.3	174.1
162	12.77	15.6	20.7	7.7	18.5	4.3	174.1
163	12.86	15.5	20.7	7.7	18.4	4.4	174.2
164	12.95	15.5	20.7	7.7	18.4	4.4	174.3
165	13.04	15.4	20.7	7.7	18.3	4.4	174.4
166	13.13	15.4	20.7	7.7	18.3	4.4	174.5
167	13.13	15.4	20.7	7.7	18.3	4.4	174.5
168	13.22	15.3	20.7	7.7	18.3	4.4	174.6
169	13.31	15.2	20.7	7.7	18.2	4.4	174.7
170	13.40	15.2	20.7	7.7	18.2	4.4	174.8
171	13.49	15.2	20.7	7.7	18.1	4.4	174.8
172	13.58	15.3	20.7	7.7	18.1	4.4	174.7
173	13.67	15.3	20.7	7.7	18.1	4.4	174.7
174	13.76	15.4	20.7	7.7	18.0	4.4	174.7
175	13.85	15.5	20.7	7.7	18.0	4.4	174.7
176	13.94	15.5	20.7	7.7	17.9	4.4	174.6
177	14.02	15.6	20.7	7.7	17.9	4.4	174.6
178	14.11	15.7	20.7	7.7	17.9	4.4	174.6
179	14.20	15.7	20.7	7.7	17.8	4.4	174.5
180	14.29	15.8	20.7	7.7	17.8	4.4	174.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	15.8	20.7	7.7	17.8	4.4	174.5
182	14.47	15.9	20.7	7.7	17.7	4.4	174.5
183	14.56	16.0	20.7	7.7	17.7	4.4	174.5
184	14.65	16.0	20.7	7.7	17.6	4.4	174.4
185	14.74	16.1	20.7	7.7	17.6	4.4	174.4
186	14.83	16.1	20.7	7.7	17.6	4.4	174.4
187	14.92	16.2	20.7	7.7	17.5	4.4	174.4
188	14.92	16.2	20.7	7.7	17.5	4.4	174.4
189	15.01	16.3	20.7	7.7	17.5	4.4	174.3
190	15.10	16.3	20.7	7.7	17.5	4.4	174.3
191	15.19	16.4	20.7	7.7	17.4	4.4	174.3
192	15.28	16.5	20.7	7.7	17.4	4.4	174.3
193	15.37	16.5	20.7	7.7	17.4	4.4	174.2
194	15.46	16.6	20.7	7.7	17.3	4.4	174.2
195	15.55	16.6	20.7	7.7	17.3	4.4	174.2
196	15.64	16.7	20.7	7.7	17.3	4.4	174.1
197	15.73	16.8	20.7	7.7	17.3	4.4	174.1
198	15.81	16.8	20.7	7.7	17.2	4.4	174.1
199	15.90	16.9	20.7	7.7	17.2	4.4	174.0
200	15.99	17.0	20.7	7.7	17.2	4.4	174.0
201	16.08	17.0	20.7	7.7	17.2	4.4	174.0
202	16.17	17.1	20.7	7.7	17.1	4.4	173.9
203	16.26	17.1	20.7	7.7	17.1	4.4	173.9
204	16.35	17.2	20.7	7.7	17.1	4.4	173.9
205	16.44	17.3	20.7	7.7	17.1	4.4	173.8
206	16.53	17.3	20.7	7.7	17.0	4.4	173.8
207	16.62	17.4	20.7	7.7	17.0	4.4	173.8
208	16.71	17.4	20.7	7.7	17.0	4.4	173.7
209	16.71	17.4	20.7	7.7	17.0	4.4	173.7
210	16.80	17.5	20.7	7.7	17.0	4.4	173.7
211	16.89	17.6	20.7	7.7	17.0	4.4	173.7
212	16.98	17.6	20.7	7.7	16.9	4.4	173.6
213	17.07	17.7	20.7	7.7	16.9	4.4	173.6
214	17.16	17.8	20.7	7.7	16.9	4.4	173.5
215	17.25	17.8	20.7	7.7	16.9	4.4	173.5
216	17.34	17.9	20.7	7.7	16.9	4.4	173.5
217	17.43	17.9	20.7	7.7	16.9	4.4	173.4
218	17.52	18.0	20.7	7.7	16.8	4.4	173.4
219	17.60	18.1	20.7	7.7	16.8	4.4	173.3
220	17.69	18.1	20.7	7.7	16.8	4.4	173.3
221	17.78	18.2	20.6	7.7	16.8	4.4	173.2
222	17.87	18.2	20.6	7.7	16.8	4.3	173.2
223	17.96	18.3	20.6	7.7	16.8	4.3	173.1
224	18.05	18.4	20.6	7.7	16.8	4.3	173.1
225	18.14	18.4	20.6	7.7	16.8	4.3	173.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	18.5	20.6	7.7	16.8	4.3	173.0
227	18.32	18.6	20.6	7.7	16.8	4.3	173.0
228	18.41	18.6	20.6	7.7	16.8	4.3	172.9
229	18.50	18.7	20.6	7.7	16.7	4.3	172.9
230	18.50	18.7	20.6	7.7	16.7	4.3	172.9
231	18.59	18.6	20.6	7.7	16.8	4.3	172.9
232	18.68	18.6	20.6	7.7	16.8	4.3	173.0
233	18.77	18.5	20.6	7.7	16.8	4.3	173.0
234	18.86	18.4	20.6	7.7	16.8	4.3	173.1
235	18.95	18.4	20.6	7.7	16.8	4.3	173.1
236	19.04	18.3	20.6	7.7	16.8	4.3	173.1
237	19.13	18.2	20.6	7.7	16.8	4.3	173.2
238	19.22	18.2	20.6	7.7	16.8	4.4	173.2
239	19.31	18.1	20.7	7.7	16.8	4.4	173.3
240	19.40	18.1	20.7	7.7	16.8	4.4	173.3
241	19.48	18.0	20.7	7.7	16.8	4.4	173.4
242	19.57	17.9	20.7	7.7	16.9	4.4	173.4
243	19.66	17.9	20.7	7.7	16.9	4.4	173.5
244	19.75	17.8	20.7	7.7	16.9	4.4	173.5
245	19.84	17.8	20.7	7.7	16.9	4.4	173.5
246	19.93	17.7	20.7	7.7	16.9	4.4	173.6
247	20.02	17.6	20.7	7.7	16.9	4.4	173.6
248	20.11	17.6	20.7	7.7	16.9	4.4	173.7
249	20.20	17.5	20.7	7.7	17.0	4.4	173.7
250	20.29	17.4	20.7	7.7	17.0	4.4	173.7
251	20.29	17.4	20.7	7.7	17.0	4.4	173.7
252	20.38	17.4	20.7	7.7	17.0	4.4	173.8
253	20.47	17.3	20.7	7.7	17.0	4.4	173.8
254	20.56	17.3	20.7	7.7	17.0	4.4	173.8
255	20.65	17.2	20.7	7.7	17.1	4.4	173.9
256	20.74	17.1	20.7	7.7	17.1	4.4	173.9
257	20.83	17.1	20.7	7.7	17.1	4.4	174.0
258	20.92	17.0	20.7	7.7	17.1	4.4	174.0
259	21.01	17.0	20.7	7.7	17.2	4.4	174.0
260	21.10	16.9	20.7	7.7	17.2	4.4	174.1
261	21.19	16.8	20.7	7.7	17.2	4.4	174.1
262	21.27	16.8	20.7	7.7	17.2	4.4	174.1
263	21.36	16.7	20.7	7.7	17.3	4.4	174.1
264	21.45	16.6	20.7	7.7	17.3	4.4	174.2
265	21.54	16.6	20.7	7.7	17.3	4.4	174.2
266	21.63	16.5	20.7	7.7	17.4	4.4	174.2
267	21.72	16.5	20.7	7.7	17.4	4.4	174.3
268	21.81	16.4	20.7	7.7	17.4	4.4	174.3
269	21.90	16.3	20.7	7.7	17.5	4.4	174.3
270	21.99	16.3	20.7	7.7	17.5	4.4	174.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	16.2	20.7	7.7	17.5	4.4	174.4
272	22.08	16.2	20.7	7.7	17.5	4.4	174.4
273	22.17	16.1	20.7	7.7	17.6	4.4	174.4
274	22.26	16.1	20.7	7.7	17.6	4.4	174.4
275	22.35	16.0	20.7	7.7	17.6	4.4	174.4
276	22.44	16.0	20.7	7.7	17.7	4.4	174.5
277	22.53	15.9	20.7	7.7	17.7	4.4	174.5
278	22.62	15.8	20.7	7.7	17.7	4.4	174.5
279	22.71	15.8	20.7	7.7	17.8	4.4	174.5
280	22.80	15.7	20.7	7.7	17.8	4.4	174.6
281	22.89	15.7	20.7	7.7	17.9	4.4	174.6
282	22.98	15.6	20.7	7.7	17.9	4.4	174.6
283	23.06	15.5	20.7	7.7	17.9	4.4	174.6
284	23.15	15.5	20.7	7.7	18.0	4.4	174.7
285	23.24	15.4	20.7	7.7	18.0	4.4	174.7
286	23.33	15.3	20.7	7.7	18.1	4.4	174.7
287	23.42	15.3	20.7	7.7	18.1	4.4	174.7
288	23.51	15.2	20.7	7.7	18.1	4.4	174.8
289	23.60	15.2	20.7	7.7	18.2	4.4	174.8
290	23.69	15.2	20.7	7.7	18.2	4.4	174.7
291	23.78	15.3	20.7	7.7	18.2	4.4	174.6
292	23.87	15.4	20.7	7.7	18.3	4.4	174.5
293	23.87	15.4	20.7	7.7	18.3	4.4	174.5
294	23.96	15.4	20.7	7.7	18.3	4.4	174.4
295	24.05	15.5	20.7	7.7	18.4	4.4	174.3
296	24.14	15.5	20.7	7.7	18.4	4.4	174.2
297	24.23	15.6	20.7	7.7	18.5	4.3	174.2
298	24.32	15.7	20.7	7.7	18.5	4.3	174.1
299	24.41	15.7	20.7	7.7	18.6	4.3	174.0
300	24.50	15.8	20.7	7.7	18.6	4.3	173.9
301	24.59	15.9	20.7	7.7	18.6	4.3	173.8
302	24.68	15.9	20.6	7.7	18.7	4.3	173.7
303	24.76	16.0	20.6	7.7	18.7	4.3	173.6
304	24.85	16.0	20.6	7.7	18.8	4.3	173.5
305	24.94	16.1	20.6	7.7	18.8	4.3	173.4
306	25.03	16.2	20.6	7.7	18.9	4.2	173.3
307	25.12	16.2	20.6	7.7	18.9	4.2	173.2
308	25.21	16.3	20.6	7.7	19.0	4.2	173.2
309	25.30	16.4	20.6	7.7	19.0	4.2	173.1
310	25.39	16.4	20.6	7.7	19.0	4.2	173.0
311	25.48	16.5	20.6	7.7	19.1	4.2	172.9
312	25.57	16.5	20.6	7.7	19.1	4.2	172.8
313	25.66	16.6	20.6	7.7	19.2	4.2	172.7
314	25.66	16.6	20.6	7.7	19.2	4.2	172.7
315	25.75	16.7	20.5	7.7	19.2	4.2	172.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	16.7	20.5	7.7	19.3	4.1	172.6
317	25.93	16.8	20.5	7.7	19.3	4.1	172.5
318	26.02	16.9	20.5	7.7	19.4	4.1	172.4
319	26.11	16.9	20.5	7.7	19.4	4.1	172.3
320	26.20	17.0	20.5	7.7	19.5	4.1	172.2
321	26.29	17.0	20.4	7.7	19.5	4.1	172.1
322	26.38	17.1	20.4	7.7	19.6	4.1	172.1
323	26.47	17.2	20.4	7.7	19.6	4.1	172.0
324	26.56	17.2	20.4	7.7	19.6	4.1	171.9
325	26.64	17.3	20.4	7.7	19.7	4.1	171.8
326	26.73	17.4	20.3	7.7	19.7	4.0	171.8
327	26.82	17.4	20.3	7.7	19.8	4.0	171.7
328	26.91	17.5	20.3	7.7	19.8	4.0	171.6
329	27.00	17.5	20.3	7.7	19.9	4.0	171.5
330	27.09	17.6	20.2	7.7	19.9	4.0	171.5
331	27.18	17.8	20.2	7.7	20.0	4.0	171.3
332	27.27	17.9	20.2	7.7	20.0	4.0	171.1
333	27.36	18.1	20.2	7.7	20.0	3.9	171.0
334	27.45	18.3	20.1	7.7	20.1	3.9	170.8
335	27.45	18.3	20.1	7.7	20.1	3.9	170.8
336	27.54	18.5	20.1	7.7	20.1	3.9	170.7
337	27.63	18.7	20.0	7.7	20.1	3.9	170.5
338	27.72	18.8	20.0	7.7	20.2	3.9	170.4
339	27.81	19.0	19.9	7.7	20.2	3.9	170.2
340	27.90	19.2	19.9	7.7	20.2	3.8	170.1
341	27.99	19.4	19.8	7.7	20.3	3.8	169.9
342	28.08	19.6	19.7	7.7	20.3	3.8	169.8
343	28.17	19.7	19.7	7.7	20.3	3.8	169.7
344	28.26	19.9	19.6	7.7	20.3	3.8	169.6
345	28.35	20.1	19.5	7.7	20.3	3.8	169.5
346	28.43	20.3	19.4	7.7	20.4	3.8	169.4
347	28.52	20.4	19.3	7.7	20.4	3.8	169.3
348	28.61	20.6	19.2	7.7	20.4	3.7	169.2
349	28.70	20.8	19.1	7.7	20.4	3.7	169.1
350	28.79	21.0	19.0	7.7	20.4	3.7	169.1
351	28.88	21.2	18.9	7.7	20.4	3.7	169.0
352	28.97	21.3	18.8	7.7	20.4	3.7	168.9
353	29.06	21.5	18.7	7.7	20.3	3.7	168.9
354	29.15	21.7	18.6	7.7	20.3	3.7	168.8
355	29.24	21.9	18.5	7.8	20.3	3.7	168.8
356	29.24	21.9	18.5	7.8	20.3	3.7	168.8
357	29.33	22.1	18.3	7.8	20.3	3.7	168.8
358	29.42	22.2	18.2	7.8	20.3	3.7	168.8
359	29.51	22.4	18.1	7.8	20.2	3.7	168.7
360	29.60	22.6	17.9	7.8	20.2	3.6	168.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	22.8	17.8	7.8	20.2	3.6	168.7
362	29.78	23.0	17.7	7.8	20.2	3.6	168.7
363	29.87	23.2	17.5	7.8	20.1	3.6	168.7
364	29.96	23.3	17.4	7.8	20.1	3.6	168.7
365	30.05	23.5	17.2	7.8	20.0	3.6	168.7
366	30.14	23.7	17.1	7.8	20.0	3.6	168.7
367	30.22	23.9	16.9	7.8	20.0	3.6	168.7
368	30.31	24.1	16.7	7.8	19.9	3.6	168.8
369	30.40	24.2	16.6	7.8	19.9	3.6	168.8
370	30.49	24.4	16.4	7.8	19.9	3.6	168.8
371	30.58	24.6	16.3	7.8	19.8	3.6	168.8
372	30.67	24.8	16.1	7.9	19.8	3.6	168.8
373	30.76	25.0	15.9	7.9	19.7	3.6	168.9
374	30.85	25.1	15.7	7.9	19.7	3.6	168.9
375	30.94	25.3	15.6	7.9	19.6	3.6	168.9
376	31.03	25.5	15.4	7.9	19.6	3.6	169.0
377	31.03	25.5	15.4	7.9	19.5	3.6	169.0
378	31.12	25.7	15.2	7.9	19.5	3.6	169.1
379	31.21	25.9	15.0	7.9	19.4	3.6	169.1
380	31.30	26.0	14.9	7.9	19.4	3.6	169.1
381	31.39	26.2	14.7	7.9	19.3	3.6	169.2
382	31.48	26.4	14.5	7.9	19.3	3.6	169.2
383	31.57	26.5	14.3	7.9	19.2	3.6	169.3
384	31.66	26.6	14.2	7.9	19.2	3.6	169.5
385	31.75	26.6	14.0	8.0	19.1	3.6	169.7
386	31.84	26.7	13.8	8.0	19.0	3.6	169.8
387	31.92	26.8	13.6	8.0	19.0	3.6	170.0
388	32.01	26.8	13.5	8.0	18.9	3.6	170.1
389	32.10	26.9	13.3	8.0	18.9	3.6	170.3
390	32.19	26.9	13.1	8.0	18.8	3.6	170.4
391	32.28	27.0	13.0	8.0	18.7	3.6	170.6
392	32.37	27.1	12.8	8.0	18.7	3.6	170.7
393	32.46	27.1	12.7	8.0	18.6	3.6	170.9
394	32.55	27.2	12.5	8.0	18.5	3.6	171.0
395	32.64	27.3	12.4	8.0	18.5	3.6	171.2
396	32.73	27.3	12.2	8.0	18.4	3.6	171.3
397	32.82	27.4	12.1	8.1	18.3	3.6	171.4
398	32.82	27.4	12.1	8.1	18.3	3.6	171.4
399	32.91	27.5	11.9	8.1	18.3	3.6	171.6
400	33.00	27.5	11.8	8.1	18.2	3.7	171.7
401	33.09	27.6	11.6	8.1	18.1	3.7	171.8
402	33.18	27.7	11.5	8.1	18.1	3.7	171.9
403	33.27	27.7	11.4	8.1	18.0	3.7	172.1
404	33.36	27.8	11.2	8.1	17.9	3.7	172.2
405	33.45	27.8	11.1	8.1	17.9	3.7	172.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	27.9	11.0	8.1	17.8	3.7	172.4
407	33.63	28.0	10.9	8.1	17.7	3.7	172.5
408	33.72	28.0	10.8	8.1	17.6	3.7	172.6
409	33.80	28.1	10.6	8.1	17.6	3.7	172.8
410	33.89	28.2	10.5	8.1	17.5	3.7	172.9
411	33.98	28.2	10.4	8.2	17.4	3.7	173.0
412	34.07	28.3	10.3	8.2	17.4	3.7	173.1
413	34.16	28.4	10.2	8.2	17.3	3.7	173.2
414	34.25	28.4	10.1	8.2	17.2	3.7	173.3
415	34.34	28.5	10.0	8.2	17.1	3.7	173.4
416	34.43	28.5	9.9	8.2	17.1	3.7	173.5
417	34.52	28.6	9.9	8.2	17.0	3.7	173.5
418	34.61	28.7	9.8	8.2	16.9	3.7	173.6
419	34.61	28.7	9.8	8.2	16.9	3.7	173.6
420	34.70	28.7	9.7	8.2	16.9	3.7	173.7
421	34.79	28.8	9.6	8.2	16.8	3.7	173.8
422	34.88	28.9	9.5	8.2	16.7	3.7	173.8
423	34.97	28.9	9.5	8.2	16.6	3.7	173.9
424	35.06	29.0	9.4	8.2	16.6	3.7	174.0
425	35.15	29.1	9.3	8.2	16.5	3.7	174.0
426	35.24	29.1	9.3	8.2	16.4	3.7	174.1
427	35.33	29.2	9.2	8.2	16.4	3.7	174.2
428	35.42	29.3	9.2	8.2	16.3	3.7	174.2
429	35.51	29.3	9.1	8.3	16.2	3.7	174.3
430	35.59	29.4	9.1	8.3	16.1	3.7	174.3
431	35.68	29.4	9.0	8.3	16.1	3.7	174.4
432	35.77	29.5	9.0	8.3	16.0	3.7	174.4
433	35.86	29.6	9.0	8.3	15.9	3.7	174.4
434	35.95	29.6	8.9	8.3	15.8	3.7	174.5
435	36.04	29.7	8.9	8.3	15.8	3.7	174.5
436	36.13	29.8	8.9	8.3	15.7	3.7	174.5
437	36.22	29.8	8.9	8.3	15.6	3.7	174.6
438	36.31	29.9	8.9	8.3	15.5	3.7	174.6
439	36.40	30.0	8.8	8.3	15.5	3.7	174.6
440	36.40	30.0	8.9	8.3	15.7	3.7	174.4
441	36.43	30.0	8.9	8.3	15.7	3.7	174.3
442	36.46	30.0	8.9	8.3	15.7	3.7	174.3
443	36.49	30.0	8.9	8.3	15.7	3.7	174.2
444	36.52	30.1	8.9	8.3	15.8	3.7	174.2
445	36.55	30.1	8.9	8.3	15.8	3.7	174.1
446	36.58	30.1	8.9	8.3	15.8	3.7	174.1
447	36.61	30.1	8.9	8.3	15.8	3.7	174.1
448	36.64	30.1	8.9	8.3	15.9	3.7	174.0
449	36.67	30.2	8.9	8.3	15.9	3.7	174.0
450	36.70	30.2	8.9	8.3	15.9	3.7	173.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga ext 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	30.2	8.9	8.3	15.9	3.7	173.9
452	36.76	30.2	8.9	8.3	15.9	3.7	173.8
453	36.79	30.2	8.9	8.3	16.0	3.7	173.8
454	36.82	30.3	8.9	8.3	16.0	3.7	173.8
455	36.85	30.3	8.9	8.3	16.0	3.7	173.7
456	36.88	30.3	8.9	8.3	16.0	3.7	173.7
457	36.90	30.3	3.0	8.3	5.4	4.9	189.0

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	30.5	2.1	8.2	6.4	4.9	188.8
3	0.12	30.5	6.2	8.2	19.8	3.6	172.5
4	0.15	30.5	6.2	8.2	19.6	3.7	172.8
5	0.18	30.5	6.2	8.2	19.4	3.7	173.0
6	0.21	30.4	6.2	8.2	19.1	3.7	173.2
7	0.24	30.4	6.2	8.2	18.9	3.7	173.5
8	0.27	30.4	6.2	8.2	18.8	3.7	173.6
9	0.30	30.4	6.2	8.2	18.7	3.7	173.6
10	0.33	30.4	6.2	8.2	18.7	3.7	173.7
11	0.36	30.3	6.3	8.2	18.6	3.7	173.8
12	0.39	30.3	6.3	8.2	18.5	3.7	173.9
13	0.42	30.3	6.3	8.2	18.4	3.7	174.0
14	0.45	30.3	6.3	8.2	18.3	3.7	174.1
15	0.48	30.2	6.3	8.2	18.3	3.7	174.2
16	0.51	30.2	6.3	8.2	18.2	3.7	174.3
17	0.54	30.2	6.3	8.2	18.1	3.7	174.4
18	0.57	30.2	6.4	8.2	18.0	3.7	174.5
19	0.60	30.2	6.4	8.2	17.9	3.7	174.5
20	0.60	30.2	6.3	8.2	17.7	3.7	174.9
21	0.69	30.1	6.3	8.2	17.7	3.7	174.8
22	0.78	30.0	6.4	8.2	17.8	3.7	174.8
23	0.87	30.0	6.4	8.2	17.9	3.8	174.7
24	0.96	29.9	6.5	8.2	17.9	3.8	174.7
25	1.05	29.8	6.5	8.2	18.0	3.8	174.7
26	1.14	29.8	6.6	8.2	18.0	3.8	174.6
27	1.23	29.7	6.6	8.2	18.1	3.8	174.6
28	1.32	29.6	6.7	8.2	18.2	3.8	174.5
29	1.41	29.6	6.7	8.1	18.2	3.8	174.5
30	1.50	29.5	6.8	8.1	18.3	3.8	174.4
31	1.58	29.4	6.9	8.1	18.4	3.8	174.4
32	1.67	29.4	6.9	8.1	18.4	3.8	174.3
33	1.76	29.3	7.0	8.1	18.5	3.8	174.3
34	1.85	29.3	7.1	8.1	18.5	3.8	174.2
35	1.94	29.2	7.1	8.1	18.6	3.8	174.1
36	2.03	29.1	7.2	8.1	18.7	3.8	174.1
37	2.12	29.1	7.3	8.1	18.7	3.8	174.0
38	2.21	29.0	7.4	8.1	18.8	3.8	173.9
39	2.30	28.9	7.4	8.1	18.9	3.8	173.8
40	2.39	28.9	7.5	8.1	18.9	3.8	173.8
41	2.39	28.9	7.5	8.1	18.9	3.8	173.8
42	2.48	28.8	7.6	8.1	19.0	3.8	173.7
43	2.57	28.7	7.7	8.1	19.0	3.8	173.6
44	2.66	28.7	7.8	8.0	19.1	3.8	173.5
45	2.75	28.6	7.9	8.0	19.2	3.8	173.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	28.5	8.0	8.0	19.2	3.8	173.4
47	2.93	28.5	8.1	8.0	19.3	3.8	173.3
48	3.02	28.4	8.2	8.0	19.4	3.8	173.2
49	3.11	28.4	8.3	8.0	19.4	3.8	173.1
50	3.20	28.3	8.4	8.0	19.5	3.7	173.0
51	3.28	28.2	8.4	8.0	19.6	3.7	172.9
52	3.37	28.2	8.5	8.0	19.6	3.7	172.9
53	3.46	28.1	8.6	8.0	19.7	3.7	172.8
54	3.55	28.0	8.8	8.0	19.7	3.7	172.7
55	3.64	28.0	8.9	7.9	19.8	3.7	172.6
56	3.73	27.9	9.0	7.9	19.9	3.7	172.5
57	3.82	27.8	9.1	7.9	19.9	3.7	172.4
58	3.91	27.8	9.2	7.9	20.0	3.7	172.3
59	4.00	27.7	9.3	7.9	20.0	3.7	172.2
60	4.09	27.7	9.4	7.9	20.1	3.7	172.1
61	4.18	27.6	9.5	7.9	20.1	3.7	172.0
62	4.18	27.6	9.5	7.9	20.2	3.7	172.0
63	4.27	27.5	9.6	7.9	20.2	3.7	171.9
64	4.36	27.5	9.7	7.9	20.3	3.7	171.9
65	4.45	27.4	9.8	7.9	20.3	3.7	171.8
66	4.54	27.3	9.9	7.9	20.4	3.7	171.7
67	4.63	27.3	10.0	7.9	20.4	3.7	171.6
68	4.72	27.2	10.2	7.8	20.5	3.7	171.5
69	4.81	27.1	10.3	7.8	20.6	3.7	171.4
70	4.90	27.0	10.4	7.8	20.6	3.7	171.4
71	4.99	26.8	10.5	7.8	20.7	3.8	171.4
72	5.07	26.6	10.6	7.8	20.7	3.8	171.4
73	5.16	26.4	10.7	7.8	20.8	3.8	171.4
74	5.25	26.2	10.8	7.8	20.8	3.8	171.4
75	5.34	26.1	10.9	7.8	20.9	3.8	171.5
76	5.43	25.9	11.0	7.8	20.9	3.8	171.5
77	5.52	25.7	11.2	7.8	21.0	3.8	171.5
78	5.61	25.5	11.3	7.8	21.0	3.8	171.6
79	5.70	25.3	11.4	7.7	21.1	3.8	171.6
80	5.79	25.1	11.5	7.7	21.1	3.8	171.6
81	5.88	25.0	11.6	7.7	21.2	3.8	171.6
82	5.97	24.8	11.7	7.7	21.2	3.8	171.7
83	5.97	24.8	11.7	7.7	21.2	3.8	171.7
84	6.06	24.6	11.8	7.7	21.3	3.9	171.7
85	6.15	24.4	11.9	7.7	21.3	3.9	171.7
86	6.24	24.2	12.0	7.7	21.4	3.9	171.8
87	6.33	24.1	12.1	7.7	21.4	3.9	171.8
88	6.42	23.9	12.2	7.7	21.5	3.9	171.8
89	6.51	23.7	12.3	7.7	21.5	3.9	171.9
90	6.60	23.5	12.4	7.7	21.5	3.9	171.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	23.3	12.5	7.7	21.6	3.9	172.0
92	6.78	23.2	12.6	7.7	21.6	3.9	172.0
93	6.86	23.0	12.7	7.7	21.6	3.9	172.1
94	6.95	22.8	12.7	7.6	21.6	4.0	172.1
95	7.04	22.6	12.8	7.6	21.6	4.0	172.2
96	7.13	22.4	12.9	7.6	21.7	4.0	172.3
97	7.22	22.3	13.0	7.6	21.7	4.0	172.3
98	7.31	22.1	13.1	7.6	21.7	4.0	172.4
99	7.40	21.9	13.2	7.6	21.7	4.0	172.5
100	7.49	21.7	13.2	7.6	21.7	4.0	172.6
101	7.58	21.5	13.3	7.6	21.7	4.0	172.7
102	7.67	21.4	13.4	7.6	21.7	4.1	172.8
103	7.76	21.2	13.5	7.6	21.7	4.1	172.9
104	7.76	21.2	13.5	7.6	21.7	4.1	172.9
105	7.85	21.0	13.6	7.6	21.7	4.1	173.0
106	7.94	20.8	13.6	7.6	21.7	4.1	173.1
107	8.03	20.6	13.7	7.6	21.7	4.1	173.2
108	8.12	20.5	13.7	7.6	21.7	4.1	173.3
109	8.21	20.3	13.8	7.6	21.6	4.2	173.4
110	8.30	20.1	13.9	7.6	21.6	4.2	173.6
111	8.39	19.9	13.9	7.6	21.6	4.2	173.7
112	8.48	19.7	14.0	7.6	21.5	4.2	173.9
113	8.57	19.6	14.0	7.6	21.5	4.2	174.0
114	8.66	19.4	14.1	7.6	21.5	4.2	174.2
115	8.74	19.2	14.1	7.6	21.4	4.3	174.3
116	8.83	19.1	14.2	7.6	21.4	4.3	174.4
117	8.92	19.0	14.2	7.6	21.4	4.3	174.5
118	9.01	19.0	14.2	7.6	21.3	4.3	174.5
119	9.10	18.9	14.3	7.6	21.3	4.3	174.6
120	9.19	18.8	14.3	7.6	21.2	4.3	174.6
121	9.28	18.8	14.3	7.6	21.2	4.3	174.7
122	9.37	18.7	14.4	7.6	21.1	4.3	174.8
123	9.46	18.7	14.4	7.6	21.1	4.4	174.8
124	9.55	18.6	14.5	7.6	21.0	4.4	174.9
125	9.55	18.6	14.5	7.6	21.0	4.4	174.9
126	9.64	18.5	14.5	7.6	21.0	4.4	175.0
127	9.73	18.5	14.5	7.6	20.9	4.4	175.1
128	9.82	18.4	14.6	7.6	20.9	4.4	175.1
129	9.91	18.3	14.6	7.6	20.8	4.4	175.2
130	10.00	18.3	14.6	7.6	20.8	4.4	175.3
131	10.09	18.2	14.6	7.6	20.7	4.4	175.4
132	10.18	18.2	14.7	7.6	20.6	4.5	175.4
133	10.27	18.1	14.7	7.6	20.6	4.5	175.5
134	10.36	18.0	14.7	7.6	20.5	4.5	175.6
135	10.44	18.0	14.7	7.6	20.5	4.5	175.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	17.9	14.8	7.6	20.4	4.5	175.8
137	10.62	17.8	14.8	7.6	20.3	4.5	175.9
138	10.71	17.8	14.8	7.6	20.3	4.5	176.0
139	10.80	17.7	14.8	7.6	20.2	4.5	176.0
140	10.89	17.6	14.8	7.6	20.2	4.6	176.1
141	10.98	17.6	14.9	7.6	20.1	4.6	176.2
142	11.07	17.5	14.9	7.6	20.0	4.6	176.3
143	11.16	17.5	14.9	7.6	20.0	4.6	176.4
144	11.25	17.4	14.9	7.6	19.9	4.6	176.5
145	11.34	17.3	14.9	7.6	19.9	4.6	176.6
146	11.34	17.3	14.9	7.6	19.9	4.6	176.6
147	11.43	17.3	14.9	7.6	19.8	4.6	176.7
148	11.52	17.2	15.0	7.6	19.8	4.7	176.8
149	11.61	17.1	15.0	7.6	19.7	4.7	176.9
150	11.70	17.1	15.0	7.6	19.6	4.7	177.0
151	11.79	17.0	15.0	7.6	19.6	4.7	177.1
152	11.88	17.0	15.0	7.6	19.5	4.7	177.2
153	11.97	16.9	15.0	7.6	19.5	4.7	177.3
154	12.06	16.8	15.0	7.6	19.4	4.7	177.4
155	12.15	16.8	15.0	7.6	19.4	4.7	177.5
156	12.24	16.7	15.0	7.6	19.3	4.8	177.6
157	12.32	16.6	15.0	7.6	19.2	4.8	177.7
158	12.41	16.6	15.0	7.6	19.2	4.8	177.8
159	12.50	16.5	15.0	7.6	19.1	4.8	177.9
160	12.59	16.5	15.0	7.6	19.1	4.8	178.0
161	12.68	16.4	15.0	7.6	19.0	4.8	178.1
162	12.77	16.3	15.0	7.6	19.0	4.8	178.2
163	12.86	16.3	15.0	7.6	18.9	4.9	178.3
164	12.95	16.2	15.0	7.6	18.9	4.9	178.4
165	13.04	16.2	15.0	7.6	18.8	4.9	178.5
166	13.13	16.1	15.0	7.6	18.7	4.9	178.6
167	13.13	16.1	15.0	7.6	18.7	4.9	178.6
168	13.22	16.0	15.0	7.6	18.7	4.9	178.7
169	13.31	16.0	15.0	7.6	18.6	4.9	178.8
170	13.40	15.9	15.0	7.6	18.6	4.9	178.9
171	13.49	15.8	15.0	7.6	18.6	5.0	179.0
172	13.58	15.8	15.0	7.6	18.5	5.0	179.1
173	13.67	15.7	15.0	7.6	18.5	5.0	179.2
174	13.76	15.7	15.0	7.6	18.4	5.0	179.3
175	13.85	15.6	15.0	7.6	18.4	5.0	179.4
176	13.94	15.5	15.0	7.6	18.3	5.0	179.5
177	14.02	15.5	15.0	7.6	18.3	5.0	179.6
178	14.11	15.4	15.0	7.6	18.2	5.0	179.7
179	14.20	15.3	15.0	7.6	18.2	5.1	179.8
180	14.29	15.3	15.0	7.6	18.1	5.1	179.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	15.3	15.0	7.6	18.1	5.1	179.9
182	14.47	15.4	15.0	7.6	18.0	5.1	179.9
183	14.56	15.4	15.0	7.6	18.0	5.1	179.8
184	14.65	15.5	15.0	7.6	17.9	5.1	179.8
185	14.74	15.5	15.0	7.6	17.9	5.1	179.8
186	14.83	15.6	15.0	7.6	17.8	5.1	179.8
187	14.92	15.7	15.0	7.6	17.8	5.1	179.8
188	14.92	15.7	15.0	7.6	17.8	5.1	179.8
189	15.01	15.7	15.0	7.6	17.8	5.1	179.8
190	15.10	15.8	15.0	7.6	17.7	5.1	179.7
191	15.19	15.9	15.0	7.6	17.7	5.1	179.7
192	15.28	15.9	15.0	7.6	17.6	5.1	179.7
193	15.37	16.0	15.0	7.6	17.6	5.1	179.7
194	15.46	16.0	15.0	7.6	17.6	5.1	179.6
195	15.55	16.1	15.0	7.6	17.5	5.1	179.6
196	15.64	16.2	15.0	7.6	17.5	5.1	179.6
197	15.73	16.2	15.0	7.6	17.5	5.1	179.6
198	15.81	16.3	15.0	7.6	17.4	5.1	179.5
199	15.90	16.3	15.0	7.6	17.4	5.1	179.5
200	15.99	16.4	15.0	7.6	17.4	5.1	179.5
201	16.08	16.5	15.0	7.6	17.3	5.1	179.4
202	16.17	16.5	15.0	7.6	17.3	5.1	179.4
203	16.26	16.6	15.0	7.6	17.3	5.1	179.4
204	16.35	16.7	15.0	7.6	17.2	5.1	179.3
205	16.44	16.7	15.0	7.6	17.2	5.1	179.3
206	16.53	16.8	15.0	7.6	17.2	5.1	179.3
207	16.62	16.8	15.0	7.6	17.2	5.1	179.2
208	16.71	16.9	15.0	7.6	17.1	5.1	179.2
209	16.71	16.9	15.0	7.6	17.1	5.1	179.2
210	16.80	17.0	15.0	7.6	17.1	5.1	179.2
211	16.89	17.0	15.0	7.6	17.1	5.1	179.1
212	16.98	17.1	15.0	7.6	17.1	5.1	179.1
213	17.07	17.1	15.0	7.6	17.1	5.1	179.1
214	17.16	17.2	15.0	7.6	17.0	5.0	179.0
215	17.25	17.3	15.0	7.6	17.0	5.0	179.0
216	17.34	17.3	15.1	7.6	17.0	5.0	178.9
217	17.43	17.4	15.1	7.6	17.0	5.0	178.9
218	17.52	17.5	15.1	7.6	17.0	5.0	178.9
219	17.60	17.5	15.1	7.6	17.0	5.0	178.8
220	17.69	17.6	15.1	7.6	16.9	5.0	178.8
221	17.78	17.6	15.1	7.6	16.9	5.0	178.7
222	17.87	17.7	15.1	7.6	16.9	5.0	178.7
223	17.96	17.8	15.1	7.6	16.9	5.0	178.6
224	18.05	17.8	15.1	7.6	16.9	5.0	178.6
225	18.14	17.9	15.1	7.6	16.9	5.0	178.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	17.9	15.1	7.6	16.9	5.0	178.5
227	18.32	18.0	15.1	7.6	16.9	5.0	178.4
228	18.41	18.1	15.1	7.6	16.9	5.0	178.4
229	18.50	18.1	15.1	7.6	16.8	5.0	178.3
230	18.50	18.1	15.1	7.6	16.8	5.0	178.3
231	18.59	18.2	15.1	7.6	16.9	5.0	178.3
232	18.68	18.3	15.1	7.6	16.9	5.0	178.2
233	18.77	18.3	15.1	7.6	16.9	5.0	178.1
234	18.86	18.4	15.1	7.6	16.9	5.0	178.1
235	18.95	18.4	15.1	7.6	16.9	4.9	178.0
236	19.04	18.5	15.1	7.6	16.9	4.9	177.9
237	19.13	18.6	15.1	7.6	16.9	4.9	177.9
238	19.22	18.6	15.1	7.6	16.9	4.9	177.8
239	19.31	18.7	15.1	7.6	16.9	4.9	177.7
240	19.40	18.7	15.1	7.6	16.9	4.9	177.7
241	19.48	18.8	15.1	7.6	17.0	4.9	177.6
242	19.57	18.9	15.1	7.6	17.0	4.9	177.5
243	19.66	18.9	15.1	7.6	17.0	4.9	177.4
244	19.75	19.0	15.1	7.6	17.0	4.9	177.4
245	19.84	19.0	15.1	7.6	17.0	4.9	177.3
246	19.93	19.1	15.1	7.6	17.1	4.9	177.2
247	20.02	19.2	15.1	7.6	17.1	4.9	177.1
248	20.11	19.2	15.1	7.6	17.1	4.8	177.1
249	20.20	19.3	15.1	7.6	17.1	4.8	177.0
250	20.29	19.4	15.1	7.6	17.1	4.8	176.9
251	20.29	19.4	15.1	7.6	17.1	4.8	176.9
252	20.38	19.4	15.1	7.6	17.2	4.8	176.8
253	20.47	19.5	15.2	7.6	17.2	4.8	176.7
254	20.56	19.5	15.2	7.6	17.2	4.8	176.7
255	20.65	19.6	15.2	7.6	17.2	4.8	176.6
256	20.74	19.7	15.2	7.6	17.3	4.8	176.5
257	20.83	19.7	15.2	7.6	17.3	4.8	176.4
258	20.92	19.8	15.2	7.6	17.3	4.8	176.3
259	21.01	19.8	15.2	7.6	17.4	4.8	176.2
260	21.10	19.9	15.2	7.6	17.4	4.7	176.2
261	21.19	20.0	15.2	7.6	17.4	4.7	176.1
262	21.27	20.0	15.2	7.6	17.5	4.7	176.0
263	21.36	20.1	15.2	7.6	17.5	4.7	175.9
264	21.45	20.1	15.2	7.6	17.5	4.7	175.8
265	21.54	20.2	15.2	7.6	17.6	4.7	175.7
266	21.63	20.3	15.2	7.6	17.6	4.7	175.6
267	21.72	20.3	15.2	7.6	17.6	4.7	175.5
268	21.81	20.4	15.2	7.6	17.7	4.7	175.4
269	21.90	20.4	15.2	7.6	17.7	4.6	175.3
270	21.99	20.5	15.2	7.6	17.7	4.6	175.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	20.6	15.2	7.6	17.8	4.6	175.2
272	22.08	20.6	15.2	7.6	17.8	4.6	175.2
273	22.17	20.6	15.2	7.6	17.8	4.6	175.1
274	22.26	20.7	15.2	7.6	17.9	4.6	175.0
275	22.35	20.7	15.2	7.6	17.9	4.6	174.9
276	22.44	20.8	15.2	7.6	18.0	4.6	174.8
277	22.53	20.9	15.2	7.6	18.0	4.6	174.7
278	22.62	20.9	15.2	7.6	18.1	4.6	174.6
279	22.71	21.0	15.3	7.6	18.1	4.5	174.5
280	22.80	21.0	15.3	7.6	18.2	4.5	174.4
281	22.89	21.1	15.3	7.6	18.2	4.5	174.3
282	22.98	21.2	15.3	7.6	18.2	4.5	174.2
283	23.06	21.2	15.3	7.6	18.3	4.5	174.1
284	23.15	21.3	15.3	7.6	18.3	4.5	174.0
285	23.24	21.4	15.3	7.6	18.4	4.5	173.9
286	23.33	21.4	15.3	7.6	18.4	4.5	173.8
287	23.42	21.5	15.2	7.6	18.5	4.5	173.7
288	23.51	21.5	15.2	7.6	18.5	4.4	173.6
289	23.60	21.6	15.2	7.6	18.6	4.4	173.5
290	23.69	21.7	15.2	7.6	18.6	4.4	173.4
291	23.78	21.7	15.2	7.6	18.7	4.4	173.3
292	23.87	21.8	15.2	7.6	18.7	4.4	173.2
293	23.87	21.8	15.2	7.6	18.7	4.4	173.2
294	23.96	21.8	15.2	7.6	18.8	4.4	173.1
295	24.05	21.9	15.2	7.6	18.8	4.4	173.0
296	24.14	22.0	15.2	7.6	18.9	4.4	172.9
297	24.23	22.0	15.2	7.6	19.0	4.3	172.8
298	24.32	22.1	15.2	7.6	19.0	4.3	172.7
299	24.41	22.1	15.2	7.6	19.1	4.3	172.6
300	24.50	22.2	15.2	7.6	19.1	4.3	172.5
301	24.59	22.3	15.2	7.6	19.2	4.3	172.4
302	24.68	22.3	15.2	7.6	19.2	4.3	172.3
303	24.76	22.4	15.2	7.6	19.3	4.3	172.2
304	24.85	22.4	15.2	7.6	19.3	4.3	172.1
305	24.94	22.5	15.2	7.6	19.4	4.2	172.0
306	25.03	22.6	15.2	7.6	19.5	4.2	171.9
307	25.12	22.6	15.2	7.6	19.5	4.2	171.8
308	25.21	22.7	15.2	7.6	19.6	4.2	171.7
309	25.30	22.7	15.2	7.6	19.6	4.2	171.6
310	25.39	22.8	15.2	7.6	19.7	4.2	171.5
311	25.48	22.9	15.2	7.6	19.7	4.2	171.4
312	25.57	22.9	15.2	7.6	19.8	4.2	171.3
313	25.66	23.0	15.2	7.6	19.9	4.1	171.2
314	25.66	23.0	15.2	7.6	19.9	4.1	171.2
315	25.75	23.0	15.1	7.6	19.9	4.1	171.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	23.1	15.1	7.6	20.0	4.1	171.0
317	25.93	23.2	15.1	7.6	20.0	4.1	171.0
318	26.02	23.2	15.1	7.6	20.1	4.1	170.9
319	26.11	23.3	15.1	7.6	20.2	4.1	170.8
320	26.20	23.3	15.1	7.6	20.2	4.1	170.7
321	26.29	23.4	15.0	7.6	20.3	4.1	170.6
322	26.38	23.5	15.0	7.6	20.3	4.0	170.5
323	26.47	23.5	15.0	7.6	20.4	4.0	170.4
324	26.56	23.6	15.0	7.6	20.4	4.0	170.3
325	26.64	23.6	14.9	7.6	20.5	4.0	170.3
326	26.73	23.7	14.9	7.6	20.6	4.0	170.2
327	26.82	23.8	14.9	7.6	20.6	4.0	170.1
328	26.91	23.8	14.9	7.6	20.7	4.0	170.0
329	27.00	23.9	14.8	7.6	20.8	4.0	169.9
330	27.09	23.9	14.8	7.6	20.8	4.0	169.9
331	27.18	24.0	14.8	7.6	20.9	3.9	169.8
332	27.27	24.1	14.7	7.6	20.9	3.9	169.7
333	27.36	24.1	14.7	7.6	21.0	3.9	169.6
334	27.45	24.2	14.7	7.6	21.0	3.9	169.6
335	27.45	24.2	14.7	7.6	21.0	3.9	169.6
336	27.54	24.2	14.6	7.6	21.1	3.9	169.5
337	27.63	24.3	14.6	7.6	21.1	3.9	169.4
338	27.72	24.3	14.6	7.6	21.2	3.9	169.4
339	27.81	24.4	14.5	7.6	21.2	3.9	169.3
340	27.90	24.5	14.5	7.6	21.3	3.9	169.3
341	27.99	24.5	14.5	7.6	21.3	3.9	169.2
342	28.08	24.6	14.4	7.6	21.4	3.8	169.1
343	28.17	24.6	14.4	7.6	21.4	3.8	169.1
344	28.26	24.7	14.3	7.6	21.4	3.8	169.0
345	28.35	24.8	14.3	7.6	21.5	3.8	169.0
346	28.43	24.8	14.2	7.6	21.5	3.8	168.9
347	28.52	24.9	14.2	7.6	21.6	3.8	168.9
348	28.61	24.9	14.1	7.6	21.6	3.8	168.9
349	28.70	25.0	14.1	7.6	21.6	3.8	168.9
350	28.79	25.1	14.0	7.6	21.7	3.8	168.8
351	28.88	25.1	13.9	7.6	21.7	3.8	168.8
352	28.97	25.2	13.9	7.6	21.7	3.8	168.8
353	29.06	25.2	13.8	7.6	21.7	3.8	168.8
354	29.15	25.3	13.7	7.6	21.7	3.8	168.8
355	29.24	25.4	13.7	7.6	21.8	3.7	168.8
356	29.24	25.4	13.7	7.6	21.8	3.7	168.8
357	29.33	25.4	13.6	7.6	21.8	3.7	168.8
358	29.42	25.5	13.5	7.6	21.8	3.7	168.8
359	29.51	25.5	13.4	7.6	21.8	3.7	168.8
360	29.60	25.6	13.4	7.6	21.8	3.7	168.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	25.7	13.3	7.6	21.8	3.7	168.8
362	29.78	25.7	13.2	7.6	21.8	3.7	168.8
363	29.87	25.8	13.1	7.6	21.8	3.7	168.9
364	29.96	25.8	13.0	7.6	21.9	3.7	168.9
365	30.05	25.9	12.9	7.6	21.9	3.7	168.9
366	30.14	26.0	12.8	7.6	21.9	3.7	168.9
367	30.22	26.0	12.7	7.6	21.9	3.7	169.0
368	30.31	26.1	12.6	7.6	21.9	3.7	169.0
369	30.40	26.1	12.5	7.6	21.9	3.7	169.0
370	30.49	26.2	12.4	7.6	21.9	3.7	169.1
371	30.58	26.2	12.3	7.6	21.9	3.7	169.1
372	30.67	26.3	12.2	7.7	21.8	3.7	169.2
373	30.76	26.4	12.1	7.7	21.8	3.7	169.3
374	30.85	26.4	12.0	7.7	21.8	3.7	169.3
375	30.94	26.5	11.9	7.7	21.8	3.7	169.4
376	31.03	26.5	11.8	7.7	21.8	3.7	169.4
377	31.03	26.5	11.8	7.7	21.8	3.7	169.5
378	31.12	26.6	11.7	7.7	21.8	3.7	169.5
379	31.21	26.7	11.6	7.7	21.7	3.7	169.6
380	31.30	26.7	11.5	7.7	21.7	3.7	169.7
381	31.39	26.8	11.3	7.7	21.7	3.7	169.7
382	31.48	26.8	11.2	7.7	21.7	3.7	169.8
383	31.57	26.9	11.1	7.7	21.7	3.7	169.9
384	31.66	27.0	11.0	7.7	21.7	3.7	169.9
385	31.75	27.1	10.9	7.7	21.7	3.7	169.9
386	31.84	27.3	10.8	7.7	21.7	3.7	169.8
387	31.92	27.5	10.6	7.7	21.6	3.7	169.8
388	32.01	27.7	10.5	7.7	21.6	3.7	169.7
389	32.10	27.8	10.4	7.7	21.6	3.6	169.7
390	32.19	28.0	10.2	7.7	21.6	3.6	169.7
391	32.28	28.2	10.1	7.7	21.6	3.6	169.7
392	32.37	28.4	10.0	7.7	21.5	3.6	169.6
393	32.46	28.5	9.9	7.8	21.5	3.6	169.6
394	32.55	28.7	9.7	7.8	21.5	3.6	169.6
395	32.64	28.9	9.6	7.8	21.5	3.6	169.6
396	32.73	29.1	9.5	7.8	21.4	3.6	169.5
397	32.82	29.2	9.4	7.8	21.4	3.6	169.5
398	32.82	29.2	9.4	7.8	21.4	3.6	169.5
399	32.91	29.4	9.2	7.8	21.4	3.6	169.5
400	33.00	29.6	9.1	7.8	21.3	3.6	169.5
401	33.09	29.8	9.0	7.8	21.3	3.6	169.5
402	33.18	29.9	8.9	7.8	21.3	3.6	169.4
403	33.27	30.1	8.7	7.8	21.3	3.5	169.4
404	33.36	30.3	8.6	7.8	21.2	3.5	169.4
405	33.45	30.5	8.5	7.8	21.2	3.5	169.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	30.6	8.4	7.8	21.2	3.5	169.4
407	33.63	30.8	8.2	7.9	21.1	3.5	169.3
408	33.72	31.0	8.1	7.9	21.1	3.5	169.3
409	33.80	31.2	8.0	7.9	21.1	3.5	169.3
410	33.89	31.3	7.9	7.9	21.0	3.5	169.3
411	33.98	31.5	7.8	7.9	21.0	3.5	169.3
412	34.07	31.7	7.6	7.9	20.9	3.5	169.3
413	34.16	31.9	7.5	7.9	20.9	3.5	169.2
414	34.25	32.0	7.4	7.9	20.9	3.5	169.2
415	34.34	32.2	7.3	7.9	20.8	3.5	169.2
416	34.43	32.4	7.2	7.9	20.8	3.4	169.2
417	34.52	32.6	7.1	7.9	20.7	3.4	169.2
418	34.61	32.7	7.0	7.9	20.7	3.4	169.2
419	34.61	32.7	7.0	7.9	20.7	3.4	169.2
420	34.70	32.9	6.8	8.0	20.6	3.4	169.2
421	34.79	33.1	6.7	8.0	20.6	3.4	169.1
422	34.88	33.3	6.6	8.0	20.5	3.4	169.1
423	34.97	33.4	6.5	8.0	20.5	3.4	169.2
424	35.06	33.4	6.4	8.0	20.4	3.4	169.2
425	35.15	33.5	6.3	8.0	20.4	3.4	169.3
426	35.24	33.5	6.2	8.0	20.3	3.4	169.4
427	35.33	33.6	6.1	8.0	20.3	3.4	169.5
428	35.42	33.7	6.0	8.0	20.2	3.4	169.5
429	35.51	33.7	6.0	8.0	20.2	3.4	169.6
430	35.59	33.8	5.9	8.0	20.2	3.4	169.7
431	35.68	33.8	5.8	8.0	20.1	3.4	169.8
432	35.77	33.9	5.7	8.1	20.1	3.4	169.8
433	35.86	33.9	5.6	8.1	20.0	3.4	169.9
434	35.95	34.0	5.5	8.1	20.0	3.4	169.9
435	36.04	34.1	5.4	8.1	19.9	3.4	170.0
436	36.13	34.1	5.4	8.1	19.9	3.4	170.1
437	36.22	34.2	5.3	8.1	19.8	3.4	170.1
438	36.31	34.2	5.2	8.1	19.8	3.4	170.2
439	36.40	34.3	5.1	8.1	19.8	3.4	170.2
440	36.40	34.3	5.3	8.1	20.0	3.4	169.8
441	36.43	34.3	5.2	8.1	20.2	3.4	169.7
442	36.46	34.3	5.2	8.1	20.3	3.4	169.5
443	36.49	34.4	5.2	8.1	20.5	3.4	169.4
444	36.52	34.4	5.2	8.1	20.6	3.4	169.3
445	36.55	34.4	5.2	8.1	20.8	3.3	169.1
446	36.58	34.4	5.1	8.1	20.9	3.3	169.0
447	36.61	34.4	5.1	8.1	21.0	3.3	168.9
448	36.64	34.4	5.1	8.1	21.2	3.3	168.7
449	36.67	34.5	5.1	8.1	21.3	3.3	168.6
450	36.70	34.5	5.0	8.1	21.4	3.3	168.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga ext 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	34.5	5.0	8.1	21.6	3.3	168.3
452	36.76	34.5	5.0	8.1	21.7	3.3	168.2
453	36.79	34.5	5.0	8.1	21.9	3.3	168.1
454	36.82	34.6	5.0	8.1	22.0	3.3	167.9
455	36.85	34.6	4.9	8.1	22.1	3.3	167.8
456	36.88	34.6	4.9	8.2	22.3	3.3	167.7
457	36.90	34.6	1.6	8.2	6.9	4.5	185.1

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	0.0	8.8	0.0	10.4	221.7
2	0.10	34.6	0.3	8.2	7.2	4.6	186.1
3	0.12	34.6	1.0	8.2	23.1	3.5	170.6
4	0.15	34.6	1.0	8.1	22.8	3.5	170.9
5	0.18	34.6	1.0	8.1	22.4	3.6	171.2
6	0.21	34.5	1.0	8.1	22.1	3.6	171.6
7	0.24	34.5	1.0	8.1	21.8	3.6	171.9
8	0.27	34.5	1.0	8.1	21.6	3.6	172.1
9	0.30	34.5	1.0	8.1	21.5	3.6	172.2
10	0.33	34.5	1.0	8.1	21.4	3.6	172.3
11	0.36	34.4	1.0	8.1	21.2	3.6	172.5
12	0.39	34.4	1.0	8.1	21.1	3.6	172.6
13	0.42	34.4	1.0	8.1	20.9	3.6	172.8
14	0.45	34.4	1.0	8.1	20.8	3.6	172.9
15	0.48	34.4	1.0	8.1	20.7	3.6	173.1
16	0.51	34.4	1.0	8.1	20.5	3.6	173.2
17	0.54	34.3	1.1	8.1	20.4	3.6	173.4
18	0.57	34.3	1.1	8.1	20.2	3.6	173.5
19	0.60	34.3	1.1	8.1	20.1	3.7	173.7
20	0.60	34.3	1.0	8.1	19.8	3.7	174.0
21	0.69	34.2	1.0	8.1	19.8	3.7	174.0
22	0.78	34.2	1.1	8.1	19.9	3.7	174.0
23	0.87	34.1	1.1	8.1	19.9	3.7	174.0
24	0.96	34.1	1.1	8.1	20.0	3.7	174.0
25	1.05	34.0	1.1	8.1	20.0	3.7	174.0
26	1.14	33.9	1.2	8.1	20.1	3.7	174.0
27	1.23	33.9	1.2	8.1	20.1	3.7	174.0
28	1.32	33.8	1.2	8.0	20.2	3.7	174.0
29	1.41	33.8	1.2	8.0	20.2	3.7	173.9
30	1.50	33.7	1.3	8.0	20.2	3.7	173.9
31	1.58	33.7	1.3	8.0	20.3	3.7	173.9
32	1.67	33.6	1.3	8.0	20.3	3.7	173.9
33	1.76	33.5	1.4	8.0	20.4	3.7	173.9
34	1.85	33.5	1.4	8.0	20.4	3.7	173.9
35	1.94	33.4	1.4	8.0	20.5	3.7	173.8
36	2.03	33.4	1.5	8.0	20.5	3.8	173.8
37	2.12	33.3	1.5	8.0	20.6	3.8	173.8
38	2.21	33.1	1.5	8.0	20.6	3.8	173.9
39	2.30	32.9	1.6	8.0	20.7	3.8	174.0
40	2.39	32.7	1.6	7.9	20.7	3.8	174.1
41	2.39	32.7	1.6	7.9	20.7	3.8	174.1
42	2.48	32.6	1.7	7.9	20.8	3.8	174.2
43	2.57	32.4	1.7	7.9	20.8	3.8	174.3
44	2.66	32.2	1.7	7.9	20.9	3.8	174.3
45	2.75	32.0	1.8	7.9	20.9	3.9	174.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	31.9	1.8	7.9	21.0	3.9	174.5
47	2.93	31.7	1.9	7.9	21.0	3.9	174.6
48	3.02	31.5	1.9	7.9	21.0	3.9	174.6
49	3.11	31.3	2.0	7.9	21.1	3.9	174.7
50	3.20	31.2	2.0	7.9	21.1	3.9	174.8
51	3.28	31.0	2.1	7.9	21.2	3.9	174.9
52	3.37	30.8	2.1	7.9	21.2	3.9	175.0
53	3.46	30.6	2.2	7.8	21.2	4.0	175.0
54	3.55	30.5	2.2	7.8	21.3	4.0	175.1
55	3.64	30.3	2.3	7.8	21.3	4.0	175.2
56	3.73	30.1	2.4	7.8	21.3	4.0	175.3
57	3.82	29.9	2.4	7.8	21.4	4.0	175.4
58	3.91	29.8	2.5	7.8	21.4	4.0	175.5
59	4.00	29.6	2.5	7.8	21.4	4.0	175.5
60	4.09	29.4	2.6	7.8	21.4	4.1	175.6
61	4.18	29.2	2.7	7.8	21.5	4.1	175.7
62	4.18	29.2	2.7	7.8	21.5	4.1	175.7
63	4.27	29.1	2.7	7.8	21.5	4.1	175.8
64	4.36	28.9	2.8	7.8	21.5	4.1	175.9
65	4.45	28.7	2.8	7.8	21.5	4.1	175.9
66	4.54	28.5	2.9	7.8	21.6	4.1	176.0
67	4.63	28.4	3.0	7.7	21.6	4.1	176.1
68	4.72	28.2	3.0	7.7	21.6	4.2	176.2
69	4.81	28.0	3.1	7.7	21.6	4.2	176.3
70	4.90	27.8	3.1	7.7	21.7	4.2	176.4
71	4.99	27.7	3.2	7.7	21.7	4.2	176.4
72	5.07	27.5	3.3	7.7	21.7	4.2	176.5
73	5.16	27.3	3.3	7.7	21.7	4.2	176.6
74	5.25	27.1	3.4	7.7	21.7	4.2	176.7
75	5.34	27.0	3.5	7.7	21.7	4.2	176.8
76	5.43	26.9	3.5	7.7	21.7	4.3	176.8
77	5.52	26.8	3.6	7.7	21.7	4.3	176.8
78	5.61	26.8	3.6	7.7	21.7	4.3	176.8
79	5.70	26.7	3.7	7.7	21.8	4.3	176.8
80	5.79	26.7	3.8	7.7	21.8	4.3	176.8
81	5.88	26.6	3.8	7.7	21.8	4.3	176.7
82	5.97	26.5	3.9	7.7	21.8	4.3	176.7
83	5.97	26.5	3.9	7.7	21.8	4.3	176.7
84	6.06	26.5	4.0	7.7	21.8	4.3	176.7
85	6.15	26.4	4.0	7.7	21.8	4.3	176.7
86	6.24	26.4	4.1	7.7	21.8	4.3	176.7
87	6.33	26.3	4.2	7.7	21.9	4.3	176.6
88	6.42	26.2	4.2	7.6	21.9	4.3	176.6
89	6.51	26.2	4.3	7.6	21.9	4.3	176.6
90	6.60	26.1	4.3	7.6	21.9	4.3	176.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	26.1	4.4	7.6	21.9	4.3	176.6
92	6.78	26.0	4.5	7.6	21.9	4.3	176.6
93	6.86	26.0	4.5	7.6	21.9	4.3	176.6
94	6.95	25.9	4.6	7.6	21.9	4.3	176.6
95	7.04	25.8	4.6	7.6	21.9	4.4	176.6
96	7.13	25.8	4.7	7.6	21.9	4.4	176.6
97	7.22	25.7	4.8	7.6	21.9	4.4	176.6
98	7.31	25.7	4.8	7.6	21.8	4.4	176.6
99	7.40	25.6	4.9	7.6	21.8	4.4	176.6
100	7.49	25.5	4.9	7.6	21.8	4.4	176.6
101	7.58	25.5	5.0	7.6	21.8	4.4	176.7
102	7.67	25.4	5.0	7.6	21.8	4.4	176.7
103	7.76	25.4	5.1	7.6	21.8	4.4	176.7
104	7.76	25.4	5.1	7.6	21.8	4.4	176.7
105	7.85	25.3	5.1	7.6	21.8	4.4	176.7
106	7.94	25.2	5.2	7.6	21.7	4.4	176.7
107	8.03	25.2	5.2	7.6	21.7	4.4	176.8
108	8.12	25.1	5.3	7.6	21.7	4.4	176.8
109	8.21	25.1	5.3	7.6	21.7	4.5	176.8
110	8.30	25.0	5.4	7.6	21.6	4.5	176.9
111	8.39	24.9	5.4	7.6	21.6	4.5	176.9
112	8.48	24.9	5.5	7.6	21.6	4.5	177.0
113	8.57	24.8	5.5	7.6	21.5	4.5	177.0
114	8.66	24.8	5.5	7.6	21.5	4.5	177.0
115	8.74	24.7	5.6	7.6	21.4	4.5	177.1
116	8.83	24.6	5.6	7.6	21.4	4.5	177.1
117	8.92	24.6	5.7	7.6	21.4	4.5	177.2
118	9.01	24.5	5.7	7.6	21.3	4.5	177.3
119	9.10	24.5	5.7	7.6	21.3	4.6	177.3
120	9.19	24.4	5.8	7.6	21.2	4.6	177.4
121	9.28	24.3	5.8	7.6	21.2	4.6	177.4
122	9.37	24.3	5.8	7.6	21.1	4.6	177.5
123	9.46	24.2	5.9	7.6	21.1	4.6	177.6
124	9.55	24.2	5.9	7.6	21.0	4.6	177.6
125	9.55	24.2	5.9	7.6	21.0	4.6	177.6
126	9.64	24.1	5.9	7.6	21.0	4.6	177.7
127	9.73	24.1	6.0	7.6	20.9	4.6	177.8
128	9.82	24.0	6.0	7.6	20.9	4.7	177.8
129	9.91	23.9	6.0	7.6	20.8	4.7	177.9
130	10.00	23.9	6.1	7.6	20.8	4.7	178.0
131	10.09	23.8	6.1	7.6	20.7	4.7	178.1
132	10.18	23.8	6.1	7.6	20.6	4.7	178.2
133	10.27	23.7	6.1	7.6	20.6	4.7	178.2
134	10.36	23.6	6.1	7.6	20.5	4.7	178.3
135	10.44	23.6	6.2	7.6	20.5	4.7	178.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	23.5	6.2	7.6	20.4	4.8	178.5
137	10.62	23.5	6.2	7.6	20.3	4.8	178.6
138	10.71	23.4	6.2	7.6	20.3	4.8	178.7
139	10.80	23.3	6.2	7.6	20.2	4.8	178.8
140	10.89	23.3	6.3	7.6	20.2	4.8	178.8
141	10.98	23.2	6.3	7.6	20.1	4.8	178.9
142	11.07	23.2	6.3	7.6	20.0	4.8	179.0
143	11.16	23.1	6.3	7.6	20.0	4.9	179.1
144	11.25	23.0	6.3	7.6	19.9	4.9	179.2
145	11.34	23.0	6.3	7.6	19.9	4.9	179.3
146	11.34	23.0	6.3	7.6	19.9	4.9	179.3
147	11.43	22.9	6.3	7.6	19.8	4.9	179.4
148	11.52	22.9	6.3	7.6	19.8	4.9	179.5
149	11.61	22.8	6.4	7.6	19.7	4.9	179.6
150	11.70	22.7	6.4	7.6	19.6	4.9	179.7
151	11.79	22.7	6.4	7.6	19.6	5.0	179.8
152	11.88	22.6	6.4	7.6	19.5	5.0	179.9
153	11.97	22.6	6.4	7.6	19.5	5.0	180.0
154	12.06	22.5	6.4	7.6	19.4	5.0	180.1
155	12.15	22.4	6.4	7.6	19.4	5.0	180.2
156	12.24	22.4	6.4	7.6	19.3	5.0	180.3
157	12.32	22.3	6.4	7.6	19.2	5.0	180.4
158	12.41	22.3	6.4	7.6	19.2	5.1	180.5
159	12.50	22.2	6.4	7.6	19.1	5.1	180.6
160	12.59	22.1	6.4	7.6	19.1	5.1	180.7
161	12.68	22.1	6.4	7.6	19.0	5.1	180.8
162	12.77	22.0	6.4	7.6	19.0	5.1	180.9
163	12.86	22.0	6.4	7.6	18.9	5.1	181.0
164	12.95	21.9	6.4	7.6	18.9	5.2	181.1
165	13.04	21.8	6.4	7.6	18.8	5.2	181.2
166	13.13	21.8	6.4	7.6	18.7	5.2	181.3
167	13.13	21.8	6.4	7.6	18.7	5.2	181.3
168	13.22	21.7	6.4	7.6	18.7	5.2	181.4
169	13.31	21.7	6.4	7.6	18.6	5.2	181.5
170	13.40	21.6	6.4	7.6	18.6	5.2	181.6
171	13.49	21.5	6.4	7.6	18.6	5.2	181.7
172	13.58	21.5	6.4	7.6	18.5	5.3	181.8
173	13.67	21.4	6.4	7.6	18.5	5.3	181.9
174	13.76	21.4	6.4	7.6	18.4	5.3	182.0
175	13.85	21.3	6.4	7.6	18.4	5.3	182.1
176	13.94	21.2	6.4	7.6	18.3	5.3	182.2
177	14.02	21.2	6.4	7.6	18.3	5.3	182.2
178	14.11	21.1	6.4	7.6	18.2	5.3	182.3
179	14.20	21.0	6.3	7.6	18.2	5.4	182.4
180	14.29	21.0	6.3	7.6	18.1	5.4	182.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	20.9	6.3	7.6	18.1	5.4	182.6
182	14.47	20.9	6.3	7.6	18.0	5.4	182.7
183	14.56	20.8	6.3	7.6	18.0	5.4	182.8
184	14.65	20.7	6.3	7.6	17.9	5.4	182.9
185	14.74	20.7	6.3	7.6	17.9	5.4	183.0
186	14.83	20.6	6.3	7.6	17.8	5.4	183.1
187	14.92	20.6	6.3	7.6	17.8	5.5	183.2
188	14.92	20.6	6.3	7.6	17.8	5.5	183.2
189	15.01	20.5	6.3	7.6	17.8	5.5	183.3
190	15.10	20.4	6.3	7.6	17.7	5.5	183.4
191	15.19	20.4	6.3	7.6	17.7	5.5	183.5
192	15.28	20.3	6.3	7.6	17.6	5.5	183.6
193	15.37	20.3	6.3	7.6	17.6	5.5	183.6
194	15.46	20.2	6.3	7.6	17.6	5.5	183.7
195	15.55	20.1	6.3	7.6	17.5	5.5	183.8
196	15.64	20.1	6.3	7.6	17.5	5.6	183.9
197	15.73	20.0	6.3	7.6	17.5	5.6	184.0
198	15.81	20.0	6.3	7.6	17.4	5.6	184.1
199	15.90	19.9	6.3	7.6	17.4	5.6	184.2
200	15.99	19.8	6.3	7.6	17.4	5.6	184.2
201	16.08	19.8	6.3	7.6	17.3	5.6	184.3
202	16.17	19.7	6.3	7.6	17.3	5.6	184.4
203	16.26	19.7	6.3	7.6	17.3	5.6	184.5
204	16.35	19.6	6.3	7.6	17.2	5.6	184.6
205	16.44	19.5	6.3	7.6	17.2	5.7	184.6
206	16.53	19.5	6.3	7.6	17.2	5.7	184.7
207	16.62	19.4	6.3	7.6	17.2	5.7	184.8
208	16.71	19.4	6.3	7.6	17.1	5.7	184.9
209	16.71	19.4	6.3	7.6	17.1	5.7	184.9
210	16.80	19.3	6.3	7.6	17.1	5.7	185.0
211	16.89	19.2	6.3	7.6	17.1	5.7	185.0
212	16.98	19.2	6.3	7.6	17.1	5.7	185.1
213	17.07	19.1	6.3	7.6	17.1	5.7	185.2
214	17.16	19.0	6.3	7.6	17.0	5.7	185.2
215	17.25	19.0	6.3	7.6	17.0	5.7	185.3
216	17.34	18.9	6.3	7.6	17.0	5.8	185.4
217	17.43	18.9	6.3	7.6	17.0	5.8	185.5
218	17.52	18.8	6.3	7.6	17.0	5.8	185.5
219	17.60	18.7	6.3	7.6	17.0	5.8	185.6
220	17.69	18.7	6.3	7.6	16.9	5.8	185.7
221	17.78	18.6	6.3	7.6	16.9	5.8	185.7
222	17.87	18.6	6.3	7.6	16.9	5.8	185.8
223	17.96	18.5	6.3	7.6	16.9	5.8	185.9
224	18.05	18.4	6.3	7.6	16.9	5.8	185.9
225	18.14	18.4	6.3	7.6	16.9	5.8	186.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	18.3	6.3	7.6	16.9	5.8	186.1
227	18.32	18.3	6.3	7.6	16.9	5.8	186.1
228	18.41	18.2	6.3	7.6	16.9	5.9	186.2
229	18.50	18.1	6.3	7.6	16.8	5.9	186.3
230	18.50	18.1	6.3	7.6	16.8	5.9	186.3
231	18.59	18.1	6.3	7.6	16.9	5.9	186.3
232	18.68	18.0	6.3	7.6	16.9	5.9	186.3
233	18.77	17.9	6.3	7.6	16.9	5.9	186.4
234	18.86	17.9	6.3	7.6	16.9	5.9	186.4
235	18.95	17.8	6.3	7.6	16.9	5.9	186.5
236	19.04	17.8	6.3	7.6	16.9	5.9	186.5
237	19.13	17.7	6.3	7.6	16.9	5.9	186.6
238	19.22	17.6	6.3	7.6	16.9	5.9	186.6
239	19.31	17.6	6.3	7.6	16.9	5.9	186.7
240	19.40	17.5	6.3	7.6	16.9	5.9	186.7
241	19.48	17.5	6.3	7.6	17.0	5.9	186.7
242	19.57	17.4	6.3	7.6	17.0	5.9	186.8
243	19.66	17.3	6.3	7.6	17.0	5.9	186.8
244	19.75	17.3	6.3	7.6	17.0	5.9	186.9
245	19.84	17.2	6.3	7.6	17.0	5.9	186.9
246	19.93	17.1	6.3	7.6	17.1	5.9	186.9
247	20.02	17.1	6.3	7.6	17.1	5.9	187.0
248	20.11	17.0	6.3	7.6	17.1	5.9	187.0
249	20.20	17.0	6.3	7.6	17.1	6.0	187.0
250	20.29	16.9	6.3	7.6	17.1	6.0	187.1
251	20.29	16.9	6.3	7.6	17.1	6.0	187.1
252	20.38	16.8	6.3	7.6	17.2	6.0	187.1
253	20.47	16.8	6.3	7.6	17.2	6.0	187.1
254	20.56	16.7	6.3	7.6	17.2	6.0	187.2
255	20.65	16.7	6.3	7.6	17.2	6.0	187.2
256	20.74	16.6	6.3	7.6	17.3	6.0	187.2
257	20.83	16.5	6.3	7.6	17.3	6.0	187.3
258	20.92	16.5	6.3	7.6	17.3	6.0	187.3
259	21.01	16.4	6.3	7.6	17.4	6.0	187.3
260	21.10	16.3	6.3	7.6	17.4	6.0	187.3
261	21.19	16.3	6.3	7.6	17.4	6.0	187.4
262	21.27	16.2	6.3	7.6	17.5	6.0	187.4
263	21.36	16.2	6.3	7.6	17.5	6.0	187.4
264	21.45	16.1	6.3	7.6	17.5	6.0	187.4
265	21.54	16.0	6.3	7.6	17.6	6.0	187.5
266	21.63	16.0	6.3	7.6	17.6	6.0	187.5
267	21.72	15.9	6.3	7.6	17.6	6.0	187.5
268	21.81	15.9	6.3	7.6	17.7	6.0	187.5
269	21.90	15.8	6.3	7.6	17.7	6.0	187.5
270	21.99	15.7	6.3	7.6	17.7	6.0	187.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	15.7	6.3	7.6	17.8	6.0	187.6
272	22.08	15.7	6.3	7.6	17.8	6.0	187.6
273	22.17	15.6	6.3	7.6	17.8	6.0	187.6
274	22.26	15.5	6.3	7.6	17.9	6.0	187.6
275	22.35	15.5	6.3	7.6	17.9	6.0	187.6
276	22.44	15.4	6.3	7.6	18.0	6.0	187.7
277	22.53	15.4	6.3	7.6	18.0	6.0	187.7
278	22.62	15.3	6.3	7.6	18.1	6.0	187.7
279	22.71	15.3	6.3	7.6	18.1	6.0	187.7
280	22.80	15.3	6.3	7.6	18.2	5.9	187.6
281	22.89	15.4	6.4	7.6	18.2	5.9	187.5
282	22.98	15.5	6.4	7.6	18.2	5.9	187.4
283	23.06	15.5	6.4	7.6	18.3	5.9	187.3
284	23.15	15.6	6.4	7.6	18.3	5.9	187.2
285	23.24	15.7	6.4	7.6	18.4	5.9	187.1
286	23.33	15.7	6.4	7.6	18.4	5.9	187.0
287	23.42	15.8	6.4	7.6	18.5	5.8	186.9
288	23.51	15.8	6.4	7.6	18.5	5.8	186.8
289	23.60	15.9	6.4	7.6	18.6	5.8	186.7
290	23.69	16.0	6.4	7.6	18.6	5.8	186.6
291	23.78	16.0	6.4	7.6	18.7	5.8	186.5
292	23.87	16.1	6.4	7.6	18.7	5.8	186.4
293	23.87	16.1	6.4	7.6	18.7	5.8	186.4
294	23.96	16.2	6.4	7.6	18.8	5.7	186.3
295	24.05	16.2	6.4	7.6	18.8	5.7	186.2
296	24.14	16.3	6.4	7.6	18.9	5.7	186.1
297	24.23	16.3	6.4	7.6	19.0	5.7	186.0
298	24.32	16.4	6.4	7.6	19.0	5.7	185.9
299	24.41	16.5	6.4	7.6	19.1	5.7	185.8
300	24.50	16.5	6.4	7.6	19.1	5.6	185.7
301	24.59	16.6	6.4	7.6	19.2	5.6	185.6
302	24.68	16.6	6.4	7.6	19.2	5.6	185.5
303	24.76	16.7	6.4	7.6	19.3	5.6	185.4
304	24.85	16.8	6.4	7.6	19.3	5.6	185.3
305	24.94	16.8	6.4	7.6	19.4	5.6	185.2
306	25.03	16.9	6.4	7.6	19.5	5.5	185.1
307	25.12	17.0	6.4	7.6	19.5	5.5	185.0
308	25.21	17.0	6.4	7.6	19.6	5.5	184.9
309	25.30	17.1	6.4	7.6	19.6	5.5	184.8
310	25.39	17.1	6.4	7.6	19.7	5.5	184.7
311	25.48	17.2	6.3	7.6	19.7	5.5	184.6
312	25.57	17.3	6.3	7.6	19.8	5.4	184.5
313	25.66	17.3	6.3	7.6	19.9	5.4	184.4
314	25.66	17.3	6.3	7.6	19.9	5.4	184.4
315	25.75	17.4	6.3	7.6	19.9	5.4	184.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	17.5	6.3	7.6	20.0	5.4	184.2
317	25.93	17.5	6.3	7.6	20.0	5.4	184.1
318	26.02	17.6	6.3	7.6	20.1	5.4	184.0
319	26.11	17.6	6.3	7.6	20.2	5.3	183.9
320	26.20	17.7	6.2	7.6	20.2	5.3	183.9
321	26.29	17.8	6.2	7.6	20.3	5.3	183.8
322	26.38	17.8	6.2	7.6	20.3	5.3	183.7
323	26.47	17.9	6.2	7.6	20.4	5.3	183.6
324	26.56	18.0	6.2	7.6	20.4	5.3	183.5
325	26.64	18.0	6.1	7.6	20.5	5.3	183.4
326	26.73	18.1	6.1	7.6	20.6	5.2	183.3
327	26.82	18.2	6.1	7.6	20.6	5.2	183.2
328	26.91	18.2	6.1	7.6	20.7	5.2	183.2
329	27.00	18.3	6.1	7.6	20.8	5.2	183.1
330	27.09	18.3	6.0	7.6	20.8	5.2	183.0
331	27.18	18.4	6.0	7.6	20.9	5.2	182.9
332	27.27	18.5	6.0	7.6	20.9	5.2	182.9
333	27.36	18.5	5.9	7.6	21.0	5.1	182.8
334	27.45	18.6	5.9	7.6	21.0	5.1	182.7
335	27.45	18.6	5.9	7.6	21.0	5.1	182.7
336	27.54	18.7	5.9	7.6	21.1	5.1	182.7
337	27.63	18.7	5.8	7.6	21.1	5.1	182.6
338	27.72	18.8	5.8	7.6	21.2	5.1	182.5
339	27.81	18.8	5.8	7.6	21.2	5.1	182.4
340	27.90	18.9	5.7	7.6	21.3	5.1	182.4
341	27.99	19.0	5.7	7.6	21.3	5.0	182.3
342	28.08	19.0	5.7	7.6	21.4	5.0	182.3
343	28.17	19.1	5.6	7.6	21.4	5.0	182.2
344	28.26	19.2	5.6	7.6	21.4	5.0	182.1
345	28.35	19.4	5.5	7.6	21.5	5.0	181.9
346	28.43	19.6	5.5	7.6	21.5	5.0	181.8
347	28.52	19.7	5.5	7.6	21.5	4.9	181.7
348	28.61	19.9	5.4	7.6	21.6	4.9	181.5
349	28.70	20.1	5.4	7.6	21.6	4.9	181.4
350	28.79	20.3	5.3	7.6	21.6	4.9	181.2
351	28.88	20.5	5.3	7.6	21.6	4.9	181.1
352	28.97	20.6	5.2	7.6	21.7	4.8	181.0
353	29.06	20.8	5.2	7.6	21.7	4.8	180.8
354	29.15	21.0	5.1	7.6	21.7	4.8	180.7
355	29.24	21.2	5.1	7.6	21.7	4.8	180.6
356	29.24	21.2	5.0	7.6	21.7	4.8	180.6
357	29.33	21.4	5.0	7.6	21.7	4.8	180.5
358	29.42	21.5	4.9	7.6	21.7	4.7	180.4
359	29.51	21.7	4.9	7.6	21.7	4.7	180.3
360	29.60	21.9	4.8	7.6	21.7	4.7	180.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 205
 Date: 7/10/11

Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	22.1	4.8	7.6	21.7	4.7	180.1
362	29.78	22.3	4.7	7.6	21.7	4.7	180.0
363	29.87	22.4	4.6	7.6	21.6	4.7	179.9
364	29.96	22.6	4.6	7.6	21.6	4.6	179.8
365	30.05	22.8	4.5	7.6	21.6	4.6	179.7
366	30.14	23.0	4.5	7.7	21.6	4.6	179.6
367	30.22	23.2	4.4	7.7	21.6	4.6	179.5
368	30.31	23.3	4.3	7.7	21.5	4.6	179.5
369	30.40	23.5	4.3	7.7	21.5	4.6	179.4
370	30.49	23.7	4.2	7.7	21.5	4.5	179.3
371	30.58	23.9	4.1	7.7	21.4	4.5	179.2
372	30.67	24.1	4.1	7.7	21.4	4.5	179.2
373	30.76	24.2	4.0	7.7	21.4	4.5	179.1
374	30.85	24.4	3.9	7.7	21.3	4.5	179.1
375	30.94	24.6	3.9	7.7	21.3	4.5	179.0
376	31.03	24.8	3.8	7.7	21.2	4.5	178.9
377	31.03	24.8	3.8	7.7	21.2	4.5	178.9
378	31.12	25.0	3.7	7.7	21.1	4.5	178.9
379	31.21	25.1	3.7	7.7	21.1	4.4	178.8
380	31.30	25.3	3.6	7.7	21.0	4.4	178.7
381	31.39	25.5	3.6	7.8	21.0	4.4	178.7
382	31.48	25.7	3.5	7.8	21.0	4.4	178.6
383	31.57	25.9	3.5	7.8	20.9	4.4	178.5
384	31.66	26.1	3.4	7.8	20.9	4.4	178.5
385	31.75	26.2	3.3	7.8	20.8	4.4	178.4
386	31.84	26.4	3.3	7.8	20.8	4.3	178.3
387	31.92	26.6	3.2	7.8	20.7	4.3	178.2
388	32.01	26.8	3.2	7.8	20.6	4.3	178.2
389	32.10	27.0	3.1	7.8	20.6	4.3	178.1
390	32.19	27.1	3.1	7.8	20.5	4.3	178.0
391	32.28	27.2	3.0	7.8	20.5	4.3	178.1
392	32.37	27.3	3.0	7.9	20.4	4.3	178.1
393	32.46	27.3	2.9	7.9	20.3	4.3	178.2
394	32.55	27.4	2.9	7.9	20.3	4.3	178.2
395	32.64	27.5	2.9	7.9	20.2	4.3	178.2
396	32.73	27.5	2.8	7.9	20.2	4.3	178.3
397	32.82	27.6	2.8	7.9	20.1	4.3	178.3
398	32.82	27.6	2.8	7.9	20.1	4.3	178.3
399	32.91	27.7	2.7	7.9	20.0	4.3	178.3
400	33.00	27.7	2.7	7.9	20.0	4.2	178.3
401	33.09	27.8	2.7	7.9	19.9	4.2	178.4
402	33.18	27.8	2.6	7.9	19.9	4.2	178.4
403	33.27	27.9	2.6	7.9	19.8	4.2	178.4
404	33.36	28.0	2.6	7.9	19.8	4.2	178.4
405	33.45	28.0	2.5	8.0	19.7	4.2	178.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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 Date: 7/10/11

Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	28.1	2.5	8.0	19.6	4.2	178.5
407	33.63	28.2	2.5	8.0	19.6	4.2	178.5
408	33.72	28.2	2.4	8.0	19.5	4.2	178.5
409	33.80	28.3	2.4	8.0	19.5	4.2	178.5
410	33.89	28.4	2.4	8.0	19.4	4.2	178.6
411	33.98	28.4	2.4	8.0	19.3	4.2	178.6
412	34.07	28.5	2.4	8.0	19.3	4.2	178.6
413	34.16	28.5	2.3	8.0	19.2	4.2	178.6
414	34.25	28.6	2.3	8.0	19.1	4.2	178.6
415	34.34	28.7	2.3	8.0	19.1	4.2	178.7
416	34.43	28.7	2.3	8.1	19.0	4.2	178.7
417	34.52	28.8	2.3	8.1	18.9	4.2	178.7
418	34.61	28.9	2.2	8.1	18.9	4.2	178.7
419	34.61	28.9	2.2	8.1	18.9	4.2	178.7
420	34.70	28.9	2.2	8.1	18.8	4.2	178.7
421	34.79	29.0	2.2	8.1	18.8	4.2	178.7
422	34.88	29.1	2.2	8.1	18.7	4.1	178.7
423	34.97	29.1	2.2	8.1	18.6	4.1	178.7
424	35.06	29.2	2.2	8.1	18.6	4.1	178.7
425	35.15	29.3	2.2	8.1	18.5	4.1	178.7
426	35.24	29.3	2.2	8.1	18.4	4.1	178.7
427	35.33	29.4	2.2	8.1	18.4	4.1	178.7
428	35.42	29.4	2.2	8.1	18.3	4.1	178.7
429	35.51	29.5	2.2	8.1	18.3	4.1	178.7
430	35.59	29.6	2.2	8.1	18.2	4.1	178.7
431	35.68	29.6	2.2	8.2	18.1	4.1	178.7
432	35.77	29.7	2.2	8.2	18.1	4.1	178.7
433	35.86	29.8	2.2	8.2	18.0	4.1	178.7
434	35.95	29.8	2.2	8.2	18.0	4.1	178.7
435	36.04	29.9	2.2	8.2	17.9	4.1	178.7
436	36.13	30.0	2.2	8.2	17.8	4.1	178.7
437	36.22	30.0	2.2	8.2	17.8	4.1	178.7
438	36.31	30.1	2.2	8.2	17.7	4.1	178.7
439	36.40	30.2	2.2	8.2	17.6	4.1	178.6
440	36.40	30.2	2.2	8.2	17.9	4.0	178.4
441	36.43	30.2	2.2	8.2	18.0	4.0	178.3
442	36.46	30.2	2.2	8.2	18.1	4.0	178.2
443	36.49	30.2	2.2	8.2	18.1	4.0	178.1
444	36.52	30.2	2.2	8.2	18.2	4.0	178.0
445	36.55	30.3	2.3	8.2	18.3	4.0	177.9
446	36.58	30.3	2.3	8.2	18.4	4.0	177.8
447	36.61	30.3	2.3	8.2	18.5	4.0	177.6
448	36.64	30.3	2.3	8.2	18.6	4.0	177.5
449	36.67	30.4	2.3	8.2	18.6	4.0	177.4
450	36.70	30.4	2.3	8.2	18.7	4.0	177.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga ext 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

Page: 207

Date: 7/10/11

Summary of tension force losses for cable no. 4, at t = 30000, beam no. 1

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	30.4	2.3	8.2	18.8	4.0	177.2
452	36.76	30.4	2.3	8.2	18.9	4.0	177.1
453	36.79	30.4	2.3	8.2	18.9	4.0	177.0
454	36.82	30.5	2.3	8.2	19.0	4.0	176.9
455	36.85	30.5	2.3	8.2	19.1	4.0	176.8
456	36.88	30.5	2.3	8.2	19.2	4.0	176.7
457	36.90	30.5	0.8	8.2	6.2	5.0	190.2

Time-steps analysis was performed.

VERIFICAÇÃO DE SEÇÕES PROTENDIDAS

<VerProtFint>

OBRA: VIADUTO NA PE-060

1. Dados de Entrada

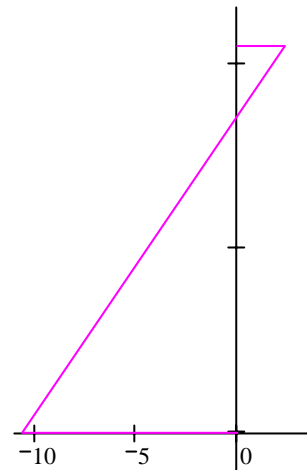
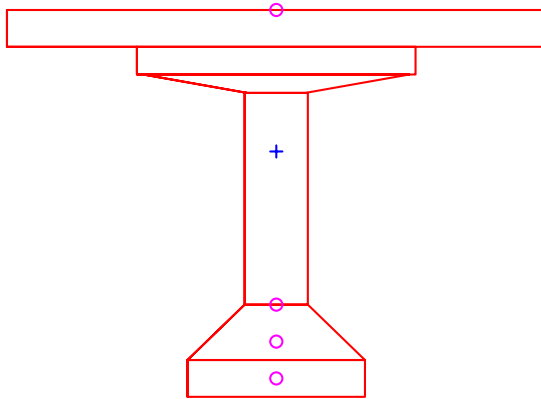
VIGA EXTERNA 37 m

	<u>Base Superior</u>	<u>Base Inferior</u>	<u>Altura</u>	<u>As</u> <cm ² >	<u>Prof.</u> <m>	<u>Prealon.</u> <%>
trap :=	1	2	3			
	2.125	2.125	0.2			
	1.1	1.1	0.15			
	1.05	0.23	0.1			
	0.25	0.25	1.15			
	0.25	0.7	0.3			
	0.7	0.7	0.2			

	1	2	3
1	34.4	2	5
2	17.2	1.8	5
3	17.2	1.6	5
4	0	0	0

c/toda carga movel

Fator do conc. $\gamma_c := 1.4$ Resistencia carac. <tf/m²> $f_{ck} := 3500$ $f_c := 0.85 \cdot \frac{f_{ck}}{\gamma_c}$
 Fator dos esf. $\gamma_f := 1.4$



Momento último de projeto $M_r(D) = 1810$

$$M_d := 1.35 \cdot 700 + 1.5 \cdot 375$$

Momento de serviço $\frac{M_r(D)}{\gamma_f} = 1293$

$$M_d = 1508$$

menor que $M_r(D)$

Altura total $h_{total} = 2.1$

Profundidade do CG $y_s = 0.768$

Deformação de compressão $\epsilon_{c1} = 2.345$

Profundidade do eixo neutro $p_{en} = 0.38$

OBRA: VIADUTO NA BR PE-060 37m

VIGA EXTERNA

Dados gerais

- . número de seções ns := 6
- . cortantes de carga permanente, carga móvel e protensão (KN) i := 1..ns
- | <u>carga permanente</u> | <u>carga móvel</u> | <u>protensão</u> |
|-------------------------|----------------------|--------------------|
| vg1 _i := | vcml _i := | vp _i := |
| vg2 _i := 0 | vcm2 _i := | |
| 786 | 475 | -713 |
| 650 | 434 | -616 |
| 488 | 355 | -288 |
| 325 | 287 | -0 |
| 163 | 227 | -0 |
| 0 | 182 | 0 |
- vg1 - refere-se a G1+ G2 + G3
- vg12_i := vg1_i + vg2_i vm_{i,1} := vcml_i vm_{i,2} := vcm2_i
- . momento torsor (KN) Mt := (0 0 0 0 0 0)
- . geometria (mm,mm2)
- | largura nominal | altura | área efetiva | espessura da parede |
|-----------------------|------------------------|--------------------------|-----------------------------------|
| b _i := 210 | h _i := 2100 | A _i := 100000 | ef _i := b _i |
| b ₁ := 660 | | | |
- . distância p/centro armadura (m) c := 100
- . coeficiente
- | majoração das cargas | K1 _i := | K2 _i := | K3 _i := |
|----------------------|--------------------|--------------------|--------------------|
| | 1.35 | 1.50 | 1.20 |
| | 1.00 | 0 | 0.90 |
- . coeficiente
- | | |
|---------------------------------|------------------------|
| minoração do concreto | γ _c := 1.5 |
| minoração do aço | γ _s := 1.15 |
| redução da carga móvel p/fadiga | γ _f := 0.5 |
- . resistência característica do concreto a compressão (MPa) f_{ck} := 35
- . resistência característica do aço a tração (MPa) f_{yk} := 500
- . variação de tensão na armadura para fadiga (MPa) Δσ := 85
- . número de vigas para os esforços dados nv := 1

$$f_{yd} := \frac{f_{yk}}{\gamma_s} \quad \alpha_{v2} := \left(1 - \frac{f_{ck}}{250}\right) \quad f_{ctm} := 0.3 \cdot f_{ck}^{\frac{2}{3}} \quad f_{ctdinf} := 0.7 \cdot f_{ctm} \quad d_1 := h_1 - c$$

$$f_{cd} := \frac{f_{ck}}{\gamma_c} \quad f_{ctd} := \frac{f_{ctdinf}}{\gamma_c} \quad v_{c1} := 0.6 \cdot f_{ctd} \cdot b_1 \cdot d_1 \quad d_1 := 0.001 \cdot d_1$$

. número de pernas do estribo **cortante** **np₁ := 2**

torção **nt₁ := 1**

$$\rho_{min} := 0.2 \cdot \frac{f_{ctm}}{f_{yk}} \quad \rho_{min} = 0.00128 \quad K_v := \frac{1}{n_v}$$

**RUPTURA****EM SERVIÇO****CORTANTE****CORTANTE**

$$v_{sd1}_i := K_v \cdot \max\left(\left| m_{max,1,1} \right|, \left| m_{min,1,1} \right|\right)$$

$$v_{11}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm1}_i + v_{p1}_i)$$

TORÇÃO

$$v_{12}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm2}_i + v_{p1}_i)$$

$$M_{tsd}_i := 1.5 \cdot \left| M_t \right|$$

$$\Delta 1_i := \begin{cases} |v_{11}_i - v_{12}_i| & \text{if } v_{11}_i \cdot v_{12}_i \geq 0 \\ \max(|v_{11}_i|, |v_{12}_i|) & \text{otherwise} \end{cases}$$

$$V1_i := \max(|v_{11}_i|, |v_{12}_i|)$$

$$v_{sd1} = \begin{pmatrix} 1131900 \\ 974100 \\ 932100 \\ 869250 \\ 560550 \\ 381000 \end{pmatrix} \quad b = \begin{pmatrix} 660 \\ 210 \\ 210 \\ 210 \\ 210 \\ 210 \end{pmatrix} \quad \Delta 1 = \begin{pmatrix} 237500 \\ 237000 \\ 211500 \\ 208000 \\ 209500 \\ 127000 \end{pmatrix} \quad V1 = \begin{pmatrix} 310500 \\ 251000 \\ 377500 \\ 468500 \\ 276500 \\ 127000 \end{pmatrix} \quad v_c = \begin{pmatrix} 1186402.12 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \end{pmatrix}$$

ARMADURA

$$v_{sd}_i := v_{sd1}_i \quad V_i := V1_i \quad \Delta_i := \Delta 1_i$$

ruptura**fadiga**

$$AS1_i := \begin{cases} \frac{v_{sd}_i - v_c}{0.9 \cdot d_1 \cdot f_{yd}} & \text{if } v_{sd}_i \geq v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS2_i := \begin{cases} \frac{V_i - 0.5 \cdot v_c}{0.9 \cdot d_1 \cdot \Delta \sigma} \cdot \frac{\Delta_i}{V_i} & \text{if } V_i \geq 0.5 \cdot v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS3_i := \max(AS1_i, AS2_i)$$

$$AS4_i := \frac{M_{tsd}_i}{2 \cdot A_1 \cdot f_{yd}} \cdot 1000$$

$$d_1 := 1000 \cdot d_1$$

SOLICITAÇÕES COMBINADAS**ARMAÇÃO TOTAL /PERNA**

$$\text{TRD1}_1 := 0.5 \cdot \alpha v_2 \cdot f_{cd} \cdot A_1 \cdot e_{f_1} \quad \text{VRD2}_1 := 0.27 \cdot \alpha v_2 \cdot f_{cd} \cdot b_1 \cdot d_1 \quad \text{AS}_1 := \max \left(\frac{\text{AS4}_1}{n t_1} + \frac{\text{AS3}_1}{n p_1}, \frac{1000 \cdot \rho_{\min} \cdot b_1}{n p_1} \right)$$

$$\text{TRD1} = \begin{pmatrix} 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \end{pmatrix} \quad \text{VRD2} = \begin{pmatrix} 7151760 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \end{pmatrix} \quad \text{AS} = \begin{pmatrix} 423.72 \\ 381.17 \\ 354.33 \\ 405.89 \\ 217.29 \\ 134.82 \end{pmatrix} \quad (\text{mm}^2)/\text{perna/m}$$

$$v1_1 := \frac{\text{vsd}_1}{\text{VRD2}_1} \quad v2_1 := \frac{\text{Mtsd}_1}{\text{TRD1}_1} \quad v := v1 + v2$$

$$v1 = \begin{pmatrix} 0.16 \\ 0.43 \\ 0.41 \\ 0.38 \\ 0.25 \\ 0.17 \end{pmatrix} \quad v2 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad v = \begin{pmatrix} 0.16 \\ 0.43 \\ 0.41 \\ 0.38 \\ 0.25 \\ 0.17 \end{pmatrix}$$

5.2.1.3.3 VIGA INTERNA (TRECHO DE 37M)

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m geometry dat table

Code: EuroCode
 Page: 208
 Date: 7/10/11

Prepared by:

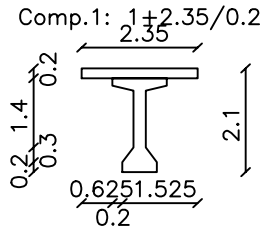
Units: ton meter

GEOMETRY DATA TABLE

BEAM NO. B2

el. =	67	68,.... ,77	78,.... ,87	88
prop. #	1+2.35/0.2	1+2.35/0.2	1+2.35/0.2	1+2.35/0.2
	0.6	17.9	17.9	0.6
As top	10.	10.	10.	10.
As bot	12.	12.	12.	12.
ds top	3.5	3.5	3.5	3.5
ds bot	3.5	3.5	3.5	3.5
casting t=	0.	0.	0.	0.
topping t=	33.	33.	33.	33.

SECTIONS



PARAMETERS

Design Code = EuroCode, conc. $f_c = 35.$, reinf. $f_y = 500.$, shear reinf. $f_y = 500.$
 Reinf. modulus $E = 200000.$, conc. modulus $E = 30000.$, cables modulus $E = 205000.$
 Humidity = 75.%, cement type = normal, temperature = 30.
 Calculation methods: Ultimate moment = include decompression strain,
 Shear = inclined struts method, Deflections = use effective I at each point.

CABLE NO. = 1

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

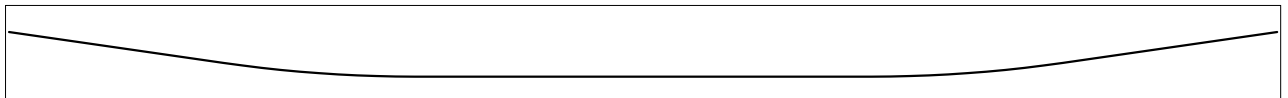
Cable is bonded

JACKING SEQUENCE :

Stage 1/4: TRANSFER

Strands 1-12 jacked from two sides to 100.%, Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-595	-651	-707	-763	-818	-874	-930	-986	-1042	-1098	-1154	-1210
x	6100	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100	11600
y	-1265	-1320	-1371	-1417	-1457	-1492	-1523	-1548	-1568	-1584	-1594	-1599
x	11870	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	23100
y	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600	-1600
x	23600	24100	24600	25130	25600	26100	26600	27100	27600	28100	28600	29100
y	-1600	-1600	-1600	-1600	-1598	-1591	-1578	-1561	-1539	-1511	-1479	-1441
x	29600	30100	30600	31100	31600	32100	32600	33100	33600	34100	34600	35100
y	-1399	-1351	-1299	-1243	-1187	-1131	-1075	-1020	-964	-908	-852	-796
x	35600	36100	36600	36900								

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m geometry dat table

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x	29600	30100	30600	31100	31650	32100	32600	33100	33600	34100	34600	35100
y	-2000	-2000	-2000	-2000	-2000	-1997	-1989	-1973	-1952	-1924	-1890	-1850
x	35600	36100	36600	36900								
y	-1810	-1770	-1729	-1705								

CABLE NO. = 4

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

Cable is bonded

JACKING SEQUENCE :

Stage 1/3: TRANSFER

Strands 1-12 jacked from right side to 100.%, Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5350
y	-1705	-1745	-1786	-1826	-1866	-1904	-1936	-1961	-1980	-1993	-1999	-2000
x	5600	6100	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	23100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23600	24100	24600	25100	25600	26100	26600	27100	27600	28100	28220	28600
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-1998
x	29100	29600	30100	30600	31100	31600	32100	32600	33100	33600	34100	34600
y	-1990	-1976	-1956	-1929	-1896	-1857	-1812	-1762	-1713	-1663	-1613	-1564
x	35100	35600	36100	36600	36900							
y	-1514	-1464	-1414	-1365	-1335							

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
67	0.00	4	0.61	3	-0.26	3	0.60	4	-0.26
	0.03	4	0.73	3	-0.56	3	0.72	4	-0.56
	0.06	4	0.85	3	-0.86	3	0.84	4	-0.86
	0.09	4	0.97	3	-1.16	3	0.96	4	-1.16
	0.10	4	1.97	3	4.53	3	1.97	4	4.53
	0.12	4	3.96	4	15.91	3	3.96	3	15.91
	0.15	4	4.01	4	15.42	3	4.01	3	15.42
	0.18	4	4.06	4	14.94	3	4.06	3	14.94
	0.21	4	4.11	3	14.45	3	4.11	4	14.45
	0.24	4	4.16	3	13.96	3	4.16	4	13.96
	0.27	4	4.25	4	13.72	3	4.25	3	13.72
	0.30	4	4.34	4	13.48	3	4.34	3	13.48
	0.33	4	4.43	3	13.23	3	4.43	3	13.23
	0.36	4	4.52	4	12.99	3	4.52	3	12.99
	0.39	4	4.61	4	12.75	3	4.61	3	12.75
	0.42	4	4.70	4	12.50	3	4.70	3	12.50
	0.45	4	4.79	3	12.26	3	4.79	3	12.26
	0.48	4	4.88	3	12.02	3	4.88	3	12.02
	0.51	4	4.96	4	11.77	3	4.96	3	11.77
	0.54	4	5.05	3	11.53	3	5.05	4	11.53
	0.57	4	5.14	3	11.29	3	5.14	4	11.29
	0.60	4	5.23	3	11.05	3	5.23	4	11.05
68	0.60	4	5.25	3	10.94	3	5.22	4	10.88
	0.69	4	5.26	3	10.92	3	5.21	4	10.83
	0.78	4	5.27	3	10.91	3	5.21	4	10.78
	0.87	4	5.29	3	10.90	3	5.20	4	10.70
	0.96	4	5.31	3	10.89	3	5.19	4	10.63
	1.05	4	5.33	3	10.88	3	5.19	4	10.55
	1.14	4	5.35	3	10.87	3	5.18	4	10.47
	1.23	4	5.36	3	10.86	3	5.17	4	10.40
	1.32	4	5.38	3	10.85	3	5.16	4	10.32
	1.41	4	5.40	3	10.84	3	5.15	4	10.24
	1.50	4	5.42	3	10.83	3	5.15	4	10.16
	1.58	4	5.44	3	10.82	3	5.14	4	10.08
	1.67	4	5.46	3	10.82	3	5.13	4	10.00
	1.76	4	5.48	3	10.81	3	5.12	4	9.92
	1.85	4	5.50	3	10.80	3	5.11	4	9.84
	1.94	4	5.52	3	10.79	3	5.10	4	9.76
	2.03	4	5.53	3	10.79	3	5.08	4	9.68
	2.12	4	5.55	3	10.78	3	5.07	4	9.61
	2.21	4	5.57	3	10.78	3	5.06	4	9.53
	2.30	4	5.58	3	10.78	3	5.05	4	9.46
	2.39	4	5.60	3	10.77	3	5.03	4	9.38

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
69	2.39	4	5.62	3	10.78	3	5.05	4	9.37
	2.48	4	5.63	3	10.78	3	5.03	4	9.32
	2.57	4	5.63	3	10.78	3	5.02	4	9.27
	2.66	4	5.64	3	10.78	3	5.01	4	9.21
	2.75	4	5.65	3	10.78	3	4.99	4	9.16
	2.84	4	5.66	3	10.78	3	4.98	4	9.10
	2.93	4	5.67	3	10.78	3	4.97	4	9.05
	3.02	4	5.68	3	10.78	3	4.95	4	8.99
	3.11	4	5.69	3	10.77	3	4.94	4	8.93
	3.20	4	5.70	3	10.77	3	4.93	4	8.87
	3.28	4	5.71	3	10.77	3	4.92	4	8.80
	3.37	4	5.72	3	10.76	3	4.91	4	8.74
	3.46	4	5.74	3	10.76	3	4.89	4	8.68
	3.55	4	5.75	3	10.75	3	4.88	4	8.61
	3.64	4	5.76	3	10.75	3	4.87	4	8.54
	3.73	4	5.78	3	10.74	3	4.86	4	8.47
	3.82	4	5.79	3	10.73	3	4.85	4	8.41
	3.91	4	5.80	3	10.72	3	4.84	4	8.34
	4.00	4	5.82	3	10.72	3	4.83	4	8.26
	4.09	4	5.84	3	10.71	3	4.82	4	8.19
	4.18	4	5.85	3	10.70	3	4.81	4	8.12
70	4.18	4	5.86	3	10.71	3	4.82	4	8.14
	4.27	4	5.87	3	10.71	3	4.81	4	8.09
	4.36	4	5.88	3	10.70	3	4.80	4	8.04
	4.45	4	5.88	3	10.69	3	4.79	4	7.99
	4.54	4	5.89	3	10.69	3	4.78	4	7.94
	4.63	4	5.90	3	10.69	3	4.77	4	7.89
	4.72	4	5.90	3	10.68	3	4.76	4	7.85
	4.81	4	5.91	3	10.68	3	4.75	4	7.80
	4.90	4	5.92	3	10.66	3	4.74	4	7.73
	4.99	4	5.93	3	10.65	3	4.73	4	7.68
	5.07	4	5.94	3	10.65	3	4.72	4	7.63
	5.16	4	5.95	3	10.64	3	4.72	4	7.58
	5.25	4	5.96	3	10.63	3	4.71	4	7.52
	5.34	4	5.98	3	10.63	3	4.70	4	7.46
	5.43	4	5.99	3	10.63	3	4.70	4	7.41
	5.52	4	6.01	3	10.60	3	4.69	4	7.33
	5.61	4	6.02	3	10.59	3	4.69	4	7.27
	5.70	4	6.04	3	10.58	3	4.68	4	7.21
	5.79	4	6.06	3	10.56	3	4.68	4	7.14
	5.88	4	6.07	3	10.55	3	4.68	4	7.08
	5.97	4	6.09	3	10.53	3	4.67	4	7.01

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
71	5.97	4	6.11	3	10.55	3	4.69	4	7.03
	6.06	4	6.12	3	10.54	3	4.69	4	6.99
	6.15	4	6.13	3	10.52	3	4.69	4	6.95
	6.24	4	6.14	3	10.51	3	4.69	4	6.90
	6.33	4	6.15	3	10.49	3	4.69	4	6.85
	6.42	4	6.17	3	10.48	3	4.69	4	6.80
	6.51	4	6.18	3	10.46	3	4.69	4	6.75
	6.60	4	6.20	3	10.45	3	4.69	4	6.70
	6.69	4	6.21	3	10.43	3	4.69	4	6.65
	6.78	4	6.23	3	10.41	3	4.70	4	6.60
	6.86	4	6.25	3	10.39	3	4.70	4	6.54
	6.95	4	6.27	3	10.37	3	4.71	4	6.48
	7.04	4	6.29	3	10.35	3	4.71	4	6.42
	7.13	4	6.32	3	10.32	3	4.72	4	6.36
	7.22	4	6.34	3	10.30	3	4.73	4	6.30
	7.31	4	6.37	3	10.27	3	4.74	4	6.24
	7.40	4	6.39	3	10.24	3	4.75	4	6.17
	7.49	4	6.42	3	10.22	3	4.77	4	6.10
	7.58	4	6.45	3	10.19	3	4.78	4	6.03
	7.67	4	6.48	3	10.16	3	4.79	4	5.96
	7.76	4	6.52	3	10.12	3	4.81	4	5.88
72	7.76	4	6.53	3	10.14	3	4.83	4	5.89
	7.85	4	6.56	3	10.11	3	4.84	4	5.85
	7.94	4	6.58	3	10.08	3	4.86	4	5.80
	8.03	4	6.61	3	10.04	3	4.88	4	5.74
	8.12	4	6.63	3	10.01	3	4.89	4	5.69
	8.21	4	6.66	3	9.97	3	4.91	4	5.64
	8.30	4	6.69	3	9.94	3	4.93	4	5.58
	8.39	4	6.72	3	9.90	3	4.95	4	5.52
	8.48	4	6.75	3	9.86	3	4.98	4	5.46
	8.57	4	6.79	3	9.82	3	5.00	4	5.39
	8.66	4	6.82	3	9.77	3	5.03	4	5.31
	8.74	4	6.86	3	9.72	3	5.05	4	5.24
	8.83	4	6.89	3	9.70	3	5.08	4	5.19
	8.92	4	6.93	3	9.65	3	5.10	4	5.12
	9.01	4	6.97	3	9.61	3	5.13	4	5.04
	9.10	4	7.01	3	9.56	3	5.16	4	4.97
	9.19	4	7.05	3	9.51	3	5.19	4	4.89
	9.28	4	7.09	3	9.46	3	5.22	4	4.81
	9.37	4	7.13	3	9.41	3	5.25	4	4.74
	9.46	4	7.17	3	9.36	3	5.28	4	4.66
	9.55	4	7.22	3	9.31	3	5.31	4	4.58

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
73	9.55	4	7.23	3	9.32	3	5.32	4	4.57
	9.64	4	7.26	3	9.27	3	5.35	4	4.51
	9.73	4	7.30	3	9.21	3	5.38	4	4.45
	9.82	4	7.34	3	9.16	3	5.42	4	4.39
	9.91	4	7.37	3	9.13	3	5.45	4	4.35
	10.00	4	7.41	3	9.08	3	5.48	4	4.29
	10.09	4	7.44	3	9.02	3	5.51	4	4.23
	10.18	4	7.48	3	8.97	3	5.55	4	4.16
	10.27	4	7.52	3	8.92	3	5.58	4	4.10
	10.36	4	7.56	3	8.87	3	5.61	4	4.03
	10.44	4	7.60	3	8.82	3	5.64	4	3.96
	10.53	4	7.64	3	8.76	3	5.68	4	3.90
	10.62	4	7.67	3	8.71	3	5.71	4	3.83
	10.71	4	7.71	3	8.66	3	5.74	4	3.76
	10.80	4	7.76	3	8.61	3	5.78	4	3.69
	10.89	4	7.80	3	8.56	3	5.81	4	3.62
	10.98	4	7.84	3	8.51	3	5.84	4	3.55
	11.07	4	7.88	3	8.46	3	5.88	4	3.48
	11.16	4	7.92	3	8.40	3	5.91	4	3.41
	11.25	4	7.96	3	8.35	3	5.94	4	3.34
	11.34	4	8.00	3	8.30	3	5.98	4	3.27
74	11.34	4	8.01	3	8.30	3	5.98	4	3.27
	11.43	4	8.04	3	8.26	3	6.01	4	3.22
	11.52	4	8.07	3	8.21	3	6.05	4	3.18
	11.61	4	8.10	3	8.16	3	6.08	4	3.13
	11.70	4	8.14	3	8.12	3	6.11	4	3.08
	11.79	4	8.17	3	8.06	3	6.14	4	3.03
	11.88	4	8.20	3	8.02	3	6.18	4	2.99
	11.97	4	8.23	3	7.97	3	6.21	4	2.93
	12.06	4	8.27	3	7.92	3	6.24	4	2.88
	12.15	4	8.30	3	7.88	3	6.27	4	2.83
	12.24	4	8.33	3	7.83	3	6.30	4	2.78
	12.32	4	8.37	3	7.78	3	6.33	4	2.73
	12.41	4	8.40	3	7.74	3	6.37	4	2.68
	12.50	4	8.43	3	7.69	3	6.40	4	2.62
	12.59	4	8.47	3	7.64	3	6.43	4	2.56
	12.68	4	8.50	3	7.59	3	6.46	4	2.50
	12.77	4	8.53	3	7.54	3	6.49	4	2.45
	12.86	4	8.57	3	7.50	3	6.52	4	2.39
	12.95	4	8.60	3	7.45	3	6.54	4	2.33
	13.04	4	8.63	3	7.40	3	6.57	4	2.28
	13.13	4	8.67	3	7.36	3	6.60	4	2.22

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
75	13.13	4	8.67	3	7.36	3	6.60	4	2.23
	13.22	4	8.69	3	7.32	3	6.63	4	2.20
	13.31	4	8.71	3	7.28	3	6.65	4	2.16
	13.40	4	8.73	3	7.24	3	6.68	4	2.13
	13.49	4	8.75	3	7.20	3	6.70	4	2.10
	13.58	4	8.78	3	7.16	3	6.73	4	2.07
	13.67	4	8.80	3	7.12	3	6.75	4	2.04
	13.76	4	8.82	3	7.08	3	6.78	4	2.00
	13.85	4	8.84	3	7.04	3	6.80	4	1.97
	13.94	4	8.86	3	7.00	3	6.82	4	1.94
	14.02	4	8.88	3	6.97	3	6.85	4	1.90
	14.11	4	8.90	3	6.93	3	6.87	4	1.87
	14.20	4	8.92	3	6.89	3	6.89	4	1.83
	14.29	4	8.95	3	6.85	3	6.91	4	1.79
	14.38	4	8.97	3	6.81	3	6.94	4	1.76
	14.47	4	8.99	3	6.77	3	6.96	4	1.72
	14.56	4	9.01	3	6.73	3	6.98	4	1.68
	14.65	4	9.04	3	6.70	3	7.00	4	1.64
	14.74	4	9.06	3	6.66	3	7.02	4	1.59
	14.83	4	9.08	3	6.62	3	7.04	4	1.55
	14.92	4	9.10	3	6.58	3	7.06	4	1.51
76	14.92	4	9.10	3	6.58	3	7.06	4	1.52
	15.01	4	9.11	3	6.55	3	7.08	4	1.50
	15.10	4	9.12	3	6.52	3	7.10	4	1.49
	15.19	4	9.13	3	6.49	3	7.12	4	1.47
	15.28	4	9.15	3	6.46	3	7.13	4	1.46
	15.37	4	9.16	3	6.43	3	7.15	4	1.44
	15.46	4	9.17	3	6.40	3	7.17	4	1.43
	15.55	4	9.18	3	6.37	3	7.18	4	1.41
	15.64	4	9.19	3	6.34	3	7.20	4	1.40
	15.73	4	9.20	3	6.31	3	7.22	4	1.38
	15.81	4	9.21	3	6.28	3	7.23	4	1.37
	15.90	4	9.22	3	6.26	3	7.25	4	1.35
	15.99	4	9.23	3	6.23	3	7.26	4	1.33
	16.08	4	9.24	3	6.20	3	7.27	4	1.31
	16.17	4	9.26	3	6.18	3	7.29	4	1.28
	16.26	4	9.28	3	6.15	3	7.30	4	1.24
	16.35	4	9.29	3	6.13	3	7.31	4	1.21
	16.44	4	9.31	3	6.10	3	7.33	4	1.17
	16.53	4	9.33	3	6.08	3	7.34	4	1.14
	16.62	4	9.34	3	6.06	3	7.35	4	1.11
	16.71	4	9.36	3	6.03	3	7.36	4	1.07

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
77	16.71	4	9.36	3	6.04	3	7.36	4	1.08
	16.80	4	9.37	3	6.02	3	7.37	4	1.06
	16.89	4	9.38	3	6.00	3	7.38	4	1.03
	16.98	4	9.39	3	5.98	3	7.39	4	1.01
	17.07	4	9.40	3	5.97	3	7.40	4	0.99
	17.16	4	9.41	3	5.95	3	7.41	4	0.97
	17.25	4	9.42	3	5.93	3	7.42	4	0.95
	17.34	4	9.43	3	5.92	3	7.42	4	0.93
	17.43	4	9.44	3	5.90	3	7.43	4	0.91
	17.52	4	9.45	3	5.89	3	7.44	4	0.89
	17.60	4	9.45	3	5.87	3	7.44	4	0.88
	17.69	4	9.46	3	5.86	3	7.45	4	0.86
	17.78	4	9.47	3	5.85	3	7.46	4	0.84
	17.87	4	9.48	3	5.84	3	7.46	4	0.82
	17.96	4	9.49	3	5.82	3	7.47	4	0.80
	18.05	4	9.49	3	5.81	3	7.47	4	0.79
	18.14	4	9.50	3	5.80	3	7.48	4	0.77
	18.23	4	9.51	3	5.79	3	7.48	4	0.75
	18.32	4	9.51	3	5.78	3	7.48	4	0.74
	18.41	4	9.52	3	5.77	3	7.49	4	0.72
	18.50	4	9.53	3	5.77	3	7.49	4	0.71
78	18.59	4	9.52	3	5.77	3	7.49	4	0.72
	18.68	4	9.51	3	5.78	3	7.48	4	0.74
	18.77	4	9.51	3	5.79	3	7.48	4	0.75
	18.86	4	9.50	3	5.80	3	7.48	4	0.77
	18.95	4	9.49	3	5.81	3	7.47	4	0.79
	19.04	4	9.49	3	5.82	3	7.47	4	0.80
	19.13	4	9.48	3	5.84	3	7.46	4	0.82
	19.22	4	9.47	3	5.85	3	7.46	4	0.84
	19.31	4	9.46	3	5.86	3	7.45	4	0.86
	19.40	4	9.46	3	5.87	3	7.44	4	0.87
	19.48	4	9.45	3	5.89	3	7.44	4	0.89
	19.57	4	9.44	3	5.90	3	7.43	4	0.91
	19.66	4	9.43	3	5.92	3	7.42	4	0.93
	19.75	4	9.42	3	5.93	3	7.42	4	0.95
	19.84	4	9.41	3	5.95	3	7.41	4	0.97
	19.93	4	9.40	3	5.96	3	7.40	4	0.99
	20.02	4	9.39	3	5.98	3	7.39	4	1.01
	20.11	4	9.38	3	6.00	3	7.38	4	1.03
	20.20	4	9.37	3	6.01	3	7.37	4	1.05
	20.29	4	9.36	3	6.03	3	7.36	4	1.07

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
79	20.29	4	9.36	3	6.03	3	7.36	4	1.07
	20.38	4	9.34	3	6.05	3	7.35	4	1.10
	20.47	4	9.33	3	6.08	3	7.34	4	1.14
	20.56	4	9.31	3	6.10	3	7.33	4	1.17
	20.65	4	9.29	3	6.12	3	7.31	4	1.20
	20.74	4	9.28	3	6.15	3	7.30	4	1.24
	20.83	4	9.26	3	6.17	3	7.29	4	1.27
	20.92	4	9.24	3	6.20	3	7.27	4	1.30
	21.01	4	9.23	3	6.22	3	7.26	4	1.33
	21.10	4	9.22	3	6.25	3	7.25	4	1.34
	21.19	4	9.21	3	6.28	3	7.23	4	1.36
	21.27	4	9.20	3	6.31	3	7.22	4	1.37
	21.36	4	9.19	3	6.33	3	7.20	4	1.39
	21.45	4	9.18	3	6.36	3	7.19	4	1.41
	21.54	4	9.17	3	6.39	3	7.17	4	1.42
	21.63	4	9.16	3	6.42	3	7.15	4	1.44
	21.72	4	9.15	3	6.45	3	7.14	4	1.45
	21.81	4	9.14	3	6.48	3	7.12	4	1.47
	21.90	4	9.12	3	6.51	3	7.10	4	1.48
	21.99	4	9.11	3	6.54	3	7.08	4	1.50
	22.08	4	9.10	3	6.58	3	7.06	4	1.51
80	22.08	4	9.10	3	6.58	3	7.06	4	1.50
	22.17	4	9.08	3	6.61	3	7.04	4	1.54
	22.26	4	9.06	3	6.65	3	7.02	4	1.59
	22.35	4	9.04	3	6.69	3	7.00	4	1.63
	22.44	4	9.02	3	6.73	3	6.98	4	1.67
	22.53	4	8.99	3	6.76	3	6.96	4	1.71
	22.62	4	8.97	3	6.80	3	6.94	4	1.75
	22.71	4	8.95	3	6.84	3	6.92	4	1.79
	22.80	4	8.93	3	6.88	3	6.89	4	1.82
	22.89	4	8.91	3	6.92	3	6.87	4	1.86
	22.98	4	8.88	3	6.96	3	6.85	4	1.89
	23.06	4	8.86	3	6.99	3	6.82	4	1.93
	23.15	4	8.84	3	7.03	3	6.80	4	1.96
	23.24	4	8.82	3	7.07	3	6.78	4	1.99
	23.33	4	8.80	3	7.11	3	6.75	4	2.03
	23.42	4	8.78	3	7.15	3	6.73	4	2.06
	23.51	4	8.76	3	7.20	3	6.70	4	2.09
	23.60	4	8.73	3	7.23	3	6.68	4	2.12
	23.69	4	8.71	3	7.27	3	6.65	4	2.15
	23.78	4	8.69	3	7.31	3	6.63	4	2.18
	23.87	4	8.67	3	7.35	3	6.60	4	2.21

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
81	23.87	4	8.67	3	7.35	3	6.60	4	2.21
	23.96	4	8.64	3	7.40	3	6.57	4	2.27
	24.05	4	8.60	3	7.44	3	6.55	4	2.33
	24.14	4	8.57	3	7.49	3	6.52	4	2.38
	24.23	4	8.54	3	7.53	3	6.49	4	2.44
	24.32	4	8.50	3	7.58	3	6.46	4	2.50
	24.41	4	8.47	3	7.63	3	6.43	4	2.55
	24.50	4	8.44	3	7.68	3	6.40	4	2.61
	24.59	4	8.40	3	7.73	3	6.37	4	2.67
	24.68	4	8.37	3	7.77	3	6.34	4	2.72
	24.76	4	8.34	3	7.82	3	6.31	4	2.77
	24.85	4	8.30	3	7.87	3	6.27	4	2.82
	24.94	4	8.27	3	7.92	3	6.24	4	2.88
	25.03	4	8.24	3	7.97	3	6.21	4	2.93
	25.12	4	8.20	3	8.02	3	6.18	4	2.98
	25.21	4	8.17	3	8.06	3	6.14	4	3.02
	25.30	4	8.14	3	8.11	3	6.11	4	3.07
	25.39	4	8.11	3	8.15	3	6.08	4	3.12
	25.48	4	8.07	3	8.20	3	6.05	4	3.17
	25.57	4	8.04	3	8.25	3	6.02	4	3.21
	25.66	4	8.01	3	8.30	3	5.98	4	3.26
82	25.66	4	8.00	3	8.29	3	5.98	4	3.26
	25.75	4	7.96	3	8.34	3	5.95	4	3.33
	25.84	4	7.92	3	8.40	3	5.91	4	3.40
	25.93	4	7.88	3	8.45	3	5.88	4	3.47
	26.02	4	7.84	3	8.50	3	5.84	4	3.54
	26.11	4	7.80	3	8.55	3	5.81	4	3.61
	26.20	4	7.76	3	8.60	3	5.78	4	3.68
	26.29	4	7.72	3	8.65	3	5.74	4	3.75
	26.38	4	7.68	3	8.70	3	5.71	4	3.82
	26.47	4	7.64	3	8.76	3	5.68	4	3.89
	26.56	4	7.60	3	8.81	3	5.65	4	3.96
	26.64	4	7.56	3	8.86	3	5.61	4	4.02
	26.73	4	7.52	3	8.91	3	5.58	4	4.09
	26.82	4	7.48	3	8.97	3	5.55	4	4.15
	26.91	4	7.44	3	9.02	3	5.51	4	4.22
	27.00	4	7.41	3	9.08	3	5.48	4	4.29
	27.09	4	7.37	3	9.13	3	5.45	4	4.35
	27.18	4	7.33	3	9.16	3	5.42	4	4.40
	27.27	4	7.30	3	9.21	3	5.38	4	4.46
	27.36	4	7.27	3	9.26	3	5.35	4	4.51
	27.45	4	7.23	3	9.31	3	5.32	4	4.57

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 220
 Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
83	27.45	4	7.22	3	9.30	3	5.31	4	4.57
	27.54	4	7.18	3	9.35	3	5.28	4	4.65
	27.63	4	7.13	3	9.40	3	5.25	4	4.73
	27.72	4	7.09	3	9.45	3	5.22	4	4.81
	27.81	4	7.05	3	9.50	3	5.19	4	4.88
	27.90	4	7.01	3	9.55	3	5.16	4	4.96
	27.99	4	6.97	3	9.60	3	5.13	4	5.03
	28.08	4	6.93	3	9.64	3	5.11	4	5.11
	28.17	4	6.89	3	9.69	3	5.08	4	5.18
	28.26	4	6.86	3	9.73	3	5.05	4	5.25
	28.35	4	6.82	3	9.78	3	5.03	4	5.32
	28.43	4	6.79	3	9.82	3	5.00	4	5.38
	28.52	4	6.75	3	9.86	3	4.98	4	5.45
	28.61	4	6.72	3	9.89	3	4.96	4	5.51
	28.70	4	6.69	3	9.93	3	4.93	4	5.57
	28.79	4	6.66	3	9.97	3	4.91	4	5.63
	28.88	4	6.63	3	10.00	3	4.90	4	5.68
	28.97	4	6.61	3	10.04	3	4.88	4	5.74
	29.06	4	6.58	3	10.07	3	4.86	4	5.79
	29.15	4	6.56	3	10.10	3	4.84	4	5.84
	29.24	4	6.54	3	10.13	3	4.83	4	5.89
84	29.24	4	6.52	3	10.11	3	4.81	4	5.88
	29.33	4	6.49	3	10.15	3	4.80	4	5.95
	29.42	4	6.45	3	10.18	3	4.78	4	6.02
	29.51	4	6.43	3	10.21	3	4.77	4	6.09
	29.60	4	6.40	3	10.24	3	4.76	4	6.16
	29.69	4	6.37	3	10.26	3	4.75	4	6.23
	29.78	4	6.34	3	10.29	3	4.74	4	6.29
	29.87	4	6.32	3	10.31	3	4.73	4	6.35
	29.96	4	6.30	3	10.34	3	4.72	4	6.41
	30.05	4	6.28	3	10.36	3	4.71	4	6.47
	30.14	4	6.26	3	10.38	3	4.71	4	6.53
	30.22	4	6.24	3	10.40	3	4.70	4	6.58
	30.31	4	6.22	3	10.42	3	4.70	4	6.64
	30.40	4	6.20	3	10.44	3	4.70	4	6.69
	30.49	4	6.19	3	10.46	3	4.69	4	6.75
	30.58	4	6.17	3	10.47	3	4.69	4	6.80
	30.67	4	6.16	3	10.49	3	4.69	4	6.84
	30.76	4	6.15	3	10.49	3	4.70	4	6.88
	30.85	4	6.14	3	10.51	3	4.70	4	6.93
	30.94	4	6.13	3	10.52	3	4.70	4	6.97
	31.03	4	6.12	3	10.53	3	4.70	4	7.01

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
85	31.03	4	6.10	3	10.52	3	4.68	4	6.99
	31.12	4	6.08	3	10.53	3	4.69	4	7.06
	31.21	4	6.07	3	10.55	3	4.69	4	7.13
	31.30	4	6.05	3	10.56	3	4.69	4	7.19
	31.39	4	6.03	3	10.57	3	4.70	4	7.26
	31.48	4	6.02	3	10.57	3	4.71	4	7.31
	31.57	4	6.01	3	10.58	3	4.71	4	7.37
	31.66	4	5.99	3	10.61	3	4.72	4	7.44
	31.75	4	5.98	3	10.61	3	4.72	4	7.50
	31.84	4	5.97	3	10.62	3	4.73	4	7.55
	31.92	4	5.96	3	10.63	3	4.74	4	7.61
	32.01	4	5.95	3	10.63	3	4.75	4	7.66
	32.10	4	5.94	3	10.63	3	4.76	4	7.71
	32.19	4	5.93	3	10.64	3	4.77	4	7.76
	32.28	4	5.92	3	10.65	3	4.78	4	7.81
	32.37	4	5.92	3	10.65	3	4.79	4	7.86
	32.46	4	5.91	3	10.66	3	4.80	4	7.91
	32.55	4	5.90	3	10.66	3	4.81	4	7.96
	32.64	4	5.90	3	10.67	3	4.82	4	8.01
	32.73	4	5.89	3	10.68	3	4.83	4	8.06
	32.82	4	5.88	3	10.68	3	4.84	4	8.10
86	32.82	4	5.87	3	10.67	3	4.83	4	8.09
	32.91	4	5.86	3	10.68	3	4.84	4	8.16
	33.00	4	5.84	3	10.68	3	4.85	4	8.23
	33.09	4	5.83	3	10.69	3	4.86	4	8.30
	33.18	4	5.81	3	10.70	3	4.87	4	8.37
	33.27	4	5.80	3	10.70	3	4.88	4	8.44
	33.36	4	5.78	3	10.71	3	4.89	4	8.51
	33.45	4	5.77	3	10.72	3	4.91	4	8.57
	33.54	4	5.76	3	10.72	3	4.92	4	8.64
	33.63	4	5.75	3	10.73	3	4.93	4	8.71
	33.72	4	5.73	3	10.73	3	4.94	4	8.77
	33.80	4	5.72	3	10.73	3	4.95	4	8.83
	33.89	4	5.71	3	10.74	3	4.96	4	8.89
	33.98	4	5.70	3	10.74	3	4.98	4	8.95
	34.07	4	5.69	3	10.74	3	4.99	4	9.01
	34.16	4	5.68	3	10.74	3	5.00	4	9.07
	34.25	4	5.67	3	10.75	3	5.02	4	9.12
	34.34	4	5.67	3	10.75	3	5.03	4	9.18
	34.43	4	5.66	3	10.75	3	5.04	4	9.23
	34.52	4	5.65	3	10.75	3	5.06	4	9.29
	34.61	4	5.64	3	10.75	3	5.07	4	9.34

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 222
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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
87	34.61	4	5.62	3	10.74	3	5.06	4	9.35
	34.70	4	5.60	3	10.74	3	5.07	4	9.42
	34.79	4	5.59	3	10.74	3	5.08	4	9.50
	34.88	4	5.57	3	10.74	3	5.09	4	9.57
	34.97	4	5.56	3	10.75	3	5.11	4	9.65
	35.06	4	5.54	3	10.76	3	5.12	4	9.73
	35.15	4	5.52	3	10.77	3	5.13	4	9.81
	35.24	4	5.50	3	10.77	3	5.14	4	9.89
	35.33	4	5.48	3	10.78	3	5.15	4	9.97
	35.42	4	5.46	3	10.79	3	5.16	4	10.05
	35.51	4	5.44	3	10.80	3	5.17	4	10.13
	35.59	4	5.42	3	10.81	3	5.17	4	10.20
	35.68	4	5.40	3	10.82	3	5.18	4	10.29
	35.77	4	5.39	3	10.83	3	5.19	4	10.36
	35.86	4	5.37	3	10.84	3	5.20	4	10.44
	35.95	4	5.35	3	10.85	3	5.21	4	10.52
	36.04	4	5.33	3	10.86	3	5.21	4	10.60
	36.13	4	5.31	3	10.87	3	5.22	4	10.67
	36.22	4	5.29	3	10.88	3	5.23	4	10.75
	36.31	4	5.28	3	10.89	3	5.23	4	10.80
	36.40	4	5.27	3	10.91	3	5.24	4	10.85
88	36.40	4	5.25	3	11.01	3	5.25	4	11.01
	36.43	4	5.16	4	11.26	3	5.16	3	11.26
	36.46	4	5.07	3	11.50	3	5.07	4	11.50
	36.49	4	4.98	3	11.74	3	4.98	4	11.74
	36.52	4	4.89	3	11.98	3	4.89	4	11.98
	36.55	4	4.81	3	12.23	3	4.81	3	12.23
	36.58	4	4.72	3	12.47	3	4.72	4	12.47
	36.61	4	4.63	3	12.71	3	4.63	3	12.71
	36.64	4	4.54	3	12.96	3	4.54	4	12.96
	36.67	4	4.45	3	13.20	3	4.45	4	13.20
	36.70	4	4.36	3	13.44	3	4.36	4	13.44
	36.73	4	4.27	3	13.69	3	4.27	3	13.69
	36.76	4	4.18	4	13.93	3	4.18	3	13.93
	36.79	4	4.09	4	14.18	3	4.09	3	14.18
	36.82	4	4.00	3	14.42	3	4.00	4	14.42
	36.85	4	3.91	4	14.66	3	3.91	3	14.66
	36.88	4	3.82	4	14.91	3	3.82	3	14.91
	36.90	4	1.92	3	4.20	3	1.92	4	4.20
	36.91	4	0.97	3	-1.16	3	0.97	4	-1.16
	36.94	4	0.85	3	-0.86	3	0.85	4	-0.86
	36.97	4	0.73	3	-0.56	3	0.73	4	-0.56
	37.00	4	0.61	3	-0.26	3	0.61	4	-0.26

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	0.0	8.8	0.0	10.4	221.7
2	0.10	29.1	0.0	8.4	4.8	5.4	193.2
3	0.12	29.1	0.0	8.4	13.1	4.7	185.6
4	0.15	29.1	0.0	8.4	13.0	4.7	185.7
5	0.18	29.1	0.0	8.4	13.0	4.7	185.7
6	0.21	29.0	0.0	8.4	12.9	4.7	185.8
7	0.24	29.0	0.0	8.4	12.9	4.7	185.9
8	0.27	29.0	0.0	8.4	12.9	4.7	185.9
9	0.30	29.0	0.0	8.4	12.9	4.7	185.8
10	0.33	29.0	0.0	8.4	13.0	4.7	185.8
11	0.36	28.9	0.0	8.4	13.0	4.7	185.8
12	0.39	28.9	0.0	8.4	13.0	4.7	185.8
13	0.42	28.9	0.0	8.4	13.1	4.7	185.8
14	0.45	28.9	0.0	8.4	13.1	4.7	185.8
15	0.48	28.9	0.0	8.4	13.1	4.7	185.8
16	0.51	28.8	0.0	8.4	13.2	4.7	185.8
17	0.54	28.8	0.0	8.4	13.2	4.7	185.8
18	0.57	28.8	0.0	8.4	13.2	4.7	185.8
19	0.60	28.8	0.0	8.4	13.2	4.7	185.8
20	0.60	28.8	0.0	8.4	13.1	4.7	185.9
21	0.69	28.7	0.0	8.4	13.2	4.7	185.9
22	0.78	28.6	0.0	8.4	13.3	4.7	185.8
23	0.87	28.6	0.0	8.4	13.4	4.7	185.8
24	0.96	28.5	0.0	8.4	13.5	4.7	185.8
25	1.05	28.4	0.0	8.4	13.6	4.7	185.8
26	1.14	28.4	0.0	8.4	13.7	4.7	185.7
27	1.23	28.3	0.0	8.4	13.7	4.7	185.7
28	1.32	28.2	0.0	8.4	13.8	4.7	185.7
29	1.41	28.2	0.0	8.4	13.9	4.7	185.7
30	1.50	28.1	0.0	8.4	14.0	4.7	185.7
31	1.58	28.1	0.0	8.4	14.1	4.7	185.7
32	1.67	28.0	0.0	8.4	14.2	4.7	185.6
33	1.76	27.9	0.0	8.4	14.2	4.7	185.6
34	1.85	27.9	0.0	8.4	14.3	4.7	185.6
35	1.94	27.8	0.0	8.4	14.4	4.7	185.6
36	2.03	27.7	0.0	8.4	14.5	4.7	185.6
37	2.12	27.7	0.0	8.4	14.6	4.7	185.6
38	2.21	27.6	0.0	8.4	14.6	4.7	185.6
39	2.30	27.5	0.0	8.4	14.7	4.7	185.6
40	2.39	27.5	0.0	8.3	14.8	4.8	185.5
41	2.39	27.5	0.0	8.3	14.8	4.7	185.5
42	2.48	27.4	0.0	8.3	14.9	4.8	185.5
43	2.57	27.3	0.0	8.3	15.0	4.8	185.5
44	2.66	27.3	0.0	8.3	15.0	4.8	185.5
45	2.75	27.2	0.0	8.3	15.1	4.8	185.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	27.2	0.0	8.3	15.2	4.8	185.5
47	2.93	27.1	0.0	8.3	15.3	4.8	185.5
48	3.02	27.0	0.0	8.3	15.4	4.8	185.4
49	3.11	27.0	0.0	8.3	15.4	4.8	185.4
50	3.20	26.9	0.0	8.3	15.5	4.8	185.4
51	3.28	26.8	0.0	8.3	15.6	4.8	185.4
52	3.37	26.8	0.0	8.3	15.7	4.8	185.4
53	3.46	26.7	0.0	8.3	15.7	4.8	185.4
54	3.55	26.6	0.0	8.3	15.8	4.8	185.4
55	3.64	26.6	0.0	8.3	15.9	4.8	185.4
56	3.73	26.5	0.0	8.3	16.0	4.8	185.4
57	3.82	26.5	0.0	8.3	16.0	4.8	185.4
58	3.91	26.4	0.0	8.3	16.1	4.8	185.4
59	4.00	26.3	0.0	8.3	16.2	4.8	185.4
60	4.09	26.3	0.0	8.2	16.3	4.8	185.4
61	4.18	26.2	0.0	8.2	16.3	4.8	185.3
62	4.18	26.2	0.0	8.2	16.3	4.8	185.3
63	4.27	26.1	0.0	8.2	16.4	4.8	185.3
64	4.36	26.1	0.0	8.2	16.5	4.8	185.3
65	4.45	26.0	0.0	8.2	16.6	4.8	185.3
66	4.54	25.9	0.0	8.2	16.6	4.8	185.3
67	4.63	25.9	0.0	8.2	16.7	4.8	185.3
68	4.72	25.8	0.0	8.2	16.8	4.8	185.3
69	4.81	25.7	0.0	8.2	16.8	4.8	185.3
70	4.90	25.7	0.0	8.2	16.9	4.8	185.3
71	4.99	25.6	0.0	8.2	17.0	4.8	185.3
72	5.07	25.6	0.0	8.2	17.1	4.9	185.3
73	5.16	25.5	0.0	8.2	17.1	4.9	185.3
74	5.25	25.4	0.0	8.2	17.2	4.9	185.3
75	5.34	25.4	0.0	8.1	17.3	4.9	185.3
76	5.43	25.3	0.0	8.1	17.3	4.9	185.3
77	5.52	25.2	0.0	8.1	17.4	4.9	185.3
78	5.61	25.2	0.0	8.1	17.5	4.9	185.3
79	5.70	25.1	0.0	8.1	17.5	4.9	185.3
80	5.79	25.0	0.0	8.1	17.6	4.9	185.3
81	5.88	25.0	0.0	8.1	17.6	4.9	185.3
82	5.97	24.9	0.0	8.1	17.7	4.9	185.3
83	5.97	24.9	0.0	8.1	17.7	4.9	185.2
84	6.06	24.9	0.0	8.1	17.8	4.9	185.2
85	6.15	24.8	0.0	8.1	17.9	4.9	185.2
86	6.24	24.7	0.0	8.1	17.9	4.9	185.3
87	6.33	24.7	0.0	8.1	18.0	4.9	185.3
88	6.42	24.5	0.0	8.1	18.0	5.0	185.4
89	6.51	24.3	0.0	8.0	18.1	5.0	185.5
90	6.60	24.2	0.0	8.0	18.2	5.0	185.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	24.0	0.0	8.0	18.2	5.0	185.6
92	6.78	23.9	0.0	8.0	18.3	5.0	185.7
93	6.86	23.7	0.0	8.0	18.3	5.0	185.8
94	6.95	23.6	0.0	8.0	18.4	5.1	185.9
95	7.04	23.4	0.0	8.0	18.4	5.1	186.0
96	7.13	23.2	0.0	8.0	18.4	5.1	186.1
97	7.22	23.1	0.0	8.0	18.5	5.1	186.3
98	7.31	22.9	0.0	8.0	18.5	5.1	186.4
99	7.40	22.8	0.0	8.0	18.6	5.1	186.5
100	7.49	22.6	0.0	8.0	18.6	5.2	186.6
101	7.58	22.4	0.0	8.0	18.6	5.2	186.7
102	7.67	22.3	0.0	8.0	18.6	5.2	186.8
103	7.76	22.1	0.0	7.9	18.7	5.2	186.9
104	7.76	22.1	0.0	7.9	18.7	5.2	186.9
105	7.85	22.0	0.0	7.9	18.7	5.2	187.0
106	7.94	21.8	0.0	7.9	18.7	5.3	187.2
107	8.03	21.7	0.0	7.9	18.8	5.3	187.3
108	8.12	21.5	0.0	7.9	18.8	5.3	187.4
109	8.21	21.3	0.0	7.9	18.8	5.3	187.5
110	8.30	21.2	0.0	7.9	18.8	5.4	187.6
111	8.39	21.0	0.0	7.9	18.8	5.4	187.8
112	8.48	20.9	0.0	7.9	18.8	5.4	187.9
113	8.57	20.7	0.0	7.9	18.8	5.4	188.0
114	8.66	20.6	0.0	7.9	18.9	5.4	188.2
115	8.74	20.4	0.0	7.9	18.9	5.5	188.3
116	8.83	20.2	0.0	7.9	18.9	5.5	188.4
117	8.92	20.1	0.0	7.9	18.9	5.5	188.6
118	9.01	19.9	0.0	7.9	18.9	5.5	188.7
119	9.10	19.8	0.0	7.9	18.9	5.5	188.8
120	9.19	19.6	0.0	7.9	18.9	5.6	188.9
121	9.28	19.5	0.0	7.9	18.9	5.6	189.1
122	9.37	19.3	0.0	7.9	18.9	5.6	189.2
123	9.46	19.1	0.0	7.9	18.9	5.6	189.4
124	9.55	19.0	0.0	7.9	18.9	5.7	189.5
125	9.55	19.0	0.0	7.9	18.9	5.7	189.5
126	9.64	18.8	0.0	7.8	18.9	5.7	189.6
127	9.73	18.7	0.0	7.8	18.9	5.7	189.8
128	9.82	18.5	0.0	7.8	18.9	5.7	189.9
129	9.91	18.4	0.0	7.8	18.9	5.8	190.1
130	10.00	18.2	0.0	7.8	18.9	5.8	190.2
131	10.09	18.1	0.0	7.8	18.8	5.8	190.4
132	10.18	17.9	0.0	7.8	18.8	5.8	190.5
133	10.27	17.7	0.0	7.8	18.8	5.9	190.7
134	10.36	17.6	0.0	7.8	18.8	5.9	190.8
135	10.44	17.4	0.0	7.8	18.8	5.9	191.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
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Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	17.3	0.0	7.8	18.7	5.9	191.1
137	10.62	17.1	0.0	7.8	18.7	6.0	191.3
138	10.71	17.0	0.0	7.8	18.7	6.0	191.4
139	10.80	16.8	0.0	7.8	18.7	6.0	191.6
140	10.89	16.6	0.0	7.8	18.6	6.0	191.8
141	10.98	16.5	0.0	7.8	18.6	6.1	191.9
142	11.07	16.3	0.0	7.8	18.6	6.1	192.1
143	11.16	16.2	0.0	7.8	18.6	6.1	192.2
144	11.25	16.0	0.0	7.8	18.5	6.1	192.4
145	11.34	15.9	0.0	7.8	18.5	6.2	192.6
146	11.34	15.9	0.0	7.8	18.5	6.2	192.6
147	11.43	15.7	0.0	7.8	18.5	6.2	192.7
148	11.52	15.6	0.0	7.8	18.4	6.2	192.9
149	11.61	15.4	0.0	7.8	18.4	6.2	193.0
150	11.70	15.2	0.0	7.8	18.4	6.3	193.2
151	11.79	15.1	0.0	7.8	18.3	6.3	193.4
152	11.88	14.9	0.0	7.8	18.3	6.3	193.5
153	11.97	14.9	0.0	7.8	18.3	6.3	193.6
154	12.06	14.8	0.0	7.8	18.3	6.4	193.7
155	12.15	14.7	0.0	7.8	18.2	6.4	193.8
156	12.24	14.7	0.0	7.8	18.2	6.4	193.8
157	12.32	14.6	0.0	7.8	18.2	6.4	193.9
158	12.41	14.6	0.0	7.8	18.1	6.4	194.0
159	12.50	14.6	0.0	7.8	18.1	6.4	194.0
160	12.59	14.7	0.0	7.8	18.0	6.4	194.0
161	12.68	14.8	0.0	7.8	18.0	6.4	193.9
162	12.77	14.8	0.0	7.8	18.0	6.4	193.9
163	12.86	14.9	0.0	7.8	17.9	6.4	193.9
164	12.95	14.9	0.0	7.8	17.9	6.4	193.8
165	13.04	15.0	0.0	7.8	17.9	6.4	193.8
166	13.13	15.1	0.0	7.8	17.8	6.4	193.8
167	13.13	15.1	0.0	7.8	17.8	6.4	193.8
168	13.22	15.1	0.0	7.8	17.8	6.4	193.7
169	13.31	15.2	0.0	7.8	17.8	6.4	193.7
170	13.40	15.2	0.0	7.8	17.8	6.4	193.7
171	13.49	15.3	0.0	7.8	17.7	6.4	193.6
172	13.58	15.4	0.0	7.8	17.7	6.4	193.6
173	13.67	15.4	0.0	7.8	17.7	6.4	193.6
174	13.76	15.5	0.0	7.8	17.6	6.4	193.6
175	13.85	15.6	0.0	7.8	17.6	6.4	193.5
176	13.94	15.6	0.0	7.8	17.6	6.4	193.5
177	14.02	15.7	0.0	7.8	17.5	6.4	193.5
178	14.11	15.7	0.0	7.8	17.5	6.4	193.4
179	14.20	15.8	0.0	7.8	17.5	6.4	193.4
180	14.29	15.9	0.0	7.8	17.5	6.4	193.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	15.9	0.0	7.8	17.4	6.4	193.3
182	14.47	16.0	0.0	7.8	17.4	6.4	193.3
183	14.56	16.1	0.0	7.8	17.4	6.4	193.3
184	14.65	16.1	0.0	7.8	17.3	6.4	193.2
185	14.74	16.2	0.0	7.8	17.3	6.4	193.2
186	14.83	16.2	0.0	7.8	17.3	6.4	193.2
187	14.92	16.3	0.0	7.8	17.2	6.4	193.2
188	14.92	16.3	0.0	7.8	17.2	6.4	193.2
189	15.01	16.4	0.0	7.8	17.2	6.4	193.1
190	15.10	16.4	0.0	7.8	17.2	6.4	193.1
191	15.19	16.5	0.0	7.8	17.2	6.4	193.0
192	15.28	16.5	0.0	7.8	17.1	6.4	193.0
193	15.37	16.6	0.0	7.8	17.1	6.4	193.0
194	15.46	16.7	0.0	7.8	17.1	6.4	192.9
195	15.55	16.7	0.0	7.8	17.1	6.4	192.9
196	15.64	16.8	0.0	7.8	17.0	6.4	192.9
197	15.73	16.9	0.0	7.8	17.0	6.4	192.8
198	15.81	16.9	0.0	7.8	17.0	6.4	192.8
199	15.90	17.0	0.0	7.8	17.0	6.4	192.8
200	15.99	17.0	0.0	7.8	17.0	6.4	192.7
201	16.08	17.1	0.0	7.8	16.9	6.4	192.7
202	16.17	17.2	0.0	7.8	16.9	6.4	192.7
203	16.26	17.2	0.0	7.8	16.9	6.4	192.6
204	16.35	17.3	0.0	7.8	16.9	6.4	192.6
205	16.44	17.4	0.0	7.8	16.9	6.4	192.5
206	16.53	17.4	0.0	7.8	16.8	6.4	192.5
207	16.62	17.5	0.0	7.8	16.8	6.3	192.5
208	16.71	17.5	0.0	7.8	16.8	6.3	192.4
209	16.71	17.5	0.0	7.8	16.8	6.3	192.4
210	16.80	17.6	0.0	7.8	16.8	6.3	192.4
211	16.89	17.7	0.0	7.8	16.8	6.3	192.3
212	16.98	17.7	0.0	7.8	16.8	6.3	192.3
213	17.07	17.8	0.0	7.8	16.7	6.3	192.3
214	17.16	17.8	0.0	7.8	16.7	6.3	192.2
215	17.25	17.9	0.0	7.8	16.7	6.3	192.2
216	17.34	18.0	0.0	7.8	16.7	6.3	192.1
217	17.43	18.0	0.0	7.8	16.7	6.3	192.1
218	17.52	18.1	0.0	7.8	16.7	6.3	192.0
219	17.60	18.2	0.0	7.8	16.7	6.3	192.0
220	17.69	18.2	0.0	7.8	16.7	6.3	191.9
221	17.78	18.3	0.0	7.8	16.6	6.3	191.9
222	17.87	18.3	0.0	7.8	16.6	6.3	191.8
223	17.96	18.4	0.0	7.8	16.6	6.3	191.8
224	18.05	18.5	0.0	7.8	16.6	6.3	191.8
225	18.14	18.5	0.0	7.8	16.6	6.3	191.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	18.6	0.0	7.8	16.6	6.3	191.7
227	18.32	18.6	0.0	7.8	16.6	6.3	191.6
228	18.41	18.7	0.0	7.8	16.6	6.2	191.6
229	18.50	18.8	0.0	7.8	16.6	6.2	191.5
230	18.50	18.8	0.0	7.8	16.6	6.2	191.5
231	18.59	18.7	0.0	7.8	16.6	6.2	191.6
232	18.68	18.6	0.0	7.8	16.6	6.3	191.6
233	18.77	18.6	0.0	7.8	16.6	6.3	191.7
234	18.86	18.5	0.0	7.8	16.6	6.3	191.7
235	18.95	18.5	0.0	7.8	16.6	6.3	191.8
236	19.04	18.4	0.0	7.8	16.6	6.3	191.8
237	19.13	18.3	0.0	7.8	16.6	6.3	191.9
238	19.22	18.3	0.0	7.8	16.6	6.3	191.9
239	19.31	18.2	0.0	7.8	16.7	6.3	191.9
240	19.40	18.2	0.0	7.8	16.7	6.3	192.0
241	19.48	18.1	0.0	7.8	16.7	6.3	192.0
242	19.57	18.0	0.0	7.8	16.7	6.3	192.1
243	19.66	18.0	0.0	7.8	16.7	6.3	192.1
244	19.75	17.9	0.0	7.8	16.7	6.3	192.2
245	19.84	17.8	0.0	7.8	16.7	6.3	192.2
246	19.93	17.8	0.0	7.8	16.7	6.3	192.3
247	20.02	17.7	0.0	7.8	16.8	6.3	192.3
248	20.11	17.7	0.0	7.8	16.8	6.3	192.3
249	20.20	17.6	0.0	7.8	16.8	6.3	192.4
250	20.29	17.5	0.0	7.8	16.8	6.3	192.4
251	20.29	17.5	0.0	7.8	16.8	6.3	192.4
252	20.38	17.5	0.0	7.8	16.8	6.3	192.5
253	20.47	17.4	0.0	7.8	16.8	6.4	192.5
254	20.56	17.4	0.0	7.8	16.9	6.4	192.5
255	20.65	17.3	0.0	7.8	16.9	6.4	192.6
256	20.74	17.2	0.0	7.8	16.9	6.4	192.6
257	20.83	17.2	0.0	7.8	16.9	6.4	192.7
258	20.92	17.1	0.0	7.8	16.9	6.4	192.7
259	21.01	17.0	0.0	7.8	17.0	6.4	192.7
260	21.10	17.0	0.0	7.8	17.0	6.4	192.8
261	21.19	16.9	0.0	7.8	17.0	6.4	192.8
262	21.27	16.9	0.0	7.8	17.0	6.4	192.8
263	21.36	16.8	0.0	7.8	17.0	6.4	192.9
264	21.45	16.7	0.0	7.8	17.1	6.4	192.9
265	21.54	16.7	0.0	7.8	17.1	6.4	193.0
266	21.63	16.6	0.0	7.8	17.1	6.4	193.0
267	21.72	16.5	0.0	7.8	17.1	6.4	193.0
268	21.81	16.5	0.0	7.8	17.2	6.4	193.1
269	21.90	16.4	0.0	7.8	17.2	6.4	193.1
270	21.99	16.4	0.0	7.8	17.2	6.4	193.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	16.3	0.0	7.8	17.2	6.4	193.2
272	22.08	16.3	0.0	7.8	17.2	6.4	193.2
273	22.17	16.2	0.0	7.8	17.3	6.4	193.2
274	22.26	16.2	0.0	7.8	17.3	6.4	193.2
275	22.35	16.1	0.0	7.8	17.3	6.4	193.2
276	22.44	16.1	0.0	7.8	17.4	6.4	193.3
277	22.53	16.0	0.0	7.8	17.4	6.4	193.3
278	22.62	15.9	0.0	7.8	17.4	6.4	193.3
279	22.71	15.9	0.0	7.8	17.4	6.4	193.4
280	22.80	15.8	0.0	7.8	17.5	6.4	193.4
281	22.89	15.7	0.0	7.8	17.5	6.4	193.4
282	22.98	15.7	0.0	7.8	17.5	6.4	193.5
283	23.06	15.6	0.0	7.8	17.6	6.4	193.5
284	23.15	15.6	0.0	7.8	17.6	6.4	193.5
285	23.24	15.5	0.0	7.8	17.6	6.4	193.6
286	23.33	15.4	0.0	7.8	17.7	6.4	193.6
287	23.42	15.4	0.0	7.8	17.7	6.4	193.6
288	23.51	15.3	0.0	7.8	17.7	6.4	193.7
289	23.60	15.2	0.0	7.8	17.7	6.4	193.7
290	23.69	15.2	0.0	7.8	17.8	6.4	193.7
291	23.78	15.1	0.0	7.8	17.8	6.4	193.7
292	23.87	15.1	0.0	7.8	17.8	6.4	193.8
293	23.87	15.1	0.0	7.8	17.8	6.4	193.8
294	23.96	15.0	0.0	7.8	17.9	6.4	193.8
295	24.05	14.9	0.0	7.8	17.9	6.4	193.8
296	24.14	14.9	0.0	7.8	17.9	6.4	193.9
297	24.23	14.8	0.0	7.8	18.0	6.4	193.9
298	24.32	14.8	0.0	7.8	18.0	6.4	193.9
299	24.41	14.7	0.0	7.8	18.0	6.4	194.0
300	24.50	14.6	0.0	7.8	18.1	6.4	194.0
301	24.59	14.6	0.0	7.8	18.1	6.4	194.0
302	24.68	14.6	0.0	7.8	18.1	6.4	193.9
303	24.76	14.7	0.0	7.8	18.2	6.4	193.8
304	24.85	14.7	0.0	7.8	18.2	6.4	193.8
305	24.94	14.8	0.0	7.8	18.2	6.4	193.7
306	25.03	14.9	0.0	7.8	18.3	6.3	193.6
307	25.12	14.9	0.0	7.8	18.3	6.3	193.5
308	25.21	15.1	0.0	7.8	18.3	6.3	193.4
309	25.30	15.2	0.0	7.8	18.4	6.3	193.2
310	25.39	15.4	0.0	7.8	18.4	6.3	193.0
311	25.48	15.6	0.0	7.8	18.4	6.2	192.9
312	25.57	15.7	0.0	7.8	18.5	6.2	192.7
313	25.66	15.9	0.0	7.8	18.5	6.2	192.6
314	25.66	15.9	0.0	7.8	18.5	6.2	192.6
315	25.75	16.0	0.0	7.8	18.5	6.1	192.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	16.2	0.0	7.8	18.6	6.1	192.2
317	25.93	16.3	0.0	7.8	18.6	6.1	192.1
318	26.02	16.5	0.0	7.8	18.6	6.1	191.9
319	26.11	16.6	0.0	7.8	18.6	6.0	191.8
320	26.20	16.8	0.0	7.8	18.7	6.0	191.6
321	26.29	17.0	0.0	7.8	18.7	6.0	191.5
322	26.38	17.1	0.0	7.8	18.7	6.0	191.3
323	26.47	17.3	0.0	7.8	18.7	5.9	191.1
324	26.56	17.4	0.0	7.8	18.8	5.9	191.0
325	26.64	17.6	0.0	7.8	18.8	5.9	190.8
326	26.73	17.7	0.0	7.8	18.8	5.9	190.7
327	26.82	17.9	0.0	7.8	18.8	5.8	190.5
328	26.91	18.1	0.0	7.8	18.8	5.8	190.4
329	27.00	18.2	0.0	7.8	18.9	5.8	190.2
330	27.09	18.4	0.0	7.8	18.9	5.8	190.1
331	27.18	18.5	0.0	7.8	18.9	5.7	189.9
332	27.27	18.7	0.0	7.8	18.9	5.7	189.8
333	27.36	18.8	0.0	7.8	18.9	5.7	189.6
334	27.45	19.0	0.0	7.9	18.9	5.7	189.5
335	27.45	19.0	0.0	7.9	18.9	5.7	189.5
336	27.54	19.1	0.0	7.9	18.9	5.6	189.4
337	27.63	19.3	0.0	7.9	18.9	5.6	189.2
338	27.72	19.5	0.0	7.9	18.9	5.6	189.1
339	27.81	19.6	0.0	7.9	18.9	5.6	189.0
340	27.90	19.8	0.0	7.9	18.9	5.5	188.8
341	27.99	19.9	0.0	7.9	18.9	5.5	188.7
342	28.08	20.1	0.0	7.9	18.9	5.5	188.6
343	28.17	20.2	0.0	7.9	18.9	5.5	188.4
344	28.26	20.4	0.0	7.9	18.9	5.5	188.3
345	28.35	20.6	0.0	7.9	18.9	5.4	188.2
346	28.43	20.7	0.0	7.9	18.8	5.4	188.0
347	28.52	20.9	0.0	7.9	18.8	5.4	187.9
348	28.61	21.0	0.0	7.9	18.8	5.4	187.8
349	28.70	21.2	0.0	7.9	18.8	5.4	187.7
350	28.79	21.3	0.0	7.9	18.8	5.3	187.5
351	28.88	21.5	0.0	7.9	18.8	5.3	187.4
352	28.97	21.7	0.0	7.9	18.7	5.3	187.3
353	29.06	21.8	0.0	7.9	18.7	5.3	187.2
354	29.15	22.0	0.0	7.9	18.7	5.2	187.0
355	29.24	22.1	0.0	7.9	18.7	5.2	186.9
356	29.24	22.1	0.0	7.9	18.7	5.2	186.9
357	29.33	22.3	0.0	8.0	18.6	5.2	186.8
358	29.42	22.4	0.0	8.0	18.6	5.2	186.7
359	29.51	22.6	0.0	8.0	18.6	5.2	186.6
360	29.60	22.8	0.0	8.0	18.5	5.1	186.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	30.3	3.0	8.3	5.6	4.9	188.8
3	0.12	30.3	8.9	8.3	16.5	3.7	173.2
4	0.15	30.3	8.9	8.3	16.4	3.7	173.4
5	0.18	30.3	8.9	8.3	16.2	3.7	173.5
6	0.21	30.2	8.9	8.3	16.1	3.7	173.7
7	0.24	30.2	8.9	8.3	16.0	3.7	173.8
8	0.27	30.2	8.9	8.3	15.9	3.7	173.9
9	0.30	30.2	8.9	8.3	15.9	3.7	173.9
10	0.33	30.2	8.9	8.3	15.9	3.7	174.0
11	0.36	30.1	8.9	8.3	15.9	3.7	174.0
12	0.39	30.1	8.9	8.3	15.8	3.7	174.0
13	0.42	30.1	8.9	8.3	15.8	3.7	174.1
14	0.45	30.1	8.9	8.3	15.8	3.7	174.1
15	0.48	30.1	8.9	8.3	15.8	3.7	174.2
16	0.51	30.0	8.9	8.3	15.7	3.7	174.2
17	0.54	30.0	8.9	8.3	15.7	3.7	174.3
18	0.57	30.0	8.9	8.3	15.7	3.7	174.3
19	0.60	30.0	8.9	8.3	15.7	3.7	174.4
20	0.60	30.0	8.8	8.3	15.5	3.7	174.6
21	0.69	29.9	8.9	8.3	15.5	3.7	174.6
22	0.78	29.8	8.9	8.3	15.6	3.7	174.6
23	0.87	29.8	8.9	8.3	15.7	3.7	174.5
24	0.96	29.7	8.9	8.3	15.8	3.7	174.5
25	1.05	29.6	8.9	8.3	15.9	3.7	174.5
26	1.14	29.6	9.0	8.3	15.9	3.7	174.4
27	1.23	29.5	9.0	8.3	16.0	3.7	174.4
28	1.32	29.4	9.0	8.3	16.1	3.7	174.3
29	1.41	29.4	9.1	8.3	16.1	3.7	174.3
30	1.50	29.3	9.1	8.3	16.2	3.7	174.3
31	1.58	29.3	9.2	8.2	16.3	3.7	174.2
32	1.67	29.2	9.2	8.2	16.4	3.7	174.2
33	1.76	29.1	9.3	8.2	16.4	3.7	174.1
34	1.85	29.1	9.3	8.2	16.5	3.7	174.0
35	1.94	29.0	9.4	8.2	16.6	3.7	174.0
36	2.03	28.9	9.5	8.2	16.7	3.7	173.9
37	2.12	28.9	9.5	8.2	16.7	3.7	173.8
38	2.21	28.8	9.6	8.2	16.8	3.7	173.8
39	2.30	28.7	9.7	8.2	16.9	3.7	173.7
40	2.39	28.7	9.8	8.2	17.0	3.7	173.6
41	2.39	28.7	9.8	8.2	16.9	3.7	173.6
42	2.48	28.6	9.8	8.2	17.0	3.7	173.5
43	2.57	28.5	9.9	8.2	17.1	3.7	173.4
44	2.66	28.5	10.0	8.2	17.2	3.7	173.3
45	2.75	28.4	10.1	8.2	17.2	3.7	173.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 242
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	22.9	0.0	8.0	18.5	5.1	186.4
362	29.78	23.1	0.0	8.0	18.5	5.1	186.3
363	29.87	23.2	0.0	8.0	18.4	5.1	186.2
364	29.96	23.4	0.0	8.0	18.4	5.1	186.1
365	30.05	23.6	0.0	8.0	18.3	5.1	185.9
366	30.14	23.7	0.0	8.0	18.3	5.0	185.8
367	30.22	23.9	0.0	8.0	18.3	5.0	185.7
368	30.31	24.0	0.0	8.0	18.2	5.0	185.6
369	30.40	24.2	0.0	8.0	18.1	5.0	185.6
370	30.49	24.3	0.0	8.0	18.1	5.0	185.5
371	30.58	24.5	0.0	8.1	18.0	5.0	185.4
372	30.67	24.7	0.0	8.1	18.0	4.9	185.3
373	30.76	24.7	0.0	8.1	17.9	4.9	185.3
374	30.85	24.8	0.0	8.1	17.9	4.9	185.3
375	30.94	24.9	0.0	8.1	17.8	4.9	185.3
376	31.03	24.9	0.0	8.1	17.7	4.9	185.3
377	31.03	24.9	0.0	8.1	17.7	4.9	185.3
378	31.12	25.0	0.0	8.1	17.6	4.9	185.3
379	31.21	25.0	0.0	8.1	17.6	4.9	185.3
380	31.30	25.1	0.0	8.1	17.5	4.9	185.3
381	31.39	25.2	0.0	8.1	17.4	4.9	185.3
382	31.48	25.2	0.0	8.1	17.4	4.9	185.3
383	31.57	25.3	0.0	8.1	17.3	4.9	185.3
384	31.66	25.4	0.0	8.1	17.2	4.9	185.3
385	31.75	25.4	0.0	8.2	17.2	4.9	185.3
386	31.84	25.5	0.0	8.2	17.1	4.9	185.3
387	31.92	25.6	0.0	8.2	17.0	4.9	185.3
388	32.01	25.6	0.0	8.2	17.0	4.8	185.3
389	32.10	25.7	0.0	8.2	16.9	4.8	185.3
390	32.19	25.7	0.0	8.2	16.8	4.8	185.3
391	32.28	25.8	0.0	8.2	16.8	4.8	185.3
392	32.37	25.9	0.0	8.2	16.7	4.8	185.3
393	32.46	25.9	0.0	8.2	16.6	4.8	185.3
394	32.55	26.0	0.0	8.2	16.5	4.8	185.3
395	32.64	26.1	0.0	8.2	16.5	4.8	185.3
396	32.73	26.1	0.0	8.2	16.4	4.8	185.3
397	32.82	26.2	0.0	8.2	16.3	4.8	185.3
398	32.82	26.2	0.0	8.2	16.3	4.8	185.4
399	32.91	26.3	0.0	8.2	16.2	4.8	185.4
400	33.00	26.3	0.0	8.3	16.2	4.8	185.4
401	33.09	26.4	0.0	8.3	16.1	4.8	185.4
402	33.18	26.5	0.0	8.3	16.0	4.8	185.4
403	33.27	26.5	0.0	8.3	16.0	4.8	185.4
404	33.36	26.6	0.0	8.3	15.9	4.8	185.4
405	33.45	26.6	0.0	8.3	15.8	4.8	185.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	26.7	0.0	8.3	15.7	4.8	185.4
407	33.63	26.8	0.0	8.3	15.7	4.8	185.4
408	33.72	26.8	0.0	8.3	15.6	4.8	185.4
409	33.80	26.9	0.0	8.3	15.5	4.8	185.4
410	33.89	27.0	0.0	8.3	15.4	4.8	185.4
411	33.98	27.0	0.0	8.3	15.4	4.8	185.4
412	34.07	27.1	0.0	8.3	15.3	4.8	185.5
413	34.16	27.2	0.0	8.3	15.2	4.8	185.5
414	34.25	27.2	0.0	8.3	15.1	4.8	185.5
415	34.34	27.3	0.0	8.3	15.0	4.8	185.5
416	34.43	27.3	0.0	8.3	15.0	4.8	185.5
417	34.52	27.4	0.0	8.3	14.9	4.8	185.5
418	34.61	27.5	0.0	8.3	14.8	4.7	185.5
419	34.61	27.5	0.0	8.3	14.8	4.8	185.5
420	34.70	27.5	0.0	8.4	14.7	4.7	185.5
421	34.79	27.6	0.0	8.4	14.6	4.7	185.6
422	34.88	27.7	0.0	8.4	14.6	4.7	185.6
423	34.97	27.7	0.0	8.4	14.5	4.7	185.6
424	35.06	27.8	0.0	8.4	14.4	4.7	185.6
425	35.15	27.9	0.0	8.4	14.3	4.7	185.6
426	35.24	27.9	0.0	8.4	14.2	4.7	185.6
427	35.33	28.0	0.0	8.4	14.2	4.7	185.6
428	35.42	28.1	0.0	8.4	14.1	4.7	185.7
429	35.51	28.1	0.0	8.4	14.0	4.7	185.7
430	35.59	28.2	0.0	8.4	13.9	4.7	185.7
431	35.68	28.2	0.0	8.4	13.8	4.7	185.7
432	35.77	28.3	0.0	8.4	13.8	4.7	185.7
433	35.86	28.4	0.0	8.4	13.7	4.7	185.7
434	35.95	28.4	0.0	8.4	13.6	4.7	185.8
435	36.04	28.5	0.0	8.4	13.5	4.7	185.8
436	36.13	28.6	0.0	8.4	13.4	4.7	185.8
437	36.22	28.6	0.0	8.4	13.3	4.7	185.8
438	36.31	28.7	0.0	8.4	13.2	4.7	185.8
439	36.40	28.8	0.0	8.4	13.1	4.7	185.9
440	36.40	28.8	0.0	8.4	13.2	4.7	185.8
441	36.43	28.8	0.0	8.4	13.2	4.7	185.8
442	36.46	28.8	0.0	8.4	13.2	4.7	185.8
443	36.49	28.8	0.0	8.4	13.2	4.7	185.8
444	36.52	28.9	0.0	8.4	13.1	4.7	185.8
445	36.55	28.9	0.0	8.4	13.1	4.7	185.8
446	36.58	28.9	0.0	8.4	13.1	4.7	185.8
447	36.61	28.9	0.0	8.4	13.1	4.7	185.8
448	36.64	28.9	0.0	8.4	13.0	4.7	185.8
449	36.67	29.0	0.0	8.4	13.0	4.7	185.8
450	36.70	29.0	0.0	8.4	13.0	4.7	185.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga int 37m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	29.0	0.0	8.4	12.9	4.7	185.8
452	36.76	29.0	0.0	8.4	12.9	4.7	185.9
453	36.79	29.0	0.0	8.4	12.9	4.7	185.9
454	36.82	29.1	0.0	8.4	12.8	4.7	185.9
455	36.85	29.1	0.0	8.4	12.8	4.7	185.9
456	36.88	29.1	0.0	8.4	12.7	4.7	185.9
457	36.90	29.1	0.0	8.4	4.7	5.4	193.3

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	28.4	10.2	8.2	17.3	3.7	173.2
47	2.93	28.3	10.3	8.2	17.4	3.7	173.1
48	3.02	28.2	10.4	8.2	17.5	3.7	173.0
49	3.11	28.2	10.5	8.1	17.5	3.7	172.8
50	3.20	28.1	10.6	8.1	17.6	3.7	172.7
51	3.28	28.0	10.8	8.1	17.7	3.7	172.6
52	3.37	28.0	10.9	8.1	17.7	3.7	172.5
53	3.46	27.9	11.0	8.1	17.8	3.7	172.4
54	3.55	27.8	11.1	8.1	17.9	3.7	172.3
55	3.64	27.8	11.2	8.1	17.9	3.7	172.2
56	3.73	27.7	11.4	8.1	18.0	3.7	172.0
57	3.82	27.7	11.5	8.1	18.1	3.7	171.9
58	3.91	27.6	11.6	8.1	18.2	3.7	171.8
59	4.00	27.5	11.8	8.1	18.2	3.7	171.7
60	4.09	27.5	11.9	8.1	18.3	3.6	171.5
61	4.18	27.4	12.1	8.1	18.3	3.6	171.4
62	4.18	27.4	12.1	8.1	18.4	3.6	171.4
63	4.27	27.3	12.2	8.0	18.4	3.6	171.3
64	4.36	27.3	12.4	8.0	18.5	3.6	171.1
65	4.45	27.2	12.5	8.0	18.6	3.6	171.0
66	4.54	27.1	12.7	8.0	18.6	3.6	170.8
67	4.63	27.1	12.8	8.0	18.7	3.6	170.7
68	4.72	27.0	13.0	8.0	18.8	3.6	170.6
69	4.81	26.9	13.1	8.0	18.8	3.6	170.4
70	4.90	26.9	13.3	8.0	18.9	3.6	170.3
71	4.99	26.8	13.5	8.0	18.9	3.6	170.1
72	5.07	26.8	13.6	8.0	19.0	3.6	169.9
73	5.16	26.7	13.8	8.0	19.1	3.6	169.8
74	5.25	26.6	14.0	8.0	19.1	3.6	169.6
75	5.34	26.6	14.2	7.9	19.2	3.6	169.5
76	5.43	26.5	14.3	7.9	19.2	3.6	169.3
77	5.52	26.4	14.5	7.9	19.3	3.6	169.2
78	5.61	26.2	14.7	7.9	19.4	3.6	169.2
79	5.70	26.0	14.9	7.9	19.4	3.6	169.1
80	5.79	25.9	15.0	7.9	19.5	3.6	169.1
81	5.88	25.7	15.2	7.9	19.5	3.6	169.0
82	5.97	25.5	15.4	7.9	19.6	3.6	169.0
83	5.97	25.5	15.4	7.9	19.6	3.6	169.0
84	6.06	25.3	15.6	7.9	19.6	3.6	168.9
85	6.15	25.1	15.7	7.9	19.7	3.6	168.9
86	6.24	25.0	15.9	7.9	19.7	3.6	168.9
87	6.33	24.8	16.1	7.9	19.8	3.6	168.8
88	6.42	24.6	16.3	7.8	19.8	3.6	168.8
89	6.51	24.4	16.4	7.8	19.9	3.6	168.8
90	6.60	24.2	16.6	7.8	19.9	3.6	168.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	24.1	16.7	7.8	19.9	3.6	168.7
92	6.78	23.9	16.9	7.8	20.0	3.6	168.7
93	6.86	23.7	17.1	7.8	20.0	3.6	168.7
94	6.95	23.5	17.2	7.8	20.1	3.6	168.7
95	7.04	23.3	17.4	7.8	20.1	3.6	168.7
96	7.13	23.2	17.5	7.8	20.1	3.6	168.7
97	7.22	23.0	17.7	7.8	20.2	3.6	168.7
98	7.31	22.8	17.8	7.8	20.2	3.6	168.7
99	7.40	22.6	17.9	7.8	20.2	3.6	168.7
100	7.49	22.4	18.1	7.8	20.2	3.7	168.7
101	7.58	22.2	18.2	7.8	20.3	3.7	168.8
102	7.67	22.1	18.3	7.8	20.3	3.7	168.8
103	7.76	21.9	18.5	7.8	20.3	3.7	168.8
104	7.76	21.9	18.5	7.8	20.3	3.7	168.8
105	7.85	21.7	18.6	7.7	20.3	3.7	168.8
106	7.94	21.5	18.7	7.7	20.4	3.7	168.9
107	8.03	21.3	18.8	7.7	20.4	3.7	168.9
108	8.12	21.2	18.9	7.7	20.4	3.7	169.0
109	8.21	21.0	19.0	7.7	20.4	3.7	169.0
110	8.30	20.8	19.1	7.7	20.4	3.7	169.1
111	8.39	20.6	19.2	7.7	20.4	3.7	169.2
112	8.48	20.4	19.3	7.7	20.4	3.8	169.3
113	8.57	20.3	19.4	7.7	20.4	3.8	169.4
114	8.66	20.1	19.5	7.7	20.3	3.8	169.5
115	8.74	19.9	19.6	7.7	20.3	3.8	169.6
116	8.83	19.7	19.7	7.7	20.3	3.8	169.7
117	8.92	19.6	19.7	7.7	20.3	3.8	169.8
118	9.01	19.4	19.8	7.7	20.3	3.8	169.9
119	9.10	19.2	19.9	7.7	20.2	3.8	170.1
120	9.19	19.0	19.9	7.7	20.2	3.9	170.2
121	9.28	18.8	20.0	7.7	20.2	3.9	170.3
122	9.37	18.7	20.0	7.7	20.1	3.9	170.5
123	9.46	18.5	20.1	7.7	20.1	3.9	170.6
124	9.55	18.3	20.1	7.7	20.1	3.9	170.8
125	9.55	18.3	20.1	7.7	20.1	3.9	170.8
126	9.64	18.1	20.2	7.7	20.0	3.9	171.0
127	9.73	17.9	20.2	7.7	20.0	4.0	171.1
128	9.82	17.8	20.2	7.7	20.0	4.0	171.3
129	9.91	17.6	20.2	7.7	19.9	4.0	171.5
130	10.00	17.5	20.3	7.7	19.9	4.0	171.5
131	10.09	17.5	20.3	7.7	19.8	4.0	171.6
132	10.18	17.4	20.3	7.7	19.8	4.0	171.7
133	10.27	17.4	20.3	7.7	19.7	4.0	171.7
134	10.36	17.3	20.4	7.7	19.7	4.1	171.8
135	10.44	17.2	20.4	7.7	19.7	4.1	171.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	17.2	20.4	7.7	19.6	4.1	172.0
137	10.62	17.1	20.4	7.7	19.6	4.1	172.1
138	10.71	17.0	20.4	7.7	19.5	4.1	172.1
139	10.80	17.0	20.5	7.7	19.5	4.1	172.2
140	10.89	16.9	20.5	7.7	19.4	4.1	172.3
141	10.98	16.9	20.5	7.7	19.4	4.1	172.4
142	11.07	16.8	20.5	7.7	19.3	4.1	172.5
143	11.16	16.7	20.5	7.7	19.3	4.1	172.5
144	11.25	16.7	20.5	7.7	19.2	4.2	172.6
145	11.34	16.6	20.6	7.7	19.2	4.2	172.7
146	11.34	16.6	20.6	7.7	19.2	4.2	172.7
147	11.43	16.5	20.6	7.7	19.1	4.2	172.8
148	11.52	16.5	20.6	7.7	19.1	4.2	172.9
149	11.61	16.4	20.6	7.7	19.1	4.2	173.0
150	11.70	16.4	20.6	7.7	19.0	4.2	173.1
151	11.79	16.3	20.6	7.7	19.0	4.2	173.2
152	11.88	16.2	20.6	7.7	18.9	4.2	173.2
153	11.97	16.2	20.6	7.7	18.9	4.2	173.3
154	12.06	16.1	20.6	7.7	18.8	4.3	173.4
155	12.15	16.0	20.6	7.7	18.8	4.3	173.5
156	12.24	16.0	20.6	7.7	18.7	4.3	173.6
157	12.32	15.9	20.6	7.7	18.7	4.3	173.7
158	12.41	15.9	20.7	7.7	18.7	4.3	173.8
159	12.50	15.8	20.7	7.7	18.6	4.3	173.9
160	12.59	15.7	20.7	7.7	18.6	4.3	174.0
161	12.68	15.7	20.7	7.7	18.5	4.3	174.1
162	12.77	15.6	20.7	7.7	18.5	4.3	174.1
163	12.86	15.5	20.7	7.7	18.4	4.4	174.2
164	12.95	15.5	20.7	7.7	18.4	4.4	174.3
165	13.04	15.4	20.7	7.7	18.3	4.4	174.4
166	13.13	15.4	20.7	7.7	18.3	4.4	174.5
167	13.13	15.4	20.7	7.7	18.3	4.4	174.5
168	13.22	15.3	20.7	7.7	18.3	4.4	174.6
169	13.31	15.2	20.7	7.7	18.2	4.4	174.7
170	13.40	15.2	20.7	7.7	18.2	4.4	174.8
171	13.49	15.2	20.7	7.7	18.1	4.4	174.8
172	13.58	15.3	20.7	7.7	18.1	4.4	174.7
173	13.67	15.3	20.7	7.7	18.1	4.4	174.7
174	13.76	15.4	20.7	7.7	18.0	4.4	174.7
175	13.85	15.5	20.7	7.7	18.0	4.4	174.7
176	13.94	15.5	20.7	7.7	17.9	4.4	174.6
177	14.02	15.6	20.7	7.7	17.9	4.4	174.6
178	14.11	15.7	20.7	7.7	17.9	4.4	174.6
179	14.20	15.7	20.7	7.7	17.8	4.4	174.5
180	14.29	15.8	20.7	7.7	17.8	4.4	174.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	15.8	20.7	7.7	17.8	4.4	174.5
182	14.47	15.9	20.7	7.7	17.7	4.4	174.5
183	14.56	16.0	20.7	7.7	17.7	4.4	174.5
184	14.65	16.0	20.7	7.7	17.6	4.4	174.4
185	14.74	16.1	20.7	7.7	17.6	4.4	174.4
186	14.83	16.1	20.7	7.7	17.6	4.4	174.4
187	14.92	16.2	20.7	7.7	17.5	4.4	174.4
188	14.92	16.2	20.7	7.7	17.5	4.4	174.4
189	15.01	16.3	20.7	7.7	17.5	4.4	174.3
190	15.10	16.3	20.7	7.7	17.5	4.4	174.3
191	15.19	16.4	20.7	7.7	17.4	4.4	174.3
192	15.28	16.5	20.7	7.7	17.4	4.4	174.3
193	15.37	16.5	20.7	7.7	17.4	4.4	174.2
194	15.46	16.6	20.7	7.7	17.3	4.4	174.2
195	15.55	16.6	20.7	7.7	17.3	4.4	174.2
196	15.64	16.7	20.7	7.7	17.3	4.4	174.1
197	15.73	16.8	20.7	7.7	17.3	4.4	174.1
198	15.81	16.8	20.7	7.7	17.2	4.4	174.1
199	15.90	16.9	20.7	7.7	17.2	4.4	174.0
200	15.99	17.0	20.7	7.7	17.2	4.4	174.0
201	16.08	17.0	20.7	7.7	17.2	4.4	174.0
202	16.17	17.1	20.7	7.7	17.1	4.4	173.9
203	16.26	17.1	20.7	7.7	17.1	4.4	173.9
204	16.35	17.2	20.7	7.7	17.1	4.4	173.9
205	16.44	17.3	20.7	7.7	17.1	4.4	173.8
206	16.53	17.3	20.7	7.7	17.0	4.4	173.8
207	16.62	17.4	20.7	7.7	17.0	4.4	173.8
208	16.71	17.4	20.7	7.7	17.0	4.4	173.7
209	16.71	17.4	20.7	7.7	17.0	4.4	173.7
210	16.80	17.5	20.7	7.7	17.0	4.4	173.7
211	16.89	17.6	20.7	7.7	17.0	4.4	173.7
212	16.98	17.6	20.7	7.7	16.9	4.4	173.6
213	17.07	17.7	20.7	7.7	16.9	4.4	173.6
214	17.16	17.8	20.7	7.7	16.9	4.4	173.5
215	17.25	17.8	20.7	7.7	16.9	4.4	173.5
216	17.34	17.9	20.7	7.7	16.9	4.4	173.5
217	17.43	17.9	20.7	7.7	16.9	4.4	173.4
218	17.52	18.0	20.7	7.7	16.8	4.4	173.4
219	17.60	18.1	20.7	7.7	16.8	4.4	173.3
220	17.69	18.1	20.7	7.7	16.8	4.4	173.3
221	17.78	18.2	20.6	7.7	16.8	4.4	173.2
222	17.87	18.2	20.6	7.7	16.8	4.3	173.2
223	17.96	18.3	20.6	7.7	16.8	4.3	173.1
224	18.05	18.4	20.6	7.7	16.8	4.3	173.1
225	18.14	18.4	20.6	7.7	16.8	4.3	173.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	18.5	20.6	7.7	16.8	4.3	173.0
227	18.32	18.6	20.6	7.7	16.8	4.3	173.0
228	18.41	18.6	20.6	7.7	16.8	4.3	172.9
229	18.50	18.7	20.6	7.7	16.7	4.3	172.9
230	18.50	18.7	20.6	7.7	16.7	4.3	172.9
231	18.59	18.6	20.6	7.7	16.8	4.3	172.9
232	18.68	18.6	20.6	7.7	16.8	4.3	173.0
233	18.77	18.5	20.6	7.7	16.8	4.3	173.0
234	18.86	18.4	20.6	7.7	16.8	4.3	173.1
235	18.95	18.4	20.6	7.7	16.8	4.3	173.1
236	19.04	18.3	20.6	7.7	16.8	4.3	173.1
237	19.13	18.2	20.6	7.7	16.8	4.3	173.2
238	19.22	18.2	20.6	7.7	16.8	4.4	173.2
239	19.31	18.1	20.7	7.7	16.8	4.4	173.3
240	19.40	18.1	20.7	7.7	16.8	4.4	173.3
241	19.48	18.0	20.7	7.7	16.8	4.4	173.4
242	19.57	17.9	20.7	7.7	16.9	4.4	173.4
243	19.66	17.9	20.7	7.7	16.9	4.4	173.5
244	19.75	17.8	20.7	7.7	16.9	4.4	173.5
245	19.84	17.8	20.7	7.7	16.9	4.4	173.5
246	19.93	17.7	20.7	7.7	16.9	4.4	173.6
247	20.02	17.6	20.7	7.7	16.9	4.4	173.6
248	20.11	17.6	20.7	7.7	16.9	4.4	173.7
249	20.20	17.5	20.7	7.7	17.0	4.4	173.7
250	20.29	17.4	20.7	7.7	17.0	4.4	173.7
251	20.29	17.4	20.7	7.7	17.0	4.4	173.7
252	20.38	17.4	20.7	7.7	17.0	4.4	173.8
253	20.47	17.3	20.7	7.7	17.0	4.4	173.8
254	20.56	17.3	20.7	7.7	17.0	4.4	173.8
255	20.65	17.2	20.7	7.7	17.1	4.4	173.9
256	20.74	17.1	20.7	7.7	17.1	4.4	173.9
257	20.83	17.1	20.7	7.7	17.1	4.4	174.0
258	20.92	17.0	20.7	7.7	17.1	4.4	174.0
259	21.01	17.0	20.7	7.7	17.2	4.4	174.0
260	21.10	16.9	20.7	7.7	17.2	4.4	174.1
261	21.19	16.8	20.7	7.7	17.2	4.4	174.1
262	21.27	16.8	20.7	7.7	17.2	4.4	174.1
263	21.36	16.7	20.7	7.7	17.3	4.4	174.1
264	21.45	16.6	20.7	7.7	17.3	4.4	174.2
265	21.54	16.6	20.7	7.7	17.3	4.4	174.2
266	21.63	16.5	20.7	7.7	17.4	4.4	174.2
267	21.72	16.5	20.7	7.7	17.4	4.4	174.3
268	21.81	16.4	20.7	7.7	17.4	4.4	174.3
269	21.90	16.3	20.7	7.7	17.5	4.4	174.3
270	21.99	16.3	20.7	7.7	17.5	4.4	174.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	16.2	20.7	7.7	17.5	4.4	174.4
272	22.08	16.2	20.7	7.7	17.5	4.4	174.4
273	22.17	16.1	20.7	7.7	17.6	4.4	174.4
274	22.26	16.1	20.7	7.7	17.6	4.4	174.4
275	22.35	16.0	20.7	7.7	17.6	4.4	174.4
276	22.44	16.0	20.7	7.7	17.7	4.4	174.5
277	22.53	15.9	20.7	7.7	17.7	4.4	174.5
278	22.62	15.8	20.7	7.7	17.7	4.4	174.5
279	22.71	15.8	20.7	7.7	17.8	4.4	174.5
280	22.80	15.7	20.7	7.7	17.8	4.4	174.6
281	22.89	15.7	20.7	7.7	17.9	4.4	174.6
282	22.98	15.6	20.7	7.7	17.9	4.4	174.6
283	23.06	15.5	20.7	7.7	17.9	4.4	174.6
284	23.15	15.5	20.7	7.7	18.0	4.4	174.7
285	23.24	15.4	20.7	7.7	18.0	4.4	174.7
286	23.33	15.3	20.7	7.7	18.1	4.4	174.7
287	23.42	15.3	20.7	7.7	18.1	4.4	174.7
288	23.51	15.2	20.7	7.7	18.1	4.4	174.8
289	23.60	15.2	20.7	7.7	18.2	4.4	174.8
290	23.69	15.2	20.7	7.7	18.2	4.4	174.7
291	23.78	15.3	20.7	7.7	18.2	4.4	174.6
292	23.87	15.4	20.7	7.7	18.3	4.4	174.5
293	23.87	15.4	20.7	7.7	18.3	4.4	174.5
294	23.96	15.4	20.7	7.7	18.3	4.4	174.4
295	24.05	15.5	20.7	7.7	18.4	4.4	174.3
296	24.14	15.5	20.7	7.7	18.4	4.4	174.2
297	24.23	15.6	20.7	7.7	18.5	4.3	174.2
298	24.32	15.7	20.7	7.7	18.5	4.3	174.1
299	24.41	15.7	20.7	7.7	18.6	4.3	174.0
300	24.50	15.8	20.7	7.7	18.6	4.3	173.9
301	24.59	15.9	20.7	7.7	18.6	4.3	173.8
302	24.68	15.9	20.6	7.7	18.7	4.3	173.7
303	24.76	16.0	20.6	7.7	18.7	4.3	173.6
304	24.85	16.0	20.6	7.7	18.8	4.3	173.5
305	24.94	16.1	20.6	7.7	18.8	4.3	173.4
306	25.03	16.2	20.6	7.7	18.9	4.2	173.3
307	25.12	16.2	20.6	7.7	18.9	4.2	173.2
308	25.21	16.3	20.6	7.7	19.0	4.2	173.2
309	25.30	16.4	20.6	7.7	19.0	4.2	173.1
310	25.39	16.4	20.6	7.7	19.0	4.2	173.0
311	25.48	16.5	20.6	7.7	19.1	4.2	172.9
312	25.57	16.5	20.6	7.7	19.1	4.2	172.8
313	25.66	16.6	20.6	7.7	19.2	4.2	172.7
314	25.66	16.6	20.6	7.7	19.2	4.2	172.7
315	25.75	16.7	20.5	7.7	19.2	4.2	172.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	16.7	20.5	7.7	19.3	4.1	172.6
317	25.93	16.8	20.5	7.7	19.3	4.1	172.5
318	26.02	16.9	20.5	7.7	19.4	4.1	172.4
319	26.11	16.9	20.5	7.7	19.4	4.1	172.3
320	26.20	17.0	20.5	7.7	19.5	4.1	172.2
321	26.29	17.0	20.4	7.7	19.5	4.1	172.1
322	26.38	17.1	20.4	7.7	19.6	4.1	172.1
323	26.47	17.2	20.4	7.7	19.6	4.1	172.0
324	26.56	17.2	20.4	7.7	19.6	4.1	171.9
325	26.64	17.3	20.4	7.7	19.7	4.1	171.8
326	26.73	17.4	20.3	7.7	19.7	4.0	171.8
327	26.82	17.4	20.3	7.7	19.8	4.0	171.7
328	26.91	17.5	20.3	7.7	19.8	4.0	171.6
329	27.00	17.5	20.3	7.7	19.9	4.0	171.5
330	27.09	17.6	20.2	7.7	19.9	4.0	171.5
331	27.18	17.8	20.2	7.7	20.0	4.0	171.3
332	27.27	17.9	20.2	7.7	20.0	4.0	171.1
333	27.36	18.1	20.2	7.7	20.0	3.9	171.0
334	27.45	18.3	20.1	7.7	20.1	3.9	170.8
335	27.45	18.3	20.1	7.7	20.1	3.9	170.8
336	27.54	18.5	20.1	7.7	20.1	3.9	170.7
337	27.63	18.7	20.0	7.7	20.1	3.9	170.5
338	27.72	18.8	20.0	7.7	20.2	3.9	170.4
339	27.81	19.0	19.9	7.7	20.2	3.9	170.2
340	27.90	19.2	19.9	7.7	20.2	3.8	170.1
341	27.99	19.4	19.8	7.7	20.3	3.8	169.9
342	28.08	19.6	19.7	7.7	20.3	3.8	169.8
343	28.17	19.7	19.7	7.7	20.3	3.8	169.7
344	28.26	19.9	19.6	7.7	20.3	3.8	169.6
345	28.35	20.1	19.5	7.7	20.3	3.8	169.5
346	28.43	20.3	19.4	7.7	20.4	3.8	169.4
347	28.52	20.4	19.3	7.7	20.4	3.8	169.3
348	28.61	20.6	19.2	7.7	20.4	3.7	169.2
349	28.70	20.8	19.1	7.7	20.4	3.7	169.1
350	28.79	21.0	19.0	7.7	20.4	3.7	169.1
351	28.88	21.2	18.9	7.7	20.4	3.7	169.0
352	28.97	21.3	18.8	7.7	20.4	3.7	168.9
353	29.06	21.5	18.7	7.7	20.3	3.7	168.9
354	29.15	21.7	18.6	7.7	20.3	3.7	168.8
355	29.24	21.9	18.5	7.8	20.3	3.7	168.8
356	29.24	21.9	18.5	7.8	20.3	3.7	168.8
357	29.33	22.1	18.3	7.8	20.3	3.7	168.8
358	29.42	22.2	18.2	7.8	20.3	3.7	168.8
359	29.51	22.4	18.1	7.8	20.2	3.7	168.7
360	29.60	22.6	17.9	7.8	20.2	3.6	168.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	22.8	17.8	7.8	20.2	3.6	168.7
362	29.78	23.0	17.7	7.8	20.2	3.6	168.7
363	29.87	23.2	17.5	7.8	20.1	3.6	168.7
364	29.96	23.3	17.4	7.8	20.1	3.6	168.7
365	30.05	23.5	17.2	7.8	20.0	3.6	168.7
366	30.14	23.7	17.1	7.8	20.0	3.6	168.7
367	30.22	23.9	16.9	7.8	20.0	3.6	168.7
368	30.31	24.1	16.7	7.8	19.9	3.6	168.8
369	30.40	24.2	16.6	7.8	19.9	3.6	168.8
370	30.49	24.4	16.4	7.8	19.9	3.6	168.8
371	30.58	24.6	16.3	7.8	19.8	3.6	168.8
372	30.67	24.8	16.1	7.9	19.8	3.6	168.8
373	30.76	25.0	15.9	7.9	19.7	3.6	168.9
374	30.85	25.1	15.7	7.9	19.7	3.6	168.9
375	30.94	25.3	15.6	7.9	19.6	3.6	168.9
376	31.03	25.5	15.4	7.9	19.6	3.6	169.0
377	31.03	25.5	15.4	7.9	19.5	3.6	169.0
378	31.12	25.7	15.2	7.9	19.5	3.6	169.1
379	31.21	25.9	15.0	7.9	19.4	3.6	169.1
380	31.30	26.0	14.9	7.9	19.4	3.6	169.1
381	31.39	26.2	14.7	7.9	19.3	3.6	169.2
382	31.48	26.4	14.5	7.9	19.3	3.6	169.2
383	31.57	26.5	14.3	7.9	19.2	3.6	169.3
384	31.66	26.6	14.2	7.9	19.2	3.6	169.5
385	31.75	26.6	14.0	8.0	19.1	3.6	169.7
386	31.84	26.7	13.8	8.0	19.0	3.6	169.8
387	31.92	26.8	13.6	8.0	19.0	3.6	170.0
388	32.01	26.8	13.5	8.0	18.9	3.6	170.1
389	32.10	26.9	13.3	8.0	18.9	3.6	170.3
390	32.19	26.9	13.1	8.0	18.8	3.6	170.4
391	32.28	27.0	13.0	8.0	18.7	3.6	170.6
392	32.37	27.1	12.8	8.0	18.7	3.6	170.7
393	32.46	27.1	12.7	8.0	18.6	3.6	170.9
394	32.55	27.2	12.5	8.0	18.5	3.6	171.0
395	32.64	27.3	12.4	8.0	18.5	3.6	171.2
396	32.73	27.3	12.2	8.0	18.4	3.6	171.3
397	32.82	27.4	12.1	8.1	18.3	3.6	171.4
398	32.82	27.4	12.1	8.1	18.3	3.6	171.4
399	32.91	27.5	11.9	8.1	18.3	3.6	171.6
400	33.00	27.5	11.8	8.1	18.2	3.7	171.7
401	33.09	27.6	11.6	8.1	18.1	3.7	171.8
402	33.18	27.7	11.5	8.1	18.1	3.7	171.9
403	33.27	27.7	11.4	8.1	18.0	3.7	172.1
404	33.36	27.8	11.2	8.1	17.9	3.7	172.2
405	33.45	27.8	11.1	8.1	17.9	3.7	172.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	27.9	11.0	8.1	17.8	3.7	172.4
407	33.63	28.0	10.9	8.1	17.7	3.7	172.5
408	33.72	28.0	10.8	8.1	17.6	3.7	172.6
409	33.80	28.1	10.6	8.1	17.6	3.7	172.8
410	33.89	28.2	10.5	8.1	17.5	3.7	172.9
411	33.98	28.2	10.4	8.2	17.4	3.7	173.0
412	34.07	28.3	10.3	8.2	17.4	3.7	173.1
413	34.16	28.4	10.2	8.2	17.3	3.7	173.2
414	34.25	28.4	10.1	8.2	17.2	3.7	173.3
415	34.34	28.5	10.0	8.2	17.1	3.7	173.4
416	34.43	28.5	9.9	8.2	17.1	3.7	173.5
417	34.52	28.6	9.9	8.2	17.0	3.7	173.5
418	34.61	28.7	9.8	8.2	16.9	3.7	173.6
419	34.61	28.7	9.8	8.2	16.9	3.7	173.6
420	34.70	28.7	9.7	8.2	16.9	3.7	173.7
421	34.79	28.8	9.6	8.2	16.8	3.7	173.8
422	34.88	28.9	9.5	8.2	16.7	3.7	173.8
423	34.97	28.9	9.5	8.2	16.6	3.7	173.9
424	35.06	29.0	9.4	8.2	16.6	3.7	174.0
425	35.15	29.1	9.3	8.2	16.5	3.7	174.0
426	35.24	29.1	9.3	8.2	16.4	3.7	174.1
427	35.33	29.2	9.2	8.2	16.4	3.7	174.2
428	35.42	29.3	9.2	8.2	16.3	3.7	174.2
429	35.51	29.3	9.1	8.3	16.2	3.7	174.3
430	35.59	29.4	9.1	8.3	16.1	3.7	174.3
431	35.68	29.4	9.0	8.3	16.1	3.7	174.4
432	35.77	29.5	9.0	8.3	16.0	3.7	174.4
433	35.86	29.6	9.0	8.3	15.9	3.7	174.4
434	35.95	29.6	8.9	8.3	15.8	3.7	174.5
435	36.04	29.7	8.9	8.3	15.8	3.7	174.5
436	36.13	29.8	8.9	8.3	15.7	3.7	174.5
437	36.22	29.8	8.9	8.3	15.6	3.7	174.6
438	36.31	29.9	8.9	8.3	15.5	3.7	174.6
439	36.40	30.0	8.8	8.3	15.5	3.7	174.6
440	36.40	30.0	8.9	8.3	15.7	3.7	174.4
441	36.43	30.0	8.9	8.3	15.7	3.7	174.3
442	36.46	30.0	8.9	8.3	15.7	3.7	174.3
443	36.49	30.0	8.9	8.3	15.7	3.7	174.2
444	36.52	30.1	8.9	8.3	15.8	3.7	174.2
445	36.55	30.1	8.9	8.3	15.8	3.7	174.1
446	36.58	30.1	8.9	8.3	15.8	3.7	174.1
447	36.61	30.1	8.9	8.3	15.8	3.7	174.1
448	36.64	30.1	8.9	8.3	15.9	3.7	174.0
449	36.67	30.2	8.9	8.3	15.9	3.7	174.0
450	36.70	30.2	8.9	8.3	15.9	3.7	173.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga int 37m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	30.2	8.9	8.3	15.9	3.7	173.9
452	36.76	30.2	8.9	8.3	15.9	3.7	173.8
453	36.79	30.2	8.9	8.3	16.0	3.7	173.8
454	36.82	30.3	8.9	8.3	16.0	3.7	173.8
455	36.85	30.3	8.9	8.3	16.0	3.7	173.7
456	36.88	30.3	8.9	8.3	16.0	3.7	173.7
457	36.90	30.3	3.0	8.3	5.4	4.9	189.0

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	30.5	2.1	8.2	6.4	4.9	188.8
3	0.12	30.5	6.2	8.2	20.0	3.6	172.4
4	0.15	30.5	6.2	8.2	19.7	3.6	172.6
5	0.18	30.5	6.2	8.2	19.5	3.7	172.9
6	0.21	30.4	6.2	8.2	19.2	3.7	173.1
7	0.24	30.4	6.2	8.2	19.0	3.7	173.4
8	0.27	30.4	6.2	8.2	18.9	3.7	173.5
9	0.30	30.4	6.2	8.2	18.8	3.7	173.6
10	0.33	30.4	6.2	8.2	18.7	3.7	173.7
11	0.36	30.3	6.3	8.2	18.6	3.7	173.8
12	0.39	30.3	6.3	8.2	18.6	3.7	173.9
13	0.42	30.3	6.3	8.2	18.5	3.7	174.0
14	0.45	30.3	6.3	8.2	18.4	3.7	174.1
15	0.48	30.2	6.3	8.2	18.3	3.7	174.2
16	0.51	30.2	6.3	8.2	18.2	3.7	174.3
17	0.54	30.2	6.3	8.2	18.1	3.7	174.4
18	0.57	30.2	6.4	8.2	18.0	3.7	174.5
19	0.60	30.2	6.4	8.2	17.9	3.7	174.6
20	0.60	30.2	6.3	8.2	17.7	3.7	174.8
21	0.69	30.1	6.3	8.2	17.7	3.7	174.8
22	0.78	30.0	6.4	8.2	17.8	3.7	174.8
23	0.87	30.0	6.4	8.2	17.9	3.7	174.7
24	0.96	29.9	6.5	8.2	17.9	3.7	174.7
25	1.05	29.8	6.5	8.2	18.0	3.8	174.6
26	1.14	29.8	6.6	8.2	18.1	3.8	174.6
27	1.23	29.7	6.6	8.2	18.1	3.8	174.5
28	1.32	29.6	6.7	8.2	18.2	3.8	174.5
29	1.41	29.6	6.7	8.1	18.3	3.8	174.4
30	1.50	29.5	6.8	8.1	18.3	3.8	174.4
31	1.58	29.4	6.9	8.1	18.4	3.8	174.3
32	1.67	29.4	6.9	8.1	18.4	3.8	174.3
33	1.76	29.3	7.0	8.1	18.5	3.8	174.2
34	1.85	29.3	7.1	8.1	18.6	3.8	174.2
35	1.94	29.2	7.1	8.1	18.6	3.8	174.1
36	2.03	29.1	7.2	8.1	18.7	3.8	174.0
37	2.12	29.1	7.3	8.1	18.8	3.8	174.0
38	2.21	29.0	7.4	8.1	18.8	3.8	173.9
39	2.30	28.9	7.4	8.1	18.9	3.8	173.8
40	2.39	28.9	7.5	8.1	19.0	3.8	173.7
41	2.39	28.9	7.5	8.1	19.0	3.8	173.7
42	2.48	28.8	7.6	8.1	19.0	3.8	173.6
43	2.57	28.7	7.7	8.1	19.1	3.8	173.6
44	2.66	28.7	7.8	8.0	19.2	3.8	173.5
45	2.75	28.6	7.9	8.0	19.2	3.8	173.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	28.5	8.0	8.0	19.3	3.7	173.3
47	2.93	28.5	8.1	8.0	19.4	3.7	173.2
48	3.02	28.4	8.2	8.0	19.4	3.7	173.1
49	3.11	28.4	8.3	8.0	19.5	3.7	173.1
50	3.20	28.3	8.4	8.0	19.6	3.7	173.0
51	3.28	28.2	8.4	8.0	19.6	3.7	172.9
52	3.37	28.2	8.5	8.0	19.7	3.7	172.8
53	3.46	28.1	8.6	8.0	19.7	3.7	172.7
54	3.55	28.0	8.8	8.0	19.8	3.7	172.6
55	3.64	28.0	8.9	7.9	19.9	3.7	172.5
56	3.73	27.9	9.0	7.9	19.9	3.7	172.4
57	3.82	27.8	9.1	7.9	20.0	3.7	172.4
58	3.91	27.8	9.2	7.9	20.0	3.7	172.3
59	4.00	27.7	9.3	7.9	20.1	3.7	172.2
60	4.09	27.7	9.4	7.9	20.1	3.7	172.1
61	4.18	27.6	9.5	7.9	20.2	3.7	172.0
62	4.18	27.6	9.5	7.9	20.2	3.7	172.0
63	4.27	27.5	9.6	7.9	20.3	3.7	171.9
64	4.36	27.5	9.7	7.9	20.3	3.7	171.8
65	4.45	27.4	9.8	7.9	20.4	3.7	171.7
66	4.54	27.3	9.9	7.9	20.4	3.7	171.6
67	4.63	27.3	10.0	7.9	20.5	3.7	171.5
68	4.72	27.2	10.2	7.8	20.6	3.7	171.4
69	4.81	27.1	10.3	7.8	20.6	3.7	171.3
70	4.90	27.0	10.4	7.8	20.7	3.7	171.3
71	4.99	26.8	10.5	7.8	20.8	3.7	171.3
72	5.07	26.6	10.6	7.8	20.8	3.8	171.3
73	5.16	26.4	10.7	7.8	20.9	3.8	171.4
74	5.25	26.2	10.8	7.8	20.9	3.8	171.4
75	5.34	26.1	10.9	7.8	21.0	3.8	171.4
76	5.43	25.9	11.0	7.8	21.0	3.8	171.4
77	5.52	25.7	11.2	7.8	21.1	3.8	171.4
78	5.61	25.5	11.3	7.8	21.1	3.8	171.5
79	5.70	25.3	11.4	7.7	21.1	3.8	171.5
80	5.79	25.1	11.5	7.7	21.2	3.8	171.6
81	5.88	25.0	11.6	7.7	21.2	3.8	171.6
82	5.97	24.8	11.7	7.7	21.3	3.8	171.6
83	5.97	24.8	11.7	7.7	21.3	3.8	171.6
84	6.06	24.6	11.8	7.7	21.3	3.9	171.6
85	6.15	24.4	11.9	7.7	21.4	3.9	171.7
86	6.24	24.2	12.0	7.7	21.4	3.9	171.7
87	6.33	24.1	12.1	7.7	21.5	3.9	171.8
88	6.42	23.9	12.2	7.7	21.5	3.9	171.8
89	6.51	23.7	12.3	7.7	21.5	3.9	171.8
90	6.60	23.5	12.4	7.7	21.6	3.9	171.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	23.3	12.5	7.7	21.6	3.9	171.9
92	6.78	23.2	12.6	7.7	21.6	3.9	172.0
93	6.86	23.0	12.7	7.7	21.6	3.9	172.0
94	6.95	22.8	12.7	7.6	21.7	4.0	172.1
95	7.04	22.6	12.8	7.6	21.7	4.0	172.2
96	7.13	22.4	12.9	7.6	21.7	4.0	172.2
97	7.22	22.3	13.0	7.6	21.7	4.0	172.3
98	7.31	22.1	13.1	7.6	21.7	4.0	172.4
99	7.40	21.9	13.2	7.6	21.7	4.0	172.5
100	7.49	21.7	13.2	7.6	21.7	4.0	172.6
101	7.58	21.5	13.3	7.6	21.7	4.0	172.7
102	7.67	21.4	13.4	7.6	21.7	4.1	172.8
103	7.76	21.2	13.5	7.6	21.7	4.1	172.9
104	7.76	21.2	13.5	7.6	21.7	4.1	172.8
105	7.85	21.0	13.6	7.6	21.7	4.1	172.9
106	7.94	20.8	13.6	7.6	21.7	4.1	173.1
107	8.03	20.6	13.7	7.6	21.7	4.1	173.2
108	8.12	20.5	13.7	7.6	21.7	4.1	173.3
109	8.21	20.3	13.8	7.6	21.7	4.2	173.4
110	8.30	20.1	13.9	7.6	21.6	4.2	173.6
111	8.39	19.9	13.9	7.6	21.6	4.2	173.7
112	8.48	19.7	14.0	7.6	21.6	4.2	173.8
113	8.57	19.6	14.0	7.6	21.5	4.2	174.0
114	8.66	19.4	14.1	7.6	21.5	4.2	174.1
115	8.74	19.2	14.1	7.6	21.5	4.3	174.3
116	8.83	19.1	14.2	7.6	21.4	4.3	174.4
117	8.92	19.0	14.2	7.6	21.4	4.3	174.5
118	9.01	19.0	14.2	7.6	21.3	4.3	174.5
119	9.10	18.9	14.3	7.6	21.3	4.3	174.6
120	9.19	18.8	14.3	7.6	21.2	4.3	174.6
121	9.28	18.8	14.3	7.6	21.2	4.3	174.7
122	9.37	18.7	14.4	7.6	21.1	4.4	174.8
123	9.46	18.7	14.4	7.6	21.1	4.4	174.8
124	9.55	18.6	14.5	7.6	21.0	4.4	174.9
125	9.55	18.6	14.5	7.6	21.0	4.4	174.9
126	9.64	18.5	14.5	7.6	21.0	4.4	175.0
127	9.73	18.5	14.5	7.6	20.9	4.4	175.0
128	9.82	18.4	14.6	7.6	20.9	4.4	175.1
129	9.91	18.3	14.6	7.6	20.8	4.4	175.2
130	10.00	18.3	14.6	7.6	20.8	4.4	175.3
131	10.09	18.2	14.6	7.6	20.7	4.4	175.3
132	10.18	18.2	14.7	7.6	20.6	4.5	175.4
133	10.27	18.1	14.7	7.6	20.6	4.5	175.5
134	10.36	18.0	14.7	7.6	20.5	4.5	175.6
135	10.44	18.0	14.7	7.6	20.5	4.5	175.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	17.9	14.8	7.6	20.4	4.5	175.8
137	10.62	17.8	14.8	7.6	20.3	4.5	175.9
138	10.71	17.8	14.8	7.6	20.3	4.5	176.0
139	10.80	17.7	14.8	7.6	20.2	4.6	176.0
140	10.89	17.6	14.8	7.6	20.2	4.6	176.1
141	10.98	17.6	14.9	7.6	20.1	4.6	176.2
142	11.07	17.5	14.9	7.6	20.0	4.6	176.3
143	11.16	17.5	14.9	7.6	20.0	4.6	176.4
144	11.25	17.4	14.9	7.6	19.9	4.6	176.5
145	11.34	17.3	14.9	7.6	19.9	4.6	176.6
146	11.34	17.3	14.9	7.6	19.9	4.6	176.6
147	11.43	17.3	14.9	7.6	19.8	4.7	176.7
148	11.52	17.2	15.0	7.6	19.7	4.7	176.8
149	11.61	17.1	15.0	7.6	19.7	4.7	176.9
150	11.70	17.1	15.0	7.6	19.6	4.7	177.0
151	11.79	17.0	15.0	7.6	19.6	4.7	177.1
152	11.88	17.0	15.0	7.6	19.5	4.7	177.2
153	11.97	16.9	15.0	7.6	19.4	4.7	177.3
154	12.06	16.8	15.0	7.6	19.4	4.8	177.4
155	12.15	16.8	15.0	7.6	19.3	4.8	177.5
156	12.24	16.7	15.0	7.6	19.3	4.8	177.6
157	12.32	16.6	15.0	7.6	19.2	4.8	177.7
158	12.41	16.6	15.0	7.6	19.2	4.8	177.8
159	12.50	16.5	15.0	7.6	19.1	4.8	177.9
160	12.59	16.5	15.0	7.6	19.0	4.8	178.0
161	12.68	16.4	15.0	7.6	19.0	4.9	178.1
162	12.77	16.3	15.0	7.6	18.9	4.9	178.2
163	12.86	16.3	15.0	7.6	18.9	4.9	178.3
164	12.95	16.2	15.0	7.6	18.8	4.9	178.4
165	13.04	16.2	15.0	7.6	18.8	4.9	178.5
166	13.13	16.1	15.0	7.6	18.7	4.9	178.6
167	13.13	16.1	15.0	7.6	18.7	4.9	178.6
168	13.22	16.0	15.0	7.6	18.7	4.9	178.7
169	13.31	16.0	15.0	7.6	18.6	5.0	178.8
170	13.40	15.9	15.0	7.6	18.6	5.0	178.9
171	13.49	15.8	15.0	7.6	18.5	5.0	179.0
172	13.58	15.8	15.0	7.6	18.5	5.0	179.1
173	13.67	15.7	15.0	7.6	18.4	5.0	179.2
174	13.76	15.7	15.0	7.6	18.4	5.0	179.3
175	13.85	15.6	15.0	7.6	18.3	5.0	179.4
176	13.94	15.5	15.0	7.6	18.3	5.1	179.5
177	14.02	15.5	15.0	7.6	18.2	5.1	179.6
178	14.11	15.4	15.0	7.6	18.2	5.1	179.7
179	14.20	15.3	15.0	7.6	18.1	5.1	179.8
180	14.29	15.3	15.0	7.6	18.1	5.1	179.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	15.3	15.0	7.6	18.0	5.1	179.9
182	14.47	15.4	15.0	7.6	18.0	5.1	179.9
183	14.56	15.4	15.0	7.6	17.9	5.1	179.9
184	14.65	15.5	15.0	7.6	17.9	5.1	179.9
185	14.74	15.5	15.0	7.6	17.8	5.1	179.8
186	14.83	15.6	15.0	7.6	17.8	5.1	179.8
187	14.92	15.7	15.0	7.6	17.7	5.1	179.8
188	14.92	15.7	15.0	7.6	17.7	5.1	179.8
189	15.01	15.7	15.0	7.6	17.7	5.1	179.8
190	15.10	15.8	15.0	7.6	17.6	5.1	179.8
191	15.19	15.9	15.0	7.6	17.6	5.1	179.7
192	15.28	15.9	15.0	7.6	17.6	5.1	179.7
193	15.37	16.0	15.0	7.6	17.5	5.1	179.7
194	15.46	16.0	15.0	7.6	17.5	5.1	179.7
195	15.55	16.1	15.0	7.6	17.4	5.1	179.6
196	15.64	16.2	15.0	7.6	17.4	5.1	179.6
197	15.73	16.2	15.0	7.6	17.4	5.1	179.6
198	15.81	16.3	15.0	7.6	17.3	5.1	179.6
199	15.90	16.3	15.0	7.6	17.3	5.1	179.5
200	15.99	16.4	15.0	7.6	17.3	5.1	179.5
201	16.08	16.5	15.0	7.6	17.2	5.1	179.5
202	16.17	16.5	15.0	7.6	17.2	5.1	179.5
203	16.26	16.6	15.0	7.6	17.2	5.1	179.4
204	16.35	16.7	15.0	7.6	17.1	5.1	179.4
205	16.44	16.7	15.0	7.6	17.1	5.1	179.4
206	16.53	16.8	15.0	7.6	17.1	5.1	179.3
207	16.62	16.8	15.0	7.6	17.1	5.1	179.3
208	16.71	16.9	15.0	7.6	17.0	5.1	179.3
209	16.71	16.9	15.0	7.6	17.0	5.1	179.3
210	16.80	17.0	15.0	7.6	17.0	5.1	179.2
211	16.89	17.0	15.0	7.6	17.0	5.1	179.2
212	16.98	17.1	15.0	7.6	17.0	5.1	179.2
213	17.07	17.1	15.0	7.6	16.9	5.1	179.1
214	17.16	17.2	15.0	7.6	16.9	5.1	179.1
215	17.25	17.3	15.0	7.6	16.9	5.1	179.0
216	17.34	17.3	15.1	7.6	16.9	5.1	179.0
217	17.43	17.4	15.1	7.6	16.9	5.1	179.0
218	17.52	17.5	15.1	7.6	16.8	5.1	178.9
219	17.60	17.5	15.1	7.6	16.8	5.1	178.9
220	17.69	17.6	15.1	7.6	16.8	5.1	178.8
221	17.78	17.6	15.1	7.6	16.8	5.1	178.8
222	17.87	17.7	15.1	7.6	16.8	5.1	178.8
223	17.96	17.8	15.1	7.6	16.8	5.1	178.7
224	18.05	17.8	15.1	7.6	16.7	5.1	178.7
225	18.14	17.9	15.1	7.6	16.7	5.1	178.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 261
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	17.9	15.1	7.6	16.7	5.1	178.6
227	18.32	18.0	15.1	7.6	16.7	5.1	178.5
228	18.41	18.1	15.1	7.6	16.7	5.1	178.5
229	18.50	18.1	15.1	7.6	16.7	5.0	178.4
230	18.50	18.1	15.1	7.6	16.7	5.0	178.4
231	18.59	18.2	15.1	7.6	16.7	5.0	178.4
232	18.68	18.3	15.1	7.6	16.7	5.0	178.3
233	18.77	18.3	15.1	7.6	16.7	5.0	178.2
234	18.86	18.4	15.1	7.6	16.7	5.0	178.2
235	18.95	18.4	15.1	7.6	16.7	5.0	178.1
236	19.04	18.5	15.1	7.6	16.8	5.0	178.0
237	19.13	18.6	15.1	7.6	16.8	5.0	177.9
238	19.22	18.6	15.1	7.6	16.8	5.0	177.9
239	19.31	18.7	15.1	7.6	16.8	5.0	177.8
240	19.40	18.7	15.1	7.6	16.8	5.0	177.7
241	19.48	18.8	15.1	7.6	16.8	5.0	177.7
242	19.57	18.9	15.1	7.6	16.9	5.0	177.6
243	19.66	18.9	15.1	7.6	16.9	4.9	177.5
244	19.75	19.0	15.1	7.6	16.9	4.9	177.4
245	19.84	19.0	15.1	7.6	16.9	4.9	177.4
246	19.93	19.1	15.1	7.6	16.9	4.9	177.3
247	20.02	19.2	15.1	7.6	17.0	4.9	177.2
248	20.11	19.2	15.1	7.6	17.0	4.9	177.1
249	20.20	19.3	15.1	7.6	17.0	4.9	177.0
250	20.29	19.4	15.1	7.6	17.0	4.9	177.0
251	20.29	19.4	15.1	7.6	17.0	4.9	177.0
252	20.38	19.4	15.1	7.6	17.0	4.9	176.9
253	20.47	19.5	15.2	7.6	17.1	4.9	176.8
254	20.56	19.5	15.2	7.6	17.1	4.8	176.7
255	20.65	19.6	15.2	7.6	17.1	4.8	176.6
256	20.74	19.7	15.2	7.6	17.2	4.8	176.5
257	20.83	19.7	15.2	7.6	17.2	4.8	176.5
258	20.92	19.8	15.2	7.6	17.2	4.8	176.4
259	21.01	19.8	15.2	7.6	17.3	4.8	176.3
260	21.10	19.9	15.2	7.6	17.3	4.8	176.2
261	21.19	20.0	15.2	7.6	17.3	4.8	176.1
262	21.27	20.0	15.2	7.6	17.4	4.8	176.0
263	21.36	20.1	15.2	7.6	17.4	4.8	175.9
264	21.45	20.1	15.2	7.6	17.4	4.7	175.8
265	21.54	20.2	15.2	7.6	17.5	4.7	175.8
266	21.63	20.3	15.2	7.6	17.5	4.7	175.7
267	21.72	20.3	15.2	7.6	17.6	4.7	175.6
268	21.81	20.4	15.2	7.6	17.6	4.7	175.5
269	21.90	20.4	15.2	7.6	17.6	4.7	175.4
270	21.99	20.5	15.2	7.6	17.7	4.7	175.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	20.6	15.2	7.6	17.7	4.7	175.2
272	22.08	20.6	15.2	7.6	17.7	4.7	175.2
273	22.17	20.6	15.2	7.6	17.8	4.6	175.1
274	22.26	20.7	15.2	7.6	17.8	4.6	175.0
275	22.35	20.7	15.2	7.6	17.9	4.6	174.9
276	22.44	20.8	15.2	7.6	17.9	4.6	174.8
277	22.53	20.9	15.2	7.6	18.0	4.6	174.7
278	22.62	20.9	15.2	7.6	18.0	4.6	174.6
279	22.71	21.0	15.3	7.6	18.0	4.6	174.5
280	22.80	21.0	15.3	7.6	18.1	4.6	174.4
281	22.89	21.1	15.3	7.6	18.1	4.6	174.3
282	22.98	21.2	15.3	7.6	18.2	4.5	174.2
283	23.06	21.2	15.3	7.6	18.2	4.5	174.1
284	23.15	21.3	15.3	7.6	18.3	4.5	174.0
285	23.24	21.4	15.3	7.6	18.3	4.5	173.9
286	23.33	21.4	15.3	7.6	18.4	4.5	173.8
287	23.42	21.5	15.2	7.6	18.4	4.5	173.7
288	23.51	21.5	15.2	7.6	18.5	4.5	173.6
289	23.60	21.6	15.2	7.6	18.5	4.5	173.5
290	23.69	21.7	15.2	7.6	18.6	4.4	173.4
291	23.78	21.7	15.2	7.6	18.6	4.4	173.3
292	23.87	21.8	15.2	7.6	18.7	4.4	173.2
293	23.87	21.8	15.2	7.6	18.7	4.4	173.2
294	23.96	21.8	15.2	7.6	18.7	4.4	173.1
295	24.05	21.9	15.2	7.6	18.8	4.4	173.0
296	24.14	22.0	15.2	7.6	18.9	4.4	172.9
297	24.23	22.0	15.2	7.6	18.9	4.4	172.8
298	24.32	22.1	15.2	7.6	19.0	4.3	172.7
299	24.41	22.1	15.2	7.6	19.0	4.3	172.6
300	24.50	22.2	15.2	7.6	19.1	4.3	172.5
301	24.59	22.3	15.2	7.6	19.1	4.3	172.4
302	24.68	22.3	15.2	7.6	19.2	4.3	172.3
303	24.76	22.4	15.2	7.6	19.3	4.3	172.2
304	24.85	22.4	15.2	7.6	19.3	4.3	172.1
305	24.94	22.5	15.2	7.6	19.4	4.3	172.0
306	25.03	22.6	15.2	7.6	19.4	4.2	171.9
307	25.12	22.6	15.2	7.6	19.5	4.2	171.8
308	25.21	22.7	15.2	7.6	19.6	4.2	171.7
309	25.30	22.7	15.2	7.6	19.6	4.2	171.6
310	25.39	22.8	15.2	7.6	19.7	4.2	171.5
311	25.48	22.9	15.2	7.6	19.7	4.2	171.4
312	25.57	22.9	15.2	7.6	19.8	4.2	171.3
313	25.66	23.0	15.2	7.6	19.8	4.2	171.2
314	25.66	23.0	15.2	7.6	19.8	4.2	171.2
315	25.75	23.0	15.1	7.6	19.9	4.1	171.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 263
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	23.1	15.1	7.6	20.0	4.1	171.0
317	25.93	23.2	15.1	7.6	20.0	4.1	171.0
318	26.02	23.2	15.1	7.6	20.1	4.1	170.9
319	26.11	23.3	15.1	7.6	20.1	4.1	170.8
320	26.20	23.3	15.1	7.6	20.2	4.1	170.7
321	26.29	23.4	15.0	7.6	20.3	4.1	170.6
322	26.38	23.5	15.0	7.6	20.3	4.1	170.5
323	26.47	23.5	15.0	7.6	20.4	4.0	170.4
324	26.56	23.6	15.0	7.6	20.4	4.0	170.3
325	26.64	23.6	14.9	7.6	20.5	4.0	170.2
326	26.73	23.7	14.9	7.6	20.6	4.0	170.2
327	26.82	23.8	14.9	7.6	20.6	4.0	170.1
328	26.91	23.8	14.9	7.6	20.7	4.0	170.0
329	27.00	23.9	14.8	7.6	20.8	4.0	169.9
330	27.09	23.9	14.8	7.6	20.8	4.0	169.8
331	27.18	24.0	14.8	7.6	20.9	4.0	169.8
332	27.27	24.1	14.7	7.6	20.9	3.9	169.7
333	27.36	24.1	14.7	7.6	21.0	3.9	169.6
334	27.45	24.2	14.7	7.6	21.0	3.9	169.6
335	27.45	24.2	14.7	7.6	21.0	3.9	169.6
336	27.54	24.2	14.6	7.6	21.1	3.9	169.5
337	27.63	24.3	14.6	7.6	21.1	3.9	169.4
338	27.72	24.3	14.6	7.6	21.2	3.9	169.4
339	27.81	24.4	14.5	7.6	21.2	3.9	169.3
340	27.90	24.5	14.5	7.6	21.3	3.9	169.2
341	27.99	24.5	14.5	7.6	21.3	3.9	169.2
342	28.08	24.6	14.4	7.6	21.4	3.8	169.1
343	28.17	24.6	14.4	7.6	21.4	3.8	169.1
344	28.26	24.7	14.3	7.6	21.5	3.8	169.0
345	28.35	24.8	14.3	7.6	21.5	3.8	169.0
346	28.43	24.8	14.2	7.6	21.5	3.8	168.9
347	28.52	24.9	14.2	7.6	21.6	3.8	168.9
348	28.61	24.9	14.1	7.6	21.6	3.8	168.9
349	28.70	25.0	14.1	7.6	21.6	3.8	168.8
350	28.79	25.1	14.0	7.6	21.7	3.8	168.8
351	28.88	25.1	13.9	7.6	21.7	3.8	168.8
352	28.97	25.2	13.9	7.6	21.7	3.8	168.8
353	29.06	25.2	13.8	7.6	21.7	3.8	168.8
354	29.15	25.3	13.7	7.6	21.8	3.8	168.7
355	29.24	25.4	13.7	7.6	21.8	3.8	168.7
356	29.24	25.4	13.7	7.6	21.8	3.8	168.8
357	29.33	25.4	13.6	7.6	21.8	3.7	168.8
358	29.42	25.5	13.5	7.6	21.8	3.7	168.8
359	29.51	25.5	13.4	7.6	21.8	3.7	168.8
360	29.60	25.6	13.4	7.6	21.8	3.7	168.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	25.7	13.3	7.6	21.9	3.7	168.8
362	29.78	25.7	13.2	7.6	21.9	3.7	168.8
363	29.87	25.8	13.1	7.6	21.9	3.7	168.8
364	29.96	25.8	13.0	7.6	21.9	3.7	168.9
365	30.05	25.9	12.9	7.6	21.9	3.7	168.9
366	30.14	26.0	12.8	7.6	21.9	3.7	168.9
367	30.22	26.0	12.7	7.6	21.9	3.7	168.9
368	30.31	26.1	12.6	7.6	21.9	3.7	169.0
369	30.40	26.1	12.5	7.6	21.9	3.7	169.0
370	30.49	26.2	12.4	7.6	21.9	3.7	169.1
371	30.58	26.2	12.3	7.6	21.9	3.7	169.1
372	30.67	26.3	12.2	7.7	21.9	3.7	169.1
373	30.76	26.4	12.1	7.7	21.9	3.7	169.2
374	30.85	26.4	12.0	7.7	21.8	3.7	169.3
375	30.94	26.5	11.9	7.7	21.8	3.7	169.3
376	31.03	26.5	11.8	7.7	21.8	3.7	169.4
377	31.03	26.5	11.8	7.7	21.8	3.7	169.4
378	31.12	26.6	11.7	7.7	21.8	3.7	169.5
379	31.21	26.7	11.6	7.7	21.8	3.7	169.5
380	31.30	26.7	11.5	7.7	21.8	3.7	169.6
381	31.39	26.8	11.3	7.7	21.8	3.7	169.7
382	31.48	26.8	11.2	7.7	21.8	3.7	169.7
383	31.57	26.9	11.1	7.7	21.8	3.7	169.8
384	31.66	27.0	11.0	7.7	21.7	3.7	169.8
385	31.75	27.1	10.9	7.7	21.7	3.7	169.8
386	31.84	27.3	10.8	7.7	21.7	3.7	169.7
387	31.92	27.5	10.6	7.7	21.7	3.7	169.7
388	32.01	27.7	10.5	7.7	21.7	3.6	169.7
389	32.10	27.8	10.4	7.7	21.7	3.6	169.6
390	32.19	28.0	10.2	7.7	21.7	3.6	169.6
391	32.28	28.2	10.1	7.7	21.6	3.6	169.6
392	32.37	28.4	10.0	7.7	21.6	3.6	169.6
393	32.46	28.5	9.9	7.8	21.6	3.6	169.5
394	32.55	28.7	9.7	7.8	21.6	3.6	169.5
395	32.64	28.9	9.6	7.8	21.5	3.6	169.5
396	32.73	29.1	9.5	7.8	21.5	3.6	169.5
397	32.82	29.2	9.4	7.8	21.5	3.6	169.4
398	32.82	29.2	9.4	7.8	21.5	3.6	169.5
399	32.91	29.4	9.2	7.8	21.4	3.6	169.4
400	33.00	29.6	9.1	7.8	21.4	3.6	169.4
401	33.09	29.8	9.0	7.8	21.4	3.6	169.4
402	33.18	29.9	8.9	7.8	21.4	3.5	169.4
403	33.27	30.1	8.7	7.8	21.3	3.5	169.4
404	33.36	30.3	8.6	7.8	21.3	3.5	169.3
405	33.45	30.5	8.5	7.8	21.3	3.5	169.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	30.6	8.4	7.8	21.2	3.5	169.3
407	33.63	30.8	8.2	7.9	21.2	3.5	169.3
408	33.72	31.0	8.1	7.9	21.2	3.5	169.3
409	33.80	31.2	8.0	7.9	21.1	3.5	169.3
410	33.89	31.3	7.9	7.9	21.1	3.5	169.2
411	33.98	31.5	7.8	7.9	21.0	3.5	169.2
412	34.07	31.7	7.6	7.9	21.0	3.5	169.2
413	34.16	31.9	7.5	7.9	21.0	3.5	169.2
414	34.25	32.0	7.4	7.9	20.9	3.5	169.2
415	34.34	32.2	7.3	7.9	20.9	3.4	169.2
416	34.43	32.4	7.2	7.9	20.8	3.4	169.2
417	34.52	32.6	7.1	7.9	20.8	3.4	169.1
418	34.61	32.7	7.0	7.9	20.7	3.4	169.1
419	34.61	32.7	7.0	7.9	20.7	3.4	169.1
420	34.70	32.9	6.8	8.0	20.7	3.4	169.1
421	34.79	33.1	6.7	8.0	20.6	3.4	169.1
422	34.88	33.3	6.6	8.0	20.6	3.4	169.1
423	34.97	33.4	6.5	8.0	20.5	3.4	169.1
424	35.06	33.4	6.4	8.0	20.5	3.4	169.2
425	35.15	33.5	6.3	8.0	20.4	3.4	169.3
426	35.24	33.5	6.2	8.0	20.4	3.4	169.4
427	35.33	33.6	6.1	8.0	20.3	3.4	169.4
428	35.42	33.7	6.0	8.0	20.3	3.4	169.5
429	35.51	33.7	6.0	8.0	20.2	3.4	169.6
430	35.59	33.8	5.9	8.0	20.2	3.4	169.6
431	35.68	33.8	5.8	8.0	20.2	3.4	169.7
432	35.77	33.9	5.7	8.1	20.1	3.4	169.8
433	35.86	33.9	5.6	8.1	20.1	3.4	169.8
434	35.95	34.0	5.5	8.1	20.0	3.4	169.9
435	36.04	34.1	5.4	8.1	20.0	3.4	170.0
436	36.13	34.1	5.4	8.1	19.9	3.4	170.0
437	36.22	34.2	5.3	8.1	19.9	3.4	170.1
438	36.31	34.2	5.2	8.1	19.9	3.4	170.1
439	36.40	34.3	5.1	8.1	19.8	3.4	170.2
440	36.40	34.3	5.3	8.1	20.1	3.4	169.8
441	36.43	34.3	5.2	8.1	20.2	3.4	169.6
442	36.46	34.3	5.2	8.1	20.4	3.4	169.5
443	36.49	34.4	5.2	8.1	20.5	3.4	169.4
444	36.52	34.4	5.2	8.1	20.7	3.3	169.2
445	36.55	34.4	5.2	8.1	20.8	3.3	169.1
446	36.58	34.4	5.1	8.1	21.0	3.3	168.9
447	36.61	34.4	5.1	8.1	21.1	3.3	168.8
448	36.64	34.4	5.1	8.1	21.3	3.3	168.6
449	36.67	34.5	5.1	8.1	21.5	3.3	168.5
450	36.70	34.5	5.0	8.1	21.6	3.3	168.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga int 37m cabo c3 perdas t=30000 dias

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Units: ton meter

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	34.5	5.0	8.1	21.8	3.3	168.2
452	36.76	34.5	5.0	8.1	21.9	3.3	168.0
453	36.79	34.5	5.0	8.1	22.0	3.3	167.9
454	36.82	34.6	5.0	8.1	22.2	3.3	167.8
455	36.85	34.6	4.9	8.1	22.3	3.3	167.6
456	36.88	34.6	4.9	8.2	22.5	3.3	167.5
457	36.90	34.6	1.6	8.2	7.0	4.5	185.1

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	0.0	8.8	0.0	10.4	221.7
2	0.10	34.6	0.3	8.2	7.2	4.6	186.0
3	0.12	34.6	1.0	8.2	23.3	3.5	170.4
4	0.15	34.6	1.0	8.1	23.0	3.5	170.7
5	0.18	34.6	1.0	8.1	22.6	3.5	171.0
6	0.21	34.5	1.0	8.1	22.3	3.6	171.4
7	0.24	34.5	1.0	8.1	21.9	3.6	171.7
8	0.27	34.5	1.0	8.1	21.8	3.6	171.9
9	0.30	34.5	1.0	8.1	21.6	3.6	172.1
10	0.33	34.5	1.0	8.1	21.5	3.6	172.2
11	0.36	34.4	1.0	8.1	21.3	3.6	172.4
12	0.39	34.4	1.0	8.1	21.2	3.6	172.5
13	0.42	34.4	1.0	8.1	21.0	3.6	172.7
14	0.45	34.4	1.0	8.1	20.9	3.6	172.9
15	0.48	34.4	1.0	8.1	20.7	3.6	173.0
16	0.51	34.4	1.0	8.1	20.6	3.6	173.2
17	0.54	34.3	1.1	8.1	20.4	3.6	173.3
18	0.57	34.3	1.1	8.1	20.3	3.6	173.5
19	0.60	34.3	1.1	8.1	20.1	3.7	173.7
20	0.60	34.3	1.0	8.1	19.9	3.7	174.0
21	0.69	34.2	1.0	8.1	19.9	3.7	174.0
22	0.78	34.2	1.1	8.1	19.9	3.7	174.0
23	0.87	34.1	1.1	8.1	20.0	3.7	174.0
24	0.96	34.1	1.1	8.1	20.0	3.7	174.0
25	1.05	34.0	1.1	8.1	20.1	3.7	173.9
26	1.14	33.9	1.2	8.1	20.1	3.7	173.9
27	1.23	33.9	1.2	8.1	20.2	3.7	173.9
28	1.32	33.8	1.2	8.0	20.2	3.7	173.9
29	1.41	33.8	1.2	8.0	20.3	3.7	173.9
30	1.50	33.7	1.3	8.0	20.3	3.7	173.9
31	1.58	33.7	1.3	8.0	20.3	3.7	173.9
32	1.67	33.6	1.3	8.0	20.4	3.7	173.9
33	1.76	33.5	1.4	8.0	20.4	3.7	173.8
34	1.85	33.5	1.4	8.0	20.5	3.7	173.8
35	1.94	33.4	1.4	8.0	20.5	3.7	173.8
36	2.03	33.4	1.5	8.0	20.6	3.8	173.8
37	2.12	33.3	1.5	8.0	20.6	3.8	173.8
38	2.21	33.1	1.5	8.0	20.7	3.8	173.9
39	2.30	32.9	1.6	8.0	20.7	3.8	174.0
40	2.39	32.7	1.6	7.9	20.8	3.8	174.0
41	2.39	32.7	1.6	7.9	20.8	3.8	174.0
42	2.48	32.6	1.7	7.9	20.8	3.8	174.1
43	2.57	32.4	1.7	7.9	20.9	3.8	174.2
44	2.66	32.2	1.7	7.9	20.9	3.8	174.3
45	2.75	32.0	1.8	7.9	21.0	3.8	174.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.84	31.9	1.8	7.9	21.0	3.9	174.4
47	2.93	31.7	1.9	7.9	21.1	3.9	174.5
48	3.02	31.5	1.9	7.9	21.1	3.9	174.6
49	3.11	31.3	2.0	7.9	21.1	3.9	174.7
50	3.20	31.2	2.0	7.9	21.2	3.9	174.7
51	3.28	31.0	2.1	7.9	21.2	3.9	174.8
52	3.37	30.8	2.1	7.9	21.3	3.9	174.9
53	3.46	30.6	2.2	7.8	21.3	4.0	175.0
54	3.55	30.5	2.2	7.8	21.3	4.0	175.1
55	3.64	30.3	2.3	7.8	21.3	4.0	175.1
56	3.73	30.1	2.4	7.8	21.4	4.0	175.2
57	3.82	29.9	2.4	7.8	21.4	4.0	175.3
58	3.91	29.8	2.5	7.8	21.4	4.0	175.4
59	4.00	29.6	2.5	7.8	21.5	4.0	175.5
60	4.09	29.4	2.6	7.8	21.5	4.1	175.6
61	4.18	29.2	2.7	7.8	21.5	4.1	175.6
62	4.18	29.2	2.7	7.8	21.5	4.1	175.6
63	4.27	29.1	2.7	7.8	21.6	4.1	175.7
64	4.36	28.9	2.8	7.8	21.6	4.1	175.8
65	4.45	28.7	2.8	7.8	21.6	4.1	175.9
66	4.54	28.5	2.9	7.8	21.7	4.1	175.9
67	4.63	28.4	3.0	7.7	21.7	4.1	176.0
68	4.72	28.2	3.0	7.7	21.7	4.1	176.1
69	4.81	28.0	3.1	7.7	21.7	4.2	176.2
70	4.90	27.8	3.1	7.7	21.7	4.2	176.3
71	4.99	27.7	3.2	7.7	21.7	4.2	176.4
72	5.07	27.5	3.3	7.7	21.8	4.2	176.5
73	5.16	27.3	3.3	7.7	21.8	4.2	176.6
74	5.25	27.1	3.4	7.7	21.8	4.2	176.7
75	5.34	27.0	3.5	7.7	21.8	4.2	176.8
76	5.43	26.9	3.5	7.7	21.8	4.3	176.8
77	5.52	26.8	3.6	7.7	21.8	4.3	176.7
78	5.61	26.8	3.6	7.7	21.8	4.3	176.7
79	5.70	26.7	3.7	7.7	21.8	4.3	176.7
80	5.79	26.7	3.8	7.7	21.8	4.3	176.7
81	5.88	26.6	3.8	7.7	21.8	4.3	176.7
82	5.97	26.5	3.9	7.7	21.8	4.3	176.7
83	5.97	26.5	3.9	7.7	21.8	4.3	176.7
84	6.06	26.5	4.0	7.7	21.9	4.3	176.7
85	6.15	26.4	4.0	7.7	21.9	4.3	176.6
86	6.24	26.4	4.1	7.7	21.9	4.3	176.6
87	6.33	26.3	4.2	7.7	21.9	4.3	176.6
88	6.42	26.2	4.2	7.6	21.9	4.3	176.6
89	6.51	26.2	4.3	7.6	21.9	4.3	176.6
90	6.60	26.1	4.3	7.6	21.9	4.3	176.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.69	26.1	4.4	7.6	21.9	4.3	176.6
92	6.78	26.0	4.5	7.6	21.9	4.3	176.6
93	6.86	26.0	4.5	7.6	21.9	4.3	176.6
94	6.95	25.9	4.6	7.6	21.9	4.3	176.6
95	7.04	25.8	4.6	7.6	21.9	4.4	176.6
96	7.13	25.8	4.7	7.6	21.9	4.4	176.6
97	7.22	25.7	4.8	7.6	21.9	4.4	176.6
98	7.31	25.7	4.8	7.6	21.9	4.4	176.6
99	7.40	25.6	4.9	7.6	21.9	4.4	176.6
100	7.49	25.5	4.9	7.6	21.8	4.4	176.6
101	7.58	25.5	5.0	7.6	21.8	4.4	176.6
102	7.67	25.4	5.0	7.6	21.8	4.4	176.7
103	7.76	25.4	5.1	7.6	21.8	4.4	176.7
104	7.76	25.4	5.1	7.6	21.8	4.4	176.7
105	7.85	25.3	5.1	7.6	21.8	4.4	176.7
106	7.94	25.2	5.2	7.6	21.8	4.4	176.7
107	8.03	25.2	5.2	7.6	21.7	4.4	176.7
108	8.12	25.1	5.3	7.6	21.7	4.4	176.8
109	8.21	25.1	5.3	7.6	21.7	4.5	176.8
110	8.30	25.0	5.4	7.6	21.6	4.5	176.8
111	8.39	24.9	5.4	7.6	21.6	4.5	176.9
112	8.48	24.9	5.5	7.6	21.6	4.5	176.9
113	8.57	24.8	5.5	7.6	21.5	4.5	177.0
114	8.66	24.8	5.5	7.6	21.5	4.5	177.0
115	8.74	24.7	5.6	7.6	21.5	4.5	177.1
116	8.83	24.6	5.6	7.6	21.4	4.5	177.1
117	8.92	24.6	5.7	7.6	21.4	4.5	177.2
118	9.01	24.5	5.7	7.6	21.3	4.6	177.2
119	9.10	24.5	5.7	7.6	21.3	4.6	177.3
120	9.19	24.4	5.8	7.6	21.2	4.6	177.4
121	9.28	24.3	5.8	7.6	21.2	4.6	177.4
122	9.37	24.3	5.8	7.6	21.1	4.6	177.5
123	9.46	24.2	5.9	7.6	21.1	4.6	177.6
124	9.55	24.2	5.9	7.6	21.0	4.6	177.6
125	9.55	24.2	5.9	7.6	21.0	4.6	177.6
126	9.64	24.1	5.9	7.6	21.0	4.6	177.7
127	9.73	24.1	6.0	7.6	20.9	4.7	177.8
128	9.82	24.0	6.0	7.6	20.9	4.7	177.8
129	9.91	23.9	6.0	7.6	20.8	4.7	177.9
130	10.00	23.9	6.1	7.6	20.8	4.7	178.0
131	10.09	23.8	6.1	7.6	20.7	4.7	178.1
132	10.18	23.8	6.1	7.6	20.6	4.7	178.1
133	10.27	23.7	6.1	7.6	20.6	4.7	178.2
134	10.36	23.6	6.1	7.6	20.5	4.7	178.3
135	10.44	23.6	6.2	7.6	20.5	4.8	178.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	10.53	23.5	6.2	7.6	20.4	4.8	178.5
137	10.62	23.5	6.2	7.6	20.3	4.8	178.6
138	10.71	23.4	6.2	7.6	20.3	4.8	178.7
139	10.80	23.3	6.2	7.6	20.2	4.8	178.7
140	10.89	23.3	6.3	7.6	20.2	4.8	178.8
141	10.98	23.2	6.3	7.6	20.1	4.8	178.9
142	11.07	23.2	6.3	7.6	20.0	4.9	179.0
143	11.16	23.1	6.3	7.6	20.0	4.9	179.1
144	11.25	23.0	6.3	7.6	19.9	4.9	179.2
145	11.34	23.0	6.3	7.6	19.9	4.9	179.3
146	11.34	23.0	6.3	7.6	19.9	4.9	179.3
147	11.43	22.9	6.3	7.6	19.8	4.9	179.4
148	11.52	22.9	6.3	7.6	19.7	4.9	179.5
149	11.61	22.8	6.4	7.6	19.7	5.0	179.6
150	11.70	22.7	6.4	7.6	19.6	5.0	179.7
151	11.79	22.7	6.4	7.6	19.6	5.0	179.8
152	11.88	22.6	6.4	7.6	19.5	5.0	179.9
153	11.97	22.6	6.4	7.6	19.4	5.0	180.0
154	12.06	22.5	6.4	7.6	19.4	5.0	180.1
155	12.15	22.4	6.4	7.6	19.3	5.0	180.2
156	12.24	22.4	6.4	7.6	19.3	5.1	180.3
157	12.32	22.3	6.4	7.6	19.2	5.1	180.4
158	12.41	22.3	6.4	7.6	19.2	5.1	180.5
159	12.50	22.2	6.4	7.6	19.1	5.1	180.6
160	12.59	22.1	6.4	7.6	19.0	5.1	180.7
161	12.68	22.1	6.4	7.6	19.0	5.1	180.8
162	12.77	22.0	6.4	7.6	18.9	5.2	180.9
163	12.86	22.0	6.4	7.6	18.9	5.2	181.0
164	12.95	21.9	6.4	7.6	18.8	5.2	181.1
165	13.04	21.8	6.4	7.6	18.8	5.2	181.2
166	13.13	21.8	6.4	7.6	18.7	5.2	181.3
167	13.13	21.8	6.4	7.6	18.7	5.2	181.3
168	13.22	21.7	6.4	7.6	18.7	5.2	181.4
169	13.31	21.7	6.4	7.6	18.6	5.2	181.5
170	13.40	21.6	6.4	7.6	18.6	5.3	181.6
171	13.49	21.5	6.4	7.6	18.5	5.3	181.7
172	13.58	21.5	6.4	7.6	18.5	5.3	181.8
173	13.67	21.4	6.4	7.6	18.4	5.3	181.9
174	13.76	21.4	6.4	7.6	18.4	5.3	182.0
175	13.85	21.3	6.4	7.6	18.3	5.3	182.1
176	13.94	21.2	6.4	7.6	18.3	5.3	182.2
177	14.02	21.2	6.4	7.6	18.2	5.4	182.3
178	14.11	21.1	6.4	7.6	18.2	5.4	182.4
179	14.20	21.0	6.3	7.6	18.1	5.4	182.5
180	14.29	21.0	6.3	7.6	18.1	5.4	182.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	14.38	20.9	6.3	7.6	18.0	5.4	182.7
182	14.47	20.9	6.3	7.6	18.0	5.4	182.7
183	14.56	20.8	6.3	7.6	17.9	5.4	182.8
184	14.65	20.7	6.3	7.6	17.9	5.5	182.9
185	14.74	20.7	6.3	7.6	17.8	5.5	183.0
186	14.83	20.6	6.3	7.6	17.8	5.5	183.1
187	14.92	20.6	6.3	7.6	17.7	5.5	183.2
188	14.92	20.6	6.3	7.6	17.7	5.5	183.2
189	15.01	20.5	6.3	7.6	17.7	5.5	183.3
190	15.10	20.4	6.3	7.6	17.6	5.5	183.4
191	15.19	20.4	6.3	7.6	17.6	5.5	183.5
192	15.28	20.3	6.3	7.6	17.6	5.6	183.6
193	15.37	20.3	6.3	7.6	17.5	5.6	183.7
194	15.46	20.2	6.3	7.6	17.5	5.6	183.8
195	15.55	20.1	6.3	7.6	17.4	5.6	183.9
196	15.64	20.1	6.3	7.6	17.4	5.6	183.9
197	15.73	20.0	6.3	7.6	17.4	5.6	184.0
198	15.81	20.0	6.3	7.6	17.3	5.6	184.1
199	15.90	19.9	6.3	7.6	17.3	5.6	184.2
200	15.99	19.8	6.3	7.6	17.3	5.7	184.3
201	16.08	19.8	6.3	7.6	17.2	5.7	184.4
202	16.17	19.7	6.3	7.6	17.2	5.7	184.4
203	16.26	19.7	6.3	7.6	17.2	5.7	184.5
204	16.35	19.6	6.3	7.6	17.1	5.7	184.6
205	16.44	19.5	6.3	7.6	17.1	5.7	184.7
206	16.53	19.5	6.3	7.6	17.1	5.7	184.8
207	16.62	19.4	6.3	7.6	17.1	5.7	184.9
208	16.71	19.4	6.3	7.6	17.0	5.8	184.9
209	16.71	19.4	6.3	7.6	17.0	5.8	184.9
210	16.80	19.3	6.3	7.6	17.0	5.8	185.0
211	16.89	19.2	6.3	7.6	17.0	5.8	185.1
212	16.98	19.2	6.3	7.6	17.0	5.8	185.2
213	17.07	19.1	6.3	7.6	16.9	5.8	185.2
214	17.16	19.0	6.3	7.6	16.9	5.8	185.3
215	17.25	19.0	6.3	7.6	16.9	5.8	185.4
216	17.34	18.9	6.3	7.6	16.9	5.8	185.4
217	17.43	18.9	6.3	7.6	16.9	5.8	185.5
218	17.52	18.8	6.3	7.6	16.8	5.8	185.6
219	17.60	18.7	6.3	7.6	16.8	5.9	185.7
220	17.69	18.7	6.3	7.6	16.8	5.9	185.7
221	17.78	18.6	6.3	7.6	16.8	5.9	185.8
222	17.87	18.6	6.3	7.6	16.8	5.9	185.9
223	17.96	18.5	6.3	7.6	16.8	5.9	185.9
224	18.05	18.4	6.3	7.6	16.7	5.9	186.0
225	18.14	18.4	6.3	7.6	16.7	5.9	186.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	18.23	18.3	6.3	7.6	16.7	5.9	186.1
227	18.32	18.3	6.3	7.6	16.7	5.9	186.2
228	18.41	18.2	6.3	7.6	16.7	5.9	186.3
229	18.50	18.1	6.3	7.6	16.7	5.9	186.3
230	18.50	18.1	6.3	7.6	16.7	5.9	186.3
231	18.59	18.1	6.3	7.6	16.7	5.9	186.4
232	18.68	18.0	6.3	7.6	16.7	6.0	186.4
233	18.77	17.9	6.3	7.6	16.7	6.0	186.5
234	18.86	17.9	6.3	7.6	16.7	6.0	186.5
235	18.95	17.8	6.3	7.6	16.7	6.0	186.5
236	19.04	17.8	6.3	7.6	16.8	6.0	186.6
237	19.13	17.7	6.3	7.6	16.8	6.0	186.6
238	19.22	17.6	6.3	7.6	16.8	6.0	186.7
239	19.31	17.6	6.3	7.6	16.8	6.0	186.7
240	19.40	17.5	6.3	7.6	16.8	6.0	186.8
241	19.48	17.5	6.3	7.6	16.8	6.0	186.8
242	19.57	17.4	6.3	7.6	16.9	6.0	186.8
243	19.66	17.3	6.3	7.6	16.9	6.0	186.9
244	19.75	17.3	6.3	7.6	16.9	6.0	186.9
245	19.84	17.2	6.3	7.6	16.9	6.0	186.9
246	19.93	17.1	6.3	7.6	16.9	6.0	187.0
247	20.02	17.1	6.3	7.6	17.0	6.0	187.0
248	20.11	17.0	6.3	7.6	17.0	6.0	187.1
249	20.20	17.0	6.3	7.6	17.0	6.0	187.1
250	20.29	16.9	6.3	7.6	17.0	6.0	187.1
251	20.29	16.9	6.3	7.6	17.0	6.0	187.1
252	20.38	16.8	6.3	7.6	17.0	6.0	187.1
253	20.47	16.8	6.3	7.6	17.1	6.0	187.2
254	20.56	16.7	6.3	7.6	17.1	6.0	187.2
255	20.65	16.7	6.3	7.6	17.1	6.0	187.2
256	20.74	16.6	6.3	7.6	17.2	6.0	187.3
257	20.83	16.5	6.3	7.6	17.2	6.0	187.3
258	20.92	16.5	6.3	7.6	17.2	6.0	187.3
259	21.01	16.4	6.3	7.6	17.3	6.0	187.3
260	21.10	16.3	6.3	7.6	17.3	6.0	187.4
261	21.19	16.3	6.3	7.6	17.3	6.0	187.4
262	21.27	16.2	6.3	7.6	17.4	6.0	187.4
263	21.36	16.2	6.3	7.6	17.4	6.0	187.4
264	21.45	16.1	6.3	7.6	17.4	6.0	187.5
265	21.54	16.0	6.3	7.6	17.5	6.0	187.5
266	21.63	16.0	6.3	7.6	17.5	6.0	187.5
267	21.72	15.9	6.3	7.6	17.6	6.0	187.5
268	21.81	15.9	6.3	7.6	17.6	6.0	187.6
269	21.90	15.8	6.3	7.6	17.6	6.0	187.6
270	21.99	15.7	6.3	7.6	17.7	6.0	187.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	22.08	15.7	6.3	7.6	17.7	6.0	187.6
272	22.08	15.7	6.3	7.6	17.7	6.0	187.6
273	22.17	15.6	6.3	7.6	17.8	6.0	187.6
274	22.26	15.5	6.3	7.6	17.8	6.0	187.6
275	22.35	15.5	6.3	7.6	17.9	6.0	187.7
276	22.44	15.4	6.3	7.6	17.9	6.0	187.7
277	22.53	15.4	6.3	7.6	18.0	6.0	187.7
278	22.62	15.3	6.3	7.6	18.0	6.0	187.7
279	22.71	15.3	6.3	7.6	18.0	6.0	187.7
280	22.80	15.3	6.3	7.6	18.1	6.0	187.6
281	22.89	15.4	6.4	7.6	18.1	6.0	187.5
282	22.98	15.5	6.4	7.6	18.2	6.0	187.4
283	23.06	15.5	6.4	7.6	18.2	5.9	187.3
284	23.15	15.6	6.4	7.6	18.3	5.9	187.2
285	23.24	15.7	6.4	7.6	18.3	5.9	187.1
286	23.33	15.7	6.4	7.6	18.4	5.9	187.0
287	23.42	15.8	6.4	7.6	18.4	5.9	186.9
288	23.51	15.8	6.4	7.6	18.5	5.9	186.8
289	23.60	15.9	6.4	7.6	18.5	5.8	186.7
290	23.69	16.0	6.4	7.6	18.6	5.8	186.6
291	23.78	16.0	6.4	7.6	18.6	5.8	186.5
292	23.87	16.1	6.4	7.6	18.7	5.8	186.4
293	23.87	16.1	6.4	7.6	18.7	5.8	186.4
294	23.96	16.2	6.4	7.6	18.7	5.8	186.3
295	24.05	16.2	6.4	7.6	18.8	5.8	186.2
296	24.14	16.3	6.4	7.6	18.9	5.7	186.1
297	24.23	16.3	6.4	7.6	18.9	5.7	186.0
298	24.32	16.4	6.4	7.6	19.0	5.7	185.9
299	24.41	16.5	6.4	7.6	19.0	5.7	185.8
300	24.50	16.5	6.4	7.6	19.1	5.7	185.7
301	24.59	16.6	6.4	7.6	19.1	5.7	185.6
302	24.68	16.6	6.4	7.6	19.2	5.6	185.5
303	24.76	16.7	6.4	7.6	19.3	5.6	185.4
304	24.85	16.8	6.4	7.6	19.3	5.6	185.3
305	24.94	16.8	6.4	7.6	19.4	5.6	185.2
306	25.03	16.9	6.4	7.6	19.4	5.6	185.1
307	25.12	17.0	6.4	7.6	19.5	5.5	185.0
308	25.21	17.0	6.4	7.6	19.6	5.5	184.9
309	25.30	17.1	6.4	7.6	19.6	5.5	184.8
310	25.39	17.1	6.4	7.6	19.7	5.5	184.7
311	25.48	17.2	6.3	7.6	19.7	5.5	184.6
312	25.57	17.3	6.3	7.6	19.8	5.5	184.5
313	25.66	17.3	6.3	7.6	19.8	5.4	184.4
314	25.66	17.3	6.3	7.6	19.8	5.4	184.4
315	25.75	17.4	6.3	7.6	19.9	5.4	184.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	25.84	17.5	6.3	7.6	20.0	5.4	184.2
317	25.93	17.5	6.3	7.6	20.0	5.4	184.1
318	26.02	17.6	6.3	7.6	20.1	5.4	184.0
319	26.11	17.6	6.3	7.6	20.1	5.4	183.9
320	26.20	17.7	6.2	7.6	20.2	5.3	183.8
321	26.29	17.8	6.2	7.6	20.3	5.3	183.8
322	26.38	17.8	6.2	7.6	20.3	5.3	183.7
323	26.47	17.9	6.2	7.6	20.4	5.3	183.6
324	26.56	18.0	6.2	7.6	20.4	5.3	183.5
325	26.64	18.0	6.1	7.6	20.5	5.3	183.4
326	26.73	18.1	6.1	7.6	20.6	5.3	183.3
327	26.82	18.2	6.1	7.6	20.6	5.2	183.2
328	26.91	18.2	6.1	7.6	20.7	5.2	183.1
329	27.00	18.3	6.1	7.6	20.8	5.2	183.1
330	27.09	18.3	6.0	7.6	20.8	5.2	183.0
331	27.18	18.4	6.0	7.6	20.9	5.2	182.9
332	27.27	18.5	6.0	7.6	20.9	5.2	182.8
333	27.36	18.5	5.9	7.6	21.0	5.1	182.8
334	27.45	18.6	5.9	7.6	21.0	5.1	182.7
335	27.45	18.6	5.9	7.6	21.0	5.1	182.7
336	27.54	18.7	5.9	7.6	21.1	5.1	182.6
337	27.63	18.7	5.8	7.6	21.1	5.1	182.6
338	27.72	18.8	5.8	7.6	21.2	5.1	182.5
339	27.81	18.8	5.8	7.6	21.2	5.1	182.4
340	27.90	18.9	5.7	7.6	21.3	5.1	182.4
341	27.99	19.0	5.7	7.6	21.3	5.0	182.3
342	28.08	19.0	5.7	7.6	21.4	5.0	182.3
343	28.17	19.1	5.6	7.6	21.4	5.0	182.2
344	28.26	19.2	5.6	7.6	21.5	5.0	182.1
345	28.35	19.4	5.5	7.6	21.5	5.0	181.9
346	28.43	19.6	5.5	7.6	21.5	5.0	181.8
347	28.52	19.7	5.5	7.6	21.6	4.9	181.6
348	28.61	19.9	5.4	7.6	21.6	4.9	181.5
349	28.70	20.1	5.4	7.6	21.6	4.9	181.3
350	28.79	20.3	5.3	7.6	21.7	4.9	181.2
351	28.88	20.5	5.3	7.6	21.7	4.9	181.1
352	28.97	20.6	5.2	7.6	21.7	4.8	180.9
353	29.06	20.8	5.2	7.6	21.7	4.8	180.8
354	29.15	21.0	5.1	7.6	21.7	4.8	180.7
355	29.24	21.2	5.1	7.6	21.7	4.8	180.6
356	29.24	21.2	5.0	7.6	21.7	4.8	180.6
357	29.33	21.4	5.0	7.6	21.7	4.8	180.5
358	29.42	21.5	4.9	7.6	21.7	4.7	180.4
359	29.51	21.7	4.9	7.6	21.7	4.7	180.3
360	29.60	21.9	4.8	7.6	21.7	4.7	180.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	29.69	22.1	4.8	7.6	21.7	4.7	180.1
362	29.78	22.3	4.7	7.6	21.7	4.7	180.0
363	29.87	22.4	4.6	7.6	21.7	4.7	179.9
364	29.96	22.6	4.6	7.6	21.7	4.6	179.8
365	30.05	22.8	4.5	7.6	21.6	4.6	179.7
366	30.14	23.0	4.5	7.7	21.6	4.6	179.6
367	30.22	23.2	4.4	7.7	21.6	4.6	179.5
368	30.31	23.3	4.3	7.7	21.6	4.6	179.4
369	30.40	23.5	4.3	7.7	21.5	4.6	179.4
370	30.49	23.7	4.2	7.7	21.5	4.5	179.3
371	30.58	23.9	4.1	7.7	21.5	4.5	179.2
372	30.67	24.1	4.1	7.7	21.4	4.5	179.1
373	30.76	24.2	4.0	7.7	21.4	4.5	179.1
374	30.85	24.4	3.9	7.7	21.4	4.5	179.0
375	30.94	24.6	3.9	7.7	21.3	4.5	178.9
376	31.03	24.8	3.8	7.7	21.3	4.5	178.9
377	31.03	24.8	3.8	7.7	21.2	4.5	178.9
378	31.12	25.0	3.7	7.7	21.2	4.4	178.8
379	31.21	25.1	3.7	7.7	21.2	4.4	178.7
380	31.30	25.3	3.6	7.7	21.1	4.4	178.7
381	31.39	25.5	3.6	7.8	21.1	4.4	178.6
382	31.48	25.7	3.5	7.8	21.0	4.4	178.5
383	31.57	25.9	3.5	7.8	21.0	4.4	178.5
384	31.66	26.1	3.4	7.8	20.9	4.4	178.4
385	31.75	26.2	3.3	7.8	20.9	4.3	178.3
386	31.84	26.4	3.3	7.8	20.8	4.3	178.2
387	31.92	26.6	3.2	7.8	20.8	4.3	178.2
388	32.01	26.8	3.2	7.8	20.7	4.3	178.1
389	32.10	27.0	3.1	7.8	20.6	4.3	178.0
390	32.19	27.1	3.1	7.8	20.6	4.3	178.0
391	32.28	27.2	3.0	7.8	20.5	4.3	178.0
392	32.37	27.3	3.0	7.9	20.5	4.3	178.1
393	32.46	27.3	2.9	7.9	20.4	4.3	178.1
394	32.55	27.4	2.9	7.9	20.3	4.3	178.1
395	32.64	27.5	2.9	7.9	20.3	4.3	178.2
396	32.73	27.5	2.8	7.9	20.2	4.3	178.2
397	32.82	27.6	2.8	7.9	20.2	4.3	178.2
398	32.82	27.6	2.8	7.9	20.1	4.3	178.2
399	32.91	27.7	2.7	7.9	20.1	4.2	178.3
400	33.00	27.7	2.7	7.9	20.0	4.2	178.3
401	33.09	27.8	2.7	7.9	20.0	4.2	178.3
402	33.18	27.8	2.6	7.9	19.9	4.2	178.3
403	33.27	27.9	2.6	7.9	19.9	4.2	178.4
404	33.36	28.0	2.6	7.9	19.8	4.2	178.4
405	33.45	28.0	2.5	8.0	19.8	4.2	178.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
 viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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 Date: 7/10/11

Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	33.54	28.1	2.5	8.0	19.7	4.2	178.4
407	33.63	28.2	2.5	8.0	19.6	4.2	178.5
408	33.72	28.2	2.4	8.0	19.6	4.2	178.5
409	33.80	28.3	2.4	8.0	19.5	4.2	178.5
410	33.89	28.4	2.4	8.0	19.5	4.2	178.5
411	33.98	28.4	2.4	8.0	19.4	4.2	178.5
412	34.07	28.5	2.4	8.0	19.3	4.2	178.5
413	34.16	28.5	2.3	8.0	19.3	4.2	178.6
414	34.25	28.6	2.3	8.0	19.2	4.2	178.6
415	34.34	28.7	2.3	8.0	19.1	4.2	178.6
416	34.43	28.7	2.3	8.1	19.1	4.2	178.6
417	34.52	28.8	2.3	8.1	19.0	4.2	178.6
418	34.61	28.9	2.2	8.1	18.9	4.2	178.6
419	34.61	28.9	2.2	8.1	18.9	4.2	178.7
420	34.70	28.9	2.2	8.1	18.9	4.2	178.7
421	34.79	29.0	2.2	8.1	18.8	4.1	178.7
422	34.88	29.1	2.2	8.1	18.7	4.1	178.7
423	34.97	29.1	2.2	8.1	18.7	4.1	178.7
424	35.06	29.2	2.2	8.1	18.6	4.1	178.7
425	35.15	29.3	2.2	8.1	18.5	4.1	178.7
426	35.24	29.3	2.2	8.1	18.5	4.1	178.7
427	35.33	29.4	2.2	8.1	18.4	4.1	178.7
428	35.42	29.4	2.2	8.1	18.4	4.1	178.7
429	35.51	29.5	2.2	8.1	18.3	4.1	178.7
430	35.59	29.6	2.2	8.1	18.2	4.1	178.7
431	35.68	29.6	2.2	8.2	18.2	4.1	178.7
432	35.77	29.7	2.2	8.2	18.1	4.1	178.7
433	35.86	29.8	2.2	8.2	18.0	4.1	178.7
434	35.95	29.8	2.2	8.2	18.0	4.1	178.7
435	36.04	29.9	2.2	8.2	17.9	4.1	178.7
436	36.13	30.0	2.2	8.2	17.9	4.1	178.7
437	36.22	30.0	2.2	8.2	17.8	4.1	178.7
438	36.31	30.1	2.2	8.2	17.7	4.1	178.6
439	36.40	30.2	2.2	8.2	17.7	4.1	178.6
440	36.40	30.2	2.2	8.2	17.9	4.0	178.4
441	36.43	30.2	2.2	8.2	18.0	4.0	178.3
442	36.46	30.2	2.2	8.2	18.1	4.0	178.2
443	36.49	30.2	2.2	8.2	18.2	4.0	178.1
444	36.52	30.2	2.2	8.2	18.3	4.0	177.9
445	36.55	30.3	2.3	8.2	18.3	4.0	177.8
446	36.58	30.3	2.3	8.2	18.4	4.0	177.7
447	36.61	30.3	2.3	8.2	18.5	4.0	177.6
448	36.64	30.3	2.3	8.2	18.6	4.0	177.5
449	36.67	30.4	2.3	8.2	18.7	4.0	177.4
450	36.70	30.4	2.3	8.2	18.8	4.0	177.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga int 37m cabo c4 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

Page: 277

Date: 7/10/11

Summary of tension force losses for cable no. 4, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	36.73	30.4	2.3	8.2	18.9	4.0	177.1
452	36.76	30.4	2.3	8.2	19.0	4.0	177.0
453	36.79	30.4	2.3	8.2	19.1	4.0	176.9
454	36.82	30.5	2.3	8.2	19.1	4.0	176.8
455	36.85	30.5	2.3	8.2	19.2	4.0	176.7
456	36.88	30.5	2.3	8.2	19.3	4.0	176.6
457	36.90	30.5	0.8	8.2	6.2	5.0	190.2

Time-steps analysis was performed.

VERIFICAÇÃO DE SEÇÕES PROTENDIDAS

<VerProtFint>

OBRA: VIADUTO NA PE-060

1. Dados de Entrada

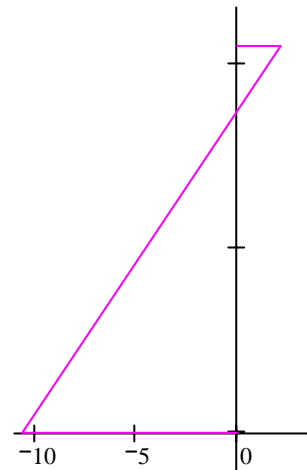
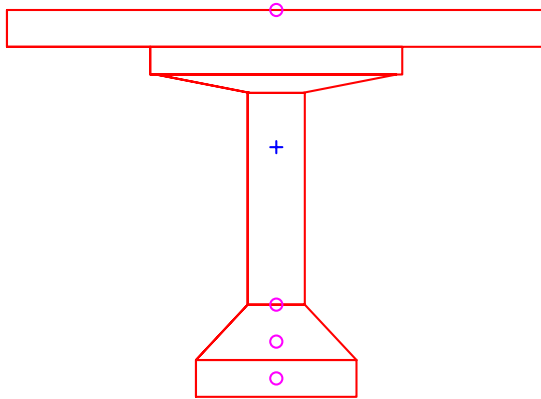
VIGA INTERNA 37 m

	<u>Base Superior</u>	<u>Base Inferior</u>	<u>Altura</u>	<u>As</u> <cm ² >	<u>Prof.</u> <m>	<u>Prealon.</u> <%>
trap :=	1	2	3	1	2	3
	2.35	2.35	0.2	34.4	2	5
	1.1	1.1	0.15	17.2	1.8	5
	1.05	0.23	0.1	17.2	1.6	5
	0.25	0.25	1.15	0	0	0
	0.25	0.7	0.3			
	0.7	0.7	0.2			

c/toda carga movel

Fator do conc. $\gamma_c := 1.4$ Resistencia carac. <tf/m²> $f_{ck} := 3500$ $f_c := 0.85 \cdot \frac{f_{ck}}{\gamma_c}$

Fator dos esf. $\gamma_f := 1.4$



Momento último de projeto $M_r(D) = 1822$

$$M_d := 1.35 \cdot 714 + 1.5 \cdot 312$$

Momento de serviço $\frac{M_r(D)}{\gamma_f} = 1301$

$$M_d = 1432$$

menor que $M_r(D)$

Altura total $h_{total} = 2.1$

Profundidade do CG $y_s = 0.744$

Deformação de compressão $\epsilon_{c1} = 2.132$

Profundidade do eixo neutro $p_{en} = 0.352$

OBRA: VIADUTO NA BR PE-060 37m

VIGA INTENA

Dados gerais

- . número de seções ns := 6
- . cortantes de carga permanente, carga móvel e protensão (KN) i := 1..ns
- | <u>carga permanente</u> | <u>carga móvel</u> | <u>protensão</u> |
|-------------------------|-----------------------|----------------------|
| vg1 _i := | vg2 _i := 0 | vcml _i := |
| 798 | | 495 |
| 664 | | 440 |
| 507 | | 336 |
| 350 | | 247 |
| 193 | | 173 |
| 0 | | 140 |
| | | -0 |
| | | -40 |
| | | -78 |
| | | -158 |
| | | -240 |
| | | -319 |
| | | -714 |
| | | -617 |
| | | -289 |
| | | -0 |
| | | -0 |
| | | 0 |
- vg1 - refere-se a G1+ G2 + G3
- vg12_i := vg1_i + vg2_i vm_{i,1} := vcml_i vm_{i,2} := vcm2_i
- . momento torsor (KN) Mt := (0 0 0 0 0 0)
- . geometria (mm,mm2)
- | largura nominal | altura | área efetiva | espessura da parede |
|-----------------------|------------------------|--------------------------|-----------------------------------|
| b _i := 210 | h _i := 2100 | A _i := 100000 | ef _i := b _i |
| b ₁ := 660 | | | |
- . distância p/centro armadura (m) c := 100
- . coeficiente
- | majoração das cargas | K1 _i := | K2 _i := | K3 _i := |
|----------------------|--------------------|--------------------|--------------------|
| | 1.35 | 1.50 | 1.20 |
| | 1.00 | 0 | 0.90 |
- . coeficiente
- | | |
|---------------------------------|------------------------|
| minoração do concreto | γ _c := 1.5 |
| minoração do aço | γ _s := 1.15 |
| redução da carga móvel p/fadiga | γ _f := 0.5 |
- . resistência característica do concreto a compressão (MPa) f_{ck} := 35
- . resistência característica do aço a tração (MPa) f_{yk} := 500
- . variação de tensão na armadura para fadiga (MPa) Δσ := 85
- . número de vigas para os esforços dados nv := 1

$$f_{yd} := \frac{f_{yk}}{\gamma_s} \quad \alpha_{v2} := \left(1 - \frac{f_{ck}}{250}\right) \quad f_{ctm} := 0.3 \cdot f_{ck}^{\frac{2}{3}} \quad f_{ctdinf} := 0.7 \cdot f_{ctm} \quad d_1 := h_1 - c$$

$$f_{cd} := \frac{f_{ck}}{\gamma_c} \quad f_{ctd} := \frac{f_{ctdinf}}{\gamma_c} \quad v_{c1} := 0.6 \cdot f_{ctd} \cdot b_1 \cdot d_1 \quad d_1 := 0.001 \cdot d_1$$

. número de pernas do estribo **cortante** **np₁ := 2**

torção **nt₁ := 1**

$$\rho_{min} := 0.2 \cdot \frac{f_{ctm}}{f_{yk}} \quad \rho_{min} = 0.00128 \quad K_v := \frac{1}{n_v}$$

**RUPTURA****EM SERVIÇO****CORTANTE****CORTANTE**

$$v_{sd1}_i := K_v \cdot \max\left(\left| m_{max,1,1} \right|, \left| m_{min,1,1} \right|\right)$$

$$v_{11}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm1}_i + v_{p1}_i)$$

TORÇÃO

$$v_{12}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm2}_i + v_{p1}_i)$$

$$M_{tsd}_i := 1.5 \cdot \left| M_t \right|^{(\dot{\varphi})}$$

$$\Delta 1_i := \begin{cases} |v_{11}_i - v_{12}_i| & \text{if } v_{11}_i \cdot v_{12}_i \geq 0 \\ \max(|v_{11}_i|, |v_{12}_i|) & \text{otherwise} \end{cases}$$

$$V_{1_i} := \max(|v_{11}_i|, |v_{12}_i|)$$

$$v_{sd1} = \begin{pmatrix} 1177200 \\ 1001100 \\ 928350 \\ 843000 \\ 520050 \\ 381000 \end{pmatrix} \quad b = \begin{pmatrix} 660 \\ 210 \\ 210 \\ 210 \\ 210 \\ 210 \end{pmatrix} \quad \Delta 1 = \begin{pmatrix} 247500 \\ 240000 \\ 207000 \\ 202500 \\ 206500 \\ 159500 \end{pmatrix} \quad V1 = \begin{pmatrix} 331500 \\ 267000 \\ 386000 \\ 473500 \\ 279500 \\ 159500 \end{pmatrix} \quad v_c = \begin{pmatrix} 1186402.12 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \end{pmatrix}$$

ARMADURA

$$v_{sd}_i := v_{sd1}_i \quad V_i := V_{1_i} \quad \Delta 1_i := \Delta 1_i$$

ruptura**fadiga**

$$AS1_i := \begin{cases} \frac{v_{sd}_i - v_c}{0.9 \cdot d_1 \cdot f_{yd}} & \text{if } v_{sd}_i \geq v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS2_i := \begin{cases} \frac{V_i - 0.5 \cdot v_c}{0.9 \cdot d_1 \cdot \Delta \sigma} \cdot \frac{\Delta 1_i}{V_i} & \text{if } V_i \geq 0.5 \cdot v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS3_i := \max(AS1_i, AS2_i)$$

$$AS4_i := \frac{M_{tsd}_i}{2 \cdot A_1 \cdot f_{yd}} \cdot 1000$$

$$d_1 := 1000 \cdot d_1$$

SOLICITAÇÕES COMBINADAS**ARMAÇÃO TOTAL /PERNA**

$$\text{TRD1}_i := 0.5 \cdot \alpha v_2 \cdot \text{fcd} \cdot A_i \cdot e_{f_i} \quad \text{VRD2}_i := 0.27 \cdot \alpha v_2 \cdot \text{fcd} \cdot b_i \cdot d_i \quad \text{AS}_i := \max \left(\frac{\text{AS4}_i}{n_{t_i}} + \frac{\text{AS3}_i}{n_{p_i}}, \frac{1000 \cdot \rho_{\text{min}} \cdot b_i}{n_{p_i}} \right)$$

$$\text{TRD1} = \begin{pmatrix} 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \end{pmatrix} \quad \text{VRD2} = \begin{pmatrix} 7151760 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \end{pmatrix} \quad \text{AS} = \begin{pmatrix} 423.72 \\ 398.42 \\ 351.94 \\ 397.97 \\ 219.12 \\ 134.82 \end{pmatrix} \quad (\text{mm}^2)/\text{perna}/\text{m}$$

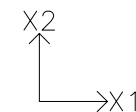
$$v1_i := \frac{\text{vsd}_i}{\text{VRD2}_i} \quad v2_i := \frac{\text{Mtsd}_i}{\text{TRD1}_i} \quad v := v1 + v2$$

$$v1 = \begin{pmatrix} 0.16 \\ 0.44 \\ 0.41 \\ 0.37 \\ 0.23 \\ 0.17 \end{pmatrix} \quad v2 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad v = \begin{pmatrix} 0.16 \\ 0.44 \\ 0.41 \\ 0.37 \\ 0.23 \\ 0.17 \end{pmatrix}$$

5.2.1.3.4 VIGA (TRECHO DE 33,2M)

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m

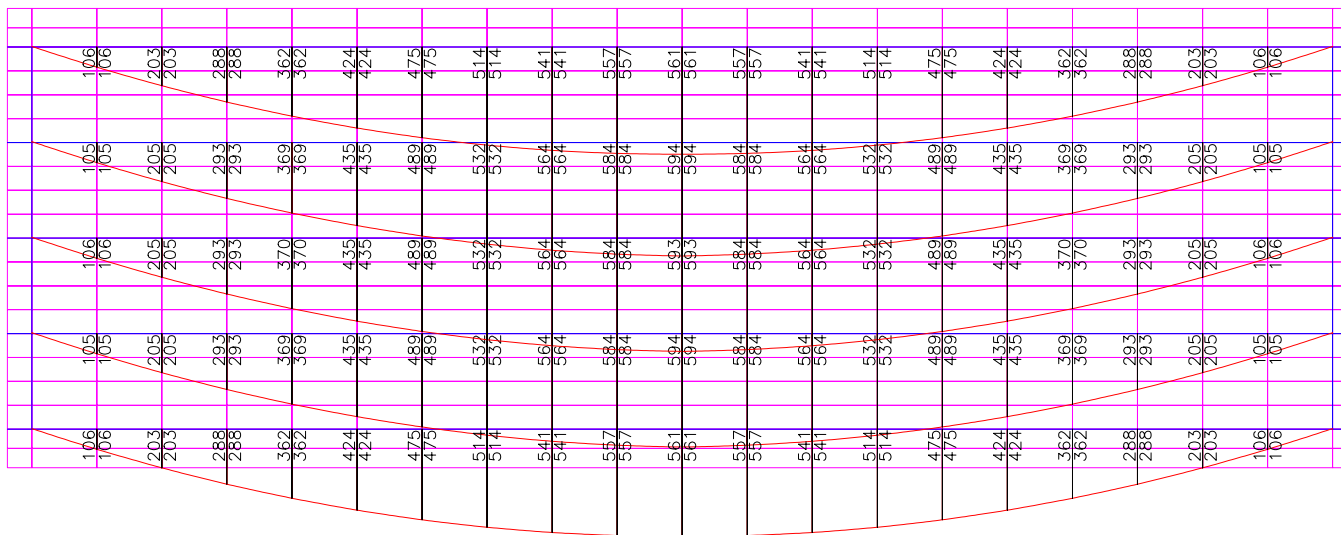
viga 33m mom g1+g2+g3



ESCALA= 1:186

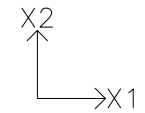
UNIDS: tf*m

DATA: 7/10/11



VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m

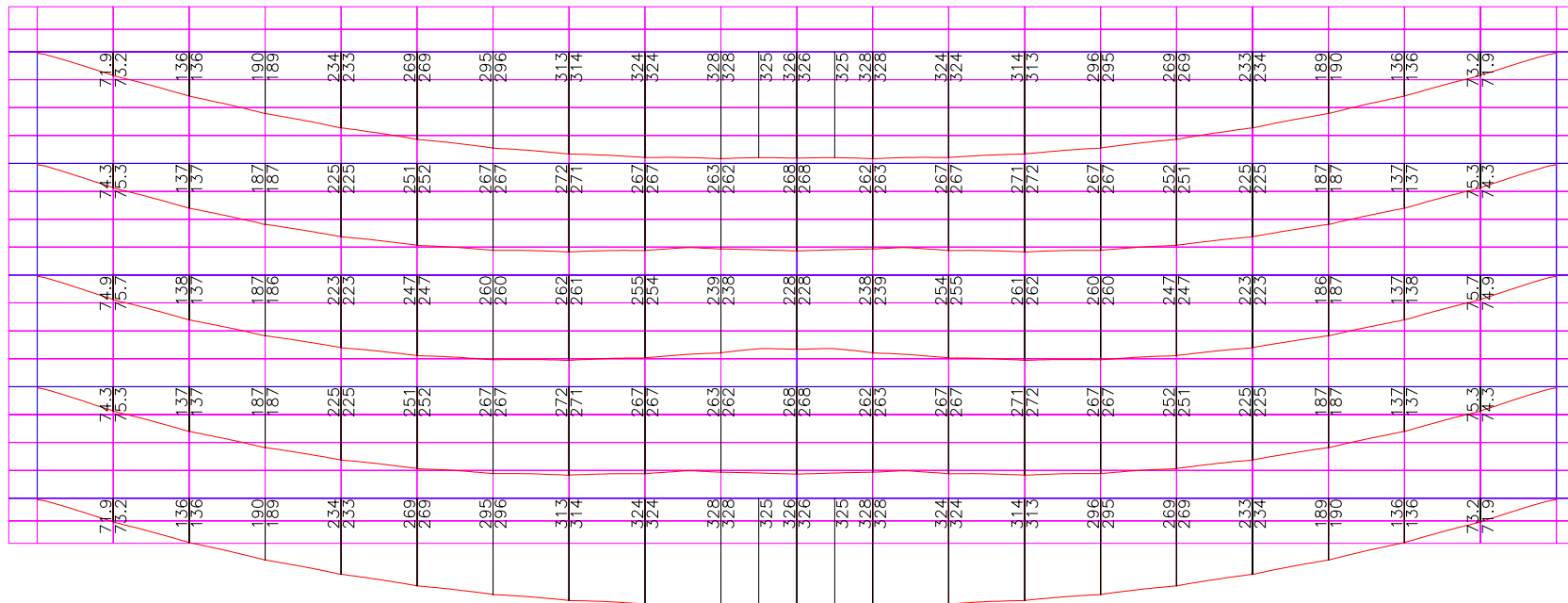
viga 33m mom 100%cmovel+



ESCALA= 1:150

UNIDS: tf*m

DATA: 7/10/11

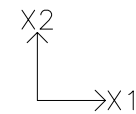


MOM. FLETOR M2

CARREG. N°22 100%cmovel+

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m

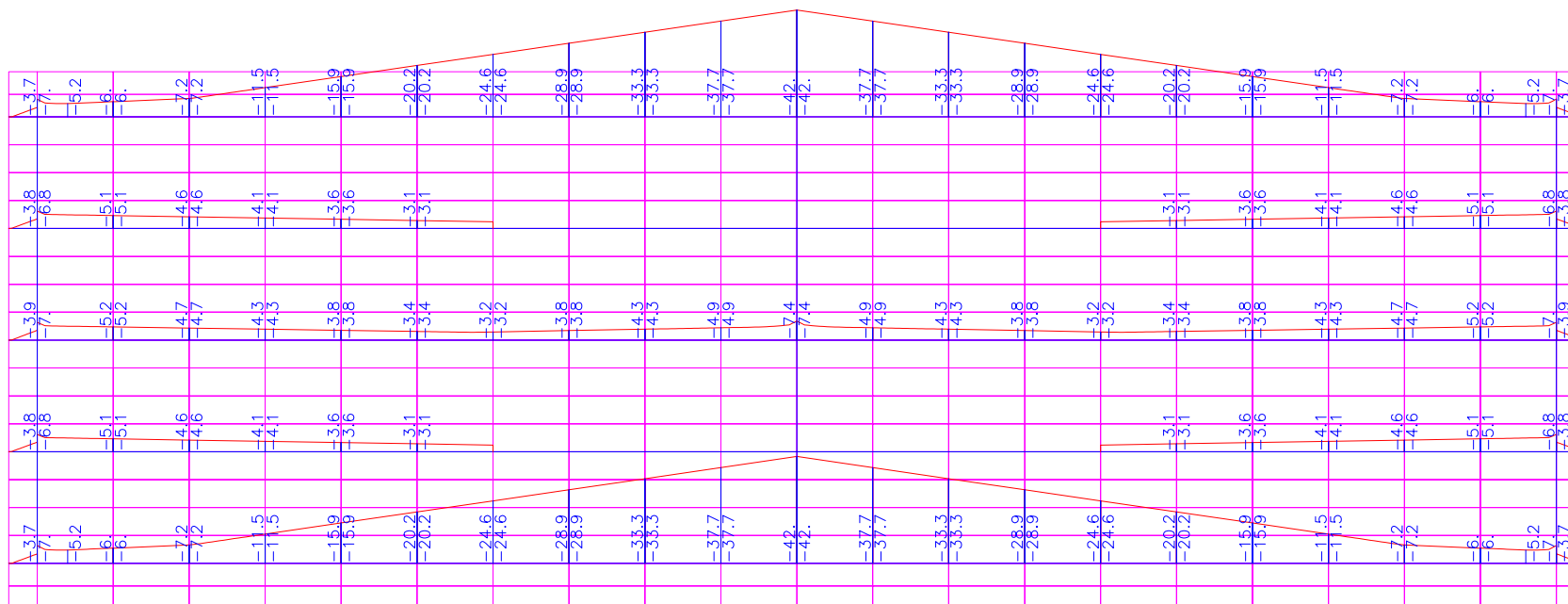
viga 33m mom 100%cmovel-



ESCALA= 1:150

UNIDS: tf*m

DATA: 7/10/11

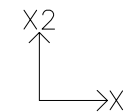


MOM. FLETOR M2

CARREG. N°23 100%cmovel-

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m

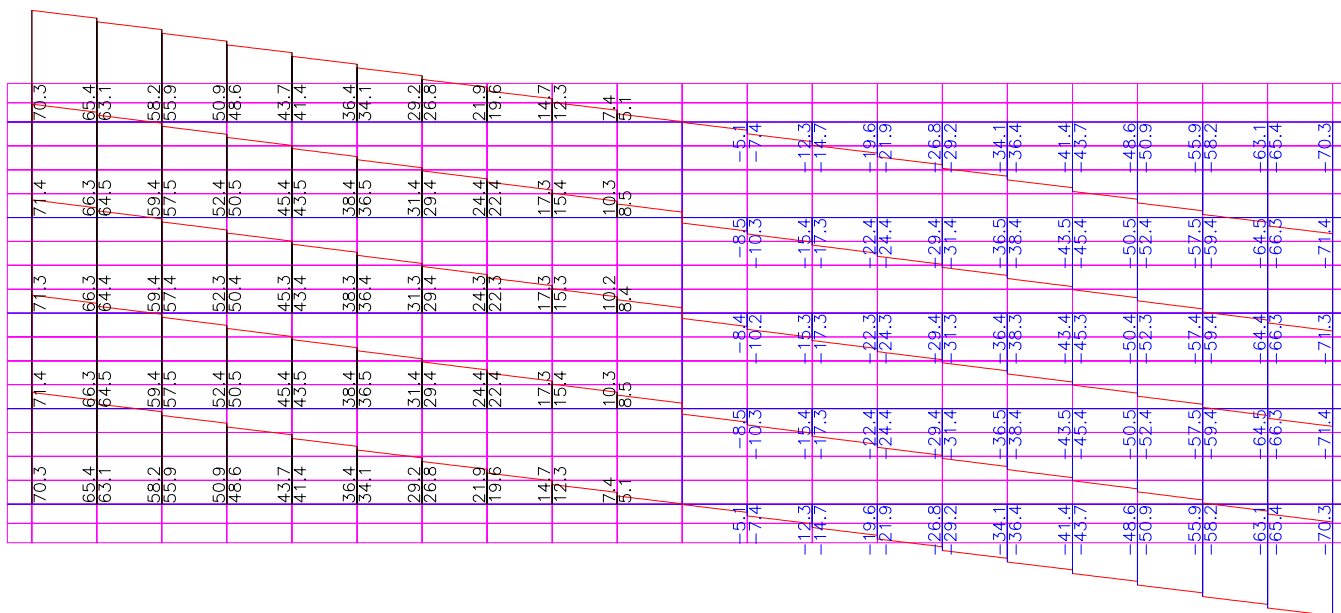
viga 33m cort g1+g2+g3



ESCALA= 1:186

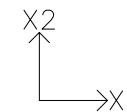
UNIDS: tf

DATA: 7/10/11



VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m

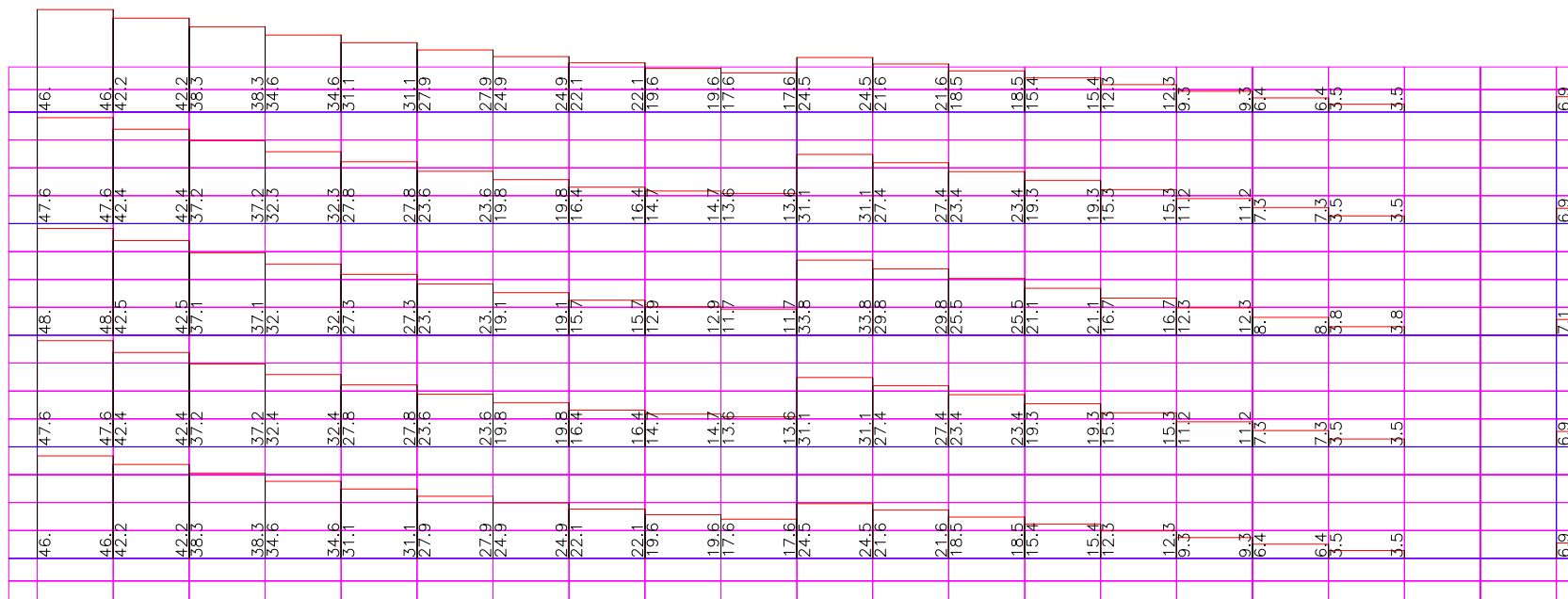
viga 33m cort 100%cmovel+



ESCALA= 1:150

UNIDS: tf

DATA: 7/10/11



CORTANTE V3

CARREG. N°22 100%cmovel+

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga 33m project data table

Prepared by:

Units: ton meter

Code: EuroCode

Page: 94

Date: 7/10/11

PROJECT DATA TABLE

STAGES

Name	Start time (days)	Allow. tens. (MPa)	Allow. compr. (MPa)	model stage	add creep forces after schm. cng.
TRANSFER	14	1.	20.	pre-moldado	not relevant
conclaje	30	2.3	25.	pre-moldado	not relevant
ligação	33	2.3	25.	Whole model	Yes
pavimentação	80	2.3	25.	Whole model	not relevant
serviço	100	2.3	25.	Whole model	not relevant

TIME STEPS IN ADDITION TO THE TIME OF THE STAGES (DAYS)

time = 0
 time = 30
 time = 33
 time = 50
 time = 60
 time = 80
 time = 100
 time = 120
 time = 365
 time = 730
 time = 30000

LOAD COMBINATIONS

Name	Start time (days)	End time (days)	perman.	type
g1	14	30	Yes	fact. & serv.
g1+g2	30	80	Yes	fact. & serv.
g1+g2+g3	80	infinity	Yes	fact. & serv.
g1+g2+g3+cm	100	infinity	No	fact. & serv.

STRAND TYPES

Name	Strand area (mm ²)	Max. stress (MPa)	Steel type
7WS15.2MM	143.4	1400.	TYPE-1860

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
viga ext=int 33m stages data table

Prepared by:

Units: ton meter

Code: EuroCode

Page: 100

Date: 7/10/11

STAGES DATA TABLE

BEAM NO. 1

Stage 1: TRANSFER, t = 14.

Combinations that start at this stage:

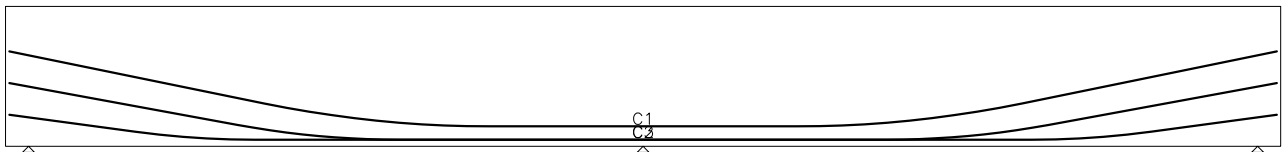
Comb. no.1: g1

Cables jacked at this stage:

Cable no. 1: force = 240.91[t]

Cable no. 2: force = 240.91[t]

Cable no. 3: force = 240.91[t]



Stage 2: conclaje, t = 30.

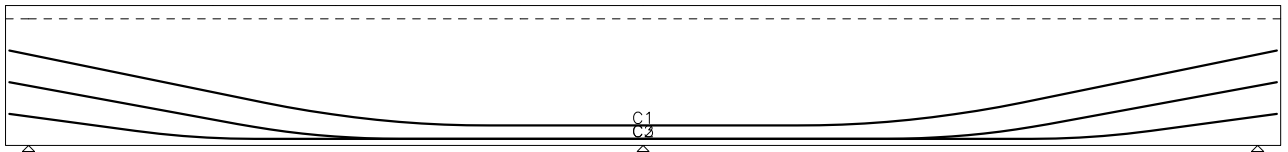
Combinations that start at this stage:

Comb. no.2: g1+g2

Combinations, that end at this stage:

Comb. no.1: g1

Stage 3: ligação, t = 33.



Stage 4: pavimentação, t = 80.

Combinations that start at this stage:

Comb. no.3: g1+g2+g3

Combinations, that end at this stage:

Comb. no.2: g1+g2

Stage 5: serviço, t = 100.

Combinations that start at this stage:

Comb. no.4: g1+g2+g3+cm

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m geometry data table
 Prepared by:

Units: ton meter

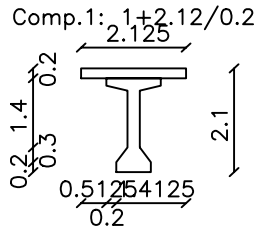
Code: EuroCode
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GEOMETRY DATA TABLE

BEAM NO. B1

el. =	45	46,.... ,55	56,.... ,65	66
prop. #	1+2.12/0.2	1+2.12/0.2	1+2.12/0.2	1+2.12/0.2
	0.6	16.	16.	0.6
As top	10.	10.	10.	10.
As bot	12.	12.	12.	12.
ds top	3.5	3.5	3.5	3.5
ds bot	3.5	3.5	3.5	3.5
casting t=	0.	0.	0.	0.
topping t=	33.	33.	33.	33.

SECTIONS



PARAMETERS

Design Code = EuroCode, conc. $f_c = 35.$, reinf. $f_y = 500.$, shear reinf. $f_y = 500.$
 Reinf. modulus $E = 200000.$, conc. modulus $E = 30000.$, cables modulus $E = 205000.$
 Humidity = 75.%, cement type = normal, temperature = 30.
 Calculation methods: Ultimate moment = include decompression strain,
 Shear = inclined struts method, Deflections = use effective I at each point.

CABLE NO. = 1

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands = 240.91[t]

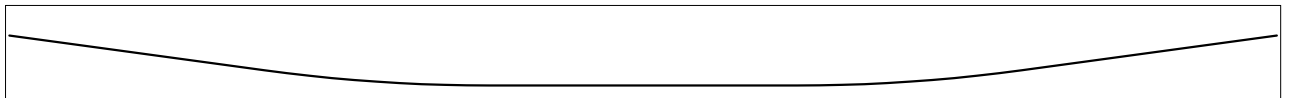
Cable is bonded

JACKING SEQUENCE :

Stage 1/3: TRANSFER

Strands 1-12 jacked from two sides to 100.%, Total force of jacked strands = 240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-675	-734	-793	-852	-911	-969	-1028	-1087	-1146	-1205	-1264	-1323
x	6100	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100	11600
y	-1382	-1441	-1498	-1550	-1598	-1640	-1678	-1710	-1738	-1760	-1778	-1790
x	12100	12590	13100	13600	14100	14600	15100	15600	16100	16600	17100	17600
y	-1798	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800
x	18100	18600	19100	19600	20100	20610	21100	21600	22100	22600	23100	23600
y	-1800	-1800	-1800	-1800	-1800	-1800	-1798	-1790	-1778	-1760	-1738	-1710
x	24100	24600	25100	25600	26100	26600	27100	27600	28100	28600	29100	29600
y	-1678	-1640	-1598	-1550	-1498	-1441	-1382	-1323	-1264	-1205	-1146	-1087
x	30100	30600	31100	31600	32100	32600	33100					
y	-1028	-969	-911	-852	-793	-734	-675					

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m geometry data table

Code: EuroCode
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Prepared by:

Units: ton meter

CABLE NO. = 2

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

Cable is bonded

JACKING SEQUENCE :

Stage 1/1: TRANSFER

Strands 1-12 jacked from left side to 100%, Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-1150	-1203	-1256	-1309	-1361	-1414	-1467	-1520	-1573	-1626	-1679	-1731
x	6100	6600	7100	7600	8100	8600	9100	9600	10100	10250	10600	11100
y	-1784	-1833	-1876	-1912	-1942	-1966	-1983	-1995	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	23100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23600	24100	24600	25100	25600	26100	26600	26720	27100	27600	28100	28600
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-1998	-1990	-1976	-1956
x	29100	29600	30100	30600	31100	31600	32100	32600	33100			
y	-1929	-1896	-1858	-1819	-1780	-1742	-1703	-1664	-1625			

CABLE NO. = 3

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

Cable is bonded

JACKING SEQUENCE :

Stage 1/2: TRANSFER

Strands 1-12 jacked from right side to 100%, Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-1625	-1664	-1703	-1742	-1780	-1819	-1858	-1896	-1929	-1956	-1976	-1990
x	6100	6480	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100
y	-1998	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	22950
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23100	23600	24100	24600	25100	25600	26100	26600	27100	27600	28100	28600
y	-2000	-1995	-1983	-1966	-1942	-1912	-1876	-1833	-1784	-1731	-1679	-1626
x	29100	29600	30100	30600	31100	31600	32100	32600	33100			
y	-1573	-1520	-1467	-1414	-1361	-1309	-1256	-1203	-1150			

5.2.1.3.5 VIGA EXTERNA (TRECHO DE 33,2M)

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m geometry data table
 Prepared by:

Units: ton meter

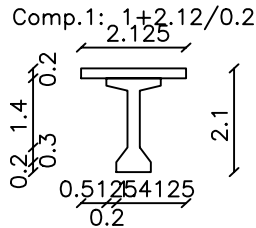
Code: EuroCode
 Page: 97
 Date: 7/10/11

GEOMETRY DATA TABLE

BEAM NO. B1

el. =	45	46,.... ,55	56,.... ,65	66
prop. #	1+2.12/0.2	1+2.12/0.2	1+2.12/0.2	1+2.12/0.2
	0.6	16.	16.	0.6
As top	10.	10.	10.	10.
As bot	12.	12.	12.	12.
ds top	3.5	3.5	3.5	3.5
ds bot	3.5	3.5	3.5	3.5
casting t=	0.	0.	0.	0.
topping t=	33.	33.	33.	33.

SECTIONS



PARAMETERS

Design Code = EuroCode, conc. $f_c = 35.$, reinf. $f_y = 500.$, shear reinf. $f_y = 500.$
 Reinf. modulus $E = 200000.$, conc. modulus $E = 30000.$, cables modulus $E = 205000.$
 Humidity = 75.%, cement type = normal, temperature = 30.
 Calculation methods: Ultimate moment = include decompression strain,
 Shear = inclined struts method, Deflections = use effective I at each point.

CABLE NO. = 1

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands = 240.91[t]

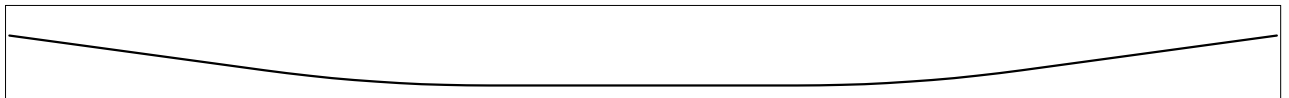
Cable is bonded

JACKING SEQUENCE :

Stage 1/3: TRANSFER

Strands 1-12 jacked from two sides to 100.%, Total force of jacked strands = 240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-675	-734	-793	-852	-911	-969	-1028	-1087	-1146	-1205	-1264	-1323
x	6100	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100	11600
y	-1382	-1441	-1498	-1550	-1598	-1640	-1678	-1710	-1738	-1760	-1778	-1790
x	12100	12590	13100	13600	14100	14600	15100	15600	16100	16600	17100	17600
y	-1798	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800
x	18100	18600	19100	19600	20100	20610	21100	21600	22100	22600	23100	23600
y	-1800	-1800	-1800	-1800	-1800	-1800	-1798	-1790	-1778	-1760	-1738	-1710
x	24100	24600	25100	25600	26100	26600	27100	27600	28100	28600	29100	29600
y	-1678	-1640	-1598	-1550	-1498	-1441	-1382	-1323	-1264	-1205	-1146	-1087
x	30100	30600	31100	31600	32100	32600	33100					
y	-1028	-969	-911	-852	-793	-734	-675					

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m geometry data table

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Prepared by:

Units: ton meter

CABLE NO. = 2

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

Cable is bonded

JACKING SEQUENCE :

Stage 1/1: TRANSFER

Strands 1-12 jacked from left side to 100%, Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-1150	-1203	-1256	-1309	-1361	-1414	-1467	-1520	-1573	-1626	-1679	-1731
x	6100	6600	7100	7600	8100	8600	9100	9600	10100	10250	10600	11100
y	-1784	-1833	-1876	-1912	-1942	-1966	-1983	-1995	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	23100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23600	24100	24600	25100	25600	26100	26600	26720	27100	27600	28100	28600
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-1998	-1990	-1976	-1956
x	29100	29600	30100	30600	31100	31600	32100	32600	33100			
y	-1929	-1896	-1858	-1819	-1780	-1742	-1703	-1664	-1625			

CABLE NO. = 3

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

Cable is bonded

JACKING SEQUENCE :

Stage 1/2: TRANSFER

Strands 1-12 jacked from right side to 100%, Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-1625	-1664	-1703	-1742	-1780	-1819	-1858	-1896	-1929	-1956	-1976	-1990
x	6100	6480	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100
y	-1998	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	22950
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23100	23600	24100	24600	25100	25600	26100	26600	27100	27600	28100	28600
y	-2000	-1995	-1983	-1966	-1942	-1912	-1876	-1833	-1784	-1731	-1679	-1626
x	29100	29600	30100	30600	31100	31600	32100	32600	33100			
y	-1573	-1520	-1467	-1414	-1361	-1309	-1256	-1203	-1150			

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
45	0.00	4	0.58	3	-0.25	3	0.58	4	-0.26
	0.03	4	0.67	3	-0.47	3	0.67	4	-0.47
	0.06	4	0.76	3	-0.68	3	0.76	4	-0.69
	0.09	4	0.86	3	-0.90	3	0.86	4	-0.90
	0.10	4	1.64	3	3.34	3	1.64	4	3.34
	0.12	4	3.21	3	11.82	3	3.21	4	11.82
	0.15	4	3.25	3	11.52	3	3.25	4	11.52
	0.18	4	3.30	3	11.21	3	3.30	4	11.21
	0.21	4	3.34	3	10.90	3	3.34	4	10.90
	0.24	4	3.39	3	10.59	3	3.39	4	10.59
	0.27	4	3.46	3	10.41	3	3.46	4	10.41
	0.30	4	3.53	3	10.24	3	3.52	4	10.24
	0.33	4	3.59	3	10.06	3	3.59	4	10.06
	0.36	4	3.66	3	9.89	3	3.66	4	9.89
	0.39	4	3.73	3	9.71	3	3.73	4	9.71
	0.42	4	3.80	3	9.54	3	3.80	4	9.54
	0.45	4	3.86	3	9.36	3	3.86	4	9.36
	0.48	4	3.93	3	9.19	3	3.93	4	9.19
	0.51	4	4.00	3	9.01	3	4.00	4	9.01
	0.54	4	4.07	3	8.84	3	4.07	4	8.84
	0.57	4	4.13	3	8.67	3	4.13	4	8.66
	0.60	4	4.20	3	8.49	3	4.20	4	8.49
46	0.60	4	4.22	3	8.38	3	4.19	4	8.32
	0.68	4	4.24	3	8.36	3	4.20	4	8.26
	0.76	4	4.26	3	8.34	3	4.20	4	8.21
	0.84	4	4.29	3	8.31	3	4.21	4	8.13
	0.92	4	4.32	3	8.29	3	4.21	4	8.06
	1.00	4	4.35	3	8.27	3	4.22	4	7.98
	1.08	4	4.37	3	8.25	3	4.22	4	7.91
	1.16	4	4.40	3	8.23	3	4.22	4	7.83
	1.24	4	4.43	3	8.20	3	4.23	4	7.75
	1.32	4	4.46	3	8.18	3	4.23	4	7.67
	1.40	4	4.49	3	8.16	3	4.24	4	7.59
	1.48	4	4.51	3	8.14	3	4.24	4	7.51
	1.56	4	4.54	3	8.12	3	4.24	4	7.43
	1.64	4	4.57	3	8.11	3	4.24	4	7.35
	1.72	4	4.60	3	8.09	3	4.25	4	7.27
	1.80	4	4.63	3	8.07	3	4.25	4	7.19
	1.88	4	4.65	3	8.05	3	4.25	4	7.12
	1.96	4	4.68	3	8.03	3	4.25	4	7.04
	2.04	4	4.71	3	8.01	3	4.25	4	6.96
	2.12	4	4.73	3	8.00	3	4.25	4	6.88
	2.20	4	4.76	3	7.98	3	4.25	4	6.81

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 14/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
47	2.20	4	4.77	3	7.98	3	4.25	4	6.78
	2.28	4	4.78	3	7.97	3	4.25	4	6.72
	2.36	4	4.80	3	7.95	3	4.25	4	6.67
	2.44	4	4.82	3	7.94	3	4.24	4	6.61
	2.52	4	4.84	3	7.93	3	4.24	4	6.55
	2.60	4	4.86	3	7.92	3	4.24	4	6.49
	2.68	4	4.87	3	7.91	3	4.24	4	6.43
	2.76	4	4.89	3	7.90	3	4.23	4	6.37
	2.84	4	4.91	3	7.89	3	4.23	4	6.31
	2.92	4	4.93	3	7.88	3	4.23	4	6.25
	3.00	4	4.95	3	7.87	3	4.22	4	6.18
	3.08	4	4.96	3	7.86	3	4.22	4	6.12
	3.16	4	4.98	3	7.85	3	4.21	4	6.06
	3.24	4	5.00	3	7.84	3	4.21	4	6.00
	3.32	4	5.02	3	7.83	3	4.20	4	5.94
	3.40	4	5.04	3	7.82	3	4.20	4	5.88
	3.48	4	5.05	3	7.82	3	4.19	4	5.82
	3.56	4	5.07	3	7.81	3	4.19	4	5.76
	3.64	4	5.09	3	7.81	3	4.18	4	5.70
	3.72	4	5.10	3	7.80	3	4.18	4	5.64
	3.80	4	5.12	3	7.80	3	4.17	4	5.58
48	3.80	4	5.13	3	7.80	3	4.18	4	5.58
	3.88	4	5.14	3	7.80	3	4.17	4	5.53
	3.96	4	5.15	3	7.80	3	4.16	4	5.49
	4.04	4	5.16	3	7.79	3	4.16	4	5.45
	4.12	4	5.17	3	7.79	3	4.15	4	5.40
	4.20	4	5.18	3	7.79	3	4.14	4	5.36
	4.28	4	5.19	3	7.78	3	4.14	4	5.31
	4.36	4	5.21	3	7.78	3	4.13	4	5.27
	4.44	4	5.22	3	7.77	3	4.13	4	5.22
	4.52	4	5.23	3	7.77	3	4.12	4	5.17
	4.60	4	5.24	3	7.76	3	4.11	4	5.13
	4.68	4	5.26	3	7.76	3	4.11	4	5.08
	4.76	4	5.27	3	7.75	3	4.10	4	5.03
	4.84	4	5.29	3	7.75	3	4.10	4	4.97
	4.92	4	5.30	3	7.74	3	4.10	4	4.92
	5.00	4	5.32	3	7.73	3	4.09	4	4.87
	5.08	4	5.33	3	7.73	3	4.09	4	4.81
	5.16	4	5.35	3	7.72	3	4.08	4	4.76
	5.24	4	5.37	3	7.71	3	4.08	4	4.70
	5.32	4	5.38	3	7.70	3	4.08	4	4.65
	5.40	4	5.40	3	7.69	3	4.07	4	4.59

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 14/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
49	5.40	4	5.40	3	7.70	3	4.08	4	4.60
	5.48	4	5.41	3	7.69	3	4.07	4	4.56
	5.56	4	5.42	3	7.69	3	4.07	4	4.52
	5.64	4	5.43	3	7.68	3	4.07	4	4.49
	5.72	4	5.44	3	7.68	3	4.06	4	4.44
	5.80	4	5.45	3	7.67	3	4.06	4	4.41
	5.88	4	5.46	3	7.67	3	4.05	4	4.37
	5.96	4	5.47	3	7.67	3	4.05	4	4.34
	6.04	4	5.48	3	7.67	3	4.04	4	4.30
	6.12	4	5.50	3	7.64	3	4.04	4	4.24
	6.20	4	5.51	3	7.64	3	4.04	4	4.20
	6.28	4	5.52	3	7.64	3	4.04	4	4.16
	6.36	4	5.53	3	7.63	3	4.03	4	4.12
	6.44	4	5.55	3	7.62	3	4.03	4	4.07
	6.52	4	5.56	3	7.61	3	4.03	4	4.03
	6.60	4	5.58	3	7.60	3	4.03	4	3.98
	6.68	4	5.60	3	7.59	3	4.03	4	3.93
	6.76	4	5.61	3	7.58	3	4.03	4	3.88
	6.84	4	5.63	3	7.57	3	4.03	4	3.83
	6.92	4	5.65	3	7.56	3	4.03	4	3.77
	7.00	4	5.67	3	7.55	3	4.03	4	3.72
50	7.00	4	5.68	3	7.56	3	4.04	4	3.74
	7.08	4	5.69	3	7.55	3	4.04	4	3.71
	7.16	4	5.70	3	7.54	3	4.05	4	3.68
	7.24	4	5.71	3	7.53	3	4.05	4	3.64
	7.32	4	5.72	3	7.52	3	4.05	4	3.60
	7.40	4	5.74	3	7.51	3	4.05	4	3.57
	7.48	4	5.75	3	7.50	3	4.05	4	3.53
	7.56	4	5.77	3	7.49	3	4.06	4	3.49
	7.64	4	5.78	3	7.48	3	4.06	4	3.45
	7.72	4	5.80	3	7.47	3	4.06	4	3.41
	7.80	4	5.81	3	7.45	3	4.07	4	3.36
	7.88	4	5.83	3	7.44	3	4.07	4	3.32
	7.96	4	5.85	3	7.42	3	4.08	4	3.28
	8.04	4	5.87	3	7.41	3	4.08	4	3.23
	8.12	4	5.89	3	7.39	3	4.09	4	3.19
	8.20	4	5.91	3	7.38	3	4.10	4	3.14
	8.28	4	5.93	3	7.36	3	4.10	4	3.09
	8.36	4	5.95	3	7.34	3	4.11	4	3.04
	8.44	4	5.97	3	7.33	3	4.12	4	2.99
	8.52	4	5.99	3	7.31	3	4.13	4	2.94
	8.60	4	6.02	3	7.29	3	4.14	4	2.89

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 14/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
51	8.60	4	6.03	3	7.30	3	4.15	4	2.89
	8.68	4	6.04	3	7.28	3	4.16	4	2.86
	8.76	4	6.06	3	7.27	3	4.16	4	2.83
	8.84	4	6.08	3	7.25	3	4.17	4	2.79
	8.92	4	6.09	3	7.23	3	4.18	4	2.76
	9.00	4	6.11	3	7.21	3	4.19	4	2.72
	9.08	4	6.13	3	7.19	3	4.20	4	2.69
	9.16	4	6.15	3	7.18	3	4.21	4	2.65
	9.24	4	6.17	3	7.16	3	4.22	4	2.61
	9.32	4	6.19	3	7.14	3	4.24	4	2.56
	9.40	4	6.21	3	7.12	3	4.25	4	2.52
	9.48	4	6.23	3	7.09	3	4.26	4	2.48
	9.56	4	6.26	3	7.07	3	4.27	4	2.43
	9.64	4	6.28	3	7.05	3	4.29	4	2.39
	9.72	4	6.30	3	7.03	3	4.30	4	2.34
	9.80	4	6.33	3	7.01	3	4.32	4	2.30
	9.88	4	6.35	3	6.98	3	4.33	4	2.25
	9.96	4	6.38	3	6.96	3	4.35	4	2.20
	10.04	4	6.40	3	6.93	3	4.36	4	2.15
	10.12	4	6.43	3	6.91	3	4.38	4	2.10
	10.20	4	6.46	3	6.88	3	4.40	4	2.05
52	10.20	4	6.47	3	6.89	3	4.40	4	2.04
	10.28	4	6.49	3	6.86	3	4.42	4	2.01
	10.36	4	6.51	3	6.84	3	4.44	4	1.98
	10.44	4	6.53	3	6.81	3	4.45	4	1.94
	10.52	4	6.55	3	6.79	3	4.47	4	1.90
	10.60	4	6.57	3	6.76	3	4.49	4	1.87
	10.68	4	6.60	3	6.73	3	4.50	4	1.83
	10.76	4	6.62	3	6.71	3	4.52	4	1.79
	10.84	4	6.64	3	6.68	3	4.54	4	1.75
	10.92	4	6.66	3	6.66	3	4.55	4	1.71
	11.00	4	6.69	3	6.63	3	4.57	4	1.67
	11.08	4	6.71	3	6.61	3	4.59	4	1.63
	11.16	4	6.74	3	6.58	3	4.60	4	1.59
	11.24	4	6.76	3	6.55	3	4.62	4	1.54
	11.32	4	6.79	3	6.53	3	4.64	4	1.50
	11.40	4	6.81	3	6.50	3	4.66	4	1.46
	11.48	4	6.83	3	6.48	3	4.67	4	1.41
	11.56	4	6.86	3	6.45	3	4.69	4	1.37
	11.64	4	6.89	3	6.42	3	4.71	4	1.33
	11.72	4	6.91	3	6.40	3	4.73	4	1.28
	11.80	4	6.94	3	6.37	3	4.75	4	1.24

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
53	11.80	4	6.94	3	6.37	3	4.75	4	1.23
	11.88	4	6.96	3	6.35	3	4.76	4	1.21
	11.96	4	6.98	3	6.33	3	4.78	4	1.18
	12.04	4	7.00	3	6.31	3	4.80	4	1.15
	12.12	4	7.01	3	6.29	3	4.81	4	1.13
	12.20	4	7.03	3	6.26	3	4.83	4	1.10
	12.28	4	7.05	3	6.23	3	4.85	4	1.07
	12.36	4	7.07	3	6.21	3	4.86	4	1.03
	12.44	4	7.09	3	6.18	3	4.88	4	1.00
	12.52	4	7.11	3	6.16	3	4.90	4	0.97
	12.60	4	7.13	3	6.12	3	4.92	4	0.92
	12.68	4	7.16	3	6.09	3	4.93	4	0.89
	12.76	4	7.18	3	6.07	3	4.95	4	0.85
	12.84	4	7.20	3	6.04	3	4.97	4	0.81
	12.92	4	7.22	3	6.02	3	4.98	4	0.78
	13.00	4	7.24	3	5.99	3	5.00	4	0.74
	13.08	4	7.26	3	5.97	3	5.02	4	0.70
	13.16	4	7.28	3	5.94	3	5.03	4	0.66
	13.24	4	7.30	3	5.91	3	5.05	4	0.63
	13.32	4	7.33	3	5.89	3	5.06	4	0.59
	13.40	4	7.35	3	5.87	3	5.08	4	0.55
54	13.40	4	7.35	3	5.87	3	5.08	4	0.55
	13.48	4	7.36	3	5.85	3	5.09	4	0.53
	13.56	4	7.37	3	5.82	3	5.11	4	0.51
	13.64	4	7.39	3	5.80	3	5.12	4	0.49
	13.72	4	7.40	3	5.78	3	5.13	4	0.47
	13.80	4	7.41	3	5.76	3	5.14	4	0.45
	13.88	4	7.42	3	5.74	3	5.16	4	0.43
	13.96	4	7.43	3	5.72	3	5.17	4	0.41
	14.04	4	7.45	3	5.70	3	5.18	4	0.39
	14.12	4	7.46	3	5.68	3	5.19	4	0.37
	14.20	4	7.47	3	5.66	3	5.20	4	0.35
	14.28	4	7.48	3	5.65	3	5.21	4	0.33
	14.36	4	7.49	3	5.63	3	5.22	4	0.31
	14.44	4	7.51	3	5.61	3	5.23	4	0.29
	14.52	4	7.52	3	5.59	3	5.24	4	0.26
	14.60	4	7.53	3	5.58	3	5.25	4	0.24
	14.68	4	7.54	3	5.56	3	5.26	4	0.22
	14.76	4	7.55	3	5.55	3	5.27	4	0.19
	14.84	4	7.57	3	5.53	3	5.28	4	0.17
	14.92	4	7.58	3	5.52	3	5.29	4	0.15
	15.00	4	7.59	3	5.50	3	5.30	4	0.13

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
55	15.00	4	7.59	3	5.50	3	5.30	4	0.13
	15.08	4	7.59	3	5.49	3	5.30	4	0.13
	15.16	4	7.60	3	5.48	3	5.31	4	0.12
	15.24	4	7.60	3	5.47	3	5.31	4	0.12
	15.32	4	7.60	3	5.46	3	5.32	4	0.12
	15.40	4	7.60	3	5.45	3	5.33	4	0.11
	15.48	4	7.61	3	5.45	3	5.33	4	0.11
	15.56	4	7.61	3	5.44	3	5.33	4	0.11
	15.64	4	7.61	3	5.43	3	5.34	4	0.10
	15.72	4	7.62	3	5.42	3	5.34	4	0.10
	15.80	4	7.62	3	5.42	3	5.35	4	0.09
	15.88	4	7.62	3	5.41	3	5.35	4	0.09
	15.96	4	7.63	3	5.40	3	5.35	4	0.08
	16.04	4	7.63	3	5.40	3	5.36	4	0.07
	16.12	4	7.63	3	5.39	3	5.36	4	0.07
	16.20	4	7.64	3	5.39	3	5.36	4	0.06
	16.28	4	7.64	3	5.38	3	5.36	4	0.05
	16.36	4	7.64	3	5.38	3	5.37	4	0.04
	16.44	4	7.65	3	5.38	3	5.37	4	0.04
	16.52	4	7.65	3	5.37	3	5.37	4	0.03
	16.60	4	7.65	3	5.37	3	5.37	4	0.02
56	16.68	4	7.65	3	5.37	3	5.37	4	0.03
	16.76	4	7.65	3	5.38	3	5.37	4	0.04
	16.84	4	7.64	3	5.38	3	5.37	4	0.04
	16.92	4	7.64	3	5.38	3	5.36	4	0.05
	17.00	4	7.64	3	5.39	3	5.36	4	0.06
	17.08	4	7.63	3	5.39	3	5.36	4	0.07
	17.16	4	7.63	3	5.40	3	5.36	4	0.07
	17.24	4	7.63	3	5.40	3	5.35	4	0.08
	17.32	4	7.62	3	5.41	3	5.35	4	0.09
	17.40	4	7.62	3	5.41	3	5.35	4	0.09
	17.48	4	7.62	3	5.42	3	5.34	4	0.10
	17.56	4	7.61	3	5.43	3	5.34	4	0.10
	17.64	4	7.61	3	5.44	3	5.34	4	0.10
	17.72	4	7.61	3	5.44	3	5.33	4	0.11
	17.80	4	7.61	3	5.45	3	5.33	4	0.11
	17.88	4	7.60	3	5.46	3	5.32	4	0.11
	17.96	4	7.60	3	5.47	3	5.31	4	0.12
	18.04	4	7.60	3	5.48	3	5.31	4	0.12
	18.12	4	7.59	3	5.49	3	5.30	4	0.12
	18.20	4	7.59	3	5.50	3	5.30	4	0.13

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
57	18.20	4	7.59	3	5.50	3	5.30	4	0.12
	18.28	4	7.58	3	5.51	3	5.29	4	0.15
	18.36	4	7.57	3	5.53	3	5.28	4	0.17
	18.44	4	7.56	3	5.54	3	5.27	4	0.19
	18.52	4	7.54	3	5.56	3	5.26	4	0.21
	18.60	4	7.53	3	5.57	3	5.25	4	0.24
	18.68	4	7.52	3	5.59	3	5.24	4	0.26
	18.76	4	7.51	3	5.61	3	5.23	4	0.28
	18.84	4	7.49	3	5.62	3	5.22	4	0.30
	18.92	4	7.48	3	5.64	3	5.21	4	0.32
	19.00	4	7.47	3	5.66	3	5.20	4	0.35
	19.08	4	7.46	3	5.68	3	5.19	4	0.37
	19.16	4	7.45	3	5.70	3	5.18	4	0.39
	19.24	4	7.43	3	5.72	3	5.17	4	0.41
	19.32	4	7.42	3	5.73	3	5.16	4	0.43
	19.40	4	7.41	3	5.75	3	5.15	4	0.45
	19.48	4	7.40	3	5.78	3	5.13	4	0.46
	19.56	4	7.39	3	5.80	3	5.12	4	0.48
	19.64	4	7.38	3	5.82	3	5.11	4	0.50
	19.72	4	7.36	3	5.84	3	5.09	4	0.52
	19.80	4	7.35	3	5.86	3	5.08	4	0.54
58	19.80	4	7.35	3	5.86	3	5.08	4	0.55
	19.88	4	7.33	3	5.88	3	5.06	4	0.58
	19.96	4	7.31	3	5.91	3	5.05	4	0.62
	20.04	4	7.28	3	5.93	3	5.03	4	0.66
	20.12	4	7.26	3	5.96	3	5.02	4	0.70
	20.20	4	7.24	3	5.98	3	5.00	4	0.73
	20.28	4	7.22	3	6.01	3	4.99	4	0.77
	20.36	4	7.20	3	6.03	3	4.97	4	0.81
	20.44	4	7.18	3	6.06	3	4.95	4	0.84
	20.52	4	7.16	3	6.09	3	4.94	4	0.88
	20.60	4	7.14	3	6.11	3	4.92	4	0.91
	20.68	4	7.11	3	6.15	3	4.90	4	0.96
	20.76	4	7.09	3	6.17	3	4.88	4	0.99
	20.84	4	7.07	3	6.20	3	4.87	4	1.03
	20.92	4	7.05	3	6.23	3	4.85	4	1.06
	21.00	4	7.03	3	6.25	3	4.83	4	1.09
	21.08	4	7.02	3	6.28	3	4.81	4	1.12
	21.16	4	7.00	3	6.30	3	4.80	4	1.15
	21.24	4	6.98	3	6.32	3	4.78	4	1.17
	21.32	4	6.96	3	6.35	3	4.77	4	1.20
	21.40	4	6.95	3	6.37	3	4.75	4	1.22

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
59	21.40	4	6.94	3	6.36	3	4.75	4	1.23
	21.48	4	6.91	3	6.39	3	4.73	4	1.27
	21.56	4	6.89	3	6.42	3	4.71	4	1.32
	21.64	4	6.86	3	6.44	3	4.69	4	1.36
	21.72	4	6.84	3	6.47	3	4.68	4	1.41
	21.80	4	6.81	3	6.49	3	4.66	4	1.45
	21.88	4	6.79	3	6.52	3	4.64	4	1.49
	21.96	4	6.76	3	6.55	3	4.62	4	1.54
	22.04	4	6.74	3	6.57	3	4.61	4	1.58
	22.12	4	6.71	3	6.60	3	4.59	4	1.62
	22.20	4	6.69	3	6.62	3	4.57	4	1.66
	22.28	4	6.67	3	6.65	3	4.55	4	1.70
	22.36	4	6.64	3	6.68	3	4.54	4	1.75
	22.44	4	6.62	3	6.70	3	4.52	4	1.78
	22.52	4	6.60	3	6.73	3	4.50	4	1.82
	22.60	4	6.58	3	6.75	3	4.49	4	1.86
	22.68	4	6.55	3	6.78	3	4.47	4	1.90
	22.76	4	6.53	3	6.81	3	4.45	4	1.94
	22.84	4	6.51	3	6.84	3	4.44	4	1.97
	22.92	4	6.49	3	6.86	3	4.42	4	2.01
	23.00	4	6.47	3	6.88	3	4.40	4	2.04
60	23.00	4	6.46	3	6.88	3	4.40	4	2.04
	23.08	4	6.43	3	6.90	3	4.38	4	2.09
	23.16	4	6.41	3	6.93	3	4.36	4	2.15
	23.24	4	6.38	3	6.95	3	4.35	4	2.20
	23.32	4	6.35	3	6.98	3	4.33	4	2.24
	23.40	4	6.33	3	7.00	3	4.32	4	2.29
	23.48	4	6.30	3	7.02	3	4.30	4	2.34
	23.56	4	6.28	3	7.04	3	4.29	4	2.38
	23.64	4	6.26	3	7.07	3	4.28	4	2.43
	23.72	4	6.23	3	7.09	3	4.26	4	2.47
	23.80	4	6.21	3	7.11	3	4.25	4	2.51
	23.88	4	6.19	3	7.13	3	4.24	4	2.56
	23.96	4	6.17	3	7.15	3	4.23	4	2.60
	24.04	4	6.15	3	7.17	3	4.22	4	2.64
	24.12	4	6.13	3	7.19	3	4.21	4	2.68
	24.20	4	6.11	3	7.21	3	4.20	4	2.72
	24.28	4	6.10	3	7.22	3	4.19	4	2.75
	24.36	4	6.08	3	7.24	3	4.18	4	2.79
	24.44	4	6.06	3	7.26	3	4.17	4	2.82
	24.52	4	6.05	3	7.27	3	4.16	4	2.85
	24.60	4	6.03	3	7.29	3	4.15	4	2.88

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 14/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
61	24.60	4	6.02	3	7.28	3	4.14	4	2.88
	24.68	4	6.00	3	7.30	3	4.13	4	2.93
	24.76	4	5.98	3	7.32	3	4.12	4	2.98
	24.84	4	5.95	3	7.33	3	4.12	4	3.03
	24.92	4	5.93	3	7.35	3	4.11	4	3.08
	25.00	4	5.91	3	7.37	3	4.10	4	3.13
	25.08	4	5.89	3	7.38	3	4.10	4	3.18
	25.16	4	5.87	3	7.40	3	4.09	4	3.22
	25.24	4	5.86	3	7.41	3	4.09	4	3.27
	25.32	4	5.84	3	7.43	3	4.08	4	3.31
	25.40	4	5.82	3	7.44	3	4.08	4	3.35
	25.48	4	5.81	3	7.45	3	4.07	4	3.39
	25.56	4	5.79	3	7.46	3	4.07	4	3.43
	25.64	4	5.78	3	7.48	3	4.07	4	3.47
	25.72	4	5.76	3	7.49	3	4.06	4	3.51
	25.80	4	5.75	3	7.50	3	4.06	4	3.55
	25.88	4	5.73	3	7.51	3	4.06	4	3.59
	25.96	4	5.72	3	7.52	3	4.06	4	3.62
	26.04	4	5.71	3	7.53	3	4.06	4	3.66
	26.12	4	5.70	3	7.53	3	4.06	4	3.69
	26.20	4	5.69	3	7.54	3	4.06	4	3.72
62	26.20	4	5.68	3	7.53	3	4.05	4	3.70
	26.28	4	5.66	3	7.54	3	4.05	4	3.76
	26.36	4	5.65	3	7.56	3	4.05	4	3.81
	26.44	4	5.63	3	7.57	3	4.05	4	3.86
	26.52	4	5.61	3	7.57	3	4.05	4	3.91
	26.60	4	5.60	3	7.58	3	4.05	4	3.95
	26.68	4	5.58	3	7.58	3	4.05	4	4.00
	26.76	4	5.57	3	7.60	3	4.05	4	4.05
	26.84	4	5.55	3	7.61	3	4.05	4	4.09
	26.92	4	5.54	3	7.61	3	4.05	4	4.14
	27.00	4	5.53	3	7.62	3	4.06	4	4.18
	27.08	4	5.52	3	7.62	3	4.06	4	4.22
	27.16	4	5.51	3	7.62	3	4.07	4	4.25
	27.24	4	5.50	3	7.63	3	4.07	4	4.29
	27.32	4	5.49	3	7.63	3	4.07	4	4.33
	27.40	4	5.48	3	7.64	3	4.08	4	4.37
	27.48	4	5.47	3	7.64	3	4.08	4	4.41
	27.56	4	5.46	3	7.65	3	4.09	4	4.45
	27.64	4	5.45	3	7.66	3	4.09	4	4.49
	27.72	4	5.44	3	7.66	3	4.10	4	4.53
	27.80	4	5.43	3	7.66	3	4.10	4	4.57

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 255
 Date: 14/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
63	27.80	4	5.42	3	7.66	3	4.10	4	4.55
	27.88	4	5.41	3	7.67	3	4.10	4	4.61
	27.96	4	5.39	3	7.67	3	4.10	4	4.67
	28.04	4	5.37	3	7.68	3	4.11	4	4.72
	28.12	4	5.36	3	7.69	3	4.11	4	4.78
	28.20	4	5.34	3	7.70	3	4.12	4	4.83
	28.28	4	5.33	3	7.70	3	4.12	4	4.88
	28.36	4	5.31	3	7.71	3	4.13	4	4.94
	28.44	4	5.30	3	7.71	3	4.13	4	4.99
	28.52	4	5.28	3	7.72	3	4.14	4	5.04
	28.60	4	5.27	3	7.72	3	4.14	4	5.09
	28.68	4	5.26	3	7.73	3	4.15	4	5.14
	28.76	4	5.24	3	7.73	3	4.15	4	5.18
	28.84	4	5.23	3	7.74	3	4.16	4	5.23
	28.92	4	5.22	3	7.74	3	4.16	4	5.28
	29.00	4	5.21	3	7.75	3	4.17	4	5.32
	29.08	4	5.20	3	7.75	3	4.18	4	5.36
	29.16	4	5.19	3	7.75	3	4.18	4	5.41
	29.24	4	5.18	3	7.76	3	4.19	4	5.45
	29.32	4	5.17	3	7.76	3	4.19	4	5.50
	29.40	4	5.16	3	7.76	3	4.20	4	5.54
64	29.40	4	5.15	3	7.76	3	4.20	4	5.54
	29.48	4	5.13	3	7.76	3	4.20	4	5.60
	29.56	4	5.11	3	7.77	3	4.21	4	5.66
	29.64	4	5.10	3	7.78	3	4.21	4	5.72
	29.72	4	5.08	3	7.78	3	4.22	4	5.78
	29.80	4	5.06	3	7.78	3	4.22	4	5.83
	29.88	4	5.04	3	7.79	3	4.23	4	5.90
	29.96	4	5.03	3	7.80	3	4.23	4	5.96
	30.04	4	5.01	3	7.81	3	4.24	4	6.02
	30.12	4	4.99	3	7.82	3	4.24	4	6.08
	30.20	4	4.97	3	7.83	3	4.25	4	6.15
	30.28	4	4.95	3	7.84	3	4.25	4	6.21
	30.36	4	4.93	3	7.85	3	4.25	4	6.27
	30.44	4	4.92	3	7.86	3	4.26	4	6.33
	30.52	4	4.90	3	7.87	3	4.26	4	6.39
	30.60	4	4.88	3	7.88	3	4.26	4	6.45
	30.68	4	4.86	3	7.89	3	4.27	4	6.51
	30.76	4	4.84	3	7.91	3	4.27	4	6.57
	30.84	4	4.83	3	7.92	3	4.27	4	6.63
	30.92	4	4.81	3	7.93	3	4.27	4	6.69
	31.00	4	4.79	3	7.94	3	4.27	4	6.75

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m 80%cmovel tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 256
 Date: 14/10/11

Stresses [MPa] , at t = 30000, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
65	31.00	4	4.78	3	7.95	3	4.28	4	6.77
	31.08	4	4.76	3	7.96	3	4.27	4	6.85
	31.16	4	4.73	3	7.98	3	4.27	4	6.93
	31.24	4	4.70	3	8.00	3	4.27	4	7.00
	31.32	4	4.68	3	8.02	3	4.27	4	7.08
	31.40	4	4.65	3	8.03	3	4.27	4	7.16
	31.48	4	4.62	3	8.05	3	4.27	4	7.24
	31.56	4	4.59	3	8.07	3	4.27	4	7.32
	31.64	4	4.56	3	8.09	3	4.26	4	7.40
	31.72	4	4.54	3	8.11	3	4.26	4	7.48
	31.80	4	4.51	3	8.13	3	4.26	4	7.56
	31.88	4	4.48	3	8.15	3	4.25	4	7.64
	31.96	4	4.45	3	8.17	3	4.25	4	7.72
	32.04	4	4.42	3	8.19	3	4.25	4	7.80
	32.12	4	4.39	3	8.21	3	4.24	4	7.87
	32.20	4	4.37	3	8.24	3	4.24	4	7.95
	32.28	4	4.34	3	8.26	3	4.23	4	8.03
	32.36	4	4.31	3	8.28	3	4.23	4	8.10
	32.44	4	4.28	3	8.30	3	4.22	4	8.18
	32.52	4	4.26	3	8.33	3	4.22	4	8.23
	32.60	4	4.24	3	8.35	3	4.21	4	8.29
66	32.60	4	4.22	3	8.46	3	4.22	4	8.46
	32.63	4	4.16	3	8.63	3	4.15	4	8.63
	32.66	4	4.09	3	8.81	3	4.09	4	8.81
	32.69	4	4.02	3	8.98	3	4.02	4	8.98
	32.72	4	3.95	3	9.16	3	3.95	4	9.16
	32.75	4	3.88	3	9.33	3	3.88	4	9.33
	32.78	4	3.82	3	9.51	3	3.82	4	9.50
	32.81	4	3.75	3	9.68	3	3.75	4	9.68
	32.84	4	3.68	3	9.86	3	3.68	4	9.85
	32.87	4	3.61	3	10.03	3	3.61	4	10.03
	32.90	4	3.55	3	10.20	3	3.55	4	10.20
	32.93	4	3.48	3	10.38	3	3.48	4	10.38
	32.96	4	3.41	3	10.56	3	3.41	4	10.55
	32.99	4	3.34	3	10.73	3	3.34	4	10.73
	33.02	4	3.27	3	10.91	3	3.27	4	10.91
	33.05	4	3.21	3	11.08	3	3.20	4	11.08
	33.08	4	3.14	3	11.26	3	3.14	4	11.26
	33.10	4	1.62	3	3.17	3	1.62	4	3.16
	33.11	4	0.86	3	-0.90	3	0.86	4	-0.90
	33.14	4	0.76	3	-0.68	3	0.76	4	-0.69
	33.17	4	0.67	3	-0.47	3	0.67	4	-0.47
	33.20	4	0.58	3	-0.25	3	0.58	4	-0.26

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
45	0.00	1	0.00	1	-0.00	1	0.00	1	-0.00
	0.03	1	-0.00	1	0.00	1	-0.00	1	0.00
	0.06	1	-0.00	1	0.00	1	-0.00	1	0.00
	0.09	1	-0.00	1	0.00	1	-0.00	1	0.00
	0.10	1	2.44	1	2.76	1	2.44	1	2.76
	0.12	1	7.33	1	8.29	1	7.33	1	8.29
	0.15	1	7.27	1	8.33	1	7.27	1	8.33
	0.18	1	7.21	1	8.36	1	7.21	1	8.36
	0.21	1	7.15	1	8.40	1	7.15	1	8.40
	0.24	1	7.10	1	8.43	1	7.10	1	8.43
	0.27	1	7.05	1	8.48	1	7.05	1	8.48
	0.30	1	7.00	1	8.53	1	7.00	1	8.53
	0.33	1	6.95	1	8.59	1	6.95	1	8.59
	0.36	1	6.91	1	8.64	1	6.91	1	8.64
	0.39	1	6.86	1	8.69	1	6.86	1	8.69
	0.42	1	6.81	1	8.74	1	6.81	1	8.74
	0.45	1	6.76	1	8.80	1	6.76	1	8.80
	0.48	1	6.71	1	8.85	1	6.71	1	8.85
	0.51	1	6.67	1	8.90	1	6.67	1	8.90
	0.54	1	6.62	1	8.95	1	6.62	1	8.95
	0.57	1	6.57	1	9.01	1	6.57	1	9.01
	0.60	1	6.52	1	9.06	1	6.52	1	9.06
46	0.60	1	6.60	1	8.90	1	6.60	1	8.90
	0.68	1	6.54	1	8.97	1	6.54	1	8.97
	0.76	1	6.47	1	9.03	1	6.47	1	9.03
	0.84	1	6.41	1	9.10	1	6.41	1	9.10
	0.92	1	6.35	1	9.17	1	6.35	1	9.17
	1.00	1	6.29	1	9.24	1	6.29	1	9.24
	1.08	1	6.23	1	9.31	1	6.23	1	9.31
	1.16	1	6.16	1	9.38	1	6.16	1	9.38
	1.24	1	6.10	1	9.45	1	6.10	1	9.45
	1.32	1	6.03	1	9.52	1	6.03	1	9.52
	1.40	1	5.97	1	9.60	1	5.97	1	9.60
	1.48	1	5.90	1	9.67	1	5.90	1	9.67
	1.56	1	5.84	1	9.74	1	5.84	1	9.74
	1.64	1	5.77	1	9.81	1	5.77	1	9.81
	1.72	1	5.71	1	9.88	1	5.71	1	9.88
	1.80	1	5.64	1	9.96	1	5.64	1	9.96
	1.88	1	5.57	1	10.03	1	5.57	1	10.03
	1.96	1	5.51	1	10.10	1	5.51	1	10.10
	2.04	1	5.44	1	10.18	1	5.44	1	10.18
	2.12	1	5.37	1	10.25	1	5.37	1	10.25
	2.20	1	5.30	1	10.33	1	5.30	1	10.33

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 157
 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
47	2.28	1	5.24	1	10.40	1	5.24	1	10.40
	2.36	1	5.17	1	10.48	1	5.17	1	10.48
	2.44	1	5.10	1	10.55	1	5.10	1	10.55
	2.52	1	5.03	1	10.63	1	5.03	1	10.63
	2.60	1	4.96	1	10.71	1	4.96	1	10.71
	2.68	1	4.89	1	10.78	1	4.89	1	10.78
	2.76	1	4.82	1	10.86	1	4.82	1	10.86
	2.84	1	4.74	1	10.94	1	4.74	1	10.94
	2.92	1	4.67	1	11.01	1	4.67	1	11.01
	3.00	1	4.60	1	11.09	1	4.60	1	11.09
	3.08	1	4.53	1	11.17	1	4.53	1	11.17
	3.16	1	4.46	1	11.25	1	4.46	1	11.25
	3.24	1	4.38	1	11.33	1	4.38	1	11.33
	3.32	1	4.31	1	11.41	1	4.31	1	11.41
	3.40	1	4.24	1	11.49	1	4.24	1	11.49
	3.48	1	4.16	1	11.57	1	4.16	1	11.57
	3.56	1	4.09	1	11.65	1	4.09	1	11.65
	3.64	1	4.01	1	11.73	1	4.01	1	11.73
	3.72	1	3.94	1	11.82	1	3.94	1	11.82
	3.80	1	3.87	1	11.90	1	3.87	1	11.90
48	3.80	1	3.87	1	11.90	1	3.87	1	11.90
	3.88	1	3.80	1	11.98	1	3.80	1	11.98
	3.96	1	3.73	1	12.06	1	3.73	1	12.06
	4.04	1	3.66	1	12.14	1	3.66	1	12.14
	4.12	1	3.59	1	12.22	1	3.59	1	12.22
	4.20	1	3.52	1	12.29	1	3.52	1	12.29
	4.28	1	3.45	1	12.37	1	3.45	1	12.37
	4.36	1	3.38	1	12.45	1	3.38	1	12.45
	4.44	1	3.31	1	12.52	1	3.31	1	12.52
	4.52	1	3.24	1	12.60	1	3.24	1	12.60
	4.60	1	3.17	1	12.67	1	3.17	1	12.67
	4.68	1	3.11	1	12.75	1	3.11	1	12.75
	4.76	1	3.04	1	12.82	1	3.04	1	12.82
	4.84	1	2.97	1	12.89	1	2.97	1	12.89
	4.92	1	2.91	1	12.97	1	2.91	1	12.97
	5.00	1	2.84	1	13.04	1	2.84	1	13.04
	5.08	1	2.78	1	13.11	1	2.78	1	13.11
	5.16	1	2.72	1	13.18	1	2.72	1	13.18
	5.24	1	2.65	1	13.25	1	2.65	1	13.25
	5.32	1	2.59	1	13.32	1	2.59	1	13.32
	5.40	1	2.53	1	13.39	1	2.53	1	13.39

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 158
 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
49	5.40	1	2.53	1	13.39	1	2.53	1	13.39
	5.48	1	2.47	1	13.46	1	2.47	1	13.46
	5.56	1	2.41	1	13.53	1	2.41	1	13.53
	5.64	1	2.35	1	13.59	1	2.35	1	13.59
	5.72	1	2.29	1	13.66	1	2.29	1	13.66
	5.80	1	2.23	1	13.73	1	2.23	1	13.73
	5.88	1	2.17	1	13.80	1	2.17	1	13.80
	5.96	1	2.11	1	13.86	1	2.11	1	13.86
	6.04	1	2.05	1	13.93	1	2.05	1	13.93
	6.12	1	2.00	1	13.99	1	2.00	1	13.99
	6.20	1	1.94	1	14.05	1	1.94	1	14.05
	6.28	1	1.88	1	14.12	1	1.88	1	14.12
	6.36	1	1.83	1	14.18	1	1.83	1	14.18
	6.44	1	1.78	1	14.23	1	1.78	1	14.23
	6.52	1	1.73	1	14.30	1	1.73	1	14.30
	6.60	1	1.68	1	14.35	1	1.68	1	14.35
	6.68	1	1.63	1	14.41	1	1.63	1	14.41
	6.76	1	1.58	1	14.46	1	1.58	1	14.46
	6.84	1	1.53	1	14.52	1	1.53	1	14.52
	6.92	1	1.48	1	14.57	1	1.48	1	14.57
	7.00	1	1.44	1	14.63	1	1.44	1	14.63
50	7.00	1	1.45	1	14.64	1	1.45	1	14.64
	7.08	1	1.41	1	14.69	1	1.41	1	14.69
	7.16	1	1.36	1	14.74	1	1.36	1	14.74
	7.24	1	1.32	1	14.79	1	1.32	1	14.79
	7.32	1	1.28	1	14.84	1	1.28	1	14.84
	7.40	1	1.24	1	14.89	1	1.24	1	14.89
	7.48	1	1.20	1	14.94	1	1.20	1	14.94
	7.56	1	1.16	1	14.98	1	1.16	1	14.98
	7.64	1	1.13	1	15.03	1	1.13	1	15.03
	7.72	1	1.09	1	15.07	1	1.09	1	15.07
	7.80	1	1.06	1	15.11	1	1.06	1	15.11
	7.88	1	1.02	1	15.15	1	1.02	1	15.15
	7.96	1	0.99	1	15.19	1	0.99	1	15.19
	8.04	1	0.96	1	15.23	1	0.96	1	15.23
	8.12	1	0.93	1	15.27	1	0.93	1	15.27
	8.20	1	0.90	1	15.30	1	0.90	1	15.30
	8.28	1	0.87	1	15.34	1	0.87	1	15.34
	8.36	1	0.85	1	15.37	1	0.85	1	15.37
	8.44	1	0.82	1	15.40	1	0.82	1	15.40
	8.52	1	0.80	1	15.43	1	0.80	1	15.43
	8.60	1	0.78	1	15.46	1	0.78	1	15.46

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 159
 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
51	8.60	1	0.79	1	15.47	1	0.79	1	15.47
	8.68	1	0.77	1	15.50	1	0.77	1	15.50
	8.76	1	0.75	1	15.53	1	0.75	1	15.53
	8.84	1	0.73	1	15.56	1	0.73	1	15.56
	8.92	1	0.71	1	15.58	1	0.71	1	15.58
	9.00	1	0.69	1	15.61	1	0.69	1	15.61
	9.08	1	0.68	1	15.63	1	0.68	1	15.63
	9.16	1	0.66	1	15.65	1	0.66	1	15.65
	9.24	1	0.65	1	15.67	1	0.65	1	15.67
	9.32	1	0.64	1	15.69	1	0.64	1	15.69
	9.40	1	0.62	1	15.71	1	0.62	1	15.71
	9.48	1	0.61	1	15.73	1	0.61	1	15.73
	9.56	1	0.61	1	15.75	1	0.61	1	15.75
	9.64	1	0.60	1	15.76	1	0.60	1	15.76
	9.72	1	0.59	1	15.77	1	0.59	1	15.77
	9.80	1	0.59	1	15.79	1	0.59	1	15.79
	9.88	1	0.58	1	15.80	1	0.58	1	15.80
	9.96	1	0.58	1	15.81	1	0.58	1	15.81
	10.04	1	0.58	1	15.82	1	0.58	1	15.82
	10.12	1	0.58	1	15.82	1	0.58	1	15.82
	10.20	1	0.58	1	15.83	1	0.58	1	15.83
52	10.20	1	0.58	1	15.83	1	0.58	1	15.83
	10.28	1	0.59	1	15.84	1	0.59	1	15.84
	10.36	1	0.59	1	15.84	1	0.59	1	15.84
	10.44	1	0.60	1	15.84	1	0.60	1	15.84
	10.52	1	0.60	1	15.84	1	0.60	1	15.84
	10.60	1	0.60	1	15.84	1	0.60	1	15.84
	10.68	1	0.61	1	15.84	1	0.61	1	15.84
	10.76	1	0.62	1	15.84	1	0.62	1	15.84
	10.84	1	0.62	1	15.84	1	0.62	1	15.84
	10.92	1	0.63	1	15.84	1	0.63	1	15.84
	11.00	1	0.63	1	15.83	1	0.63	1	15.83
	11.08	1	0.64	1	15.83	1	0.64	1	15.83
	11.16	1	0.65	1	15.83	1	0.65	1	15.83
	11.24	1	0.66	1	15.83	1	0.66	1	15.83
	11.32	1	0.67	1	15.82	1	0.67	1	15.82
	11.40	1	0.67	1	15.82	1	0.67	1	15.82
	11.48	1	0.68	1	15.81	1	0.68	1	15.81
	11.56	1	0.69	1	15.81	1	0.69	1	15.81
	11.64	1	0.70	1	15.81	1	0.70	1	15.81
	11.72	1	0.71	1	15.80	1	0.71	1	15.80
	11.80	1	0.72	1	15.79	1	0.72	1	15.79

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 160
 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
53	11.80	1	0.72	1	15.80	1	0.72	1	15.80
	11.88	1	0.74	1	15.79	1	0.74	1	15.79
	11.96	1	0.75	1	15.78	1	0.75	1	15.78
	12.04	1	0.76	1	15.78	1	0.76	1	15.78
	12.12	1	0.77	1	15.77	1	0.77	1	15.77
	12.20	1	0.78	1	15.76	1	0.78	1	15.76
	12.28	1	0.80	1	15.74	1	0.80	1	15.74
	12.36	1	0.81	1	15.73	1	0.81	1	15.73
	12.44	1	0.83	1	15.72	1	0.83	1	15.72
	12.52	1	0.84	1	15.71	1	0.84	1	15.71
	12.60	1	0.86	1	15.68	1	0.86	1	15.68
	12.68	1	0.87	1	15.67	1	0.87	1	15.67
	12.76	1	0.89	1	15.65	1	0.89	1	15.65
	12.84	1	0.90	1	15.64	1	0.90	1	15.64
	12.92	1	0.92	1	15.62	1	0.92	1	15.62
	13.00	1	0.93	1	15.61	1	0.93	1	15.61
	13.08	1	0.95	1	15.60	1	0.95	1	15.60
	13.16	1	0.96	1	15.58	1	0.96	1	15.58
	13.24	1	0.97	1	15.57	1	0.97	1	15.57
	13.32	1	0.99	1	15.56	1	0.99	1	15.56
	13.40	1	1.00	1	15.54	1	1.00	1	15.54
54	13.48	1	1.01	1	15.53	1	1.01	1	15.53
	13.56	1	1.03	1	15.51	1	1.03	1	15.51
	13.64	1	1.04	1	15.50	1	1.04	1	15.50
	13.72	1	1.05	1	15.48	1	1.05	1	15.48
	13.80	1	1.06	1	15.47	1	1.06	1	15.47
	13.88	1	1.07	1	15.46	1	1.07	1	15.46
	13.96	1	1.09	1	15.44	1	1.09	1	15.44
	14.04	1	1.10	1	15.43	1	1.10	1	15.43
	14.12	1	1.11	1	15.42	1	1.11	1	15.42
	14.20	1	1.12	1	15.40	1	1.12	1	15.40
	14.28	1	1.13	1	15.39	1	1.13	1	15.39
	14.36	1	1.14	1	15.38	1	1.14	1	15.38
	14.44	1	1.15	1	15.37	1	1.15	1	15.37
	14.52	1	1.15	1	15.36	1	1.15	1	15.36
	14.60	1	1.16	1	15.35	1	1.16	1	15.35
	14.68	1	1.17	1	15.34	1	1.17	1	15.34
	14.76	1	1.18	1	15.33	1	1.18	1	15.33
	14.84	1	1.19	1	15.32	1	1.19	1	15.32
	14.92	1	1.19	1	15.31	1	1.19	1	15.31
	15.00	1	1.20	1	15.30	1	1.20	1	15.30

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 161
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
55	15.08	1	1.21	1	15.29	1	1.21	1	15.29
	15.16	1	1.21	1	15.28	1	1.21	1	15.28
	15.24	1	1.22	1	15.28	1	1.22	1	15.28
	15.32	1	1.23	1	15.27	1	1.23	1	15.27
	15.40	1	1.23	1	15.26	1	1.23	1	15.26
	15.48	1	1.24	1	15.25	1	1.24	1	15.25
	15.56	1	1.24	1	15.25	1	1.24	1	15.25
	15.64	1	1.25	1	15.24	1	1.25	1	15.24
	15.72	1	1.25	1	15.24	1	1.25	1	15.24
	15.80	1	1.25	1	15.23	1	1.25	1	15.23
	15.88	1	1.26	1	15.23	1	1.26	1	15.23
	15.96	1	1.26	1	15.22	1	1.26	1	15.22
	16.04	1	1.26	1	15.22	1	1.26	1	15.22
	16.12	1	1.27	1	15.21	1	1.27	1	15.21
	16.20	1	1.27	1	15.21	1	1.27	1	15.21
	16.28	1	1.27	1	15.21	1	1.27	1	15.21
	16.36	1	1.27	1	15.20	1	1.27	1	15.20
	16.44	1	1.27	1	15.20	1	1.27	1	15.20
	16.52	1	1.27	1	15.20	1	1.27	1	15.20
	16.60	1	1.27	1	15.20	1	1.27	1	15.20
56	16.68	1	1.27	1	15.20	1	1.27	1	15.20
	16.76	1	1.27	1	15.20	1	1.27	1	15.20
	16.84	1	1.27	1	15.20	1	1.27	1	15.20
	16.92	1	1.27	1	15.20	1	1.27	1	15.20
	17.00	1	1.27	1	15.21	1	1.27	1	15.21
	17.08	1	1.27	1	15.21	1	1.27	1	15.21
	17.16	1	1.26	1	15.22	1	1.26	1	15.22
	17.24	1	1.26	1	15.22	1	1.26	1	15.22
	17.32	1	1.26	1	15.22	1	1.26	1	15.22
	17.40	1	1.25	1	15.23	1	1.25	1	15.23
	17.48	1	1.25	1	15.23	1	1.25	1	15.23
	17.56	1	1.25	1	15.24	1	1.25	1	15.24
	17.64	1	1.24	1	15.25	1	1.24	1	15.25
	17.72	1	1.24	1	15.25	1	1.24	1	15.25
	17.80	1	1.23	1	15.26	1	1.23	1	15.26
	17.88	1	1.23	1	15.26	1	1.23	1	15.26
	17.96	1	1.22	1	15.27	1	1.22	1	15.27
	18.04	1	1.22	1	15.28	1	1.22	1	15.28
	18.12	1	1.21	1	15.29	1	1.21	1	15.29
	18.20	1	1.20	1	15.30	1	1.20	1	15.30

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
57	18.28	1	1.20	1	15.30	1	1.20	1	15.30
	18.36	1	1.19	1	15.31	1	1.19	1	15.31
	18.44	1	1.18	1	15.32	1	1.18	1	15.32
	18.52	1	1.17	1	15.33	1	1.17	1	15.33
	18.60	1	1.16	1	15.34	1	1.16	1	15.34
	18.68	1	1.16	1	15.35	1	1.16	1	15.35
	18.76	1	1.15	1	15.36	1	1.15	1	15.36
	18.84	1	1.14	1	15.38	1	1.14	1	15.38
	18.92	1	1.13	1	15.39	1	1.13	1	15.39
	19.00	1	1.12	1	15.40	1	1.12	1	15.40
	19.08	1	1.11	1	15.41	1	1.11	1	15.41
	19.16	1	1.10	1	15.42	1	1.10	1	15.42
	19.24	1	1.09	1	15.44	1	1.09	1	15.44
	19.32	1	1.08	1	15.45	1	1.08	1	15.45
	19.40	1	1.06	1	15.46	1	1.06	1	15.46
	19.48	1	1.05	1	15.48	1	1.05	1	15.48
	19.56	1	1.04	1	15.49	1	1.04	1	15.49
	19.64	1	1.03	1	15.51	1	1.03	1	15.51
	19.72	1	1.01	1	15.52	1	1.01	1	15.52
	19.80	1	1.00	1	15.54	1	1.00	1	15.54
58	19.88	1	0.99	1	15.55	1	0.99	1	15.55
	19.96	1	0.98	1	15.56	1	0.98	1	15.56
	20.04	1	0.96	1	15.58	1	0.96	1	15.58
	20.12	1	0.95	1	15.59	1	0.95	1	15.59
	20.20	1	0.93	1	15.60	1	0.93	1	15.60
	20.28	1	0.92	1	15.62	1	0.92	1	15.62
	20.36	1	0.91	1	15.63	1	0.91	1	15.63
	20.44	1	0.89	1	15.65	1	0.89	1	15.65
	20.52	1	0.88	1	15.66	1	0.88	1	15.66
	20.60	1	0.86	1	15.67	1	0.86	1	15.67
	20.68	1	0.84	1	15.69	1	0.84	1	15.69
	20.76	1	0.83	1	15.71	1	0.83	1	15.71
	20.84	1	0.81	1	15.72	1	0.81	1	15.72
	20.92	1	0.80	1	15.74	1	0.80	1	15.74
	21.00	1	0.79	1	15.75	1	0.79	1	15.75
	21.08	1	0.77	1	15.76	1	0.77	1	15.76
	21.16	1	0.76	1	15.77	1	0.76	1	15.77
	21.24	1	0.75	1	15.78	1	0.75	1	15.78
	21.32	1	0.74	1	15.78	1	0.74	1	15.78
	21.40	1	0.73	1	15.79	1	0.73	1	15.79

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
59	21.40	1	0.73	1	15.79	1	0.73	1	15.79
	21.48	1	0.71	1	15.79	1	0.71	1	15.79
	21.56	1	0.70	1	15.80	1	0.70	1	15.80
	21.64	1	0.69	1	15.80	1	0.69	1	15.80
	21.72	1	0.68	1	15.81	1	0.68	1	15.81
	21.80	1	0.68	1	15.81	1	0.68	1	15.81
	21.88	1	0.67	1	15.82	1	0.67	1	15.82
	21.96	1	0.66	1	15.82	1	0.66	1	15.82
	22.04	1	0.65	1	15.82	1	0.65	1	15.82
	22.12	1	0.64	1	15.83	1	0.64	1	15.83
	22.20	1	0.64	1	15.83	1	0.64	1	15.83
	22.28	1	0.63	1	15.83	1	0.63	1	15.83
	22.36	1	0.62	1	15.83	1	0.62	1	15.83
	22.44	1	0.62	1	15.83	1	0.62	1	15.83
	22.52	1	0.61	1	15.83	1	0.61	1	15.83
	22.60	1	0.61	1	15.83	1	0.61	1	15.83
	22.68	1	0.60	1	15.83	1	0.60	1	15.83
	22.76	1	0.60	1	15.83	1	0.60	1	15.83
	22.84	1	0.59	1	15.84	1	0.59	1	15.84
	22.92	1	0.59	1	15.84	1	0.59	1	15.84
	23.00	1	0.59	1	15.83	1	0.59	1	15.83
60	23.00	1	0.58	1	15.82	1	0.58	1	15.82
	23.08	1	0.58	1	15.82	1	0.58	1	15.82
	23.16	1	0.58	1	15.81	1	0.58	1	15.81
	23.24	1	0.58	1	15.80	1	0.58	1	15.80
	23.32	1	0.59	1	15.79	1	0.59	1	15.79
	23.40	1	0.59	1	15.78	1	0.59	1	15.78
	23.48	1	0.59	1	15.77	1	0.59	1	15.77
	23.56	1	0.60	1	15.75	1	0.60	1	15.75
	23.64	1	0.61	1	15.74	1	0.61	1	15.74
	23.72	1	0.62	1	15.72	1	0.62	1	15.72
	23.80	1	0.63	1	15.71	1	0.63	1	15.71
	23.88	1	0.64	1	15.69	1	0.64	1	15.69
	23.96	1	0.65	1	15.67	1	0.65	1	15.67
	24.04	1	0.67	1	15.65	1	0.67	1	15.65
	24.12	1	0.68	1	15.62	1	0.68	1	15.62
	24.20	1	0.70	1	15.60	1	0.70	1	15.60
	24.28	1	0.71	1	15.57	1	0.71	1	15.57
	24.36	1	0.73	1	15.55	1	0.73	1	15.55
	24.44	1	0.75	1	15.52	1	0.75	1	15.52
	24.52	1	0.77	1	15.49	1	0.77	1	15.49
	24.60	1	0.80	1	15.46	1	0.80	1	15.46

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 164
 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
61	24.60	1	0.78	1	15.45	1	0.78	1	15.45
	24.68	1	0.81	1	15.42	1	0.81	1	15.42
	24.76	1	0.83	1	15.39	1	0.83	1	15.39
	24.84	1	0.86	1	15.36	1	0.86	1	15.36
	24.92	1	0.89	1	15.32	1	0.89	1	15.32
	25.00	1	0.91	1	15.29	1	0.91	1	15.29
	25.08	1	0.94	1	15.25	1	0.94	1	15.25
	25.16	1	0.97	1	15.21	1	0.97	1	15.21
	25.24	1	1.01	1	15.17	1	1.01	1	15.17
	25.32	1	1.04	1	15.13	1	1.04	1	15.13
	25.40	1	1.07	1	15.09	1	1.07	1	15.09
	25.48	1	1.11	1	15.05	1	1.11	1	15.05
	25.56	1	1.14	1	15.01	1	1.14	1	15.01
	25.64	1	1.18	1	14.96	1	1.18	1	14.96
	25.72	1	1.22	1	14.91	1	1.22	1	14.91
	25.80	1	1.26	1	14.87	1	1.26	1	14.87
	25.88	1	1.30	1	14.82	1	1.30	1	14.82
	25.96	1	1.34	1	14.77	1	1.34	1	14.77
	26.04	1	1.39	1	14.72	1	1.39	1	14.72
	26.12	1	1.43	1	14.67	1	1.43	1	14.67
	26.20	1	1.48	1	14.61	1	1.48	1	14.61
62	26.20	1	1.46	1	14.60	1	1.46	1	14.60
	26.28	1	1.51	1	14.55	1	1.51	1	14.55
	26.36	1	1.56	1	14.50	1	1.56	1	14.50
	26.44	1	1.61	1	14.44	1	1.61	1	14.44
	26.52	1	1.66	1	14.38	1	1.66	1	14.38
	26.60	1	1.71	1	14.32	1	1.71	1	14.32
	26.68	1	1.76	1	14.26	1	1.76	1	14.26
	26.76	1	1.81	1	14.20	1	1.81	1	14.20
	26.84	1	1.86	1	14.14	1	1.86	1	14.14
	26.92	1	1.92	1	14.08	1	1.92	1	14.08
	27.00	1	1.97	1	14.02	1	1.97	1	14.02
	27.08	1	2.03	1	13.96	1	2.03	1	13.96
	27.16	1	2.09	1	13.88	1	2.09	1	13.88
	27.24	1	2.15	1	13.81	1	2.15	1	13.81
	27.32	1	2.21	1	13.75	1	2.21	1	13.75
	27.40	1	2.27	1	13.68	1	2.27	1	13.68
	27.48	1	2.33	1	13.61	1	2.33	1	13.61
	27.56	1	2.39	1	13.55	1	2.39	1	13.55
	27.64	1	2.45	1	13.48	1	2.45	1	13.48
	27.72	1	2.52	1	13.41	1	2.52	1	13.41
	27.80	1	2.58	1	13.34	1	2.58	1	13.34

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 165
 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
63	27.80	1	2.57	1	13.34	1	2.57	1	13.34
	27.88	1	2.64	1	13.27	1	2.64	1	13.27
	27.96	1	2.70	1	13.20	1	2.70	1	13.20
	28.04	1	2.76	1	13.13	1	2.76	1	13.13
	28.12	1	2.83	1	13.06	1	2.83	1	13.06
	28.20	1	2.89	1	12.98	1	2.89	1	12.98
	28.28	1	2.96	1	12.91	1	2.96	1	12.91
	28.36	1	3.02	1	12.84	1	3.02	1	12.84
	28.44	1	3.09	1	12.77	1	3.09	1	12.77
	28.52	1	3.16	1	12.69	1	3.16	1	12.69
	28.60	1	3.22	1	12.62	1	3.22	1	12.62
	28.68	1	3.29	1	12.54	1	3.29	1	12.54
	28.76	1	3.36	1	12.47	1	3.36	1	12.47
	28.84	1	3.43	1	12.39	1	3.43	1	12.39
	28.92	1	3.50	1	12.32	1	3.50	1	12.32
	29.00	1	3.57	1	12.24	1	3.57	1	12.24
	29.08	1	3.64	1	12.16	1	3.64	1	12.16
	29.16	1	3.71	1	12.08	1	3.71	1	12.08
	29.24	1	3.78	1	12.00	1	3.78	1	12.00
	29.32	1	3.85	1	11.93	1	3.85	1	11.93
	29.40	1	3.92	1	11.85	1	3.92	1	11.85
64	29.40	1	3.92	1	11.84	1	3.92	1	11.84
	29.48	1	3.99	1	11.76	1	3.99	1	11.76
	29.56	1	4.06	1	11.68	1	4.06	1	11.68
	29.64	1	4.14	1	11.60	1	4.14	1	11.60
	29.72	1	4.21	1	11.52	1	4.21	1	11.52
	29.80	1	4.28	1	11.44	1	4.28	1	11.44
	29.88	1	4.36	1	11.35	1	4.36	1	11.35
	29.96	1	4.43	1	11.28	1	4.43	1	11.28
	30.04	1	4.50	1	11.20	1	4.50	1	11.20
	30.12	1	4.58	1	11.12	1	4.58	1	11.12
	30.20	1	4.65	1	11.04	1	4.65	1	11.04
	30.28	1	4.72	1	10.96	1	4.72	1	10.96
	30.36	1	4.79	1	10.89	1	4.79	1	10.89
	30.44	1	4.86	1	10.81	1	4.86	1	10.81
	30.52	1	4.93	1	10.73	1	4.93	1	10.73
	30.60	1	5.00	1	10.66	1	5.00	1	10.66
	30.68	1	5.07	1	10.58	1	5.07	1	10.58
	30.76	1	5.14	1	10.50	1	5.14	1	10.50
	30.84	1	5.21	1	10.43	1	5.21	1	10.43
	30.92	1	5.28	1	10.35	1	5.28	1	10.35
	31.00	1	5.35	1	10.28	1	5.35	1	10.28

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m tensões t=14 dias

Prepared by:

Units: ton meter

Code: EuroCode
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 Date: 7/10/11

Stresses [MPa] , at t = 14, beam no. 1

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
65	31.08	1	5.42	1	10.21	1	5.42	1	10.21
	31.16	1	5.48	1	10.13	1	5.48	1	10.13
	31.24	1	5.55	1	10.06	1	5.55	1	10.06
	31.32	1	5.62	1	9.98	1	5.62	1	9.98
	31.40	1	5.68	1	9.91	1	5.68	1	9.91
	31.48	1	5.75	1	9.84	1	5.75	1	9.84
	31.56	1	5.82	1	9.77	1	5.82	1	9.77
	31.64	1	5.88	1	9.69	1	5.88	1	9.69
	31.72	1	5.95	1	9.62	1	5.95	1	9.62
	31.80	1	6.01	1	9.55	1	6.01	1	9.55
	31.88	1	6.08	1	9.48	1	6.08	1	9.48
	31.96	1	6.14	1	9.41	1	6.14	1	9.41
	32.04	1	6.20	1	9.34	1	6.20	1	9.34
	32.12	1	6.27	1	9.27	1	6.27	1	9.27
	32.20	1	6.33	1	9.20	1	6.33	1	9.20
	32.28	1	6.39	1	9.13	1	6.39	1	9.13
	32.36	1	6.45	1	9.06	1	6.45	1	9.06
	32.44	1	6.51	1	8.99	1	6.51	1	8.99
	32.52	1	6.58	1	8.92	1	6.58	1	8.92
	32.60	1	6.64	1	8.86	1	6.64	1	8.86
66	32.60	1	6.56	1	9.02	1	6.56	1	9.02
	32.63	1	6.61	1	8.96	1	6.61	1	8.96
	32.66	1	6.66	1	8.91	1	6.66	1	8.91
	32.69	1	6.71	1	8.86	1	6.71	1	8.86
	32.72	1	6.75	1	8.81	1	6.75	1	8.81
	32.75	1	6.80	1	8.75	1	6.80	1	8.75
	32.78	1	6.85	1	8.70	1	6.85	1	8.70
	32.81	1	6.90	1	8.65	1	6.90	1	8.65
	32.84	1	6.94	1	8.60	1	6.94	1	8.60
	32.87	1	6.99	1	8.54	1	6.99	1	8.54
	32.90	1	7.04	1	8.49	1	7.04	1	8.49
	32.93	1	7.09	1	8.44	1	7.09	1	8.44
	32.96	1	7.14	1	8.39	1	7.14	1	8.39
	32.99	1	7.18	1	8.34	1	7.18	1	8.34
	33.02	1	7.23	1	8.28	1	7.23	1	8.28
	33.05	1	7.28	1	8.23	1	7.28	1	8.23
	33.08	1	7.33	1	8.18	1	7.33	1	8.18
	33.10	1	2.45	1	2.73	1	2.45	1	2.73
	33.11	1	-0.00	1	0.00	1	-0.00	1	0.00
	33.14	1	-0.00	1	0.00	1	-0.00	1	0.00
	33.17	1	-0.00	1	-0.00	1	-0.00	1	-0.00
	33.20	1	0.00	1	-0.00	1	0.00	1	-0.00

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	0.0	8.8	0.0	10.4	221.7
2	0.10	28.7	0.0	8.5	3.9	5.6	194.2
3	0.12	28.7	0.0	8.5	10.8	5.0	188.0
4	0.15	28.7	0.0	8.5	10.7	5.0	188.0
5	0.18	28.7	0.0	8.5	10.7	5.0	188.1
6	0.21	28.7	0.0	8.5	10.7	5.0	188.1
7	0.24	28.6	0.0	8.5	10.6	5.0	188.2
8	0.27	28.6	0.0	8.5	10.7	5.0	188.2
9	0.30	28.6	0.0	8.5	10.7	5.0	188.2
10	0.33	28.6	0.0	8.5	10.7	5.0	188.2
11	0.36	28.5	0.0	8.5	10.7	5.0	188.2
12	0.39	28.5	0.0	8.5	10.7	5.0	188.2
13	0.42	28.5	0.0	8.5	10.8	5.0	188.2
14	0.45	28.5	0.0	8.5	10.8	5.0	188.2
15	0.48	28.5	0.0	8.5	10.8	5.0	188.2
16	0.51	28.4	0.0	8.5	10.8	5.0	188.2
17	0.54	28.4	0.0	8.5	10.8	5.0	188.2
18	0.57	28.4	0.0	8.5	10.8	5.0	188.2
19	0.60	28.4	0.0	8.5	10.8	5.0	188.2
20	0.60	28.4	0.0	8.5	10.7	5.0	188.3
21	0.68	28.3	0.0	8.5	10.8	5.0	188.3
22	0.76	28.3	0.0	8.5	10.9	5.0	188.3
23	0.84	28.2	0.0	8.5	10.9	5.0	188.3
24	0.92	28.1	0.0	8.5	11.0	5.0	188.3
25	1.00	28.1	0.0	8.5	11.1	5.0	188.3
26	1.08	28.0	0.0	8.5	11.1	5.0	188.3
27	1.16	28.0	0.0	8.5	11.2	5.0	188.3
28	1.24	27.9	0.0	8.5	11.2	5.0	188.3
29	1.32	27.9	0.0	8.5	11.3	5.0	188.3
30	1.40	27.8	0.0	8.5	11.4	5.0	188.3
31	1.48	27.7	0.0	8.5	11.4	5.0	188.3
32	1.56	27.7	0.0	8.4	11.5	5.0	188.3
33	1.64	27.6	0.0	8.4	11.5	5.0	188.3
34	1.72	27.6	0.0	8.4	11.6	5.0	188.3
35	1.80	27.5	0.0	8.4	11.7	5.0	188.3
36	1.88	27.5	0.0	8.4	11.7	5.0	188.3
37	1.96	27.4	0.0	8.4	11.8	5.0	188.3
38	2.04	27.3	0.0	8.4	11.8	5.0	188.3
39	2.12	27.3	0.0	8.4	11.9	5.0	188.3
40	2.20	27.2	0.0	8.4	11.9	5.1	188.3
41	2.20	27.2	0.0	8.4	11.9	5.1	188.3
42	2.28	27.2	0.0	8.4	12.0	5.1	188.3
43	2.36	27.1	0.0	8.4	12.0	5.1	188.3
44	2.44	27.0	0.0	8.4	12.1	5.1	188.3
45	2.52	27.0	0.0	8.4	12.1	5.1	188.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.60	26.9	0.0	8.4	12.2	5.1	188.3
47	2.68	26.9	0.0	8.4	12.2	5.1	188.3
48	2.76	26.8	0.0	8.4	12.3	5.1	188.3
49	2.84	26.8	0.0	8.4	12.3	5.1	188.4
50	2.92	26.7	0.0	8.4	12.4	5.1	188.4
51	3.00	26.6	0.0	8.4	12.4	5.1	188.4
52	3.08	26.6	0.0	8.4	12.5	5.1	188.4
53	3.16	26.5	0.0	8.4	12.5	5.1	188.4
54	3.24	26.5	0.0	8.4	12.6	5.1	188.4
55	3.32	26.4	0.0	8.4	12.6	5.1	188.4
56	3.40	26.4	0.0	8.4	12.6	5.1	188.4
57	3.48	26.3	0.0	8.4	12.7	5.1	188.4
58	3.56	26.2	0.0	8.4	12.7	5.1	188.4
59	3.64	26.2	0.0	8.4	12.8	5.1	188.4
60	3.72	26.1	0.0	8.4	12.8	5.1	188.5
61	3.80	26.1	0.0	8.3	12.9	5.1	188.5
62	3.80	26.1	0.0	8.3	12.9	5.1	188.5
63	3.88	26.0	0.0	8.3	12.9	5.1	188.5
64	3.96	26.0	0.0	8.3	13.0	5.2	188.5
65	4.04	25.9	0.0	8.3	13.0	5.2	188.5
66	4.12	25.8	0.0	8.3	13.1	5.2	188.5
67	4.20	25.8	0.0	8.3	13.1	5.2	188.5
68	4.28	25.7	0.0	8.3	13.2	5.2	188.5
69	4.36	25.7	0.0	8.3	13.2	5.2	188.5
70	4.44	25.6	0.0	8.3	13.3	5.2	188.5
71	4.52	25.6	0.0	8.3	13.3	5.2	188.6
72	4.60	25.5	0.0	8.3	13.4	5.2	188.6
73	4.68	25.4	0.0	8.3	13.4	5.2	188.6
74	4.76	25.4	0.0	8.3	13.4	5.2	188.6
75	4.84	25.3	0.0	8.3	13.5	5.2	188.6
76	4.92	25.3	0.0	8.3	13.5	5.2	188.6
77	5.00	25.2	0.0	8.3	13.6	5.2	188.6
78	5.08	25.2	0.0	8.3	13.6	5.2	188.6
79	5.16	25.1	0.0	8.3	13.6	5.2	188.7
80	5.24	25.0	0.0	8.2	13.7	5.3	188.7
81	5.32	25.0	0.0	8.2	13.7	5.3	188.7
82	5.40	24.9	0.0	8.2	13.8	5.3	188.7
83	5.40	24.9	0.0	8.2	13.8	5.3	188.7
84	5.48	24.9	0.0	8.2	13.8	5.3	188.7
85	5.56	24.8	0.0	8.2	13.9	5.3	188.7
86	5.64	24.8	0.0	8.2	13.9	5.3	188.7
87	5.72	24.7	0.0	8.2	13.9	5.3	188.8
88	5.80	24.7	0.0	8.2	14.0	5.3	188.8
89	5.88	24.6	0.0	8.2	14.0	5.3	188.8
90	5.96	24.5	0.0	8.2	14.1	5.3	188.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.04	24.5	0.0	8.2	14.1	5.3	188.8
92	6.12	24.4	0.0	8.2	14.1	5.3	188.8
93	6.20	24.4	0.0	8.2	14.2	5.3	188.8
94	6.28	24.3	0.0	8.2	14.2	5.4	188.9
95	6.36	24.3	0.0	8.2	14.3	5.4	188.9
96	6.44	24.2	0.0	8.2	14.3	5.4	188.9
97	6.52	24.1	0.0	8.2	14.3	5.4	188.9
98	6.60	24.1	0.0	8.1	14.4	5.4	188.9
99	6.68	24.0	0.0	8.1	14.4	5.4	188.9
100	6.76	23.9	0.0	8.1	14.4	5.4	189.0
101	6.84	23.8	0.0	8.1	14.5	5.4	189.1
102	6.92	23.6	0.0	8.1	14.5	5.4	189.2
103	7.00	23.5	0.0	8.1	14.5	5.5	189.3
104	7.00	23.5	0.0	8.1	14.5	5.5	189.3
105	7.08	23.4	0.0	8.1	14.6	5.5	189.4
106	7.16	23.2	0.0	8.1	14.6	5.5	189.5
107	7.24	23.1	0.0	8.1	14.7	5.5	189.6
108	7.32	22.9	0.0	8.1	14.7	5.5	189.6
109	7.40	22.8	0.0	8.1	14.8	5.5	189.7
110	7.48	22.7	0.0	8.1	14.8	5.6	189.8
111	7.56	22.5	0.0	8.1	14.8	5.6	189.9
112	7.64	22.4	0.0	8.1	14.9	5.6	190.0
113	7.72	22.2	0.0	8.1	14.9	5.6	190.1
114	7.80	22.1	0.0	8.1	15.0	5.6	190.2
115	7.88	22.0	0.0	8.0	15.0	5.6	190.3
116	7.96	21.8	0.0	8.0	15.0	5.7	190.4
117	8.04	21.7	0.0	8.0	15.1	5.7	190.5
118	8.12	21.5	0.0	8.0	15.1	5.7	190.6
119	8.20	21.4	0.0	8.0	15.1	5.7	190.6
120	8.28	21.3	0.0	8.0	15.2	5.7	190.7
121	8.36	21.1	0.0	8.0	15.2	5.8	190.8
122	8.44	21.0	0.0	8.0	15.2	5.8	190.9
123	8.52	20.8	0.0	8.0	15.2	5.8	191.0
124	8.60	20.7	0.0	8.0	15.3	5.8	191.1
125	8.60	20.7	0.0	8.0	15.3	5.8	191.1
126	8.68	20.6	0.0	8.0	15.3	5.8	191.2
127	8.76	20.4	0.0	8.0	15.3	5.9	191.3
128	8.84	20.3	0.0	8.0	15.3	5.9	191.4
129	8.92	20.1	0.0	8.0	15.4	5.9	191.6
130	9.00	20.0	0.0	8.0	15.4	5.9	191.7
131	9.08	19.9	0.0	8.0	15.4	5.9	191.8
132	9.16	19.7	0.0	8.0	15.4	6.0	191.9
133	9.24	19.6	0.0	8.0	15.4	6.0	192.0
134	9.32	19.4	0.0	8.0	15.4	6.0	192.1
135	9.40	19.3	0.0	8.0	15.4	6.0	192.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	9.48	19.2	0.0	8.0	15.5	6.0	192.3
137	9.56	19.0	0.0	8.0	15.5	6.1	192.4
138	9.64	18.9	0.0	7.9	15.5	6.1	192.6
139	9.72	18.7	0.0	7.9	15.5	6.1	192.7
140	9.80	18.6	0.0	7.9	15.5	6.1	192.8
141	9.88	18.5	0.0	7.9	15.5	6.1	192.9
142	9.96	18.3	0.0	7.9	15.5	6.2	193.0
143	10.04	18.2	0.0	7.9	15.5	6.2	193.1
144	10.12	18.0	0.0	7.9	15.5	6.2	193.3
145	10.20	17.9	0.0	7.9	15.5	6.2	193.4
146	10.20	17.9	0.0	7.9	15.5	6.2	193.4
147	10.28	17.8	0.0	7.9	15.5	6.2	193.5
148	10.36	17.6	0.0	7.9	15.5	6.3	193.6
149	10.44	17.5	0.0	7.9	15.5	6.3	193.8
150	10.52	17.3	0.0	7.9	15.4	6.3	193.9
151	10.60	17.2	0.0	7.9	15.4	6.3	194.0
152	10.68	17.1	0.0	7.9	15.4	6.4	194.2
153	10.76	16.9	0.0	7.9	15.4	6.4	194.3
154	10.84	16.8	0.0	7.9	15.4	6.4	194.4
155	10.92	16.6	0.0	7.9	15.4	6.4	194.5
156	11.00	16.5	0.0	7.9	15.4	6.5	194.7
157	11.08	16.4	0.0	7.9	15.4	6.5	194.8
158	11.16	16.2	0.0	7.9	15.3	6.5	194.9
159	11.24	16.1	0.0	7.9	15.3	6.5	195.1
160	11.32	15.9	0.0	7.9	15.3	6.5	195.2
161	11.40	15.8	0.0	7.9	15.3	6.6	195.3
162	11.48	15.7	0.0	7.9	15.3	6.6	195.5
163	11.56	15.5	0.0	7.9	15.3	6.6	195.6
164	11.64	15.4	0.0	7.9	15.2	6.6	195.7
165	11.72	15.2	0.0	7.9	15.2	6.7	195.9
166	11.80	15.1	0.0	7.9	15.2	6.7	196.0
167	11.80	15.1	0.0	7.9	15.2	6.7	196.0
168	11.88	15.0	0.0	7.9	15.2	6.7	196.2
169	11.96	14.8	0.0	7.9	15.2	6.7	196.3
170	12.04	14.7	0.0	7.9	15.1	6.8	196.4
171	12.12	14.6	0.0	7.9	15.1	6.8	196.6
172	12.20	14.4	0.0	7.9	15.1	6.8	196.7
173	12.28	14.5	0.0	7.9	15.1	6.8	196.7
174	12.36	14.6	0.0	7.9	15.1	6.8	196.6
175	12.44	14.7	0.0	7.9	15.0	6.8	196.5
176	12.52	14.9	0.0	7.9	15.0	6.8	196.4
177	12.60	15.0	0.0	7.9	15.0	6.8	196.3
178	12.68	15.1	0.0	7.9	14.9	6.8	196.3
179	12.76	15.1	0.0	7.9	14.9	6.8	196.2
180	12.84	15.2	0.0	7.9	14.9	6.8	196.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 149
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	12.92	15.2	0.0	7.9	14.8	6.8	196.2
182	13.00	15.3	0.0	7.9	14.8	6.8	196.2
183	13.08	15.3	0.0	7.9	14.8	6.8	196.1
184	13.16	15.4	0.0	7.9	14.8	6.8	196.1
185	13.24	15.4	0.0	7.9	14.7	6.8	196.1
186	13.32	15.5	0.0	7.9	14.7	6.8	196.1
187	13.40	15.6	0.0	7.9	14.7	6.8	196.0
188	13.40	15.6	0.0	7.9	14.7	6.8	196.0
189	13.48	15.6	0.0	7.9	14.7	6.7	196.0
190	13.56	15.7	0.0	7.9	14.6	6.7	196.0
191	13.64	15.7	0.0	7.9	14.6	6.7	195.9
192	13.72	15.8	0.0	7.9	14.6	6.7	195.9
193	13.80	15.8	0.0	7.9	14.6	6.7	195.9
194	13.88	15.9	0.0	7.9	14.5	6.7	195.9
195	13.96	15.9	0.0	7.9	14.5	6.7	195.8
196	14.04	16.0	0.0	7.9	14.5	6.7	195.8
197	14.12	16.1	0.0	7.9	14.5	6.7	195.8
198	14.20	16.1	0.0	7.9	14.5	6.7	195.7
199	14.28	16.2	0.0	7.9	14.4	6.7	195.7
200	14.36	16.2	0.0	7.9	14.4	6.7	195.7
201	14.44	16.3	0.0	7.9	14.4	6.7	195.6
202	14.52	16.3	0.0	7.9	14.4	6.7	195.6
203	14.60	16.4	0.0	7.9	14.3	6.7	195.6
204	14.68	16.4	0.0	7.9	14.3	6.7	195.5
205	14.76	16.5	0.0	7.9	14.3	6.7	195.5
206	14.84	16.6	0.0	7.9	14.3	6.7	195.5
207	14.92	16.6	0.0	7.9	14.3	6.7	195.4
208	15.00	16.7	0.0	7.9	14.3	6.7	195.4
209	15.00	16.7	0.0	7.9	14.3	6.7	195.4
210	15.08	16.7	0.0	7.9	14.2	6.7	195.4
211	15.16	16.8	0.0	7.9	14.2	6.7	195.3
212	15.24	16.8	0.0	7.9	14.2	6.7	195.3
213	15.32	16.9	0.0	7.9	14.2	6.7	195.3
214	15.40	16.9	0.0	7.9	14.2	6.7	195.2
215	15.48	17.0	0.0	7.9	14.2	6.7	195.2
216	15.56	17.1	0.0	7.9	14.2	6.7	195.1
217	15.64	17.1	0.0	7.9	14.2	6.7	195.1
218	15.72	17.2	0.0	7.9	14.2	6.7	195.1
219	15.80	17.2	0.0	7.9	14.1	6.6	195.0
220	15.88	17.3	0.0	7.9	14.1	6.6	195.0
221	15.96	17.3	0.0	7.9	14.1	6.6	194.9
222	16.04	17.4	0.0	7.9	14.1	6.6	194.9
223	16.12	17.4	0.0	7.9	14.1	6.6	194.8
224	16.20	17.5	0.0	7.9	14.1	6.6	194.8
225	16.28	17.5	0.0	7.9	14.1	6.6	194.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 150
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	16.36	17.6	0.0	7.9	14.1	6.6	194.7
227	16.44	17.7	0.0	7.9	14.1	6.6	194.7
228	16.52	17.7	0.0	7.9	14.1	6.6	194.6
229	16.60	17.8	0.0	7.9	14.1	6.6	194.6
230	16.60	17.8	0.0	7.9	14.1	6.6	194.6
231	16.68	17.7	0.0	7.9	14.1	6.6	194.6
232	16.76	17.7	0.0	7.9	14.1	6.6	194.7
233	16.84	17.6	0.0	7.9	14.1	6.6	194.7
234	16.92	17.5	0.0	7.9	14.1	6.6	194.8
235	17.00	17.5	0.0	7.9	14.1	6.6	194.8
236	17.08	17.4	0.0	7.9	14.1	6.6	194.8
237	17.16	17.4	0.0	7.9	14.1	6.6	194.9
238	17.24	17.3	0.0	7.9	14.1	6.6	194.9
239	17.32	17.3	0.0	7.9	14.1	6.6	195.0
240	17.40	17.2	0.0	7.9	14.1	6.6	195.0
241	17.48	17.2	0.0	7.9	14.2	6.7	195.1
242	17.56	17.1	0.0	7.9	14.2	6.7	195.1
243	17.64	17.1	0.0	7.9	14.2	6.7	195.1
244	17.72	17.0	0.0	7.9	14.2	6.7	195.2
245	17.80	16.9	0.0	7.9	14.2	6.7	195.2
246	17.88	16.9	0.0	7.9	14.2	6.7	195.3
247	17.96	16.8	0.0	7.9	14.2	6.7	195.3
248	18.04	16.8	0.0	7.9	14.2	6.7	195.3
249	18.12	16.7	0.0	7.9	14.2	6.7	195.4
250	18.20	16.7	0.0	7.9	14.3	6.7	195.4
251	18.20	16.7	0.0	7.9	14.3	6.7	195.4
252	18.28	16.6	0.0	7.9	14.3	6.7	195.4
253	18.36	16.6	0.0	7.9	14.3	6.7	195.5
254	18.44	16.5	0.0	7.9	14.3	6.7	195.5
255	18.52	16.4	0.0	7.9	14.3	6.7	195.5
256	18.60	16.4	0.0	7.9	14.3	6.7	195.6
257	18.68	16.3	0.0	7.9	14.4	6.7	195.6
258	18.76	16.3	0.0	7.9	14.4	6.7	195.6
259	18.84	16.2	0.0	7.9	14.4	6.7	195.7
260	18.92	16.2	0.0	7.9	14.4	6.7	195.7
261	19.00	16.1	0.0	7.9	14.4	6.7	195.7
262	19.08	16.1	0.0	7.9	14.5	6.7	195.8
263	19.16	16.0	0.0	7.9	14.5	6.7	195.8
264	19.24	15.9	0.0	7.9	14.5	6.7	195.8
265	19.32	15.9	0.0	7.9	14.5	6.7	195.9
266	19.40	15.8	0.0	7.9	14.6	6.7	195.9
267	19.48	15.8	0.0	7.9	14.6	6.7	195.9
268	19.56	15.7	0.0	7.9	14.6	6.7	196.0
269	19.64	15.7	0.0	7.9	14.6	6.7	196.0
270	19.72	15.6	0.0	7.9	14.7	6.8	196.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	19.80	15.6	0.0	7.9	14.7	6.8	196.0
272	19.80	15.6	0.0	7.9	14.7	6.8	196.0
273	19.88	15.5	0.0	7.9	14.7	6.8	196.1
274	19.96	15.4	0.0	7.9	14.7	6.8	196.1
275	20.04	15.4	0.0	7.9	14.8	6.8	196.1
276	20.12	15.3	0.0	7.9	14.8	6.8	196.1
277	20.20	15.3	0.0	7.9	14.8	6.8	196.2
278	20.28	15.2	0.0	7.9	14.8	6.8	196.2
279	20.36	15.2	0.0	7.9	14.9	6.8	196.2
280	20.44	15.1	0.0	7.9	14.9	6.8	196.3
281	20.52	15.1	0.0	7.9	14.9	6.8	196.3
282	20.60	15.0	0.0	7.9	14.9	6.8	196.3
283	20.68	14.9	0.0	7.9	15.0	6.8	196.4
284	20.76	14.7	0.0	7.9	15.0	6.8	196.5
285	20.84	14.6	0.0	7.9	15.0	6.8	196.6
286	20.92	14.5	0.0	7.9	15.1	6.8	196.7
287	21.00	14.4	0.0	7.9	15.1	6.8	196.7
288	21.08	14.6	0.0	7.9	15.1	6.8	196.6
289	21.16	14.7	0.0	7.9	15.1	6.8	196.4
290	21.24	14.8	0.0	7.9	15.2	6.7	196.3
291	21.32	15.0	0.0	7.9	15.2	6.7	196.2
292	21.40	15.1	0.0	7.9	15.2	6.7	196.0
293	21.40	15.1	0.0	7.9	15.2	6.7	196.0
294	21.48	15.2	0.0	7.9	15.2	6.7	195.9
295	21.56	15.4	0.0	7.9	15.2	6.6	195.8
296	21.64	15.5	0.0	7.9	15.3	6.6	195.6
297	21.72	15.7	0.0	7.9	15.3	6.6	195.5
298	21.80	15.8	0.0	7.9	15.3	6.6	195.3
299	21.88	15.9	0.0	7.9	15.3	6.5	195.2
300	21.96	16.1	0.0	7.9	15.3	6.5	195.1
301	22.04	16.2	0.0	7.9	15.3	6.5	195.0
302	22.12	16.4	0.0	7.9	15.4	6.5	194.8
303	22.20	16.5	0.0	7.9	15.4	6.5	194.7
304	22.28	16.6	0.0	7.9	15.4	6.4	194.6
305	22.36	16.8	0.0	7.9	15.4	6.4	194.4
306	22.44	16.9	0.0	7.9	15.4	6.4	194.3
307	22.52	17.1	0.0	7.9	15.4	6.4	194.2
308	22.60	17.2	0.0	7.9	15.4	6.3	194.0
309	22.68	17.3	0.0	7.9	15.4	6.3	193.9
310	22.76	17.5	0.0	7.9	15.4	6.3	193.8
311	22.84	17.6	0.0	7.9	15.5	6.3	193.6
312	22.92	17.8	0.0	7.9	15.5	6.3	193.5
313	23.00	17.9	0.0	7.9	15.5	6.2	193.4
314	23.00	17.9	0.0	7.9	15.5	6.2	193.4
315	23.08	18.0	0.0	7.9	15.5	6.2	193.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 152
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	23.16	18.2	0.0	7.9	15.5	6.2	193.2
317	23.24	18.3	0.0	7.9	15.5	6.2	193.0
318	23.32	18.5	0.0	7.9	15.5	6.1	192.9
319	23.40	18.6	0.0	7.9	15.5	6.1	192.8
320	23.48	18.7	0.0	7.9	15.5	6.1	192.7
321	23.56	18.9	0.0	7.9	15.5	6.1	192.6
322	23.64	19.0	0.0	8.0	15.4	6.1	192.4
323	23.72	19.2	0.0	8.0	15.4	6.0	192.3
324	23.80	19.3	0.0	8.0	15.4	6.0	192.2
325	23.88	19.4	0.0	8.0	15.4	6.0	192.1
326	23.96	19.6	0.0	8.0	15.4	6.0	192.0
327	24.04	19.7	0.0	8.0	15.4	6.0	191.9
328	24.12	19.9	0.0	8.0	15.4	5.9	191.8
329	24.20	20.0	0.0	8.0	15.4	5.9	191.7
330	24.28	20.1	0.0	8.0	15.3	5.9	191.6
331	24.36	20.3	0.0	8.0	15.3	5.9	191.5
332	24.44	20.4	0.0	8.0	15.3	5.9	191.4
333	24.52	20.6	0.0	8.0	15.3	5.8	191.2
334	24.60	20.7	0.0	8.0	15.3	5.8	191.1
335	24.60	20.7	0.0	8.0	15.2	5.8	191.2
336	24.68	20.8	0.0	8.0	15.2	5.8	191.1
337	24.76	21.0	0.0	8.0	15.2	5.8	191.0
338	24.84	21.1	0.0	8.0	15.2	5.8	190.9
339	24.92	21.3	0.0	8.0	15.1	5.7	190.8
340	25.00	21.4	0.0	8.0	15.1	5.7	190.7
341	25.08	21.5	0.0	8.0	15.1	5.7	190.6
342	25.16	21.7	0.0	8.0	15.0	5.7	190.5
343	25.24	21.8	0.0	8.0	15.0	5.7	190.4
344	25.32	22.0	0.0	8.0	15.0	5.6	190.3
345	25.40	22.1	0.0	8.1	14.9	5.6	190.2
346	25.48	22.2	0.0	8.1	14.9	5.6	190.1
347	25.56	22.4	0.0	8.1	14.9	5.6	190.0
348	25.64	22.5	0.0	8.1	14.8	5.6	189.9
349	25.72	22.7	0.0	8.1	14.8	5.6	189.8
350	25.80	22.8	0.0	8.1	14.7	5.5	189.7
351	25.88	22.9	0.0	8.1	14.7	5.5	189.7
352	25.96	23.1	0.0	8.1	14.7	5.5	189.6
353	26.04	23.2	0.0	8.1	14.6	5.5	189.5
354	26.12	23.4	0.0	8.1	14.6	5.5	189.4
355	26.20	23.5	0.0	8.1	14.5	5.5	189.3
356	26.20	23.5	0.0	8.1	14.5	5.5	189.3
357	26.28	23.6	0.0	8.1	14.5	5.4	189.2
358	26.36	23.8	0.0	8.1	14.4	5.4	189.1
359	26.44	23.9	0.0	8.1	14.4	5.4	189.0
360	26.52	24.0	0.0	8.1	14.4	5.4	189.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	26.60	24.1	0.0	8.1	14.3	5.4	189.0
362	26.68	24.1	0.0	8.2	14.3	5.4	188.9
363	26.76	24.2	0.0	8.2	14.3	5.4	188.9
364	26.84	24.3	0.0	8.2	14.2	5.4	188.9
365	26.92	24.3	0.0	8.2	14.2	5.4	188.9
366	27.00	24.4	0.0	8.2	14.2	5.3	188.9
367	27.08	24.4	0.0	8.2	14.1	5.3	188.8
368	27.16	24.5	0.0	8.2	14.1	5.3	188.8
369	27.24	24.5	0.0	8.2	14.0	5.3	188.8
370	27.32	24.6	0.0	8.2	14.0	5.3	188.8
371	27.40	24.7	0.0	8.2	14.0	5.3	188.8
372	27.48	24.7	0.0	8.2	13.9	5.3	188.8
373	27.56	24.8	0.0	8.2	13.9	5.3	188.8
374	27.64	24.8	0.0	8.2	13.8	5.3	188.7
375	27.72	24.9	0.0	8.2	13.8	5.3	188.7
376	27.80	24.9	0.0	8.2	13.8	5.3	188.7
377	27.80	24.9	0.0	8.2	13.8	5.3	188.7
378	27.88	25.0	0.0	8.2	13.7	5.3	188.7
379	27.96	25.0	0.0	8.2	13.7	5.3	188.7
380	28.04	25.1	0.0	8.3	13.6	5.2	188.7
381	28.12	25.2	0.0	8.3	13.6	5.2	188.7
382	28.20	25.2	0.0	8.3	13.5	5.2	188.6
383	28.28	25.3	0.0	8.3	13.5	5.2	188.6
384	28.36	25.3	0.0	8.3	13.5	5.2	188.6
385	28.44	25.4	0.0	8.3	13.4	5.2	188.6
386	28.52	25.4	0.0	8.3	13.4	5.2	188.6
387	28.60	25.5	0.0	8.3	13.3	5.2	188.6
388	28.68	25.6	0.0	8.3	13.3	5.2	188.6
389	28.76	25.6	0.0	8.3	13.2	5.2	188.6
390	28.84	25.7	0.0	8.3	13.2	5.2	188.5
391	28.92	25.7	0.0	8.3	13.2	5.2	188.5
392	29.00	25.8	0.0	8.3	13.1	5.2	188.5
393	29.08	25.8	0.0	8.3	13.1	5.2	188.5
394	29.16	25.9	0.0	8.3	13.0	5.2	188.5
395	29.24	26.0	0.0	8.3	13.0	5.2	188.5
396	29.32	26.0	0.0	8.3	12.9	5.1	188.5
397	29.40	26.1	0.0	8.3	12.9	5.1	188.5
398	29.40	26.1	0.0	8.3	12.9	5.1	188.5
399	29.48	26.1	0.0	8.4	12.8	5.1	188.5
400	29.56	26.2	0.0	8.4	12.8	5.1	188.5
401	29.64	26.2	0.0	8.4	12.7	5.1	188.4
402	29.72	26.3	0.0	8.4	12.7	5.1	188.4
403	29.80	26.4	0.0	8.4	12.6	5.1	188.4
404	29.88	26.4	0.0	8.4	12.6	5.1	188.4
405	29.96	26.5	0.0	8.4	12.5	5.1	188.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	30.04	26.5	0.0	8.4	12.5	5.1	188.4
407	30.12	26.6	0.0	8.4	12.5	5.1	188.4
408	30.20	26.6	0.0	8.4	12.4	5.1	188.4
409	30.28	26.7	0.0	8.4	12.4	5.1	188.4
410	30.36	26.8	0.0	8.4	12.3	5.1	188.4
411	30.44	26.8	0.0	8.4	12.3	5.1	188.3
412	30.52	26.9	0.0	8.4	12.2	5.1	188.3
413	30.60	26.9	0.0	8.4	12.2	5.1	188.3
414	30.68	27.0	0.0	8.4	12.1	5.1	188.3
415	30.76	27.0	0.0	8.4	12.1	5.1	188.3
416	30.84	27.1	0.0	8.4	12.0	5.1	188.3
417	30.92	27.2	0.0	8.4	12.0	5.1	188.3
418	31.00	27.2	0.0	8.4	11.9	5.1	188.3
419	31.00	27.2	0.0	8.4	11.9	5.1	188.3
420	31.08	27.3	0.0	8.4	11.9	5.0	188.3
421	31.16	27.3	0.0	8.4	11.8	5.0	188.3
422	31.24	27.4	0.0	8.4	11.8	5.0	188.3
423	31.32	27.5	0.0	8.4	11.7	5.0	188.3
424	31.40	27.5	0.0	8.4	11.7	5.0	188.3
425	31.48	27.6	0.0	8.4	11.6	5.0	188.3
426	31.56	27.6	0.0	8.4	11.5	5.0	188.3
427	31.64	27.7	0.0	8.4	11.5	5.0	188.3
428	31.72	27.7	0.0	8.5	11.4	5.0	188.3
429	31.80	27.8	0.0	8.5	11.4	5.0	188.3
430	31.88	27.9	0.0	8.5	11.3	5.0	188.3
431	31.96	27.9	0.0	8.5	11.3	5.0	188.3
432	32.04	28.0	0.0	8.5	11.2	5.0	188.3
433	32.12	28.0	0.0	8.5	11.1	5.0	188.3
434	32.20	28.1	0.0	8.5	11.1	5.0	188.3
435	32.28	28.1	0.0	8.5	11.0	5.0	188.3
436	32.36	28.2	0.0	8.5	10.9	5.0	188.3
437	32.44	28.3	0.0	8.5	10.9	5.0	188.3
438	32.52	28.3	0.0	8.5	10.8	5.0	188.3
439	32.60	28.4	0.0	8.5	10.7	5.0	188.3
440	32.60	28.4	0.0	8.5	10.8	5.0	188.2
441	32.63	28.4	0.0	8.5	10.8	5.0	188.2
442	32.66	28.4	0.0	8.5	10.8	5.0	188.2
443	32.69	28.4	0.0	8.5	10.8	5.0	188.2
444	32.72	28.5	0.0	8.5	10.8	5.0	188.2
445	32.75	28.5	0.0	8.5	10.8	5.0	188.2
446	32.78	28.5	0.0	8.5	10.8	5.0	188.2
447	32.81	28.5	0.0	8.5	10.8	5.0	188.2
448	32.84	28.5	0.0	8.5	10.7	5.0	188.2
449	32.87	28.6	0.0	8.5	10.7	5.0	188.1
450	32.90	28.6	0.0	8.5	10.7	5.0	188.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
viga ext 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	32.93	28.6	0.0	8.5	10.7	5.0	188.1
452	32.96	28.6	0.0	8.5	10.7	5.0	188.1
453	32.99	28.7	0.0	8.5	10.6	5.0	188.1
454	33.02	28.7	0.0	8.5	10.6	5.0	188.1
455	33.05	28.7	0.0	8.5	10.6	5.0	188.1
456	33.08	28.7	0.0	8.5	10.6	5.0	188.1
457	33.10	28.7	0.0	8.5	3.9	5.6	194.2

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 123
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	29.8	2.0	8.4	4.7	5.2	190.9
3	0.12	29.8	6.1	8.4	14.0	4.1	178.5
4	0.15	29.7	6.2	8.4	13.9	4.1	178.6
5	0.18	29.7	6.2	8.4	13.8	4.1	178.7
6	0.21	29.7	6.2	8.4	13.7	4.1	178.8
7	0.24	29.7	6.2	8.4	13.6	4.1	179.0
8	0.27	29.6	6.2	8.4	13.6	4.1	179.0
9	0.30	29.6	6.2	8.4	13.5	4.1	179.1
10	0.33	29.6	6.2	8.4	13.5	4.2	179.1
11	0.36	29.6	6.2	8.4	13.4	4.2	179.2
12	0.39	29.6	6.2	8.4	13.4	4.2	179.2
13	0.42	29.5	6.2	8.4	13.4	4.2	179.3
14	0.45	29.5	6.2	8.4	13.3	4.2	179.3
15	0.48	29.5	6.2	8.4	13.3	4.2	179.4
16	0.51	29.5	6.2	8.4	13.2	4.2	179.4
17	0.54	29.4	6.2	8.4	13.2	4.2	179.5
18	0.57	29.4	6.2	8.4	13.1	4.2	179.6
19	0.60	29.4	6.2	8.4	13.1	4.2	179.6
20	0.60	29.4	6.2	8.4	12.9	4.2	179.8
21	0.68	29.3	6.2	8.4	13.0	4.2	179.8
22	0.76	29.3	6.2	8.4	13.0	4.2	179.8
23	0.84	29.2	6.2	8.4	13.1	4.2	179.8
24	0.92	29.2	6.3	8.4	13.1	4.2	179.8
25	1.00	29.1	6.3	8.4	13.2	4.2	179.8
26	1.08	29.1	6.3	8.4	13.2	4.2	179.8
27	1.16	29.0	6.4	8.3	13.2	4.2	179.8
28	1.24	28.9	6.4	8.3	13.3	4.2	179.7
29	1.32	28.9	6.4	8.3	13.3	4.2	179.7
30	1.40	28.8	6.5	8.3	13.4	4.2	179.7
31	1.48	28.8	6.5	8.3	13.4	4.2	179.7
32	1.56	28.7	6.5	8.3	13.4	4.2	179.7
33	1.64	28.7	6.6	8.3	13.5	4.2	179.7
34	1.72	28.6	6.6	8.3	13.5	4.2	179.6
35	1.80	28.5	6.7	8.3	13.6	4.2	179.6
36	1.88	28.5	6.7	8.3	13.6	4.2	179.6
37	1.96	28.4	6.8	8.3	13.6	4.2	179.6
38	2.04	28.4	6.8	8.3	13.7	4.2	179.5
39	2.12	28.3	6.9	8.3	13.7	4.2	179.5
40	2.20	28.3	6.9	8.3	13.7	4.2	179.5
41	2.20	28.3	6.9	8.3	13.7	4.2	179.5
42	2.28	28.2	7.0	8.3	13.8	4.2	179.5
43	2.36	28.1	7.0	8.3	13.8	4.2	179.4
44	2.44	28.1	7.1	8.3	13.8	4.2	179.4
45	2.52	28.0	7.1	8.3	13.9	4.2	179.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 124
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.60	28.0	7.2	8.3	13.9	4.2	179.3
47	2.68	27.9	7.3	8.3	13.9	4.2	179.3
48	2.76	27.9	7.3	8.3	14.0	4.2	179.2
49	2.84	27.8	7.4	8.3	14.0	4.2	179.2
50	2.92	27.7	7.5	8.2	14.1	4.2	179.1
51	3.00	27.7	7.6	8.2	14.1	4.2	179.1
52	3.08	27.6	7.6	8.2	14.1	4.2	179.0
53	3.16	27.6	7.7	8.2	14.2	4.2	179.0
54	3.24	27.5	7.8	8.2	14.2	4.2	178.9
55	3.32	27.5	7.9	8.2	14.2	4.2	178.9
56	3.40	27.4	7.9	8.2	14.3	4.2	178.8
57	3.48	27.3	8.0	8.2	14.3	4.2	178.8
58	3.56	27.3	8.1	8.2	14.4	4.2	178.7
59	3.64	27.2	8.2	8.2	14.4	4.2	178.6
60	3.72	27.2	8.3	8.2	14.4	4.2	178.6
61	3.80	27.1	8.4	8.2	14.5	4.2	178.5
62	3.80	27.1	8.4	8.2	14.5	4.2	178.5
63	3.88	27.1	8.5	8.2	14.5	4.2	178.4
64	3.96	27.0	8.6	8.2	14.6	4.2	178.4
65	4.04	26.9	8.7	8.2	14.6	4.2	178.3
66	4.12	26.9	8.8	8.2	14.6	4.2	178.2
67	4.20	26.8	8.9	8.2	14.7	4.2	178.1
68	4.28	26.8	9.0	8.1	14.7	4.2	178.1
69	4.36	26.7	9.1	8.1	14.8	4.2	178.0
70	4.44	26.7	9.2	8.1	14.8	4.2	177.9
71	4.52	26.6	9.3	8.1	14.8	4.2	177.8
72	4.60	26.5	9.4	8.1	14.9	4.2	177.8
73	4.68	26.5	9.5	8.1	14.9	4.2	177.7
74	4.76	26.4	9.6	8.1	14.9	4.2	177.6
75	4.84	26.4	9.7	8.1	15.0	4.2	177.5
76	4.92	26.3	9.8	8.1	15.0	4.2	177.5
77	5.00	26.3	9.9	8.1	15.1	4.2	177.4
78	5.08	26.2	10.0	8.1	15.1	4.2	177.3
79	5.16	26.1	10.2	8.1	15.1	4.2	177.2
80	5.24	26.1	10.3	8.1	15.2	4.2	177.1
81	5.32	26.0	10.4	8.1	15.2	4.2	177.0
82	5.40	26.0	10.5	8.1	15.3	4.2	176.9
83	5.40	26.0	10.5	8.1	15.3	4.2	176.9
84	5.48	25.9	10.6	8.0	15.3	4.2	176.8
85	5.56	25.9	10.7	8.0	15.4	4.2	176.7
86	5.64	25.8	10.8	8.0	15.4	4.2	176.6
87	5.72	25.7	11.0	8.0	15.5	4.2	176.5
88	5.80	25.7	11.1	8.0	15.5	4.2	176.4
89	5.88	25.6	11.2	8.0	15.5	4.2	176.3
90	5.96	25.6	11.3	8.0	15.6	4.2	176.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 125
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.04	25.5	11.4	8.0	15.6	4.2	176.1
92	6.12	25.3	11.6	8.0	15.7	4.2	176.1
93	6.20	25.2	11.7	8.0	15.7	4.2	176.1
94	6.28	25.0	11.8	8.0	15.8	4.2	176.1
95	6.36	24.9	11.9	8.0	15.8	4.2	176.1
96	6.44	24.7	12.0	8.0	15.9	4.2	176.1
97	6.52	24.5	12.1	8.0	15.9	4.2	176.1
98	6.60	24.4	12.3	8.0	16.0	4.2	176.1
99	6.68	24.2	12.4	7.9	16.0	4.2	176.1
100	6.76	24.0	12.5	7.9	16.0	4.2	176.2
101	6.84	23.9	12.6	7.9	16.1	4.2	176.2
102	6.92	23.7	12.7	7.9	16.1	4.3	176.2
103	7.00	23.6	12.8	7.9	16.2	4.3	176.2
104	7.00	23.6	12.8	7.9	16.2	4.3	176.2
105	7.08	23.4	12.9	7.9	16.2	4.3	176.2
106	7.16	23.2	13.0	7.9	16.2	4.3	176.2
107	7.24	23.1	13.1	7.9	16.3	4.3	176.2
108	7.32	22.9	13.3	7.9	16.3	4.3	176.3
109	7.40	22.8	13.4	7.9	16.3	4.3	176.3
110	7.48	22.6	13.5	7.9	16.4	4.3	176.3
111	7.56	22.4	13.6	7.9	16.4	4.3	176.3
112	7.64	22.3	13.7	7.9	16.4	4.3	176.4
113	7.72	22.1	13.8	7.9	16.4	4.3	176.4
114	7.80	21.9	13.9	7.9	16.4	4.3	176.4
115	7.88	21.8	14.0	7.9	16.5	4.4	176.5
116	7.96	21.6	14.0	7.9	16.5	4.4	176.5
117	8.04	21.5	14.1	7.9	16.5	4.4	176.6
118	8.12	21.3	14.2	7.9	16.5	4.4	176.6
119	8.20	21.1	14.3	7.8	16.5	4.4	176.7
120	8.28	21.0	14.4	7.8	16.5	4.4	176.8
121	8.36	20.8	14.5	7.8	16.5	4.4	176.8
122	8.44	20.7	14.6	7.8	16.5	4.4	176.9
123	8.52	20.5	14.7	7.8	16.6	4.4	176.9
124	8.60	20.3	14.7	7.8	16.6	4.4	177.0
125	8.60	20.3	14.7	7.8	16.6	4.4	177.0
126	8.68	20.2	14.8	7.8	16.6	4.5	177.1
127	8.76	20.0	14.9	7.8	16.6	4.5	177.1
128	8.84	19.9	15.0	7.8	16.6	4.5	177.2
129	8.92	19.7	15.0	7.8	16.6	4.5	177.3
130	9.00	19.5	15.1	7.8	16.6	4.5	177.4
131	9.08	19.4	15.2	7.8	16.6	4.5	177.5
132	9.16	19.2	15.2	7.8	16.6	4.5	177.6
133	9.24	19.0	15.3	7.8	16.6	4.5	177.7
134	9.32	18.9	15.4	7.8	16.6	4.6	177.8
135	9.40	18.7	15.4	7.8	16.5	4.6	177.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	9.48	18.6	15.5	7.8	16.5	4.6	178.0
137	9.56	18.4	15.5	7.8	16.5	4.6	178.1
138	9.64	18.2	15.6	7.8	16.5	4.6	178.2
139	9.72	18.1	15.6	7.8	16.5	4.6	178.3
140	9.80	17.9	15.7	7.8	16.5	4.7	178.4
141	9.88	17.8	15.7	7.8	16.4	4.7	178.5
142	9.96	17.6	15.8	7.8	16.4	4.7	178.7
143	10.04	17.4	15.8	7.8	16.4	4.7	178.8
144	10.12	17.3	15.8	7.8	16.4	4.7	178.9
145	10.20	17.1	15.9	7.8	16.4	4.7	179.0
146	10.20	17.1	15.9	7.8	16.4	4.7	179.0
147	10.28	17.0	15.9	7.8	16.3	4.7	179.1
148	10.36	16.9	15.9	7.8	16.3	4.8	179.2
149	10.44	16.9	16.0	7.8	16.3	4.8	179.2
150	10.52	16.8	16.0	7.8	16.3	4.8	179.3
151	10.60	16.8	16.0	7.8	16.2	4.8	179.3
152	10.68	16.7	16.0	7.8	16.2	4.8	179.4
153	10.76	16.7	16.1	7.8	16.2	4.8	179.4
154	10.84	16.6	16.1	7.8	16.1	4.8	179.5
155	10.92	16.6	16.1	7.8	16.1	4.8	179.5
156	11.00	16.5	16.1	7.8	16.1	4.8	179.6
157	11.08	16.4	16.2	7.8	16.0	4.8	179.6
158	11.16	16.4	16.2	7.8	16.0	4.8	179.7
159	11.24	16.3	16.2	7.8	16.0	4.8	179.8
160	11.32	16.3	16.2	7.8	16.0	4.9	179.8
161	11.40	16.2	16.3	7.8	15.9	4.9	179.9
162	11.48	16.2	16.3	7.8	15.9	4.9	179.9
163	11.56	16.1	16.3	7.8	15.9	4.9	180.0
164	11.64	16.1	16.3	7.8	15.8	4.9	180.0
165	11.72	16.0	16.3	7.8	15.8	4.9	180.1
166	11.80	15.9	16.3	7.8	15.8	4.9	180.2
167	11.80	15.9	16.3	7.8	15.8	4.9	180.2
168	11.88	15.9	16.4	7.8	15.7	4.9	180.2
169	11.96	15.8	16.4	7.8	15.7	4.9	180.3
170	12.04	15.8	16.4	7.8	15.7	4.9	180.4
171	12.12	15.7	16.4	7.8	15.7	4.9	180.4
172	12.20	15.7	16.4	7.8	15.6	5.0	180.5
173	12.28	15.6	16.4	7.8	15.6	5.0	180.6
174	12.36	15.5	16.4	7.8	15.6	5.0	180.6
175	12.44	15.5	16.4	7.8	15.5	5.0	180.7
176	12.52	15.4	16.4	7.8	15.5	5.0	180.8
177	12.60	15.4	16.4	7.8	15.4	5.0	180.9
178	12.68	15.3	16.4	7.8	15.4	5.0	181.0
179	12.76	15.3	16.4	7.8	15.4	5.0	181.1
180	12.84	15.2	16.4	7.8	15.3	5.0	181.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 127
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	12.92	15.2	16.4	7.8	15.3	5.1	181.2
182	13.00	15.1	16.4	7.8	15.3	5.1	181.3
183	13.08	15.0	16.4	7.8	15.2	5.1	181.4
184	13.16	15.0	16.4	7.8	15.2	5.1	181.5
185	13.24	14.9	16.4	7.8	15.2	5.1	181.5
186	13.32	14.9	16.4	7.8	15.1	5.1	181.6
187	13.40	14.9	16.4	7.8	15.1	5.1	181.6
188	13.40	14.9	16.4	7.8	15.1	5.1	181.6
189	13.48	15.0	16.4	7.8	15.1	5.1	181.6
190	13.56	15.1	16.4	7.8	15.0	5.1	181.5
191	13.64	15.1	16.4	7.8	15.0	5.1	181.5
192	13.72	15.2	16.4	7.8	15.0	5.1	181.5
193	13.80	15.2	16.4	7.8	14.9	5.1	181.5
194	13.88	15.3	16.4	7.8	14.9	5.1	181.4
195	13.96	15.3	16.4	7.8	14.9	5.1	181.4
196	14.04	15.4	16.4	7.8	14.9	5.1	181.4
197	14.12	15.4	16.4	7.8	14.8	5.1	181.3
198	14.20	15.5	16.4	7.8	14.8	5.1	181.3
199	14.28	15.6	16.4	7.8	14.8	5.1	181.3
200	14.36	15.6	16.4	7.8	14.8	5.1	181.3
201	14.44	15.7	16.4	7.8	14.7	5.1	181.2
202	14.52	15.7	16.4	7.8	14.7	5.1	181.2
203	14.60	15.8	16.4	7.8	14.7	5.1	181.2
204	14.68	15.8	16.4	7.8	14.7	5.1	181.1
205	14.76	15.9	16.4	7.8	14.6	5.1	181.1
206	14.84	15.9	16.4	7.8	14.6	5.1	181.1
207	14.92	16.0	16.4	7.8	14.6	5.1	181.0
208	15.00	16.0	16.4	7.8	14.6	5.1	181.0
209	15.00	16.0	16.4	7.8	14.6	5.1	181.0
210	15.08	16.1	16.4	7.8	14.6	5.1	181.0
211	15.16	16.2	16.4	7.8	14.5	5.1	180.9
212	15.24	16.2	16.4	7.8	14.5	5.1	180.9
213	15.32	16.3	16.4	7.8	14.5	5.1	180.9
214	15.40	16.3	16.4	7.8	14.5	5.1	180.8
215	15.48	16.4	16.4	7.8	14.5	5.1	180.8
216	15.56	16.4	16.4	7.8	14.5	5.1	180.8
217	15.64	16.5	16.4	7.8	14.5	5.0	180.7
218	15.72	16.5	16.4	7.8	14.4	5.0	180.7
219	15.80	16.6	16.4	7.8	14.4	5.0	180.6
220	15.88	16.7	16.4	7.8	14.4	5.0	180.6
221	15.96	16.7	16.4	7.8	14.4	5.0	180.6
222	16.04	16.8	16.4	7.8	14.4	5.0	180.5
223	16.12	16.8	16.4	7.8	14.4	5.0	180.5
224	16.20	16.9	16.4	7.8	14.4	5.0	180.4
225	16.28	16.9	16.4	7.8	14.4	5.0	180.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 128
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	16.36	17.0	16.4	7.8	14.4	5.0	180.3
227	16.44	17.0	16.4	7.8	14.4	5.0	180.3
228	16.52	17.1	16.4	7.8	14.4	5.0	180.2
229	16.60	17.2	16.4	7.8	14.4	5.0	180.2
230	16.60	17.2	16.4	7.8	14.4	5.0	180.2
231	16.68	17.2	16.4	7.8	14.4	5.0	180.1
232	16.76	17.3	16.4	7.8	14.4	5.0	180.1
233	16.84	17.3	16.4	7.8	14.4	5.0	180.0
234	16.92	17.4	16.4	7.8	14.4	5.0	180.0
235	17.00	17.4	16.4	7.8	14.4	5.0	179.9
236	17.08	17.5	16.4	7.8	14.4	5.0	179.8
237	17.16	17.5	16.5	7.8	14.4	5.0	179.8
238	17.24	17.6	16.5	7.8	14.4	4.9	179.7
239	17.32	17.6	16.5	7.8	14.4	4.9	179.7
240	17.40	17.7	16.5	7.8	14.4	4.9	179.6
241	17.48	17.8	16.5	7.8	14.4	4.9	179.5
242	17.56	17.8	16.5	7.8	14.5	4.9	179.5
243	17.64	17.9	16.5	7.8	14.5	4.9	179.4
244	17.72	17.9	16.5	7.8	14.5	4.9	179.3
245	17.80	18.0	16.5	7.8	14.5	4.9	179.3
246	17.88	18.0	16.5	7.8	14.5	4.9	179.2
247	17.96	18.1	16.5	7.8	14.5	4.9	179.1
248	18.04	18.1	16.5	7.8	14.5	4.9	179.1
249	18.12	18.2	16.5	7.8	14.6	4.9	179.0
250	18.20	18.3	16.5	7.8	14.6	4.9	178.9
251	18.20	18.3	16.5	7.8	14.6	4.9	178.9
252	18.28	18.3	16.5	7.8	14.6	4.9	178.9
253	18.36	18.4	16.5	7.8	14.6	4.8	178.8
254	18.44	18.4	16.5	7.8	14.6	4.8	178.7
255	18.52	18.5	16.5	7.8	14.7	4.8	178.7
256	18.60	18.5	16.5	7.8	14.7	4.8	178.6
257	18.68	18.6	16.5	7.8	14.7	4.8	178.5
258	18.76	18.6	16.5	7.8	14.7	4.8	178.4
259	18.84	18.7	16.5	7.8	14.7	4.8	178.4
260	18.92	18.7	16.5	7.8	14.8	4.8	178.3
261	19.00	18.8	16.5	7.8	14.8	4.8	178.2
262	19.08	18.9	16.5	7.8	14.8	4.8	178.1
263	19.16	18.9	16.6	7.8	14.9	4.8	178.1
264	19.24	19.0	16.6	7.8	14.9	4.8	178.0
265	19.32	19.0	16.6	7.8	14.9	4.7	177.9
266	19.40	19.1	16.6	7.8	14.9	4.7	177.8
267	19.48	19.1	16.6	7.8	15.0	4.7	177.7
268	19.56	19.2	16.6	7.8	15.0	4.7	177.7
269	19.64	19.2	16.6	7.8	15.0	4.7	177.6
270	19.72	19.3	16.6	7.8	15.1	4.7	177.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 129
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	19.80	19.3	16.6	7.8	15.1	4.7	177.4
272	19.80	19.3	16.6	7.8	15.1	4.7	177.4
273	19.88	19.4	16.6	7.8	15.1	4.7	177.3
274	19.96	19.5	16.6	7.8	15.2	4.7	177.3
275	20.04	19.5	16.6	7.8	15.2	4.7	177.2
276	20.12	19.6	16.6	7.8	15.2	4.6	177.1
277	20.20	19.6	16.6	7.8	15.3	4.6	177.0
278	20.28	19.7	16.6	7.8	15.3	4.6	177.0
279	20.36	19.7	16.6	7.8	15.3	4.6	176.9
280	20.44	19.8	16.6	7.8	15.4	4.6	176.8
281	20.52	19.8	16.6	7.8	15.4	4.6	176.7
282	20.60	19.9	16.6	7.8	15.4	4.6	176.7
283	20.68	19.9	16.6	7.8	15.5	4.6	176.6
284	20.76	20.0	16.6	7.8	15.5	4.6	176.5
285	20.84	20.1	16.6	7.8	15.5	4.6	176.4
286	20.92	20.1	16.6	7.8	15.6	4.6	176.3
287	21.00	20.2	16.6	7.8	15.6	4.5	176.2
288	21.08	20.2	16.6	7.8	15.6	4.5	176.2
289	21.16	20.3	16.6	7.8	15.7	4.5	176.1
290	21.24	20.3	16.5	7.8	15.7	4.5	176.0
291	21.32	20.4	16.5	7.8	15.7	4.5	176.0
292	21.40	20.4	16.5	7.8	15.8	4.5	175.9
293	21.40	20.4	16.5	7.8	15.8	4.5	175.9
294	21.48	20.5	16.5	7.8	15.8	4.5	175.9
295	21.56	20.5	16.5	7.8	15.8	4.5	175.8
296	21.64	20.6	16.5	7.8	15.9	4.5	175.7
297	21.72	20.6	16.5	7.8	15.9	4.5	175.7
298	21.80	20.7	16.4	7.8	15.9	4.5	175.6
299	21.88	20.8	16.4	7.8	15.9	4.4	175.6
300	21.96	20.8	16.4	7.8	16.0	4.4	175.5
301	22.04	20.9	16.4	7.8	16.0	4.4	175.5
302	22.12	20.9	16.3	7.8	16.0	4.4	175.4
303	22.20	21.0	16.3	7.8	16.1	4.4	175.4
304	22.28	21.0	16.3	7.8	16.1	4.4	175.3
305	22.36	21.1	16.3	7.8	16.1	4.4	175.2
306	22.44	21.1	16.2	7.8	16.2	4.4	175.2
307	22.52	21.2	16.2	7.8	16.2	4.4	175.1
308	22.60	21.2	16.2	7.8	16.2	4.4	175.1
309	22.68	21.3	16.2	7.8	16.2	4.4	175.1
310	22.76	21.4	16.1	7.8	16.3	4.4	175.0
311	22.84	21.4	16.1	7.8	16.3	4.4	175.0
312	22.92	21.5	16.1	7.8	16.3	4.3	174.9
313	23.00	21.5	16.0	7.8	16.4	4.3	174.9
314	23.00	21.5	16.0	7.8	16.3	4.3	174.9
315	23.08	21.6	16.0	7.8	16.4	4.3	174.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 130
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	23.16	21.6	16.0	7.8	16.4	4.3	174.8
317	23.24	21.7	15.9	7.8	16.4	4.3	174.8
318	23.32	21.7	15.9	7.8	16.4	4.3	174.8
319	23.40	21.8	15.8	7.8	16.5	4.3	174.7
320	23.48	21.8	15.8	7.8	16.5	4.3	174.7
321	23.56	21.9	15.7	7.8	16.5	4.3	174.7
322	23.64	21.9	15.7	7.8	16.5	4.3	174.7
323	23.72	22.0	15.6	7.8	16.5	4.3	174.6
324	23.80	22.1	15.6	7.8	16.6	4.3	174.6
325	23.88	22.1	15.5	7.8	16.6	4.3	174.6
326	23.96	22.2	15.5	7.8	16.6	4.3	174.6
327	24.04	22.2	15.4	7.8	16.6	4.3	174.6
328	24.12	22.3	15.3	7.8	16.6	4.3	174.6
329	24.20	22.3	15.3	7.8	16.6	4.3	174.6
330	24.28	22.4	15.2	7.8	16.6	4.3	174.6
331	24.36	22.4	15.2	7.8	16.7	4.3	174.6
332	24.44	22.5	15.1	7.8	16.7	4.3	174.6
333	24.52	22.5	15.0	7.8	16.7	4.3	174.6
334	24.60	22.6	14.9	7.8	16.7	4.2	174.6
335	24.60	22.6	14.9	7.8	16.7	4.2	174.7
336	24.68	22.6	14.9	7.8	16.7	4.2	174.7
337	24.76	22.7	14.8	7.8	16.7	4.2	174.7
338	24.84	22.8	14.7	7.8	16.7	4.2	174.7
339	24.92	22.8	14.6	7.8	16.7	4.2	174.7
340	25.00	22.9	14.5	7.8	16.7	4.2	174.7
341	25.08	22.9	14.5	7.8	16.7	4.2	174.8
342	25.16	23.0	14.4	7.8	16.7	4.2	174.8
343	25.24	23.0	14.3	7.8	16.7	4.2	174.8
344	25.32	23.1	14.2	7.8	16.7	4.2	174.8
345	25.40	23.1	14.1	7.8	16.7	4.2	174.9
346	25.48	23.2	14.0	7.8	16.7	4.2	174.9
347	25.56	23.2	13.9	7.8	16.7	4.2	175.0
348	25.64	23.3	13.8	7.8	16.7	4.2	175.0
349	25.72	23.3	13.7	7.8	16.7	4.2	175.0
350	25.80	23.4	13.6	7.8	16.7	4.2	175.1
351	25.88	23.4	13.5	7.8	16.7	4.2	175.1
352	25.96	23.5	13.4	7.9	16.7	4.2	175.2
353	26.04	23.6	13.3	7.9	16.7	4.2	175.2
354	26.12	23.6	13.2	7.9	16.7	4.2	175.3
355	26.20	23.7	13.1	7.9	16.7	4.2	175.3
356	26.20	23.7	13.1	7.9	16.7	4.2	175.4
357	26.28	23.7	13.0	7.9	16.7	4.2	175.4
358	26.36	23.8	12.9	7.9	16.6	4.2	175.5
359	26.44	23.8	12.8	7.9	16.6	4.2	175.6
360	26.52	23.9	12.7	7.9	16.6	4.2	175.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	26.60	23.9	12.6	7.9	16.6	4.2	175.7
362	26.68	24.0	12.5	7.9	16.6	4.2	175.8
363	26.76	24.1	12.3	7.9	16.6	4.2	175.8
364	26.84	24.2	12.2	7.9	16.6	4.2	175.8
365	26.92	24.4	12.1	7.9	16.6	4.2	175.7
366	27.00	24.6	12.0	7.9	16.6	4.2	175.7
367	27.08	24.7	11.9	7.9	16.5	4.2	175.7
368	27.16	24.9	11.7	7.9	16.5	4.2	175.7
369	27.24	25.0	11.6	7.9	16.5	4.2	175.7
370	27.32	25.2	11.5	7.9	16.5	4.2	175.6
371	27.40	25.3	11.4	7.9	16.5	4.2	175.6
372	27.48	25.5	11.3	7.9	16.4	4.2	175.6
373	27.56	25.7	11.1	7.9	16.4	4.2	175.6
374	27.64	25.8	11.0	7.9	16.4	4.2	175.6
375	27.72	26.0	10.9	7.9	16.4	4.2	175.6
376	27.80	26.1	10.8	7.9	16.3	4.2	175.6
377	27.80	26.1	10.8	7.9	16.3	4.2	175.6
378	27.88	26.3	10.7	7.9	16.3	4.1	175.6
379	27.96	26.4	10.5	7.9	16.3	4.1	175.6
380	28.04	26.6	10.4	8.0	16.3	4.1	175.6
381	28.12	26.7	10.3	8.0	16.2	4.1	175.6
382	28.20	26.9	10.2	8.0	16.2	4.1	175.6
383	28.28	27.1	10.0	8.0	16.2	4.1	175.6
384	28.36	27.2	9.9	8.0	16.1	4.1	175.6
385	28.44	27.4	9.8	8.0	16.1	4.1	175.6
386	28.52	27.5	9.7	8.0	16.1	4.1	175.6
387	28.60	27.7	9.5	8.0	16.1	4.1	175.6
388	28.68	27.8	9.4	8.0	16.0	4.1	175.5
389	28.76	28.0	9.3	8.0	16.0	4.1	175.5
390	28.84	28.1	9.2	8.0	16.0	4.1	175.5
391	28.92	28.3	9.1	8.0	15.9	4.1	175.5
392	29.00	28.5	8.9	8.0	15.9	4.1	175.5
393	29.08	28.6	8.8	8.0	15.9	4.1	175.5
394	29.16	28.8	8.7	8.0	15.9	4.0	175.5
395	29.24	28.9	8.6	8.0	15.8	4.0	175.5
396	29.32	29.1	8.5	8.0	15.8	4.0	175.5
397	29.40	29.2	8.4	8.1	15.8	4.0	175.5
398	29.40	29.2	8.4	8.1	15.8	4.0	175.5
399	29.48	29.4	8.2	8.1	15.7	4.0	175.5
400	29.56	29.5	8.1	8.1	15.7	4.0	175.5
401	29.64	29.7	8.0	8.1	15.7	4.0	175.5
402	29.72	29.8	7.9	8.1	15.6	4.0	175.5
403	29.80	30.0	7.8	8.1	15.6	4.0	175.4
404	29.88	30.1	7.7	8.1	15.6	4.0	175.5
405	29.96	30.1	7.6	8.1	15.6	4.0	175.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 132
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	30.04	30.2	7.5	8.1	15.5	4.0	175.6
407	30.12	30.3	7.4	8.1	15.5	4.0	175.7
408	30.20	30.3	7.3	8.1	15.5	4.0	175.7
409	30.28	30.4	7.2	8.1	15.5	4.0	175.8
410	30.36	30.4	7.1	8.1	15.5	4.0	175.9
411	30.44	30.5	7.0	8.1	15.4	4.0	175.9
412	30.52	30.5	6.9	8.1	15.4	4.0	176.0
413	30.60	30.6	6.8	8.1	15.4	4.0	176.0
414	30.68	30.6	6.7	8.2	15.4	4.0	176.1
415	30.76	30.7	6.6	8.2	15.4	4.0	176.2
416	30.84	30.7	6.5	8.2	15.3	4.0	176.2
417	30.92	30.8	6.4	8.2	15.3	4.0	176.3
418	31.00	30.8	6.3	8.2	15.3	4.0	176.3
419	31.00	30.8	6.3	8.2	15.3	4.0	176.3
420	31.08	30.9	6.2	8.2	15.3	4.0	176.3
421	31.16	30.9	6.2	8.2	15.3	4.0	176.4
422	31.24	31.0	6.1	8.2	15.3	4.0	176.4
423	31.32	31.0	6.0	8.2	15.3	4.0	176.5
424	31.40	31.1	5.9	8.2	15.2	4.0	176.5
425	31.48	31.1	5.8	8.2	15.2	4.0	176.5
426	31.56	31.2	5.8	8.2	15.2	4.0	176.6
427	31.64	31.3	5.7	8.2	15.2	4.0	176.6
428	31.72	31.3	5.6	8.2	15.2	4.0	176.6
429	31.80	31.4	5.5	8.2	15.2	4.0	176.7
430	31.88	31.4	5.5	8.2	15.2	4.0	176.7
431	31.96	31.5	5.4	8.2	15.1	4.0	176.7
432	32.04	31.5	5.3	8.2	15.1	4.0	176.7
433	32.12	31.6	5.3	8.3	15.1	3.9	176.8
434	32.20	31.6	5.2	8.3	15.1	3.9	176.8
435	32.28	31.7	5.1	8.3	15.1	3.9	176.8
436	32.36	31.7	5.1	8.3	15.1	3.9	176.8
437	32.44	31.8	5.0	8.3	15.1	3.9	176.8
438	32.52	31.8	5.0	8.3	15.0	3.9	176.9
439	32.60	31.9	4.9	8.3	15.0	3.9	176.9
440	32.60	31.9	5.0	8.3	15.2	3.9	176.6
441	32.63	31.9	5.0	8.3	15.3	3.9	176.5
442	32.66	31.9	5.0	8.3	15.4	3.9	176.4
443	32.69	31.9	5.0	8.3	15.5	3.9	176.3
444	32.72	32.0	5.0	8.3	15.6	3.9	176.2
445	32.75	32.0	4.9	8.3	15.7	3.9	176.1
446	32.78	32.0	4.9	8.3	15.8	3.9	176.0
447	32.81	32.0	4.9	8.3	15.9	3.9	175.9
448	32.84	32.0	4.9	8.3	16.0	3.9	175.8
449	32.87	32.1	4.9	8.3	16.1	3.9	175.7
450	32.90	32.1	4.8	8.3	16.2	3.9	175.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c2 perdas t=30000 dias

Prepared by:

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	32.93	32.1	4.8	8.3	16.3	3.9	175.5
452	32.96	32.1	4.8	8.3	16.4	3.9	175.4
453	32.99	32.1	4.8	8.3	16.5	3.9	175.3
454	33.02	32.2	4.8	8.3	16.6	3.9	175.2
455	33.05	32.2	4.7	8.3	16.7	3.9	175.1
456	33.08	32.2	4.7	8.3	16.8	3.8	175.0
457	33.10	32.2	1.6	8.3	5.3	4.9	188.7

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	32.2	0.5	8.3	5.4	5.0	189.5
3	0.12	32.2	1.5	8.3	17.3	4.1	177.5
4	0.15	32.2	1.5	8.3	17.1	4.1	177.7
5	0.18	32.2	1.6	8.3	16.9	4.1	177.9
6	0.21	32.1	1.6	8.3	16.7	4.1	178.1
7	0.24	32.1	1.6	8.3	16.5	4.1	178.4
8	0.27	32.1	1.6	8.3	16.4	4.1	178.5
9	0.30	32.1	1.6	8.3	16.3	4.1	178.6
10	0.33	32.1	1.6	8.3	16.2	4.1	178.7
11	0.36	32.0	1.6	8.3	16.1	4.1	178.8
12	0.39	32.0	1.6	8.3	16.0	4.1	178.9
13	0.42	32.0	1.6	8.3	15.9	4.1	179.0
14	0.45	32.0	1.6	8.3	15.8	4.1	179.1
15	0.48	32.0	1.6	8.3	15.7	4.1	179.2
16	0.51	31.9	1.6	8.3	15.6	4.2	179.3
17	0.54	31.9	1.6	8.3	15.5	4.2	179.4
18	0.57	31.9	1.6	8.3	15.4	4.2	179.5
19	0.60	31.9	1.6	8.3	15.3	4.2	179.7
20	0.60	31.9	1.6	8.3	15.1	4.2	179.9
21	0.68	31.8	1.6	8.3	15.1	4.2	179.9
22	0.76	31.8	1.6	8.3	15.1	4.2	179.9
23	0.84	31.7	1.7	8.3	15.1	4.2	179.9
24	0.92	31.7	1.7	8.3	15.1	4.2	180.0
25	1.00	31.6	1.7	8.3	15.1	4.2	180.0
26	1.08	31.6	1.7	8.3	15.2	4.2	180.0
27	1.16	31.5	1.7	8.2	15.2	4.2	180.0
28	1.24	31.5	1.8	8.2	15.2	4.2	180.0
29	1.32	31.4	1.8	8.2	15.2	4.2	180.0
30	1.40	31.4	1.8	8.2	15.2	4.2	180.0
31	1.48	31.3	1.9	8.2	15.2	4.3	180.0
32	1.56	31.3	1.9	8.2	15.2	4.3	180.0
33	1.64	31.2	1.9	8.2	15.3	4.3	180.1
34	1.72	31.1	1.9	8.2	15.3	4.3	180.1
35	1.80	31.1	2.0	8.2	15.3	4.3	180.1
36	1.88	31.0	2.0	8.2	15.3	4.3	180.1
37	1.96	31.0	2.0	8.2	15.3	4.3	180.1
38	2.04	30.9	2.1	8.2	15.3	4.3	180.1
39	2.12	30.9	2.1	8.2	15.3	4.3	180.1
40	2.20	30.8	2.1	8.2	15.4	4.3	180.1
41	2.20	30.8	2.1	8.2	15.4	4.3	180.1
42	2.28	30.8	2.2	8.2	15.4	4.3	180.1
43	2.36	30.7	2.2	8.2	15.4	4.3	180.1
44	2.44	30.7	2.2	8.2	15.4	4.3	180.1
45	2.52	30.6	2.3	8.2	15.4	4.3	180.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.60	30.6	2.3	8.1	15.4	4.3	180.1
47	2.68	30.5	2.4	8.1	15.5	4.3	180.1
48	2.76	30.5	2.4	8.1	15.5	4.4	180.1
49	2.84	30.4	2.4	8.1	15.5	4.4	180.1
50	2.92	30.4	2.5	8.1	15.5	4.4	180.0
51	3.00	30.3	2.5	8.1	15.6	4.4	180.0
52	3.08	30.3	2.6	8.1	15.6	4.4	180.0
53	3.16	30.2	2.6	8.1	15.6	4.4	180.0
54	3.24	30.1	2.7	8.1	15.6	4.4	180.0
55	3.32	30.1	2.7	8.1	15.6	4.4	180.0
56	3.40	30.0	2.8	8.1	15.7	4.4	180.0
57	3.48	29.8	2.8	8.1	15.7	4.4	180.1
58	3.56	29.7	2.9	8.1	15.7	4.4	180.1
59	3.64	29.5	2.9	8.1	15.8	4.4	180.2
60	3.72	29.4	3.0	8.1	15.8	4.4	180.3
61	3.80	29.2	3.0	8.1	15.8	4.5	180.3
62	3.80	29.2	3.0	8.1	15.8	4.5	180.3
63	3.88	29.1	3.1	8.0	15.9	4.5	180.4
64	3.96	28.9	3.1	8.0	15.9	4.5	180.5
65	4.04	28.8	3.2	8.0	15.9	4.5	180.5
66	4.12	28.6	3.2	8.0	16.0	4.5	180.6
67	4.20	28.5	3.3	8.0	16.0	4.5	180.6
68	4.28	28.3	3.3	8.0	16.0	4.5	180.7
69	4.36	28.1	3.4	8.0	16.0	4.5	180.8
70	4.44	28.0	3.5	8.0	16.1	4.6	180.8
71	4.52	27.8	3.5	8.0	16.1	4.6	180.9
72	4.60	27.7	3.6	8.0	16.1	4.6	181.0
73	4.68	27.5	3.6	8.0	16.1	4.6	181.0
74	4.76	27.4	3.7	8.0	16.2	4.6	181.1
75	4.84	27.2	3.7	8.0	16.2	4.6	181.2
76	4.92	27.1	3.8	8.0	16.2	4.6	181.2
77	5.00	26.9	3.9	8.0	16.3	4.6	181.3
78	5.08	26.7	3.9	8.0	16.3	4.7	181.3
79	5.16	26.6	4.0	8.0	16.3	4.7	181.4
80	5.24	26.4	4.0	7.9	16.3	4.7	181.5
81	5.32	26.3	4.1	7.9	16.4	4.7	181.5
82	5.40	26.1	4.2	7.9	16.4	4.7	181.6
83	5.40	26.1	4.2	7.9	16.4	4.7	181.6
84	5.48	26.0	4.2	7.9	16.4	4.7	181.7
85	5.56	25.8	4.3	7.9	16.4	4.7	181.7
86	5.64	25.7	4.4	7.9	16.5	4.7	181.8
87	5.72	25.5	4.4	7.9	16.5	4.8	181.8
88	5.80	25.3	4.5	7.9	16.5	4.8	181.9
89	5.88	25.2	4.5	7.9	16.5	4.8	182.0
90	5.96	25.0	4.6	7.9	16.5	4.8	182.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.04	24.9	4.7	7.9	16.6	4.8	182.1
92	6.12	24.7	4.7	7.9	16.6	4.8	182.2
93	6.20	24.6	4.8	7.9	16.6	4.8	182.3
94	6.28	24.4	4.8	7.9	16.6	4.8	182.3
95	6.36	24.2	4.9	7.9	16.6	4.8	182.4
96	6.44	24.1	5.0	7.9	16.6	4.9	182.5
97	6.52	24.0	5.0	7.9	16.7	4.9	182.5
98	6.60	23.9	5.1	7.9	16.7	4.9	182.5
99	6.68	23.9	5.1	7.9	16.7	4.9	182.5
100	6.76	23.8	5.2	7.9	16.7	4.9	182.5
101	6.84	23.8	5.3	7.9	16.7	4.9	182.4
102	6.92	23.7	5.3	7.9	16.7	4.9	182.4
103	7.00	23.7	5.4	7.9	16.7	4.9	182.4
104	7.00	23.7	5.4	7.9	16.7	4.9	182.4
105	7.08	23.6	5.4	7.9	16.7	4.9	182.4
106	7.16	23.6	5.5	7.9	16.7	4.9	182.4
107	7.24	23.5	5.6	7.9	16.7	4.9	182.4
108	7.32	23.4	5.6	7.8	16.7	4.9	182.3
109	7.40	23.4	5.7	7.8	16.7	4.9	182.3
110	7.48	23.3	5.7	7.8	16.7	4.9	182.3
111	7.56	23.3	5.8	7.8	16.7	4.9	182.3
112	7.64	23.2	5.8	7.8	16.7	4.9	182.3
113	7.72	23.2	5.9	7.8	16.7	4.9	182.3
114	7.80	23.1	5.9	7.8	16.7	4.9	182.3
115	7.88	23.1	6.0	7.8	16.7	4.9	182.3
116	7.96	23.0	6.1	7.8	16.7	4.9	182.3
117	8.04	23.0	6.1	7.8	16.7	4.9	182.3
118	8.12	22.9	6.2	7.8	16.7	5.0	182.3
119	8.20	22.9	6.2	7.8	16.7	5.0	182.3
120	8.28	22.8	6.3	7.8	16.7	5.0	182.4
121	8.36	22.8	6.3	7.8	16.7	5.0	182.4
122	8.44	22.7	6.3	7.8	16.7	5.0	182.4
123	8.52	22.6	6.4	7.8	16.7	5.0	182.4
124	8.60	22.6	6.4	7.8	16.7	5.0	182.4
125	8.60	22.6	6.4	7.8	16.7	5.0	182.4
126	8.68	22.5	6.5	7.8	16.7	5.0	182.4
127	8.76	22.5	6.5	7.8	16.7	5.0	182.4
128	8.84	22.4	6.6	7.8	16.7	5.0	182.4
129	8.92	22.4	6.6	7.8	16.7	5.0	182.4
130	9.00	22.3	6.7	7.8	16.7	5.0	182.5
131	9.08	22.3	6.7	7.8	16.6	5.0	182.5
132	9.16	22.2	6.7	7.8	16.6	5.0	182.5
133	9.24	22.2	6.8	7.8	16.6	5.0	182.5
134	9.32	22.1	6.8	7.8	16.6	5.0	182.6
135	9.40	22.1	6.9	7.8	16.6	5.0	182.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	9.48	22.0	6.9	7.8	16.6	5.1	182.6
137	9.56	21.9	6.9	7.8	16.5	5.1	182.6
138	9.64	21.9	7.0	7.8	16.5	5.1	182.7
139	9.72	21.8	7.0	7.8	16.5	5.1	182.7
140	9.80	21.8	7.0	7.8	16.5	5.1	182.7
141	9.88	21.7	7.1	7.8	16.5	5.1	182.8
142	9.96	21.7	7.1	7.8	16.4	5.1	182.8
143	10.04	21.6	7.1	7.8	16.4	5.1	182.9
144	10.12	21.6	7.2	7.8	16.4	5.1	182.9
145	10.20	21.5	7.2	7.8	16.4	5.1	182.9
146	10.20	21.5	7.2	7.8	16.4	5.1	182.9
147	10.28	21.5	7.2	7.8	16.3	5.1	183.0
148	10.36	21.4	7.3	7.8	16.3	5.1	183.0
149	10.44	21.4	7.3	7.8	16.3	5.2	183.1
150	10.52	21.3	7.3	7.8	16.3	5.2	183.1
151	10.60	21.2	7.3	7.8	16.2	5.2	183.2
152	10.68	21.2	7.4	7.8	16.2	5.2	183.2
153	10.76	21.1	7.4	7.8	16.2	5.2	183.3
154	10.84	21.1	7.4	7.8	16.1	5.2	183.3
155	10.92	21.0	7.4	7.8	16.1	5.2	183.4
156	11.00	21.0	7.4	7.8	16.1	5.2	183.4
157	11.08	20.9	7.5	7.8	16.0	5.2	183.5
158	11.16	20.9	7.5	7.8	16.0	5.2	183.5
159	11.24	20.8	7.5	7.8	16.0	5.2	183.6
160	11.32	20.8	7.5	7.8	16.0	5.3	183.6
161	11.40	20.7	7.5	7.8	15.9	5.3	183.7
162	11.48	20.6	7.6	7.8	15.9	5.3	183.8
163	11.56	20.6	7.6	7.8	15.9	5.3	183.8
164	11.64	20.5	7.6	7.8	15.8	5.3	183.9
165	11.72	20.5	7.6	7.8	15.8	5.3	183.9
166	11.80	20.4	7.6	7.8	15.8	5.3	184.0
167	11.80	20.4	7.6	7.8	15.8	5.3	184.0
168	11.88	20.4	7.6	7.8	15.7	5.3	184.1
169	11.96	20.3	7.6	7.8	15.7	5.3	184.1
170	12.04	20.3	7.7	7.8	15.7	5.3	184.2
171	12.12	20.2	7.7	7.8	15.7	5.4	184.2
172	12.20	20.2	7.7	7.8	15.6	5.4	184.3
173	12.28	20.1	7.7	7.8	15.6	5.4	184.4
174	12.36	20.1	7.7	7.8	15.6	5.4	184.5
175	12.44	20.0	7.7	7.8	15.5	5.4	184.5
176	12.52	19.9	7.7	7.8	15.5	5.4	184.6
177	12.60	19.9	7.7	7.8	15.4	5.4	184.7
178	12.68	19.8	7.7	7.8	15.4	5.4	184.8
179	12.76	19.8	7.7	7.8	15.4	5.4	184.9
180	12.84	19.7	7.7	7.8	15.3	5.5	185.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	12.92	19.7	7.7	7.8	15.3	5.5	185.0
182	13.00	19.6	7.7	7.8	15.3	5.5	185.1
183	13.08	19.6	7.7	7.8	15.2	5.5	185.2
184	13.16	19.5	7.7	7.8	15.2	5.5	185.3
185	13.24	19.5	7.7	7.8	15.2	5.5	185.3
186	13.32	19.4	7.7	7.8	15.1	5.5	185.4
187	13.40	19.3	7.6	7.8	15.1	5.5	185.5
188	13.40	19.3	7.6	7.8	15.1	5.5	185.5
189	13.48	19.3	7.6	7.8	15.1	5.6	185.6
190	13.56	19.2	7.6	7.8	15.0	5.6	185.7
191	13.64	19.2	7.6	7.8	15.0	5.6	185.7
192	13.72	19.1	7.6	7.8	15.0	5.6	185.8
193	13.80	19.1	7.6	7.8	14.9	5.6	185.9
194	13.88	19.0	7.6	7.8	14.9	5.6	186.0
195	13.96	19.0	7.6	7.8	14.9	5.6	186.0
196	14.04	18.9	7.6	7.8	14.9	5.6	186.1
197	14.12	18.9	7.6	7.8	14.8	5.6	186.2
198	14.20	18.8	7.6	7.8	14.8	5.6	186.3
199	14.28	18.7	7.6	7.8	14.8	5.7	186.3
200	14.36	18.7	7.6	7.8	14.8	5.7	186.4
201	14.44	18.6	7.6	7.8	14.7	5.7	186.5
202	14.52	18.6	7.6	7.8	14.7	5.7	186.5
203	14.60	18.5	7.6	7.8	14.7	5.7	186.6
204	14.68	18.5	7.6	7.8	14.7	5.7	186.7
205	14.76	18.4	7.6	7.8	14.6	5.7	186.8
206	14.84	18.4	7.6	7.8	14.6	5.7	186.8
207	14.92	18.3	7.6	7.8	14.6	5.7	186.9
208	15.00	18.3	7.6	7.8	14.6	5.7	187.0
209	15.00	18.3	7.6	7.8	14.6	5.7	187.0
210	15.08	18.2	7.6	7.8	14.6	5.7	187.0
211	15.16	18.1	7.6	7.8	14.5	5.8	187.1
212	15.24	18.1	7.6	7.8	14.5	5.8	187.1
213	15.32	18.0	7.6	7.8	14.5	5.8	187.2
214	15.40	18.0	7.6	7.8	14.5	5.8	187.3
215	15.48	17.9	7.6	7.8	14.5	5.8	187.3
216	15.56	17.9	7.6	7.8	14.5	5.8	187.4
217	15.64	17.8	7.6	7.8	14.5	5.8	187.5
218	15.72	17.8	7.6	7.8	14.4	5.8	187.5
219	15.80	17.7	7.6	7.8	14.4	5.8	187.6
220	15.88	17.6	7.6	7.8	14.4	5.8	187.6
221	15.96	17.6	7.6	7.8	14.4	5.8	187.7
222	16.04	17.5	7.6	7.8	14.4	5.8	187.8
223	16.12	17.5	7.6	7.8	14.4	5.9	187.8
224	16.20	17.4	7.6	7.8	14.4	5.9	187.9
225	16.28	17.4	7.6	7.8	14.4	5.9	187.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 139
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	16.36	17.3	7.6	7.8	14.4	5.9	188.0
227	16.44	17.3	7.6	7.8	14.4	5.9	188.0
228	16.52	17.2	7.6	7.8	14.4	5.9	188.1
229	16.60	17.2	7.6	7.8	14.4	5.9	188.2
230	16.60	17.2	7.6	7.8	14.4	5.9	188.2
231	16.68	17.1	7.6	7.8	14.4	5.9	188.2
232	16.76	17.0	7.6	7.8	14.4	5.9	188.2
233	16.84	17.0	7.6	7.8	14.4	5.9	188.3
234	16.92	16.9	7.6	7.8	14.4	5.9	188.3
235	17.00	16.9	7.6	7.8	14.4	5.9	188.4
236	17.08	16.8	7.6	7.8	14.4	5.9	188.4
237	17.16	16.8	7.6	7.8	14.4	5.9	188.4
238	17.24	16.7	7.6	7.8	14.4	5.9	188.5
239	17.32	16.7	7.6	7.8	14.4	5.9	188.5
240	17.40	16.6	7.6	7.8	14.4	5.9	188.6
241	17.48	16.5	7.6	7.8	14.4	5.9	188.6
242	17.56	16.5	7.6	7.8	14.5	6.0	188.6
243	17.64	16.4	7.6	7.8	14.5	6.0	188.7
244	17.72	16.4	7.6	7.8	14.5	6.0	188.7
245	17.80	16.3	7.6	7.8	14.5	6.0	188.8
246	17.88	16.3	7.6	7.8	14.5	6.0	188.8
247	17.96	16.2	7.6	7.8	14.5	6.0	188.8
248	18.04	16.2	7.6	7.8	14.5	6.0	188.9
249	18.12	16.1	7.6	7.8	14.6	6.0	188.9
250	18.20	16.0	7.6	7.8	14.6	6.0	188.9
251	18.20	16.0	7.6	7.8	14.6	6.0	188.9
252	18.28	16.0	7.6	7.8	14.6	6.0	189.0
253	18.36	15.9	7.6	7.8	14.6	6.0	189.0
254	18.44	15.9	7.6	7.8	14.6	6.0	189.0
255	18.52	15.8	7.6	7.8	14.7	6.0	189.0
256	18.60	15.8	7.6	7.8	14.7	6.0	189.1
257	18.68	15.7	7.6	7.8	14.7	6.0	189.1
258	18.76	15.7	7.6	7.8	14.7	6.0	189.1
259	18.84	15.6	7.6	7.8	14.7	6.0	189.2
260	18.92	15.6	7.6	7.8	14.8	6.0	189.2
261	19.00	15.5	7.6	7.8	14.8	6.0	189.2
262	19.08	15.4	7.6	7.8	14.8	6.0	189.2
263	19.16	15.4	7.6	7.8	14.9	6.0	189.3
264	19.24	15.3	7.6	7.8	14.9	6.0	189.3
265	19.32	15.3	7.6	7.8	14.9	6.0	189.3
266	19.40	15.2	7.6	7.8	14.9	6.0	189.3
267	19.48	15.2	7.6	7.8	15.0	6.0	189.4
268	19.56	15.1	7.6	7.8	15.0	6.0	189.4
269	19.64	15.1	7.6	7.8	15.0	6.0	189.4
270	19.72	15.0	7.6	7.8	15.1	6.0	189.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 140
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	19.80	14.9	7.6	7.8	15.1	6.0	189.4
272	19.80	14.9	7.6	7.8	15.1	6.0	189.4
273	19.88	14.9	7.7	7.8	15.1	6.0	189.5
274	19.96	14.9	7.7	7.8	15.2	6.0	189.4
275	20.04	15.0	7.7	7.8	15.2	6.0	189.3
276	20.12	15.0	7.7	7.8	15.2	6.0	189.2
277	20.20	15.1	7.7	7.8	15.3	6.0	189.2
278	20.28	15.2	7.7	7.8	15.3	6.0	189.1
279	20.36	15.2	7.7	7.8	15.3	5.9	189.0
280	20.44	15.3	7.7	7.8	15.4	5.9	188.9
281	20.52	15.3	7.7	7.8	15.4	5.9	188.8
282	20.60	15.4	7.7	7.8	15.4	5.9	188.8
283	20.68	15.4	7.7	7.8	15.5	5.9	188.7
284	20.76	15.5	7.7	7.8	15.5	5.9	188.6
285	20.84	15.5	7.7	7.8	15.5	5.9	188.5
286	20.92	15.6	7.7	7.8	15.6	5.8	188.4
287	21.00	15.7	7.7	7.8	15.6	5.8	188.3
288	21.08	15.7	7.7	7.8	15.6	5.8	188.3
289	21.16	15.8	7.7	7.8	15.7	5.8	188.2
290	21.24	15.8	7.6	7.8	15.7	5.8	188.2
291	21.32	15.9	7.6	7.8	15.7	5.8	188.1
292	21.40	15.9	7.6	7.8	15.8	5.8	188.0
293	21.40	15.9	7.6	7.8	15.8	5.8	188.0
294	21.48	16.0	7.6	7.8	15.8	5.8	188.0
295	21.56	16.1	7.6	7.8	15.8	5.8	187.9
296	21.64	16.1	7.6	7.8	15.9	5.7	187.8
297	21.72	16.2	7.6	7.8	15.9	5.7	187.8
298	21.80	16.2	7.5	7.8	15.9	5.7	187.7
299	21.88	16.3	7.5	7.8	15.9	5.7	187.7
300	21.96	16.3	7.5	7.8	16.0	5.7	187.6
301	22.04	16.4	7.5	7.8	16.0	5.7	187.6
302	22.12	16.4	7.5	7.8	16.0	5.7	187.5
303	22.20	16.5	7.4	7.8	16.1	5.7	187.4
304	22.28	16.6	7.4	7.8	16.1	5.7	187.4
305	22.36	16.6	7.4	7.8	16.1	5.7	187.3
306	22.44	16.7	7.4	7.8	16.2	5.6	187.3
307	22.52	16.7	7.4	7.8	16.2	5.6	187.2
308	22.60	16.8	7.3	7.8	16.2	5.6	187.2
309	22.68	16.8	7.3	7.8	16.2	5.6	187.1
310	22.76	16.9	7.3	7.8	16.3	5.6	187.1
311	22.84	16.9	7.3	7.8	16.3	5.6	187.0
312	22.92	17.0	7.2	7.8	16.3	5.6	187.0
313	23.00	17.1	7.2	7.8	16.4	5.6	186.9
314	23.00	17.1	7.2	7.8	16.3	5.6	186.9
315	23.08	17.3	7.2	7.8	16.4	5.5	186.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	23.16	17.4	7.1	7.8	16.4	5.5	186.6
317	23.24	17.6	7.1	7.8	16.4	5.5	186.5
318	23.32	17.8	7.1	7.8	16.4	5.5	186.4
319	23.40	17.9	7.0	7.8	16.5	5.5	186.2
320	23.48	18.1	7.0	7.8	16.5	5.5	186.1
321	23.56	18.2	6.9	7.8	16.5	5.4	186.0
322	23.64	18.4	6.9	7.8	16.5	5.4	185.9
323	23.72	18.6	6.9	7.8	16.5	5.4	185.8
324	23.80	18.7	6.8	7.8	16.5	5.4	185.7
325	23.88	18.9	6.8	7.8	16.5	5.4	185.5
326	23.96	19.0	6.7	7.8	16.5	5.3	185.4
327	24.04	19.2	6.7	7.8	16.6	5.3	185.3
328	24.12	19.4	6.6	7.8	16.6	5.3	185.2
329	24.20	19.5	6.6	7.8	16.6	5.3	185.1
330	24.28	19.7	6.5	7.8	16.6	5.3	185.0
331	24.36	19.9	6.5	7.8	16.6	5.3	184.9
332	24.44	20.0	6.4	7.8	16.6	5.2	184.8
333	24.52	20.2	6.4	7.8	16.6	5.2	184.8
334	24.60	20.3	6.3	7.8	16.6	5.2	184.7
335	24.60	20.3	6.3	7.8	16.5	5.2	184.7
336	24.68	20.5	6.3	7.8	16.5	5.2	184.6
337	24.76	20.7	6.2	7.8	16.5	5.2	184.5
338	24.84	20.8	6.1	7.8	16.5	5.2	184.4
339	24.92	21.0	6.1	7.8	16.5	5.2	184.3
340	25.00	21.1	6.0	7.8	16.5	5.1	184.3
341	25.08	21.3	6.0	7.9	16.5	5.1	184.2
342	25.16	21.5	5.9	7.9	16.5	5.1	184.1
343	25.24	21.6	5.8	7.9	16.5	5.1	184.0
344	25.32	21.8	5.8	7.9	16.4	5.1	184.0
345	25.40	21.9	5.7	7.9	16.4	5.1	183.9
346	25.48	22.1	5.6	7.9	16.4	5.1	183.8
347	25.56	22.3	5.6	7.9	16.4	5.0	183.8
348	25.64	22.4	5.5	7.9	16.4	5.0	183.7
349	25.72	22.6	5.5	7.9	16.3	5.0	183.6
350	25.80	22.8	5.4	7.9	16.3	5.0	183.6
351	25.88	22.9	5.3	7.9	16.3	5.0	183.5
352	25.96	23.1	5.3	7.9	16.2	5.0	183.5
353	26.04	23.2	5.2	7.9	16.2	5.0	183.4
354	26.12	23.4	5.1	7.9	16.2	5.0	183.4
355	26.20	23.6	5.1	7.9	16.1	4.9	183.3
356	26.20	23.6	5.0	7.9	16.1	4.9	183.3
357	26.28	23.7	5.0	7.9	16.1	4.9	183.3
358	26.36	23.9	4.9	7.9	16.0	4.9	183.2
359	26.44	24.0	4.9	7.9	16.0	4.9	183.2
360	26.52	24.2	4.8	7.9	16.0	4.9	183.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 142
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	26.60	24.4	4.7	8.0	15.9	4.9	183.1
362	26.68	24.5	4.6	8.0	15.9	4.9	183.0
363	26.76	24.7	4.6	8.0	15.8	4.9	183.0
364	26.84	24.9	4.5	8.0	15.8	4.8	182.9
365	26.92	25.0	4.5	8.0	15.8	4.8	182.9
366	27.00	25.2	4.4	8.0	15.7	4.8	182.8
367	27.08	25.3	4.3	8.0	15.7	4.8	182.8
368	27.16	25.5	4.3	8.0	15.6	4.8	182.7
369	27.24	25.6	4.2	8.0	15.6	4.8	182.8
370	27.32	25.6	4.2	8.0	15.5	4.8	182.8
371	27.40	25.7	4.1	8.0	15.5	4.8	182.9
372	27.48	25.7	4.0	8.0	15.4	4.8	182.9
373	27.56	25.8	4.0	8.0	15.4	4.8	182.9
374	27.64	25.9	3.9	8.0	15.3	4.8	183.0
375	27.72	25.9	3.9	8.0	15.3	4.8	183.0
376	27.80	26.0	3.8	8.1	15.2	4.8	183.1
377	27.80	26.0	3.8	8.1	15.2	4.8	183.1
378	27.88	26.0	3.8	8.1	15.2	4.8	183.1
379	27.96	26.1	3.7	8.1	15.1	4.8	183.1
380	28.04	26.1	3.7	8.1	15.1	4.8	183.2
381	28.12	26.2	3.6	8.1	15.0	4.8	183.2
382	28.20	26.3	3.6	8.1	15.0	4.8	183.2
383	28.28	26.3	3.6	8.1	15.0	4.8	183.2
384	28.36	26.4	3.5	8.1	14.9	4.8	183.2
385	28.44	26.4	3.5	8.1	14.9	4.7	183.3
386	28.52	26.5	3.4	8.1	14.9	4.7	183.3
387	28.60	26.5	3.4	8.1	14.8	4.7	183.3
388	28.68	26.6	3.4	8.1	14.8	4.7	183.3
389	28.76	26.7	3.3	8.1	14.7	4.7	183.3
390	28.84	26.7	3.3	8.1	14.7	4.7	183.3
391	28.92	26.8	3.2	8.1	14.7	4.7	183.4
392	29.00	26.8	3.2	8.2	14.6	4.7	183.4
393	29.08	26.9	3.2	8.2	14.6	4.7	183.4
394	29.16	26.9	3.1	8.2	14.6	4.7	183.4
395	29.24	27.0	3.1	8.2	14.5	4.7	183.4
396	29.32	27.1	3.1	8.2	14.5	4.7	183.4
397	29.40	27.1	3.1	8.2	14.4	4.7	183.4
398	29.40	27.1	3.1	8.2	14.4	4.7	183.4
399	29.48	27.2	3.0	8.2	14.4	4.7	183.4
400	29.56	27.2	3.0	8.2	14.4	4.7	183.4
401	29.64	27.3	3.0	8.2	14.3	4.7	183.4
402	29.72	27.3	3.0	8.2	14.3	4.7	183.5
403	29.80	27.4	2.9	8.2	14.2	4.7	183.5
404	29.88	27.5	2.9	8.2	14.2	4.7	183.5
405	29.96	27.5	2.9	8.2	14.2	4.7	183.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 143
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	30.04	27.6	2.9	8.2	14.1	4.7	183.5
407	30.12	27.6	2.9	8.2	14.1	4.6	183.4
408	30.20	27.7	2.8	8.2	14.1	4.6	183.4
409	30.28	27.7	2.8	8.2	14.0	4.6	183.4
410	30.36	27.8	2.8	8.3	14.0	4.6	183.4
411	30.44	27.9	2.8	8.3	14.0	4.6	183.4
412	30.52	27.9	2.8	8.3	13.9	4.6	183.4
413	30.60	28.0	2.8	8.3	13.9	4.6	183.4
414	30.68	28.0	2.8	8.3	13.8	4.6	183.4
415	30.76	28.1	2.8	8.3	13.8	4.6	183.4
416	30.84	28.1	2.7	8.3	13.8	4.6	183.4
417	30.92	28.2	2.7	8.3	13.7	4.6	183.4
418	31.00	28.3	2.7	8.3	13.7	4.6	183.3
419	31.00	28.3	2.7	8.3	13.7	4.6	183.3
420	31.08	28.3	2.7	8.3	13.7	4.6	183.3
421	31.16	28.4	2.7	8.3	13.6	4.6	183.3
422	31.24	28.4	2.7	8.3	13.6	4.6	183.3
423	31.32	28.5	2.7	8.3	13.6	4.6	183.3
424	31.40	28.5	2.7	8.3	13.5	4.6	183.2
425	31.48	28.6	2.7	8.3	13.5	4.5	183.2
426	31.56	28.7	2.7	8.3	13.5	4.5	183.2
427	31.64	28.7	2.7	8.3	13.4	4.5	183.2
428	31.72	28.8	2.7	8.3	13.4	4.5	183.2
429	31.80	28.8	2.7	8.3	13.3	4.5	183.1
430	31.88	28.9	2.7	8.3	13.3	4.5	183.1
431	31.96	28.9	2.8	8.3	13.3	4.5	183.1
432	32.04	29.0	2.8	8.3	13.2	4.5	183.1
433	32.12	29.1	2.8	8.4	13.2	4.5	183.0
434	32.20	29.1	2.8	8.4	13.1	4.5	183.0
435	32.28	29.2	2.8	8.4	13.1	4.5	183.0
436	32.36	29.2	2.8	8.4	13.1	4.5	183.0
437	32.44	29.3	2.8	8.4	13.0	4.5	182.9
438	32.52	29.3	2.8	8.4	13.0	4.5	182.9
439	32.60	29.4	2.9	8.4	12.9	4.5	182.9
440	32.60	29.4	2.9	8.4	13.1	4.5	182.7
441	32.63	29.4	2.9	8.4	13.1	4.5	182.6
442	32.66	29.4	2.9	8.4	13.2	4.4	182.6
443	32.69	29.5	2.9	8.4	13.2	4.4	182.5
444	32.72	29.5	2.9	8.4	13.3	4.4	182.4
445	32.75	29.5	2.9	8.4	13.3	4.4	182.4
446	32.78	29.5	2.9	8.4	13.3	4.4	182.3
447	32.81	29.6	2.9	8.4	13.4	4.4	182.2
448	32.84	29.6	2.9	8.4	13.4	4.4	182.2
449	32.87	29.6	2.9	8.4	13.5	4.4	182.1
450	32.90	29.6	2.9	8.4	13.5	4.4	182.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga ext 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

Page: 144

Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 1

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	32.93	29.6	2.9	8.4	13.5	4.4	182.0
452	32.96	29.7	3.0	8.4	13.6	4.4	181.9
453	32.99	29.7	3.0	8.4	13.6	4.4	181.8
454	33.02	29.7	3.0	8.4	13.7	4.4	181.8
455	33.05	29.7	3.0	8.4	13.7	4.4	181.7
456	33.08	29.8	3.0	8.4	13.7	4.4	181.7
457	33.10	29.8	1.0	8.4	4.6	5.3	191.9

Time-steps analysis was performed.

VERIFICAÇÃO DE SEÇÕES PROTENDIDAS

<VerProtFint>

OBRA: VIADUTO NA PE-060

1. Dados de Entrada

VIGA EXTERNA 33.2 m

Base Superior

Base Inferior

Altura

As
<cm²>

Prof.
<m>

Prealon.
<%>

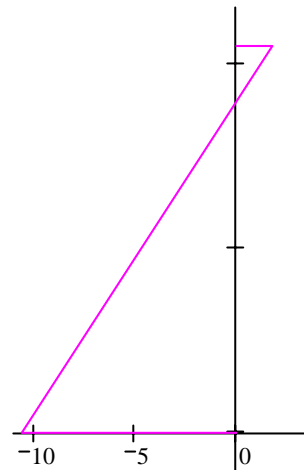
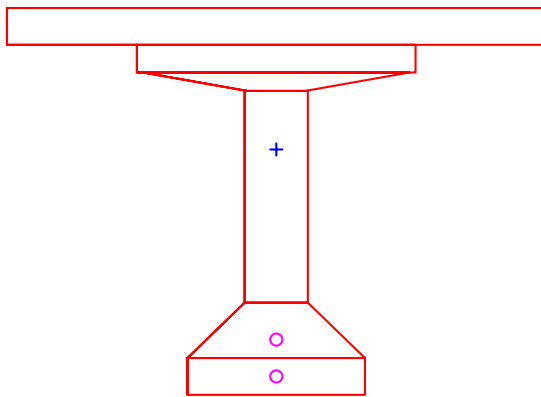
trap :=

1	2	3
2.125	2.125	0.2
1.1	1.1	0.15
1.05	0.23	0.1
0.25	0.25	1.15
0.25	0.7	0.3
0.7	0.7	0.2

	1	2	3
1	34.4	2	5
2	17.2	1.8	5

c/toda carga movel

Fator do conc. $\gamma_c := 1.4$ Resistencia carac. <tf/m²> $f_{ck} := 3500$ $f_c := 0.85 \cdot \frac{f_{ck}}{\gamma_c}$
 Fator dos esf. $\gamma_f := 1.4$



Momento último de projeto $M_r(D) = 1445$

$$M_d := 1.35 \cdot 557 + 1.5 \cdot 326$$

Momento de serviço $\frac{M_r(D)}{\gamma_f} = 1032$

$M_d = 1241$ menor que $M_r(D)$

Altura total $h_{total} = 2.1$

Profundidade do CG $y_s = 0.768$

Deformação de compressão $\epsilon_{c1} = 1.771$

Profundidade do eixo neutro $p_{en} = 0.301$

OBRA: VIADUTO NA BR PE-060 33.2m

VIGA EXTERNA

Dados gerais

- . número de seções ns := 6
 - . cortantes de carga permanente, carga móvel e protensão (KN) i := 1..ns
- | <u>carga permanente</u> | <u>carga móvel</u> | <u>protensão</u> | | | | | | | | | | | | | | | | | | |
|---|-----------------------|---|------|------|------|-----|---|-----|-----|-----|-----|-----|-----|---|----|-----|-----|------|------|------|
| vg1 _i := | vg2 _i := 0 | vcml _i := | | | | | | | | | | | | | | | | | | |
| <table border="1" style="border-collapse: collapse; width: 100%; text-align: center;"> <tr><td>703</td></tr> <tr><td>582</td></tr> <tr><td>437</td></tr> <tr><td>292</td></tr> <tr><td>147</td></tr> <tr><td>0</td></tr> </table> | 703 | 582 | 437 | 292 | 147 | 0 | <table border="1" style="border-collapse: collapse; width: 100%; text-align: center;"> <tr><td>460</td></tr> <tr><td>422</td></tr> <tr><td>346</td></tr> <tr><td>279</td></tr> <tr><td>221</td></tr> <tr><td>176</td></tr> </table> | 460 | 422 | 346 | 279 | 221 | 176 | <table border="1" style="border-collapse: collapse; width: 100%; text-align: center;"> <tr><td>-0</td></tr> <tr><td>-35</td></tr> <tr><td>-64</td></tr> <tr><td>-123</td></tr> <tr><td>-185</td></tr> <tr><td>-245</td></tr> </table> | -0 | -35 | -64 | -123 | -185 | -245 |
| 703 | | | | | | | | | | | | | | | | | | | | |
| 582 | | | | | | | | | | | | | | | | | | | | |
| 437 | | | | | | | | | | | | | | | | | | | | |
| 292 | | | | | | | | | | | | | | | | | | | | |
| 147 | | | | | | | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | | | | | | | |
| 460 | | | | | | | | | | | | | | | | | | | | |
| 422 | | | | | | | | | | | | | | | | | | | | |
| 346 | | | | | | | | | | | | | | | | | | | | |
| 279 | | | | | | | | | | | | | | | | | | | | |
| 221 | | | | | | | | | | | | | | | | | | | | |
| 176 | | | | | | | | | | | | | | | | | | | | |
| -0 | | | | | | | | | | | | | | | | | | | | |
| -35 | | | | | | | | | | | | | | | | | | | | |
| -64 | | | | | | | | | | | | | | | | | | | | |
| -123 | | | | | | | | | | | | | | | | | | | | |
| -185 | | | | | | | | | | | | | | | | | | | | |
| -245 | | | | | | | | | | | | | | | | | | | | |
| | | vp _i := | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="border-collapse: collapse; width: 100%; text-align: center;"> <tr><td>-552</td></tr> <tr><td>-530</td></tr> <tr><td>-353</td></tr> <tr><td>-95</td></tr> <tr><td>-0</td></tr> <tr><td>0</td></tr> </table> | -552 | -530 | -353 | -95 | -0 | 0 | | | | | | | | | | | | |
| -552 | | | | | | | | | | | | | | | | | | | | |
| -530 | | | | | | | | | | | | | | | | | | | | |
| -353 | | | | | | | | | | | | | | | | | | | | |
| -95 | | | | | | | | | | | | | | | | | | | | |
| -0 | | | | | | | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | | | | | | | |
- vg1 - refere-se a G1+ G2 + G3
- vg12_i := vg1_i + vg2_i vm_{i,1} := vcml_i vm_{i,2} := vcm2_i
- . momento torsor (KN) Mt := (0 0 0 0 0 0)
 - . geometria (mm,mm2)
- | largura nominal | altura | área efetiva | espessura da parede |
|-----------------------|------------------------|--------------------------|-----------------------------------|
| b _i := 210 | h _i := 2100 | A _i := 100000 | ef _i := b _i |
| b ₁ := 660 | | | |
- . distância p/centro armadura (m) c := 100
 - . coeficiente
- | majoração das cargas | K1 _i := | K2 _i := | K3 _i := | | | | | | |
|----------------------|---|--------------------|--------------------|--|------|---|---|------|------|
| | <table border="1" style="border-collapse: collapse; width: 100%; text-align: center;"> <tr><td>1.35</td></tr> <tr><td>1.00</td></tr> </table> | 1.35 | 1.00 | <table border="1" style="border-collapse: collapse; width: 100%; text-align: center;"> <tr><td>1.50</td></tr> <tr><td>0</td></tr> </table> | 1.50 | 0 | <table border="1" style="border-collapse: collapse; width: 100%; text-align: center;"> <tr><td>1.20</td></tr> <tr><td>0.90</td></tr> </table> | 1.20 | 0.90 |
| 1.35 | | | | | | | | | |
| 1.00 | | | | | | | | | |
| 1.50 | | | | | | | | | |
| 0 | | | | | | | | | |
| 1.20 | | | | | | | | | |
| 0.90 | | | | | | | | | |
- . coeficiente
- | | |
|---------------------------------|------------------------|
| minoração do concreto | γ _c := 1.5 |
| minoração do aço | γ _s := 1.15 |
| redução da carga móvel p/fadiga | γ _f := 0.5 |
- . resistência característica do concreto a compressão (MPa) f_{ck} := 35
 - . resistência característica do aço a tração (MPa) f_{yk} := 500
 - . variação de tensão na armadura para fadiga (MPa) Δσ := 85
 - . número de vigas para os esforços dados nv := 1

$$f_{yd} := \frac{f_{yk}}{\gamma_s} \quad \alpha_{v2} := \left(1 - \frac{f_{ck}}{250}\right) \quad f_{ctm} := 0.3 \cdot f_{ck}^{\frac{2}{3}} \quad f_{ctdinf} := 0.7 \cdot f_{ctm} \quad d_1 := h_1 - c$$

$$f_{cd} := \frac{f_{ck}}{\gamma_c} \quad f_{ctd} := \frac{f_{ctdinf}}{\gamma_c} \quad v_{c1} := 0.6 \cdot f_{ctd} \cdot b_1 \cdot d_1 \quad d_1 := 0.001 \cdot d_1$$

. número de pernas do estribo **cortante** **np₁ := 2**

torção **nt₁ := 1**

$$\rho_{min} := 0.2 \cdot \frac{f_{ctm}}{f_{yk}} \quad \rho_{min} = 0.00128 \quad K_v := \frac{1}{n_v}$$

**RUPTURA****EM SERVIÇO****CORTANTE****CORTANTE**

$$v_{sd1}_i := K_v \cdot \max\left(\left| m_{max,1,1} \right|, \left| m_{min,1,1} \right|\right)$$

$$v_{11}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm1}_i + v_{p1}_i)$$

TORÇÃO

$$v_{12}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm2}_i + v_{p1}_i)$$

$$M_{tsd}_i := 1.5 \cdot \left| M_t \right|$$

$$\Delta 1_i := \begin{cases} |v_{11}_i - v_{12}_i| & \text{if } v_{11}_i \cdot v_{12}_i \geq 0 \\ \max(|v_{11}_i|, |v_{12}_i|) & \text{otherwise} \end{cases}$$

$$V_{1_i} := \max(|v_{11}_i|, |v_{12}_i|)$$

$$v_{sd1} = \begin{pmatrix} 1142250 \\ 941700 \\ 791250 \\ 727200 \\ 529950 \\ 367500 \end{pmatrix} \quad b = \begin{pmatrix} 660 \\ 210 \\ 210 \\ 210 \\ 210 \\ 210 \end{pmatrix} \quad \Delta 1 = \begin{pmatrix} 230000 \\ 228500 \\ 205000 \\ 201000 \\ 203000 \\ 122500 \end{pmatrix} \quad V1 = \begin{pmatrix} 381000 \\ 263000 \\ 257000 \\ 336500 \\ 257500 \\ 122500 \end{pmatrix} \quad v_c = \begin{pmatrix} 1186402.12 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \end{pmatrix}$$

ARMADURA

$$v_{sd}_i := v_{sd1}_i \quad V_i := V_{1_i} \quad \Delta_i := \Delta_{1_i}$$

ruptura**fadiga**

$$AS1_i := \begin{cases} \frac{v_{sd}_i - v_c}{0.9 \cdot d_1 \cdot f_{yd}} & \text{if } v_{sd}_i \geq v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS2_i := \begin{cases} \frac{V_i - 0.5 \cdot v_c}{0.9 \cdot d_1 \cdot \Delta \sigma} \cdot \frac{\Delta_i}{V_i} & \text{if } V_i \geq 0.5 \cdot v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS3_i := \max(AS1_i, AS2_i)$$

$$AS4_i := \frac{M_{tsd}_i}{2 \cdot A_1 \cdot f_{yd}} \cdot 1000$$

$$d_i := 1000 \cdot d_1$$

SOLICITAÇÕES COMBINADAS**ARMAÇÃO TOTAL /PERNA**

$$\text{TRD1}_1 := 0.5 \cdot \alpha v_2 \cdot \text{fcd} \cdot A_1 \cdot e_{f_1} \quad \text{VRD2}_1 := 0.27 \cdot \alpha v_2 \cdot \text{fcd} \cdot b_1 \cdot d_1 \quad \text{AS}_1 := \max \left(\frac{\text{AS4}_1}{n_{t_1}} + \frac{\text{AS3}_1}{n_{p_1}}, \frac{1000 \cdot \rho_{\text{min}} \cdot b_1}{n_{p_1}} \right)$$

$$\text{TRD1} = \begin{pmatrix} 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \end{pmatrix} \quad \text{VRD2} = \begin{pmatrix} 7151760 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \end{pmatrix} \quad \text{AS} = \begin{pmatrix} 423.72 \\ 360.47 \\ 264.35 \\ 288.42 \\ 177.13 \\ 134.82 \end{pmatrix} \quad (\text{mm}^2)/\text{perna}/\text{m}$$

$$v1_1 := \frac{\text{vsd}_1}{\text{VRD2}_1} \quad v2_1 := \frac{\text{Mtsd}_1}{\text{TRD1}_1} \quad v := v1 + v2$$

$$v1 = \begin{pmatrix} 0.16 \\ 0.41 \\ 0.35 \\ 0.32 \\ 0.23 \\ 0.16 \end{pmatrix} \quad v2 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad v = \begin{pmatrix} 0.16 \\ 0.41 \\ 0.35 \\ 0.32 \\ 0.23 \\ 0.16 \end{pmatrix}$$

5.2.1.3.6 VIGA INTERNA (TRECHO DE 33,2M)

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m geometry data table
 Prepared by:

Units: ton meter

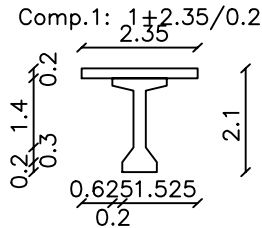
Code: EuroCode
 Page: 178
 Date: 7/10/11

GEOMETRY DATA TABLE

BEAM NO. B2

el. =	67	68,.... ,77	78,.... ,87	88
prop. #	1+2.35/0.2	1+2.35/0.2	1+2.35/0.2	1+2.35/0.2
	0.6	16.	16.	0.6
As top	10.	10.	10.	10.
As bot	12.	12.	12.	12.
ds top	3.5	3.5	3.5	3.5
ds bot	3.5	3.5	3.5	3.5
casting t=	0.	0.	0.	0.
topping t=	33.	33.	33.	33.

SECTIONS



PARAMETERS

Design Code = EuroCode, conc. $f_c = 35.$, reinf. $f_y = 500.$, shear reinf. $f_y = 500.$
 Reinf. modulus $E = 200000.$, conc. modulus $E = 30000.$, cables modulus $E = 205000.$
 Humidity = 75.%, cement type = normal, temperature = 30.
 Calculation methods: Ultimate moment = include decompression strain,
 Shear = inclined struts method, Deflections = use effective I at each point.

CABLE NO. = 1

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands = 240.91[t]

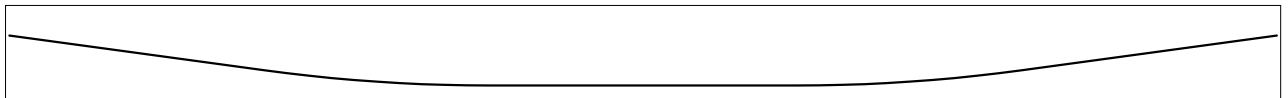
Cable is bonded

JACKING SEQUENCE :

Stage 1/3: TRANSFER

Strands 1-12 jacked from two sides to 100.%, Total force of jacked strands = 240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-675	-734	-793	-852	-911	-969	-1028	-1087	-1146	-1205	-1264	-1323
x	6100	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100	11600
y	-1382	-1441	-1498	-1550	-1598	-1640	-1678	-1710	-1738	-1760	-1778	-1790
x	12100	12590	13100	13600	14100	14600	15100	15600	16100	16600	17100	17600
y	-1798	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800	-1800
x	18100	18600	19100	19600	20100	20610	21100	21600	22100	22600	23100	23600
y	-1800	-1800	-1800	-1800	-1800	-1800	-1798	-1790	-1778	-1760	-1738	-1710
x	24100	24600	25100	25600	26100	26600	27100	27600	28100	28600	29100	29600
y	-1678	-1640	-1598	-1550	-1498	-1441	-1382	-1323	-1264	-1205	-1146	-1087
x	30100	30600	31100	31600	32100	32600	33100					
y	-1028	-969	-911	-852	-793	-734	-675					

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m geometry data table

Code: EuroCode
Page: 179
Date: 7/10/11

Prepared by:

Units: ton meter

CABLE NO. = 2

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

Cable is bonded

JACKING SEQUENCE :

Stage 1/1: TRANSFER

Strands 1-12 jacked from left side to 100., Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-1150	-1203	-1256	-1309	-1361	-1414	-1467	-1520	-1573	-1626	-1679	-1731
x	6100	6600	7100	7600	8100	8600	9100	9600	10100	10250	10600	11100
y	-1784	-1833	-1876	-1912	-1942	-1966	-1983	-1995	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	23100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23600	24100	24600	25100	25600	26100	26600	26720	27100	27600	28100	28600
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-1998	-1990	-1976	-1956
x	29100	29600	30100	30600	31100	31600	32100	32600	33100			
y	-1929	-1896	-1858	-1819	-1780	-1742	-1703	-1664	-1625			

CABLE NO. = 3

No. of strands = 12, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 240.91[t]

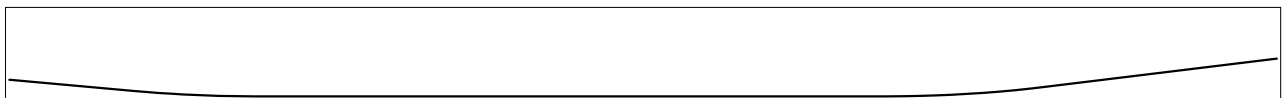
Cable is bonded

JACKING SEQUENCE :

Stage 1/2: TRANSFER

Strands 1-12 jacked from right side to 100., Total force of jacked strands =240.91[t]

CABLE GEOMETRY :



CABLE COORDINATES (mm), relative to composite section top

x	100	600	1100	1600	2100	2600	3100	3600	4100	4600	5100	5600
y	-1625	-1664	-1703	-1742	-1780	-1819	-1858	-1896	-1929	-1956	-1976	-1990
x	6100	6480	6600	7100	7600	8100	8600	9100	9600	10100	10600	11100
y	-1998	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	11600	12100	12600	13100	13600	14100	14600	15100	15600	16100	16600	17100
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	17600	18100	18600	19100	19600	20100	20600	21100	21600	22100	22600	22950
y	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000	-2000
x	23100	23600	24100	24600	25100	25600	26100	26600	27100	27600	28100	28600
y	-2000	-1995	-1983	-1966	-1942	-1912	-1876	-1833	-1784	-1731	-1679	-1626
x	29100	29600	30100	30600	31100	31600	32100	32600	33100			
y	-1573	-1520	-1467	-1414	-1361	-1309	-1256	-1203	-1150			

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
67	0.00	4	0.61	3	-0.26	3	0.61	4	-0.26
	0.03	4	0.70	3	-0.48	3	0.70	4	-0.49
	0.06	4	0.79	3	-0.71	3	0.79	4	-0.72
	0.09	4	0.88	3	-0.94	3	0.88	4	-0.94
	0.10	4	1.64	3	3.39	3	1.64	4	3.39
	0.12	4	3.16	4	12.04	3	3.16	3	12.04
	0.15	4	3.20	4	11.72	3	3.20	3	11.72
	0.18	4	3.25	4	11.40	3	3.25	3	11.40
	0.21	4	3.30	4	11.07	3	3.30	3	11.07
	0.24	4	3.34	4	10.75	3	3.34	3	10.75
	0.27	4	3.41	4	10.56	3	3.41	3	10.56
	0.30	4	3.48	4	10.38	3	3.48	3	10.38
	0.33	4	3.55	4	10.19	3	3.55	3	10.19
	0.36	4	3.61	4	10.00	3	3.61	3	10.00
	0.39	4	3.68	4	9.82	3	3.68	3	9.82
	0.42	4	3.75	4	9.63	3	3.75	3	9.63
	0.45	4	3.82	4	9.44	3	3.82	3	9.44
	0.48	4	3.89	4	9.26	3	3.89	3	9.26
	0.51	4	3.95	4	9.07	3	3.95	3	9.07
	0.54	4	4.02	4	8.89	3	4.02	3	8.89
	0.57	4	4.09	4	8.70	3	4.09	3	8.70
	0.60	4	4.16	4	8.51	3	4.16	3	8.51
68	0.60	4	4.17	3	8.43	3	4.14	4	8.38
	0.68	4	4.19	3	8.41	3	4.15	4	8.32
	0.76	4	4.21	3	8.38	3	4.15	4	8.26
	0.84	4	4.24	3	8.36	3	4.16	4	8.18
	0.92	4	4.26	3	8.34	3	4.16	4	8.11
	1.00	4	4.29	3	8.31	3	4.17	4	8.03
	1.08	4	4.32	3	8.29	3	4.17	4	7.95
	1.16	4	4.35	3	8.27	3	4.18	4	7.87
	1.24	4	4.37	3	8.25	3	4.18	4	7.79
	1.32	4	4.40	3	8.23	3	4.19	4	7.70
	1.40	4	4.43	3	8.21	3	4.19	4	7.62
	1.48	4	4.46	3	8.19	3	4.19	4	7.54
	1.56	4	4.48	3	8.17	3	4.20	4	7.46
	1.64	4	4.51	3	8.15	3	4.20	4	7.38
	1.72	4	4.54	3	8.13	3	4.20	4	7.30
	1.80	4	4.57	3	8.11	3	4.20	4	7.22
	1.88	4	4.59	3	8.09	3	4.20	4	7.14
	1.96	4	4.62	3	8.07	3	4.21	4	7.06
	2.04	4	4.64	3	8.06	3	4.21	4	6.98
	2.12	4	4.67	3	8.04	3	4.21	4	6.90
	2.20	4	4.69	3	8.02	3	4.21	4	6.82

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
69	2.20	4	4.71	3	8.03	3	4.21	4	6.81
	2.28	4	4.73	3	8.01	3	4.21	4	6.75
	2.36	4	4.74	3	8.00	3	4.21	4	6.69
	2.44	4	4.76	3	7.99	3	4.21	4	6.63
	2.52	4	4.78	3	7.98	3	4.21	4	6.57
	2.60	4	4.79	3	7.96	3	4.21	4	6.51
	2.68	4	4.81	3	7.95	3	4.21	4	6.45
	2.76	4	4.83	3	7.94	3	4.20	4	6.40
	2.84	4	4.84	3	7.93	3	4.20	4	6.34
	2.92	4	4.86	3	7.92	3	4.20	4	6.27
	3.00	4	4.88	3	7.91	3	4.19	4	6.21
	3.08	4	4.89	3	7.90	3	4.19	4	6.15
	3.16	4	4.91	3	7.89	3	4.19	4	6.09
	3.24	4	4.93	3	7.88	3	4.18	4	6.03
	3.32	4	4.94	3	7.87	3	4.18	4	5.97
	3.40	4	4.96	3	7.86	3	4.17	4	5.91
	3.48	4	4.98	3	7.85	3	4.17	4	5.85
	3.56	4	4.99	3	7.85	3	4.16	4	5.79
	3.64	4	5.01	3	7.84	3	4.16	4	5.73
	3.72	4	5.03	3	7.84	3	4.15	4	5.67
	3.80	4	5.04	3	7.83	3	4.15	4	5.61
70	3.80	4	5.05	3	7.84	3	4.16	4	5.62
	3.88	4	5.06	3	7.83	3	4.15	4	5.58
	3.96	4	5.07	3	7.83	3	4.14	4	5.53
	4.04	4	5.08	3	7.82	3	4.14	4	5.49
	4.12	4	5.09	3	7.82	3	4.13	4	5.45
	4.20	4	5.10	3	7.81	3	4.13	4	5.41
	4.28	4	5.11	3	7.81	3	4.12	4	5.36
	4.36	4	5.12	3	7.80	3	4.12	4	5.32
	4.44	4	5.13	3	7.80	3	4.11	4	5.27
	4.52	4	5.14	3	7.79	3	4.11	4	5.23
	4.60	4	5.15	3	7.78	3	4.10	4	5.18
	4.68	4	5.16	3	7.78	3	4.10	4	5.13
	4.76	4	5.18	3	7.77	3	4.09	4	5.09
	4.84	4	5.19	3	7.76	3	4.09	4	5.04
	4.92	4	5.20	3	7.76	3	4.09	4	4.99
	5.00	4	5.21	3	7.75	3	4.08	4	4.94
	5.08	4	5.23	3	7.74	3	4.08	4	4.89
	5.16	4	5.24	3	7.73	3	4.08	4	4.83
	5.24	4	5.26	3	7.72	3	4.07	4	4.78
	5.32	4	5.27	3	7.71	3	4.07	4	4.72
	5.40	4	5.29	3	7.70	3	4.07	4	4.67

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
71	5.40	4	5.29	3	7.71	3	4.08	4	4.69
	5.48	4	5.30	3	7.70	3	4.07	4	4.65
	5.56	4	5.31	3	7.70	3	4.07	4	4.62
	5.64	4	5.32	3	7.69	3	4.07	4	4.58
	5.72	4	5.32	3	7.68	3	4.06	4	4.55
	5.80	4	5.33	3	7.68	3	4.06	4	4.52
	5.88	4	5.34	3	7.68	3	4.06	4	4.48
	5.96	4	5.35	3	7.67	3	4.05	4	4.45
	6.04	4	5.36	3	7.67	3	4.05	4	4.42
	6.12	4	5.37	3	7.64	3	4.05	4	4.36
	6.20	4	5.38	3	7.64	3	4.05	4	4.32
	6.28	4	5.39	3	7.63	3	4.04	4	4.29
	6.36	4	5.40	3	7.62	3	4.04	4	4.25
	6.44	4	5.41	3	7.61	3	4.04	4	4.21
	6.52	4	5.42	3	7.60	3	4.04	4	4.17
	6.60	4	5.44	3	7.59	3	4.04	4	4.12
	6.68	4	5.45	3	7.58	3	4.04	4	4.08
	6.76	4	5.47	3	7.57	3	4.04	4	4.03
	6.84	4	5.48	3	7.56	3	4.04	4	3.99
	6.92	4	5.50	3	7.55	3	4.05	4	3.94
	7.00	4	5.51	3	7.53	3	4.05	4	3.89
72	7.00	4	5.53	3	7.54	3	4.06	4	3.90
	7.08	4	5.53	3	7.53	3	4.06	4	3.87
	7.16	4	5.54	3	7.52	3	4.06	4	3.85
	7.24	4	5.55	3	7.51	3	4.07	4	3.82
	7.32	4	5.56	3	7.50	3	4.07	4	3.79
	7.40	4	5.57	3	7.49	3	4.07	4	3.76
	7.48	4	5.58	3	7.47	3	4.07	4	3.73
	7.56	4	5.59	3	7.46	3	4.08	4	3.69
	7.64	4	5.61	3	7.45	3	4.08	4	3.66
	7.72	4	5.62	3	7.43	3	4.09	4	3.62
	7.80	4	5.63	3	7.42	3	4.09	4	3.58
	7.88	4	5.65	3	7.40	3	4.10	4	3.55
	7.96	4	5.66	3	7.38	3	4.10	4	3.51
	8.04	4	5.68	3	7.37	3	4.11	4	3.47
	8.12	4	5.70	3	7.35	3	4.12	4	3.43
	8.20	4	5.71	3	7.33	3	4.13	4	3.39
	8.28	4	5.73	3	7.31	3	4.13	4	3.34
	8.36	4	5.75	3	7.30	3	4.14	4	3.30
	8.44	4	5.77	3	7.28	3	4.15	4	3.26
	8.52	4	5.79	3	7.26	3	4.16	4	3.22
	8.60	4	5.80	3	7.24	3	4.17	4	3.17

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
73	8.60	4	5.82	3	7.24	3	4.18	4	3.17
	8.68	4	5.83	3	7.23	3	4.19	4	3.14
	8.76	4	5.84	3	7.21	3	4.20	4	3.12
	8.84	4	5.86	3	7.19	3	4.21	4	3.09
	8.92	4	5.87	3	7.17	3	4.22	4	3.06
	9.00	4	5.88	3	7.15	3	4.23	4	3.04
	9.08	4	5.90	3	7.13	3	4.24	4	3.01
	9.16	4	5.91	3	7.11	3	4.25	4	2.97
	9.24	4	5.93	3	7.09	3	4.27	4	2.94
	9.32	4	5.95	3	7.06	3	4.28	4	2.91
	9.40	4	5.97	3	7.04	3	4.29	4	2.87
	9.48	4	5.99	3	7.02	3	4.30	4	2.84
	9.56	4	6.00	3	6.99	3	4.32	4	2.80
	9.64	4	6.02	3	6.97	3	4.33	4	2.76
	9.72	4	6.04	3	6.95	3	4.35	4	2.72
	9.80	4	6.07	3	6.92	3	4.36	4	2.68
	9.88	4	6.09	3	6.89	3	4.38	4	2.64
	9.96	4	6.11	3	6.87	3	4.39	4	2.60
	10.04	4	6.13	3	6.84	3	4.41	4	2.56
	10.12	4	6.16	3	6.81	3	4.43	4	2.51
	10.20	4	6.18	3	6.79	3	4.45	4	2.47
74	10.20	4	6.19	3	6.79	3	4.45	4	2.47
	10.28	4	6.20	3	6.77	3	4.47	4	2.45
	10.36	4	6.22	3	6.74	3	4.49	4	2.42
	10.44	4	6.24	3	6.71	3	4.50	4	2.39
	10.52	4	6.26	3	6.68	3	4.52	4	2.36
	10.60	4	6.27	3	6.65	3	4.54	4	2.33
	10.68	4	6.29	3	6.62	3	4.56	4	2.30
	10.76	4	6.31	3	6.60	3	4.57	4	2.27
	10.84	4	6.33	3	6.57	3	4.59	4	2.24
	10.92	4	6.35	3	6.54	3	4.61	4	2.21
	11.00	4	6.37	3	6.51	3	4.63	4	2.18
	11.08	4	6.39	3	6.48	3	4.65	4	2.15
	11.16	4	6.41	3	6.45	3	4.66	4	2.12
	11.24	4	6.43	3	6.43	3	4.68	4	2.08
	11.32	4	6.45	3	6.40	3	4.70	4	2.05
	11.40	4	6.47	3	6.37	3	4.72	4	2.01
	11.48	4	6.49	3	6.34	3	4.74	4	1.98
	11.56	4	6.51	3	6.31	3	4.75	4	1.94
	11.64	4	6.53	3	6.28	3	4.77	4	1.90
	11.72	4	6.56	3	6.26	3	4.79	4	1.86
	11.80	4	6.58	3	6.23	3	4.81	4	1.83

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
75	11.80	4	6.58	3	6.23	3	4.81	4	1.83
	11.88	4	6.59	3	6.20	3	4.83	4	1.82
	11.96	4	6.61	3	6.18	3	4.85	4	1.80
	12.04	4	6.62	3	6.16	3	4.86	4	1.78
	12.12	4	6.64	3	6.13	3	4.88	4	1.76
	12.20	4	6.65	3	6.10	3	4.90	4	1.74
	12.28	4	6.67	3	6.07	3	4.92	4	1.72
	12.36	4	6.68	3	6.04	3	4.94	4	1.70
	12.44	4	6.70	3	6.01	3	4.95	4	1.67
	12.52	4	6.71	3	5.99	3	4.97	4	1.65
	12.60	4	6.73	3	5.95	3	4.99	4	1.62
	12.68	4	6.75	3	5.92	3	5.01	4	1.59
	12.76	4	6.77	3	5.89	3	5.03	4	1.56
	12.84	4	6.78	3	5.86	3	5.05	4	1.54
	12.92	4	6.80	3	5.83	3	5.06	4	1.51
	13.00	4	6.82	3	5.80	3	5.08	4	1.48
	13.08	4	6.83	3	5.78	3	5.10	4	1.45
	13.16	4	6.85	3	5.75	3	5.11	4	1.42
	13.24	4	6.87	3	5.72	3	5.13	4	1.39
	13.32	4	6.89	3	5.69	3	5.15	4	1.36
	13.40	4	6.90	3	5.67	3	5.16	4	1.33
76	13.40	4	6.90	3	5.67	3	5.16	4	1.34
	13.48	4	6.91	3	5.64	3	5.18	4	1.33
	13.56	4	6.92	3	5.62	3	5.19	4	1.32
	13.64	4	6.93	3	5.59	3	5.21	4	1.31
	13.72	4	6.94	3	5.57	3	5.22	4	1.30
	13.80	4	6.94	3	5.54	3	5.23	4	1.29
	13.88	4	6.95	3	5.52	3	5.25	4	1.28
	13.96	4	6.96	3	5.50	3	5.26	4	1.27
	14.04	4	6.97	3	5.47	3	5.27	4	1.26
	14.12	4	6.98	3	5.45	3	5.29	4	1.25
	14.20	4	6.98	3	5.43	3	5.30	4	1.24
	14.28	4	6.99	3	5.41	3	5.31	4	1.22
	14.36	4	7.00	3	5.39	3	5.32	4	1.21
	14.44	4	7.02	3	5.37	3	5.33	4	1.18
	14.52	4	7.03	3	5.35	3	5.34	4	1.15
	14.60	4	7.04	3	5.33	3	5.35	4	1.12
	14.68	4	7.06	3	5.31	3	5.36	4	1.10
	14.76	4	7.07	3	5.29	3	5.38	4	1.07
	14.84	4	7.09	3	5.27	3	5.39	4	1.04
	14.92	4	7.10	3	5.25	3	5.39	4	1.01
	15.00	4	7.11	3	5.24	3	5.40	4	0.98

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
77	15.00	4	7.11	3	5.24	3	5.40	4	0.99
	15.08	4	7.12	3	5.22	3	5.41	4	0.97
	15.16	4	7.13	3	5.21	3	5.42	4	0.96
	15.24	4	7.14	3	5.20	3	5.43	4	0.94
	15.32	4	7.15	3	5.18	3	5.43	4	0.92
	15.40	4	7.16	3	5.17	3	5.44	4	0.90
	15.48	4	7.16	3	5.16	3	5.45	4	0.89
	15.56	4	7.17	3	5.15	3	5.45	4	0.87
	15.64	4	7.18	3	5.14	3	5.46	4	0.86
	15.72	4	7.19	3	5.12	3	5.47	4	0.84
	15.80	4	7.20	3	5.11	3	5.47	4	0.82
	15.88	4	7.20	3	5.10	3	5.48	4	0.81
	15.96	4	7.21	3	5.09	3	5.48	4	0.79
	16.04	4	7.22	3	5.09	3	5.49	4	0.78
	16.12	4	7.22	3	5.08	3	5.49	4	0.77
	16.20	4	7.23	3	5.07	3	5.49	4	0.75
	16.28	4	7.24	3	5.06	3	5.50	4	0.74
	16.36	4	7.24	3	5.05	3	5.50	4	0.72
	16.44	4	7.25	3	5.05	3	5.51	4	0.71
	16.52	4	7.25	3	5.04	3	5.51	4	0.70
	16.60	4	7.26	3	5.03	3	5.51	4	0.69
78	16.68	4	7.25	3	5.04	3	5.51	4	0.70
	16.76	4	7.25	3	5.05	3	5.51	4	0.71
	16.84	4	7.24	3	5.05	3	5.50	4	0.72
	16.92	4	7.24	3	5.06	3	5.50	4	0.74
	17.00	4	7.23	3	5.07	3	5.49	4	0.75
	17.08	4	7.22	3	5.08	3	5.49	4	0.76
	17.16	4	7.22	3	5.08	3	5.49	4	0.78
	17.24	4	7.21	3	5.09	3	5.48	4	0.79
	17.32	4	7.20	3	5.10	3	5.48	4	0.81
	17.40	4	7.20	3	5.11	3	5.47	4	0.82
	17.48	4	7.19	3	5.12	3	5.47	4	0.84
	17.56	4	7.18	3	5.13	3	5.46	4	0.85
	17.64	4	7.17	3	5.14	3	5.45	4	0.87
	17.72	4	7.16	3	5.16	3	5.45	4	0.89
	17.80	4	7.16	3	5.17	3	5.44	4	0.90
	17.88	4	7.15	3	5.18	3	5.43	4	0.92
	17.96	4	7.14	3	5.19	3	5.43	4	0.94
	18.04	4	7.13	3	5.21	3	5.42	4	0.95
	18.12	4	7.12	3	5.22	3	5.41	4	0.97
	18.20	4	7.11	3	5.24	3	5.40	4	0.99

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
79	18.20	4	7.11	3	5.23	3	5.40	4	0.98
	18.28	4	7.10	3	5.25	3	5.40	4	1.01
	18.36	4	7.09	3	5.27	3	5.39	4	1.04
	18.44	4	7.07	3	5.29	3	5.38	4	1.06
	18.52	4	7.06	3	5.31	3	5.37	4	1.09
	18.60	4	7.05	3	5.32	3	5.36	4	1.12
	18.68	4	7.03	3	5.34	3	5.34	4	1.15
	18.76	4	7.02	3	5.36	3	5.33	4	1.18
	18.84	4	7.00	3	5.38	3	5.32	4	1.21
	18.92	4	6.99	3	5.40	3	5.31	4	1.22
	19.00	4	6.98	3	5.43	3	5.30	4	1.23
	19.08	4	6.98	3	5.45	3	5.29	4	1.24
	19.16	4	6.97	3	5.47	3	5.27	4	1.25
	19.24	4	6.96	3	5.49	3	5.26	4	1.26
	19.32	4	6.95	3	5.51	3	5.25	4	1.27
	19.40	4	6.95	3	5.54	3	5.23	4	1.28
	19.48	4	6.94	3	5.56	3	5.22	4	1.29
	19.56	4	6.93	3	5.58	3	5.21	4	1.30
	19.64	4	6.92	3	5.61	3	5.19	4	1.31
	19.72	4	6.91	3	5.63	3	5.18	4	1.32
	19.80	4	6.90	3	5.66	3	5.16	4	1.34
80	19.80	4	6.90	3	5.66	3	5.16	4	1.33
	19.88	4	6.89	3	5.69	3	5.15	4	1.36
	19.96	4	6.87	3	5.71	3	5.13	4	1.39
	20.04	4	6.85	3	5.74	3	5.11	4	1.42
	20.12	4	6.84	3	5.77	3	5.10	4	1.45
	20.20	4	6.82	3	5.80	3	5.08	4	1.47
	20.28	4	6.80	3	5.82	3	5.06	4	1.50
	20.36	4	6.78	3	5.85	3	5.05	4	1.53
	20.44	4	6.77	3	5.88	3	5.03	4	1.56
	20.52	4	6.75	3	5.91	3	5.01	4	1.58
	20.60	4	6.73	3	5.94	3	4.99	4	1.61
	20.68	4	6.72	3	5.98	3	4.97	4	1.64
	20.76	4	6.70	3	6.01	3	4.95	4	1.66
	20.84	4	6.68	3	6.04	3	4.94	4	1.69
	20.92	4	6.67	3	6.07	3	4.92	4	1.71
	21.00	4	6.65	3	6.09	3	4.90	4	1.73
	21.08	4	6.64	3	6.12	3	4.88	4	1.76
	21.16	4	6.62	3	6.15	3	4.86	4	1.77
	21.24	4	6.61	3	6.17	3	4.85	4	1.79
	21.32	4	6.59	3	6.20	3	4.83	4	1.81
	21.40	4	6.58	3	6.22	3	4.81	4	1.83

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
81	21.40	4	6.58	3	6.22	3	4.81	4	1.82
	21.48	4	6.56	3	6.25	3	4.79	4	1.86
	21.56	4	6.54	3	6.28	3	4.77	4	1.89
	21.64	4	6.51	3	6.31	3	4.76	4	1.93
	21.72	4	6.49	3	6.33	3	4.74	4	1.97
	21.80	4	6.47	3	6.36	3	4.72	4	2.00
	21.88	4	6.45	3	6.39	3	4.70	4	2.04
	21.96	4	6.43	3	6.42	3	4.68	4	2.07
	22.04	4	6.41	3	6.45	3	4.66	4	2.11
	22.12	4	6.39	3	6.48	3	4.65	4	2.14
	22.20	4	6.37	3	6.50	3	4.63	4	2.18
	22.28	4	6.35	3	6.53	3	4.61	4	2.21
	22.36	4	6.33	3	6.56	3	4.59	4	2.24
	22.44	4	6.31	3	6.59	3	4.58	4	2.27
	22.52	4	6.29	3	6.62	3	4.56	4	2.30
	22.60	4	6.28	3	6.65	3	4.54	4	2.33
	22.68	4	6.26	3	6.67	3	4.52	4	2.36
	22.76	4	6.24	3	6.70	3	4.50	4	2.39
	22.84	4	6.22	3	6.73	3	4.49	4	2.42
	22.92	4	6.21	3	6.77	3	4.47	4	2.45
	23.00	4	6.19	3	6.79	3	4.45	4	2.46
82	23.00	4	6.18	3	6.78	3	4.45	4	2.46
	23.08	4	6.16	3	6.81	3	4.43	4	2.51
	23.16	4	6.13	3	6.84	3	4.41	4	2.55
	23.24	4	6.11	3	6.86	3	4.40	4	2.59
	23.32	4	6.09	3	6.89	3	4.38	4	2.63
	23.40	4	6.07	3	6.91	3	4.36	4	2.68
	23.48	4	6.05	3	6.94	3	4.35	4	2.72
	23.56	4	6.03	3	6.96	3	4.33	4	2.76
	23.64	4	6.01	3	6.99	3	4.32	4	2.79
	23.72	4	5.99	3	7.01	3	4.31	4	2.83
	23.80	4	5.97	3	7.03	3	4.29	4	2.87
	23.88	4	5.95	3	7.06	3	4.28	4	2.90
	23.96	4	5.93	3	7.08	3	4.27	4	2.94
	24.04	4	5.92	3	7.10	3	4.26	4	2.97
	24.12	4	5.90	3	7.12	3	4.24	4	3.00
	24.20	4	5.89	3	7.14	3	4.23	4	3.03
	24.28	4	5.87	3	7.16	3	4.22	4	3.06
	24.36	4	5.86	3	7.18	3	4.21	4	3.08
	24.44	4	5.85	3	7.20	3	4.20	4	3.11
	24.52	4	5.83	3	7.22	3	4.19	4	3.14
	24.60	4	5.82	3	7.24	3	4.18	4	3.16

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
83	24.60	4	5.81	3	7.23	3	4.17	4	3.16
	24.68	4	5.79	3	7.25	3	4.16	4	3.21
	24.76	4	5.77	3	7.27	3	4.16	4	3.25
	24.84	4	5.75	3	7.29	3	4.15	4	3.29
	24.92	4	5.73	3	7.30	3	4.14	4	3.34
	25.00	4	5.72	3	7.32	3	4.13	4	3.38
	25.08	4	5.70	3	7.34	3	4.12	4	3.42
	25.16	4	5.69	3	7.36	3	4.12	4	3.46
	25.24	4	5.67	3	7.37	3	4.11	4	3.50
	25.32	4	5.66	3	7.39	3	4.11	4	3.53
	25.40	4	5.64	3	7.40	3	4.10	4	3.57
	25.48	4	5.63	3	7.42	3	4.10	4	3.61
	25.56	4	5.62	3	7.43	3	4.09	4	3.64
	25.64	4	5.60	3	7.45	3	4.09	4	3.68
	25.72	4	5.59	3	7.46	3	4.08	4	3.71
	25.80	4	5.58	3	7.47	3	4.08	4	3.74
	25.88	4	5.57	3	7.48	3	4.08	4	3.77
	25.96	4	5.56	3	7.49	3	4.08	4	3.80
	26.04	4	5.56	3	7.51	3	4.08	4	3.83
	26.12	4	5.55	3	7.52	3	4.07	4	3.85
	26.20	4	5.54	3	7.53	3	4.07	4	3.88
84	26.20	4	5.53	3	7.51	3	4.06	4	3.87
	26.28	4	5.51	3	7.53	3	4.06	4	3.92
	26.36	4	5.49	3	7.54	3	4.06	4	3.97
	26.44	4	5.48	3	7.55	3	4.06	4	4.02
	26.52	4	5.47	3	7.56	3	4.06	4	4.06
	26.60	4	5.45	3	7.57	3	4.06	4	4.09
	26.68	4	5.44	3	7.57	3	4.06	4	4.13
	26.76	4	5.43	3	7.59	3	4.06	4	4.19
	26.84	4	5.42	3	7.60	3	4.06	4	4.22
	26.92	4	5.41	3	7.61	3	4.06	4	4.26
	27.00	4	5.40	3	7.61	3	4.06	4	4.30
	27.08	4	5.39	3	7.62	3	4.07	4	4.34
	27.16	4	5.38	3	7.62	3	4.07	4	4.37
	27.24	4	5.37	3	7.63	3	4.07	4	4.40
	27.32	4	5.36	3	7.64	3	4.08	4	4.44
	27.40	4	5.35	3	7.64	3	4.08	4	4.48
	27.48	4	5.35	3	7.65	3	4.08	4	4.52
	27.56	4	5.34	3	7.66	3	4.09	4	4.55
	27.64	4	5.33	3	7.66	3	4.09	4	4.59
	27.72	4	5.32	3	7.67	3	4.10	4	4.62
	27.80	4	5.32	3	7.68	3	4.10	4	4.65

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
85	27.80	4	5.31	3	7.67	3	4.09	4	4.64
	27.88	4	5.30	3	7.68	3	4.09	4	4.69
	27.96	4	5.28	3	7.69	3	4.10	4	4.74
	28.04	4	5.27	3	7.69	3	4.10	4	4.80
	28.12	4	5.25	3	7.70	3	4.10	4	4.85
	28.20	4	5.24	3	7.71	3	4.11	4	4.90
	28.28	4	5.23	3	7.72	3	4.11	4	4.95
	28.36	4	5.21	3	7.73	3	4.12	4	5.00
	28.44	4	5.20	3	7.73	3	4.12	4	5.05
	28.52	4	5.19	3	7.74	3	4.12	4	5.10
	28.60	4	5.18	3	7.75	3	4.13	4	5.14
	28.68	4	5.17	3	7.75	3	4.13	4	5.19
	28.76	4	5.16	3	7.76	3	4.14	4	5.23
	28.84	4	5.14	3	7.76	3	4.14	4	5.28
	28.92	4	5.13	3	7.77	3	4.15	4	5.32
	29.00	4	5.12	3	7.78	3	4.15	4	5.37
	29.08	4	5.11	3	7.78	3	4.16	4	5.41
	29.16	4	5.10	3	7.79	3	4.16	4	5.45
	29.24	4	5.10	3	7.79	3	4.17	4	5.49
	29.32	4	5.09	3	7.79	3	4.18	4	5.54
	29.40	4	5.08	3	7.80	3	4.18	4	5.58
86	29.40	4	5.07	3	7.79	3	4.17	4	5.57
	29.48	4	5.05	3	7.80	3	4.18	4	5.63
	29.56	4	5.03	3	7.80	3	4.18	4	5.69
	29.64	4	5.02	3	7.81	3	4.19	4	5.75
	29.72	4	5.00	3	7.82	3	4.19	4	5.81
	29.80	4	4.99	3	7.82	3	4.20	4	5.87
	29.88	4	4.97	3	7.83	3	4.20	4	5.93
	29.96	4	4.95	3	7.84	3	4.21	4	5.99
	30.04	4	4.94	3	7.85	3	4.21	4	6.05
	30.12	4	4.92	3	7.86	3	4.21	4	6.11
	30.20	4	4.90	3	7.87	3	4.22	4	6.18
	30.28	4	4.88	3	7.88	3	4.22	4	6.24
	30.36	4	4.87	3	7.89	3	4.22	4	6.30
	30.44	4	4.85	3	7.90	3	4.23	4	6.36
	30.52	4	4.83	3	7.91	3	4.23	4	6.42
	30.60	4	4.82	3	7.93	3	4.23	4	6.48
	30.68	4	4.80	3	7.94	3	4.23	4	6.54
	30.76	4	4.78	3	7.95	3	4.23	4	6.60
	30.84	4	4.77	3	7.97	3	4.24	4	6.66
	30.92	4	4.75	3	7.98	3	4.24	4	6.72
	31.00	4	4.73	3	7.99	3	4.24	4	6.78

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m 80%cm tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 2

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
87	31.00	4	4.72	3	7.99	3	4.23	4	6.79
	31.08	4	4.69	3	8.00	3	4.23	4	6.87
	31.16	4	4.67	3	8.02	3	4.23	4	6.94
	31.24	4	4.64	3	8.04	3	4.23	4	7.02
	31.32	4	4.61	3	8.06	3	4.23	4	7.10
	31.40	4	4.59	3	8.08	3	4.22	4	7.18
	31.48	4	4.56	3	8.10	3	4.22	4	7.27
	31.56	4	4.53	3	8.12	3	4.22	4	7.35
	31.64	4	4.51	3	8.13	3	4.22	4	7.43
	31.72	4	4.48	3	8.15	3	4.21	4	7.51
	31.80	4	4.45	3	8.18	3	4.21	4	7.59
	31.88	4	4.42	3	8.20	3	4.21	4	7.67
	31.96	4	4.39	3	8.22	3	4.20	4	7.75
	32.04	4	4.37	3	8.24	3	4.20	4	7.83
	32.12	4	4.34	3	8.26	3	4.19	4	7.91
	32.20	4	4.31	3	8.28	3	4.19	4	7.99
	32.28	4	4.28	3	8.30	3	4.19	4	8.07
	32.36	4	4.26	3	8.33	3	4.18	4	8.15
	32.44	4	4.23	3	8.35	3	4.17	4	8.23
	32.52	4	4.21	3	8.37	3	4.17	4	8.29
	32.60	4	4.19	3	8.40	3	4.16	4	8.35
88	32.60	4	4.18	4	8.48	3	4.18	3	8.48
	32.63	4	4.11	4	8.67	3	4.11	3	8.67
	32.66	4	4.04	4	8.85	3	4.04	3	8.85
	32.69	4	3.97	4	9.04	3	3.97	3	9.04
	32.72	4	3.91	4	9.23	3	3.91	3	9.23
	32.75	4	3.84	4	9.41	3	3.84	3	9.41
	32.78	4	3.77	4	9.60	3	3.77	3	9.60
	32.81	4	3.70	4	9.78	3	3.70	3	9.78
	32.84	4	3.63	4	9.97	3	3.63	3	9.97
	32.87	4	3.57	4	10.16	3	3.57	3	10.16
	32.90	4	3.50	4	10.34	3	3.50	3	10.34
	32.93	4	3.43	4	10.53	3	3.43	3	10.53
	32.96	4	3.36	4	10.72	3	3.36	3	10.72
	32.99	4	3.29	4	10.90	3	3.29	3	10.90
	33.02	4	3.23	4	11.09	3	3.23	3	11.09
	33.05	4	3.16	4	11.28	3	3.16	3	11.28
	33.08	4	3.09	4	11.47	3	3.09	3	11.47
	33.10	4	1.62	3	3.21	3	1.62	4	3.21
	33.11	4	0.88	3	-0.94	3	0.88	4	-0.94
	33.14	4	0.79	3	-0.71	3	0.79	4	-0.72
	33.17	4	0.70	3	-0.48	3	0.70	4	-0.49
	33.20	4	0.61	3	-0.26	3	0.61	4	-0.26

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 202
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	0.0	8.8	0.0	10.4	221.7
2	0.10	28.7	0.0	8.5	3.9	5.6	194.2
3	0.12	28.7	0.0	8.5	10.7	5.0	188.0
4	0.15	28.7	0.0	8.5	10.7	5.0	188.0
5	0.18	28.7	0.0	8.5	10.7	5.0	188.1
6	0.21	28.7	0.0	8.5	10.7	5.0	188.1
7	0.24	28.6	0.0	8.5	10.6	5.0	188.2
8	0.27	28.6	0.0	8.5	10.6	5.0	188.2
9	0.30	28.6	0.0	8.5	10.7	5.0	188.2
10	0.33	28.6	0.0	8.5	10.7	5.0	188.2
11	0.36	28.5	0.0	8.5	10.7	5.0	188.2
12	0.39	28.5	0.0	8.5	10.7	5.0	188.2
13	0.42	28.5	0.0	8.5	10.7	5.0	188.2
14	0.45	28.5	0.0	8.5	10.7	5.0	188.2
15	0.48	28.5	0.0	8.5	10.7	5.0	188.2
16	0.51	28.4	0.0	8.5	10.8	5.0	188.2
17	0.54	28.4	0.0	8.5	10.8	5.0	188.2
18	0.57	28.4	0.0	8.5	10.8	5.0	188.3
19	0.60	28.4	0.0	8.5	10.8	5.0	188.3
20	0.60	28.4	0.0	8.5	10.7	5.0	188.4
21	0.68	28.3	0.0	8.5	10.8	5.0	188.3
22	0.76	28.3	0.0	8.5	10.8	5.0	188.3
23	0.84	28.2	0.0	8.5	10.9	5.0	188.3
24	0.92	28.1	0.0	8.5	11.0	5.0	188.3
25	1.00	28.1	0.0	8.5	11.0	5.0	188.3
26	1.08	28.0	0.0	8.5	11.1	5.0	188.3
27	1.16	28.0	0.0	8.5	11.2	5.0	188.3
28	1.24	27.9	0.0	8.5	11.2	5.0	188.3
29	1.32	27.9	0.0	8.5	11.3	5.0	188.3
30	1.40	27.8	0.0	8.5	11.4	5.0	188.3
31	1.48	27.7	0.0	8.5	11.4	5.0	188.3
32	1.56	27.7	0.0	8.5	11.5	5.0	188.3
33	1.64	27.6	0.0	8.4	11.5	5.0	188.3
34	1.72	27.6	0.0	8.4	11.6	5.0	188.3
35	1.80	27.5	0.0	8.4	11.7	5.0	188.3
36	1.88	27.5	0.0	8.4	11.7	5.0	188.3
37	1.96	27.4	0.0	8.4	11.8	5.0	188.3
38	2.04	27.3	0.0	8.4	11.8	5.0	188.3
39	2.12	27.3	0.0	8.4	11.9	5.1	188.3
40	2.20	27.2	0.0	8.4	11.9	5.1	188.3
41	2.20	27.2	0.0	8.4	11.9	5.1	188.3
42	2.28	27.2	0.0	8.4	12.0	5.1	188.3
43	2.36	27.1	0.0	8.4	12.0	5.1	188.3
44	2.44	27.0	0.0	8.4	12.1	5.1	188.3
45	2.52	27.0	0.0	8.4	12.1	5.1	188.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 203
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.60	26.9	0.0	8.4	12.2	5.1	188.3
47	2.68	26.9	0.0	8.4	12.3	5.1	188.3
48	2.76	26.8	0.0	8.4	12.3	5.1	188.3
49	2.84	26.8	0.0	8.4	12.4	5.1	188.3
50	2.92	26.7	0.0	8.4	12.4	5.1	188.3
51	3.00	26.6	0.0	8.4	12.5	5.1	188.3
52	3.08	26.6	0.0	8.4	12.5	5.1	188.3
53	3.16	26.5	0.0	8.4	12.5	5.1	188.3
54	3.24	26.5	0.0	8.4	12.6	5.1	188.4
55	3.32	26.4	0.0	8.4	12.6	5.1	188.4
56	3.40	26.4	0.0	8.4	12.7	5.1	188.4
57	3.48	26.3	0.0	8.4	12.7	5.1	188.4
58	3.56	26.2	0.0	8.4	12.8	5.1	188.4
59	3.64	26.2	0.0	8.4	12.8	5.1	188.4
60	3.72	26.1	0.0	8.4	12.9	5.1	188.4
61	3.80	26.1	0.0	8.3	12.9	5.1	188.4
62	3.80	26.1	0.0	8.3	12.9	5.1	188.4
63	3.88	26.0	0.0	8.3	13.0	5.1	188.4
64	3.96	26.0	0.0	8.3	13.0	5.2	188.4
65	4.04	25.9	0.0	8.3	13.1	5.2	188.4
66	4.12	25.8	0.0	8.3	13.1	5.2	188.4
67	4.20	25.8	0.0	8.3	13.2	5.2	188.4
68	4.28	25.7	0.0	8.3	13.2	5.2	188.5
69	4.36	25.7	0.0	8.3	13.3	5.2	188.5
70	4.44	25.6	0.0	8.3	13.3	5.2	188.5
71	4.52	25.6	0.0	8.3	13.4	5.2	188.5
72	4.60	25.5	0.0	8.3	13.4	5.2	188.5
73	4.68	25.4	0.0	8.3	13.5	5.2	188.5
74	4.76	25.4	0.0	8.3	13.5	5.2	188.5
75	4.84	25.3	0.0	8.3	13.5	5.2	188.5
76	4.92	25.3	0.0	8.3	13.6	5.2	188.6
77	5.00	25.2	0.0	8.3	13.6	5.2	188.6
78	5.08	25.2	0.0	8.3	13.7	5.2	188.6
79	5.16	25.1	0.0	8.3	13.7	5.2	188.6
80	5.24	25.0	0.0	8.2	13.7	5.3	188.6
81	5.32	25.0	0.0	8.2	13.8	5.3	188.6
82	5.40	24.9	0.0	8.2	13.8	5.3	188.6
83	5.40	24.9	0.0	8.2	13.8	5.3	188.6
84	5.48	24.9	0.0	8.2	13.9	5.3	188.6
85	5.56	24.8	0.0	8.2	13.9	5.3	188.7
86	5.64	24.8	0.0	8.2	14.0	5.3	188.7
87	5.72	24.7	0.0	8.2	14.0	5.3	188.7
88	5.80	24.7	0.0	8.2	14.0	5.3	188.7
89	5.88	24.6	0.0	8.2	14.1	5.3	188.7
90	5.96	24.5	0.0	8.2	14.1	5.3	188.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 204
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.04	24.5	0.0	8.2	14.2	5.3	188.8
92	6.12	24.4	0.0	8.2	14.2	5.3	188.8
93	6.20	24.4	0.0	8.2	14.2	5.3	188.8
94	6.28	24.3	0.0	8.2	14.3	5.4	188.8
95	6.36	24.3	0.0	8.2	14.3	5.4	188.8
96	6.44	24.2	0.0	8.2	14.3	5.4	188.8
97	6.52	24.1	0.0	8.2	14.4	5.4	188.9
98	6.60	24.1	0.0	8.1	14.4	5.4	188.9
99	6.68	24.0	0.0	8.1	14.5	5.4	188.9
100	6.76	23.9	0.0	8.1	14.5	5.4	188.9
101	6.84	23.8	0.0	8.1	14.5	5.4	189.0
102	6.92	23.6	0.0	8.1	14.6	5.4	189.1
103	7.00	23.5	0.0	8.1	14.6	5.5	189.2
104	7.00	23.5	0.0	8.1	14.6	5.5	189.2
105	7.08	23.4	0.0	8.1	14.7	5.5	189.3
106	7.16	23.2	0.0	8.1	14.7	5.5	189.4
107	7.24	23.1	0.0	8.1	14.7	5.5	189.5
108	7.32	22.9	0.0	8.1	14.8	5.5	189.6
109	7.40	22.8	0.0	8.1	14.8	5.5	189.7
110	7.48	22.7	0.0	8.1	14.9	5.6	189.8
111	7.56	22.5	0.0	8.1	14.9	5.6	189.8
112	7.64	22.4	0.0	8.1	14.9	5.6	189.9
113	7.72	22.2	0.0	8.1	15.0	5.6	190.0
114	7.80	22.1	0.0	8.1	15.0	5.6	190.1
115	7.88	22.0	0.0	8.0	15.0	5.7	190.2
116	7.96	21.8	0.0	8.0	15.1	5.7	190.3
117	8.04	21.7	0.0	8.0	15.1	5.7	190.4
118	8.12	21.5	0.0	8.0	15.1	5.7	190.5
119	8.20	21.4	0.0	8.0	15.2	5.7	190.6
120	8.28	21.3	0.0	8.0	15.2	5.7	190.7
121	8.36	21.1	0.0	8.0	15.2	5.8	190.8
122	8.44	21.0	0.0	8.0	15.2	5.8	190.9
123	8.52	20.8	0.0	8.0	15.3	5.8	191.0
124	8.60	20.7	0.0	8.0	15.3	5.8	191.1
125	8.60	20.7	0.0	8.0	15.3	5.8	191.1
126	8.68	20.6	0.0	8.0	15.3	5.8	191.2
127	8.76	20.4	0.0	8.0	15.4	5.9	191.3
128	8.84	20.3	0.0	8.0	15.4	5.9	191.4
129	8.92	20.1	0.0	8.0	15.4	5.9	191.5
130	9.00	20.0	0.0	8.0	15.4	5.9	191.6
131	9.08	19.9	0.0	8.0	15.4	5.9	191.7
132	9.16	19.7	0.0	8.0	15.4	6.0	191.8
133	9.24	19.6	0.0	8.0	15.5	6.0	191.9
134	9.32	19.4	0.0	8.0	15.5	6.0	192.0
135	9.40	19.3	0.0	8.0	15.5	6.0	192.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 205
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	9.48	19.2	0.0	8.0	15.5	6.0	192.3
137	9.56	19.0	0.0	8.0	15.5	6.1	192.4
138	9.64	18.9	0.0	7.9	15.5	6.1	192.5
139	9.72	18.7	0.0	7.9	15.5	6.1	192.6
140	9.80	18.6	0.0	7.9	15.5	6.1	192.7
141	9.88	18.5	0.0	7.9	15.5	6.2	192.9
142	9.96	18.3	0.0	7.9	15.5	6.2	193.0
143	10.04	18.2	0.0	7.9	15.5	6.2	193.1
144	10.12	18.0	0.0	7.9	15.5	6.2	193.2
145	10.20	17.9	0.0	7.9	15.5	6.2	193.3
146	10.20	17.9	0.0	7.9	15.5	6.2	193.3
147	10.28	17.8	0.0	7.9	15.5	6.3	193.5
148	10.36	17.6	0.0	7.9	15.5	6.3	193.6
149	10.44	17.5	0.0	7.9	15.5	6.3	193.7
150	10.52	17.3	0.0	7.9	15.5	6.3	193.9
151	10.60	17.2	0.0	7.9	15.5	6.4	194.0
152	10.68	17.1	0.0	7.9	15.4	6.4	194.1
153	10.76	16.9	0.0	7.9	15.4	6.4	194.2
154	10.84	16.8	0.0	7.9	15.4	6.4	194.4
155	10.92	16.6	0.0	7.9	15.4	6.5	194.5
156	11.00	16.5	0.0	7.9	15.4	6.5	194.6
157	11.08	16.4	0.0	7.9	15.4	6.5	194.8
158	11.16	16.2	0.0	7.9	15.4	6.5	194.9
159	11.24	16.1	0.0	7.9	15.3	6.5	195.0
160	11.32	15.9	0.0	7.9	15.3	6.6	195.2
161	11.40	15.8	0.0	7.9	15.3	6.6	195.3
162	11.48	15.7	0.0	7.9	15.3	6.6	195.4
163	11.56	15.5	0.0	7.9	15.3	6.6	195.6
164	11.64	15.4	0.0	7.9	15.2	6.7	195.7
165	11.72	15.2	0.0	7.9	15.2	6.7	195.9
166	11.80	15.1	0.0	7.9	15.2	6.7	196.0
167	11.80	15.1	0.0	7.9	15.2	6.7	196.0
168	11.88	15.0	0.0	7.9	15.2	6.7	196.1
169	11.96	14.8	0.0	7.9	15.2	6.8	196.3
170	12.04	14.7	0.0	7.9	15.2	6.8	196.4
171	12.12	14.6	0.0	7.9	15.1	6.8	196.5
172	12.20	14.4	0.0	7.9	15.1	6.8	196.7
173	12.28	14.5	0.0	7.9	15.1	6.8	196.7
174	12.36	14.6	0.0	7.9	15.0	6.8	196.6
175	12.44	14.7	0.0	7.9	15.0	6.8	196.5
176	12.52	14.9	0.0	7.9	15.0	6.8	196.4
177	12.60	15.0	0.0	7.9	15.0	6.8	196.3
178	12.68	15.1	0.0	7.9	14.9	6.8	196.2
179	12.76	15.1	0.0	7.9	14.9	6.8	196.2
180	12.84	15.2	0.0	7.9	14.9	6.8	196.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 206
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	12.92	15.2	0.0	7.9	14.8	6.8	196.2
182	13.00	15.3	0.0	7.9	14.8	6.8	196.1
183	13.08	15.3	0.0	7.9	14.8	6.8	196.1
184	13.16	15.4	0.0	7.9	14.8	6.8	196.1
185	13.24	15.4	0.0	7.9	14.7	6.8	196.1
186	13.32	15.5	0.0	7.9	14.7	6.8	196.0
187	13.40	15.6	0.0	7.9	14.7	6.8	196.0
188	13.40	15.6	0.0	7.9	14.7	6.8	196.0
189	13.48	15.6	0.0	7.9	14.6	6.8	196.0
190	13.56	15.7	0.0	7.9	14.6	6.8	196.0
191	13.64	15.7	0.0	7.9	14.6	6.8	195.9
192	13.72	15.8	0.0	7.9	14.6	6.8	195.9
193	13.80	15.8	0.0	7.9	14.5	6.8	195.9
194	13.88	15.9	0.0	7.9	14.5	6.8	195.8
195	13.96	15.9	0.0	7.9	14.5	6.8	195.8
196	14.04	16.0	0.0	7.9	14.5	6.8	195.8
197	14.12	16.1	0.0	7.9	14.4	6.8	195.8
198	14.20	16.1	0.0	7.9	14.4	6.8	195.7
199	14.28	16.2	0.0	7.9	14.4	6.8	195.7
200	14.36	16.2	0.0	7.9	14.4	6.8	195.7
201	14.44	16.3	0.0	7.9	14.4	6.8	195.6
202	14.52	16.3	0.0	7.9	14.3	6.8	195.6
203	14.60	16.4	0.0	7.9	14.3	6.8	195.6
204	14.68	16.4	0.0	7.9	14.3	6.8	195.5
205	14.76	16.5	0.0	7.9	14.3	6.8	195.5
206	14.84	16.6	0.0	7.9	14.3	6.7	195.5
207	14.92	16.6	0.0	7.9	14.2	6.7	195.4
208	15.00	16.7	0.0	7.9	14.2	6.7	195.4
209	15.00	16.7	0.0	7.9	14.2	6.7	195.4
210	15.08	16.7	0.0	7.9	14.2	6.7	195.4
211	15.16	16.8	0.0	7.9	14.2	6.7	195.3
212	15.24	16.8	0.0	7.9	14.2	6.7	195.3
213	15.32	16.9	0.0	7.9	14.2	6.7	195.2
214	15.40	16.9	0.0	7.9	14.2	6.7	195.2
215	15.48	17.0	0.0	7.9	14.1	6.7	195.2
216	15.56	17.1	0.0	7.9	14.1	6.7	195.1
217	15.64	17.1	0.0	7.9	14.1	6.7	195.1
218	15.72	17.2	0.0	7.9	14.1	6.7	195.1
219	15.80	17.2	0.0	7.9	14.1	6.7	195.0
220	15.88	17.3	0.0	7.9	14.1	6.7	195.0
221	15.96	17.3	0.0	7.9	14.1	6.7	194.9
222	16.04	17.4	0.0	7.9	14.1	6.7	194.9
223	16.12	17.4	0.0	7.9	14.1	6.7	194.8
224	16.20	17.5	0.0	7.9	14.1	6.7	194.8
225	16.28	17.5	0.0	7.9	14.0	6.7	194.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	16.36	17.6	0.0	7.9	14.0	6.7	194.7
227	16.44	17.7	0.0	7.9	14.0	6.7	194.7
228	16.52	17.7	0.0	7.9	14.0	6.7	194.6
229	16.60	17.8	0.0	7.9	14.0	6.6	194.6
230	16.60	17.8	0.0	7.9	14.0	6.6	194.6
231	16.68	17.7	0.0	7.9	14.0	6.7	194.6
232	16.76	17.7	0.0	7.9	14.0	6.7	194.7
233	16.84	17.6	0.0	7.9	14.0	6.7	194.7
234	16.92	17.5	0.0	7.9	14.0	6.7	194.8
235	17.00	17.5	0.0	7.9	14.1	6.7	194.8
236	17.08	17.4	0.0	7.9	14.1	6.7	194.8
237	17.16	17.4	0.0	7.9	14.1	6.7	194.9
238	17.24	17.3	0.0	7.9	14.1	6.7	194.9
239	17.32	17.3	0.0	7.9	14.1	6.7	195.0
240	17.40	17.2	0.0	7.9	14.1	6.7	195.0
241	17.48	17.2	0.0	7.9	14.1	6.7	195.1
242	17.56	17.1	0.0	7.9	14.1	6.7	195.1
243	17.64	17.1	0.0	7.9	14.1	6.7	195.1
244	17.72	17.0	0.0	7.9	14.1	6.7	195.2
245	17.80	16.9	0.0	7.9	14.2	6.7	195.2
246	17.88	16.9	0.0	7.9	14.2	6.7	195.2
247	17.96	16.8	0.0	7.9	14.2	6.7	195.3
248	18.04	16.8	0.0	7.9	14.2	6.7	195.3
249	18.12	16.7	0.0	7.9	14.2	6.7	195.4
250	18.20	16.7	0.0	7.9	14.2	6.7	195.4
251	18.20	16.7	0.0	7.9	14.2	6.7	195.4
252	18.28	16.6	0.0	7.9	14.2	6.7	195.4
253	18.36	16.6	0.0	7.9	14.3	6.7	195.5
254	18.44	16.5	0.0	7.9	14.3	6.8	195.5
255	18.52	16.4	0.0	7.9	14.3	6.8	195.5
256	18.60	16.4	0.0	7.9	14.3	6.8	195.6
257	18.68	16.3	0.0	7.9	14.3	6.8	195.6
258	18.76	16.3	0.0	7.9	14.4	6.8	195.6
259	18.84	16.2	0.0	7.9	14.4	6.8	195.7
260	18.92	16.2	0.0	7.9	14.4	6.8	195.7
261	19.00	16.1	0.0	7.9	14.4	6.8	195.7
262	19.08	16.1	0.0	7.9	14.4	6.8	195.8
263	19.16	16.0	0.0	7.9	14.5	6.8	195.8
264	19.24	15.9	0.0	7.9	14.5	6.8	195.8
265	19.32	15.9	0.0	7.9	14.5	6.8	195.8
266	19.40	15.8	0.0	7.9	14.5	6.8	195.9
267	19.48	15.8	0.0	7.9	14.6	6.8	195.9
268	19.56	15.7	0.0	7.9	14.6	6.8	195.9
269	19.64	15.7	0.0	7.9	14.6	6.8	196.0
270	19.72	15.6	0.0	7.9	14.6	6.8	196.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 208
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	19.80	15.6	0.0	7.9	14.7	6.8	196.0
272	19.80	15.6	0.0	7.9	14.7	6.8	196.0
273	19.88	15.5	0.0	7.9	14.7	6.8	196.0
274	19.96	15.4	0.0	7.9	14.7	6.8	196.1
275	20.04	15.4	0.0	7.9	14.7	6.8	196.1
276	20.12	15.3	0.0	7.9	14.8	6.8	196.1
277	20.20	15.3	0.0	7.9	14.8	6.8	196.2
278	20.28	15.2	0.0	7.9	14.8	6.8	196.2
279	20.36	15.2	0.0	7.9	14.9	6.8	196.2
280	20.44	15.1	0.0	7.9	14.9	6.8	196.2
281	20.52	15.1	0.0	7.9	14.9	6.8	196.3
282	20.60	15.0	0.0	7.9	14.9	6.8	196.3
283	20.68	14.9	0.0	7.9	15.0	6.8	196.4
284	20.76	14.7	0.0	7.9	15.0	6.8	196.5
285	20.84	14.6	0.0	7.9	15.0	6.8	196.6
286	20.92	14.5	0.0	7.9	15.1	6.8	196.7
287	21.00	14.4	0.0	7.9	15.1	6.8	196.7
288	21.08	14.6	0.0	7.9	15.1	6.8	196.5
289	21.16	14.7	0.0	7.9	15.1	6.8	196.4
290	21.24	14.8	0.0	7.9	15.2	6.8	196.3
291	21.32	15.0	0.0	7.9	15.2	6.7	196.1
292	21.40	15.1	0.0	7.9	15.2	6.7	196.0
293	21.40	15.1	0.0	7.9	15.2	6.7	196.0
294	21.48	15.2	0.0	7.9	15.2	6.7	195.9
295	21.56	15.4	0.0	7.9	15.2	6.7	195.7
296	21.64	15.5	0.0	7.9	15.3	6.6	195.6
297	21.72	15.7	0.0	7.9	15.3	6.6	195.5
298	21.80	15.8	0.0	7.9	15.3	6.6	195.3
299	21.88	15.9	0.0	7.9	15.3	6.6	195.2
300	21.96	16.1	0.0	7.9	15.3	6.5	195.0
301	22.04	16.2	0.0	7.9	15.3	6.5	194.9
302	22.12	16.4	0.0	7.9	15.4	6.5	194.8
303	22.20	16.5	0.0	7.9	15.4	6.5	194.6
304	22.28	16.6	0.0	7.9	15.4	6.5	194.5
305	22.36	16.8	0.0	7.9	15.4	6.4	194.4
306	22.44	16.9	0.0	7.9	15.4	6.4	194.3
307	22.52	17.1	0.0	7.9	15.4	6.4	194.1
308	22.60	17.2	0.0	7.9	15.5	6.4	194.0
309	22.68	17.3	0.0	7.9	15.5	6.3	193.9
310	22.76	17.5	0.0	7.9	15.5	6.3	193.7
311	22.84	17.6	0.0	7.9	15.5	6.3	193.6
312	22.92	17.8	0.0	7.9	15.5	6.3	193.5
313	23.00	17.9	0.0	7.9	15.5	6.2	193.3
314	23.00	17.9	0.0	7.9	15.5	6.2	193.4
315	23.08	18.0	0.0	7.9	15.5	6.2	193.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	23.16	18.2	0.0	7.9	15.5	6.2	193.1
317	23.24	18.3	0.0	7.9	15.5	6.2	193.0
318	23.32	18.5	0.0	7.9	15.5	6.2	192.9
319	23.40	18.6	0.0	7.9	15.5	6.1	192.7
320	23.48	18.7	0.0	7.9	15.5	6.1	192.6
321	23.56	18.9	0.0	7.9	15.5	6.1	192.5
322	23.64	19.0	0.0	8.0	15.5	6.1	192.4
323	23.72	19.2	0.0	8.0	15.5	6.0	192.3
324	23.80	19.3	0.0	8.0	15.5	6.0	192.2
325	23.88	19.4	0.0	8.0	15.5	6.0	192.1
326	23.96	19.6	0.0	8.0	15.4	6.0	191.9
327	24.04	19.7	0.0	8.0	15.4	6.0	191.8
328	24.12	19.9	0.0	8.0	15.4	5.9	191.7
329	24.20	20.0	0.0	8.0	15.4	5.9	191.6
330	24.28	20.1	0.0	8.0	15.4	5.9	191.5
331	24.36	20.3	0.0	8.0	15.4	5.9	191.4
332	24.44	20.4	0.0	8.0	15.3	5.9	191.3
333	24.52	20.6	0.0	8.0	15.3	5.8	191.2
334	24.60	20.7	0.0	8.0	15.3	5.8	191.1
335	24.60	20.7	0.0	8.0	15.3	5.8	191.1
336	24.68	20.8	0.0	8.0	15.3	5.8	191.0
337	24.76	21.0	0.0	8.0	15.2	5.8	190.9
338	24.84	21.1	0.0	8.0	15.2	5.8	190.8
339	24.92	21.3	0.0	8.0	15.2	5.7	190.7
340	25.00	21.4	0.0	8.0	15.2	5.7	190.6
341	25.08	21.5	0.0	8.0	15.1	5.7	190.5
342	25.16	21.7	0.0	8.0	15.1	5.7	190.4
343	25.24	21.8	0.0	8.0	15.1	5.7	190.3
344	25.32	22.0	0.0	8.0	15.0	5.7	190.2
345	25.40	22.1	0.0	8.1	15.0	5.6	190.1
346	25.48	22.2	0.0	8.1	15.0	5.6	190.0
347	25.56	22.4	0.0	8.1	14.9	5.6	190.0
348	25.64	22.5	0.0	8.1	14.9	5.6	189.9
349	25.72	22.7	0.0	8.1	14.8	5.6	189.8
350	25.80	22.8	0.0	8.1	14.8	5.5	189.7
351	25.88	22.9	0.0	8.1	14.8	5.5	189.6
352	25.96	23.1	0.0	8.1	14.7	5.5	189.5
353	26.04	23.2	0.0	8.1	14.7	5.5	189.4
354	26.12	23.4	0.0	8.1	14.6	5.5	189.3
355	26.20	23.5	0.0	8.1	14.6	5.5	189.2
356	26.20	23.5	0.0	8.1	14.6	5.5	189.3
357	26.28	23.6	0.0	8.1	14.5	5.5	189.2
358	26.36	23.8	0.0	8.1	14.5	5.4	189.1
359	26.44	23.9	0.0	8.1	14.5	5.4	189.0
360	26.52	24.0	0.0	8.1	14.4	5.4	188.9

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 210
 Date: 7/10/11

Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	26.60	24.1	0.0	8.1	14.4	5.4	188.9
362	26.68	24.1	0.0	8.2	14.4	5.4	188.9
363	26.76	24.2	0.0	8.2	14.3	5.4	188.9
364	26.84	24.3	0.0	8.2	14.3	5.4	188.8
365	26.92	24.3	0.0	8.2	14.3	5.4	188.8
366	27.00	24.4	0.0	8.2	14.2	5.3	188.8
367	27.08	24.4	0.0	8.2	14.2	5.3	188.8
368	27.16	24.5	0.0	8.2	14.1	5.3	188.8
369	27.24	24.5	0.0	8.2	14.1	5.3	188.8
370	27.32	24.6	0.0	8.2	14.1	5.3	188.7
371	27.40	24.7	0.0	8.2	14.0	5.3	188.7
372	27.48	24.7	0.0	8.2	14.0	5.3	188.7
373	27.56	24.8	0.0	8.2	13.9	5.3	188.7
374	27.64	24.8	0.0	8.2	13.9	5.3	188.7
375	27.72	24.9	0.0	8.2	13.9	5.3	188.7
376	27.80	24.9	0.0	8.2	13.8	5.3	188.6
377	27.80	24.9	0.0	8.2	13.8	5.3	188.7
378	27.88	25.0	0.0	8.2	13.8	5.3	188.6
379	27.96	25.0	0.0	8.2	13.7	5.3	188.6
380	28.04	25.1	0.0	8.3	13.7	5.3	188.6
381	28.12	25.2	0.0	8.3	13.6	5.2	188.6
382	28.20	25.2	0.0	8.3	13.6	5.2	188.6
383	28.28	25.3	0.0	8.3	13.6	5.2	188.6
384	28.36	25.3	0.0	8.3	13.5	5.2	188.6
385	28.44	25.4	0.0	8.3	13.5	5.2	188.5
386	28.52	25.4	0.0	8.3	13.4	5.2	188.5
387	28.60	25.5	0.0	8.3	13.4	5.2	188.5
388	28.68	25.6	0.0	8.3	13.3	5.2	188.5
389	28.76	25.6	0.0	8.3	13.3	5.2	188.5
390	28.84	25.7	0.0	8.3	13.3	5.2	188.5
391	28.92	25.7	0.0	8.3	13.2	5.2	188.5
392	29.00	25.8	0.0	8.3	13.2	5.2	188.5
393	29.08	25.8	0.0	8.3	13.1	5.2	188.5
394	29.16	25.9	0.0	8.3	13.1	5.2	188.4
395	29.24	26.0	0.0	8.3	13.0	5.2	188.4
396	29.32	26.0	0.0	8.3	13.0	5.1	188.4
397	29.40	26.1	0.0	8.3	12.9	5.1	188.4
398	29.40	26.1	0.0	8.3	12.9	5.1	188.4
399	29.48	26.1	0.0	8.4	12.9	5.1	188.4
400	29.56	26.2	0.0	8.4	12.8	5.1	188.4
401	29.64	26.2	0.0	8.4	12.8	5.1	188.4
402	29.72	26.3	0.0	8.4	12.7	5.1	188.4
403	29.80	26.4	0.0	8.4	12.7	5.1	188.4
404	29.88	26.4	0.0	8.4	12.6	5.1	188.4
405	29.96	26.5	0.0	8.4	12.6	5.1	188.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	30.04	26.5	0.0	8.4	12.5	5.1	188.4
407	30.12	26.6	0.0	8.4	12.5	5.1	188.3
408	30.20	26.6	0.0	8.4	12.4	5.1	188.3
409	30.28	26.7	0.0	8.4	12.4	5.1	188.3
410	30.36	26.8	0.0	8.4	12.3	5.1	188.3
411	30.44	26.8	0.0	8.4	12.3	5.1	188.3
412	30.52	26.9	0.0	8.4	12.2	5.1	188.3
413	30.60	26.9	0.0	8.4	12.2	5.1	188.3
414	30.68	27.0	0.0	8.4	12.1	5.1	188.3
415	30.76	27.0	0.0	8.4	12.1	5.1	188.3
416	30.84	27.1	0.0	8.4	12.0	5.1	188.3
417	30.92	27.2	0.0	8.4	12.0	5.1	188.3
418	31.00	27.2	0.0	8.4	11.9	5.1	188.3
419	31.00	27.2	0.0	8.4	11.9	5.1	188.3
420	31.08	27.3	0.0	8.4	11.9	5.1	188.3
421	31.16	27.3	0.0	8.4	11.8	5.0	188.3
422	31.24	27.4	0.0	8.4	11.8	5.0	188.3
423	31.32	27.5	0.0	8.4	11.7	5.0	188.3
424	31.40	27.5	0.0	8.4	11.7	5.0	188.3
425	31.48	27.6	0.0	8.4	11.6	5.0	188.3
426	31.56	27.6	0.0	8.4	11.5	5.0	188.3
427	31.64	27.7	0.0	8.5	11.5	5.0	188.3
428	31.72	27.7	0.0	8.5	11.4	5.0	188.3
429	31.80	27.8	0.0	8.5	11.4	5.0	188.3
430	31.88	27.9	0.0	8.5	11.3	5.0	188.3
431	31.96	27.9	0.0	8.5	11.2	5.0	188.3
432	32.04	28.0	0.0	8.5	11.2	5.0	188.3
433	32.12	28.0	0.0	8.5	11.1	5.0	188.3
434	32.20	28.1	0.0	8.5	11.0	5.0	188.3
435	32.28	28.1	0.0	8.5	11.0	5.0	188.3
436	32.36	28.2	0.0	8.5	10.9	5.0	188.3
437	32.44	28.3	0.0	8.5	10.8	5.0	188.3
438	32.52	28.3	0.0	8.5	10.8	5.0	188.3
439	32.60	28.4	0.0	8.5	10.7	5.0	188.3
440	32.60	28.4	0.0	8.5	10.8	5.0	188.3
441	32.63	28.4	0.0	8.5	10.8	5.0	188.2
442	32.66	28.4	0.0	8.5	10.8	5.0	188.2
443	32.69	28.4	0.0	8.5	10.8	5.0	188.2
444	32.72	28.5	0.0	8.5	10.8	5.0	188.2
445	32.75	28.5	0.0	8.5	10.7	5.0	188.2
446	32.78	28.5	0.0	8.5	10.7	5.0	188.2
447	32.81	28.5	0.0	8.5	10.7	5.0	188.2
448	32.84	28.5	0.0	8.5	10.7	5.0	188.2
449	32.87	28.6	0.0	8.5	10.7	5.0	188.2
450	32.90	28.6	0.0	8.5	10.7	5.0	188.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
viga int 33m cabo c1 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 2

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	32.93	28.6	0.0	8.5	10.7	5.0	188.2
452	32.96	28.6	0.0	8.5	10.6	5.0	188.2
453	32.99	28.7	0.0	8.5	10.6	5.0	188.2
454	33.02	28.7	0.0	8.5	10.6	5.0	188.2
455	33.05	28.7	0.0	8.5	10.6	5.0	188.2
456	33.08	28.7	0.0	8.5	10.6	5.0	188.2
457	33.10	28.7	0.0	8.5	3.9	5.6	194.2

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	29.8	2.0	8.4	4.7	5.2	190.8
3	0.12	29.8	6.1	8.4	14.1	4.1	178.4
4	0.15	29.7	6.2	8.4	14.0	4.1	178.5
5	0.18	29.7	6.2	8.4	13.9	4.1	178.6
6	0.21	29.7	6.2	8.4	13.8	4.1	178.8
7	0.24	29.7	6.2	8.4	13.6	4.1	178.9
8	0.27	29.6	6.2	8.4	13.6	4.1	179.0
9	0.30	29.6	6.2	8.4	13.6	4.1	179.0
10	0.33	29.6	6.2	8.4	13.5	4.2	179.1
11	0.36	29.6	6.2	8.4	13.5	4.2	179.1
12	0.39	29.6	6.2	8.4	13.4	4.2	179.2
13	0.42	29.5	6.2	8.4	13.4	4.2	179.3
14	0.45	29.5	6.2	8.4	13.3	4.2	179.3
15	0.48	29.5	6.2	8.4	13.3	4.2	179.4
16	0.51	29.5	6.2	8.4	13.2	4.2	179.4
17	0.54	29.4	6.2	8.4	13.2	4.2	179.5
18	0.57	29.4	6.2	8.4	13.1	4.2	179.6
19	0.60	29.4	6.2	8.4	13.1	4.2	179.6
20	0.60	29.4	6.2	8.4	12.9	4.2	179.8
21	0.68	29.3	6.2	8.4	13.0	4.2	179.8
22	0.76	29.3	6.2	8.4	13.0	4.2	179.8
23	0.84	29.2	6.2	8.4	13.1	4.2	179.8
24	0.92	29.2	6.3	8.4	13.1	4.2	179.8
25	1.00	29.1	6.3	8.4	13.2	4.2	179.8
26	1.08	29.1	6.3	8.4	13.2	4.2	179.8
27	1.16	29.0	6.4	8.4	13.2	4.2	179.8
28	1.24	28.9	6.4	8.3	13.3	4.2	179.7
29	1.32	28.9	6.4	8.3	13.3	4.2	179.7
30	1.40	28.8	6.5	8.3	13.4	4.2	179.7
31	1.48	28.8	6.5	8.3	13.4	4.2	179.7
32	1.56	28.7	6.5	8.3	13.5	4.2	179.7
33	1.64	28.7	6.6	8.3	13.5	4.2	179.6
34	1.72	28.6	6.6	8.3	13.5	4.2	179.6
35	1.80	28.5	6.7	8.3	13.6	4.2	179.6
36	1.88	28.5	6.7	8.3	13.6	4.2	179.6
37	1.96	28.4	6.8	8.3	13.6	4.2	179.6
38	2.04	28.4	6.8	8.3	13.7	4.2	179.5
39	2.12	28.3	6.9	8.3	13.7	4.2	179.5
40	2.20	28.3	6.9	8.3	13.8	4.2	179.5
41	2.20	28.3	6.9	8.3	13.8	4.2	179.5
42	2.28	28.2	7.0	8.3	13.8	4.2	179.4
43	2.36	28.1	7.0	8.3	13.8	4.2	179.4
44	2.44	28.1	7.1	8.3	13.9	4.2	179.4
45	2.52	28.0	7.1	8.3	13.9	4.2	179.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 214
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.60	28.0	7.2	8.3	14.0	4.2	179.3
47	2.68	27.9	7.3	8.3	14.0	4.2	179.2
48	2.76	27.9	7.3	8.3	14.0	4.2	179.2
49	2.84	27.8	7.4	8.3	14.1	4.2	179.2
50	2.92	27.7	7.5	8.2	14.1	4.2	179.1
51	3.00	27.7	7.6	8.2	14.1	4.2	179.1
52	3.08	27.6	7.6	8.2	14.2	4.2	179.0
53	3.16	27.6	7.7	8.2	14.2	4.2	179.0
54	3.24	27.5	7.8	8.2	14.2	4.2	178.9
55	3.32	27.5	7.9	8.2	14.3	4.2	178.9
56	3.40	27.4	7.9	8.2	14.3	4.2	178.8
57	3.48	27.3	8.0	8.2	14.4	4.2	178.7
58	3.56	27.3	8.1	8.2	14.4	4.2	178.7
59	3.64	27.2	8.2	8.2	14.4	4.2	178.6
60	3.72	27.2	8.3	8.2	14.5	4.2	178.5
61	3.80	27.1	8.4	8.2	14.5	4.2	178.5
62	3.80	27.1	8.4	8.2	14.5	4.2	178.5
63	3.88	27.1	8.5	8.2	14.6	4.2	178.4
64	3.96	27.0	8.6	8.2	14.6	4.2	178.3
65	4.04	26.9	8.7	8.2	14.6	4.2	178.2
66	4.12	26.9	8.8	8.2	14.7	4.2	178.2
67	4.20	26.8	8.9	8.2	14.7	4.2	178.1
68	4.28	26.8	9.0	8.1	14.8	4.2	178.0
69	4.36	26.7	9.1	8.1	14.8	4.2	178.0
70	4.44	26.7	9.2	8.1	14.8	4.2	177.9
71	4.52	26.6	9.3	8.1	14.9	4.2	177.8
72	4.60	26.5	9.4	8.1	14.9	4.2	177.7
73	4.68	26.5	9.5	8.1	15.0	4.2	177.6
74	4.76	26.4	9.6	8.1	15.0	4.2	177.6
75	4.84	26.4	9.7	8.1	15.0	4.2	177.5
76	4.92	26.3	9.8	8.1	15.1	4.2	177.4
77	5.00	26.3	9.9	8.1	15.1	4.2	177.3
78	5.08	26.2	10.0	8.1	15.2	4.2	177.2
79	5.16	26.1	10.2	8.1	15.2	4.2	177.1
80	5.24	26.1	10.3	8.1	15.2	4.2	177.0
81	5.32	26.0	10.4	8.1	15.3	4.2	177.0
82	5.40	26.0	10.5	8.1	15.3	4.2	176.9
83	5.40	26.0	10.5	8.1	15.3	4.2	176.9
84	5.48	25.9	10.6	8.0	15.4	4.2	176.8
85	5.56	25.9	10.7	8.0	15.4	4.2	176.7
86	5.64	25.8	10.8	8.0	15.5	4.2	176.6
87	5.72	25.7	11.0	8.0	15.5	4.2	176.5
88	5.80	25.7	11.1	8.0	15.5	4.2	176.4
89	5.88	25.6	11.2	8.0	15.6	4.2	176.3
90	5.96	25.6	11.3	8.0	15.6	4.2	176.2

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 215
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.04	25.5	11.4	8.0	15.7	4.2	176.1
92	6.12	25.3	11.6	8.0	15.7	4.2	176.1
93	6.20	25.2	11.7	8.0	15.8	4.2	176.1
94	6.28	25.0	11.8	8.0	15.8	4.2	176.1
95	6.36	24.9	11.9	8.0	15.9	4.2	176.1
96	6.44	24.7	12.0	8.0	15.9	4.2	176.1
97	6.52	24.5	12.1	8.0	16.0	4.2	176.1
98	6.60	24.4	12.3	8.0	16.0	4.2	176.1
99	6.68	24.2	12.4	7.9	16.0	4.2	176.1
100	6.76	24.0	12.5	7.9	16.1	4.2	176.1
101	6.84	23.9	12.6	7.9	16.1	4.3	176.1
102	6.92	23.7	12.7	7.9	16.1	4.3	176.1
103	7.00	23.6	12.8	7.9	16.2	4.3	176.2
104	7.00	23.6	12.8	7.9	16.2	4.3	176.1
105	7.08	23.4	12.9	7.9	16.2	4.3	176.2
106	7.16	23.2	13.0	7.9	16.3	4.3	176.2
107	7.24	23.1	13.1	7.9	16.3	4.3	176.2
108	7.32	22.9	13.3	7.9	16.3	4.3	176.2
109	7.40	22.8	13.4	7.9	16.4	4.3	176.2
110	7.48	22.6	13.5	7.9	16.4	4.3	176.3
111	7.56	22.4	13.6	7.9	16.4	4.3	176.3
112	7.64	22.3	13.7	7.9	16.4	4.3	176.3
113	7.72	22.1	13.8	7.9	16.4	4.3	176.4
114	7.80	21.9	13.9	7.9	16.5	4.3	176.4
115	7.88	21.8	14.0	7.9	16.5	4.4	176.5
116	7.96	21.6	14.0	7.9	16.5	4.4	176.5
117	8.04	21.5	14.1	7.9	16.5	4.4	176.6
118	8.12	21.3	14.2	7.9	16.5	4.4	176.6
119	8.20	21.1	14.3	7.9	16.5	4.4	176.7
120	8.28	21.0	14.4	7.8	16.5	4.4	176.7
121	8.36	20.8	14.5	7.8	16.6	4.4	176.8
122	8.44	20.7	14.6	7.8	16.6	4.4	176.9
123	8.52	20.5	14.7	7.8	16.6	4.4	176.9
124	8.60	20.3	14.7	7.8	16.6	4.5	177.0
125	8.60	20.3	14.7	7.8	16.6	4.5	177.0
126	8.68	20.2	14.8	7.8	16.6	4.5	177.0
127	8.76	20.0	14.9	7.8	16.6	4.5	177.1
128	8.84	19.9	15.0	7.8	16.6	4.5	177.2
129	8.92	19.7	15.0	7.8	16.6	4.5	177.3
130	9.00	19.5	15.1	7.8	16.6	4.5	177.4
131	9.08	19.4	15.2	7.8	16.6	4.5	177.4
132	9.16	19.2	15.2	7.8	16.6	4.5	177.5
133	9.24	19.0	15.3	7.8	16.6	4.6	177.6
134	9.32	18.9	15.4	7.8	16.6	4.6	177.7
135	9.40	18.7	15.4	7.8	16.5	4.6	177.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 216
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	9.48	18.6	15.5	7.8	16.5	4.6	177.9
137	9.56	18.4	15.5	7.8	16.5	4.6	178.0
138	9.64	18.2	15.6	7.8	16.5	4.6	178.2
139	9.72	18.1	15.6	7.8	16.5	4.6	178.3
140	9.80	17.9	15.7	7.8	16.5	4.7	178.4
141	9.88	17.8	15.7	7.8	16.4	4.7	178.5
142	9.96	17.6	15.8	7.8	16.4	4.7	178.6
143	10.04	17.4	15.8	7.8	16.4	4.7	178.8
144	10.12	17.3	15.8	7.8	16.4	4.7	178.9
145	10.20	17.1	15.9	7.8	16.4	4.7	179.0
146	10.20	17.1	15.9	7.8	16.4	4.7	179.0
147	10.28	17.0	15.9	7.8	16.3	4.8	179.1
148	10.36	16.9	15.9	7.8	16.3	4.8	179.2
149	10.44	16.9	16.0	7.8	16.3	4.8	179.2
150	10.52	16.8	16.0	7.8	16.2	4.8	179.3
151	10.60	16.8	16.0	7.8	16.2	4.8	179.3
152	10.68	16.7	16.0	7.8	16.2	4.8	179.4
153	10.76	16.7	16.1	7.8	16.2	4.8	179.4
154	10.84	16.6	16.1	7.8	16.1	4.8	179.5
155	10.92	16.6	16.1	7.8	16.1	4.8	179.5
156	11.00	16.5	16.1	7.8	16.1	4.8	179.6
157	11.08	16.4	16.2	7.8	16.0	4.8	179.6
158	11.16	16.4	16.2	7.8	16.0	4.9	179.7
159	11.24	16.3	16.2	7.8	16.0	4.9	179.8
160	11.32	16.3	16.2	7.8	15.9	4.9	179.8
161	11.40	16.2	16.3	7.8	15.9	4.9	179.9
162	11.48	16.2	16.3	7.8	15.9	4.9	179.9
163	11.56	16.1	16.3	7.8	15.8	4.9	180.0
164	11.64	16.1	16.3	7.8	15.8	4.9	180.0
165	11.72	16.0	16.3	7.8	15.8	4.9	180.1
166	11.80	15.9	16.3	7.8	15.8	4.9	180.2
167	11.80	15.9	16.3	7.8	15.8	4.9	180.2
168	11.88	15.9	16.4	7.8	15.7	4.9	180.2
169	11.96	15.8	16.4	7.8	15.7	5.0	180.3
170	12.04	15.8	16.4	7.8	15.7	5.0	180.4
171	12.12	15.7	16.4	7.8	15.6	5.0	180.4
172	12.20	15.7	16.4	7.8	15.6	5.0	180.5
173	12.28	15.6	16.4	7.8	15.6	5.0	180.6
174	12.36	15.5	16.4	7.8	15.5	5.0	180.6
175	12.44	15.5	16.4	7.8	15.5	5.0	180.7
176	12.52	15.4	16.4	7.8	15.4	5.0	180.8
177	12.60	15.4	16.4	7.8	15.4	5.0	180.9
178	12.68	15.3	16.4	7.8	15.4	5.0	181.0
179	12.76	15.3	16.4	7.8	15.3	5.1	181.1
180	12.84	15.2	16.4	7.8	15.3	5.1	181.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 217
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	12.92	15.2	16.4	7.8	15.3	5.1	181.2
182	13.00	15.1	16.4	7.8	15.2	5.1	181.3
183	13.08	15.0	16.4	7.8	15.2	5.1	181.4
184	13.16	15.0	16.4	7.8	15.2	5.1	181.5
185	13.24	14.9	16.4	7.8	15.1	5.1	181.5
186	13.32	14.9	16.4	7.8	15.1	5.1	181.6
187	13.40	14.9	16.4	7.8	15.1	5.1	181.6
188	13.40	14.9	16.4	7.8	15.1	5.1	181.6
189	13.48	15.0	16.4	7.8	15.0	5.1	181.6
190	13.56	15.1	16.4	7.8	15.0	5.1	181.5
191	13.64	15.1	16.4	7.8	15.0	5.1	181.5
192	13.72	15.2	16.4	7.8	14.9	5.1	181.5
193	13.80	15.2	16.4	7.8	14.9	5.1	181.5
194	13.88	15.3	16.4	7.8	14.9	5.1	181.4
195	13.96	15.3	16.4	7.8	14.8	5.1	181.4
196	14.04	15.4	16.4	7.8	14.8	5.1	181.4
197	14.12	15.4	16.4	7.8	14.8	5.1	181.4
198	14.20	15.5	16.4	7.8	14.7	5.1	181.3
199	14.28	15.6	16.4	7.8	14.7	5.1	181.3
200	14.36	15.6	16.4	7.8	14.7	5.1	181.3
201	14.44	15.7	16.4	7.8	14.7	5.1	181.3
202	14.52	15.7	16.4	7.8	14.6	5.1	181.2
203	14.60	15.8	16.4	7.8	14.6	5.1	181.2
204	14.68	15.8	16.4	7.8	14.6	5.1	181.2
205	14.76	15.9	16.4	7.8	14.6	5.1	181.1
206	14.84	15.9	16.4	7.8	14.6	5.1	181.1
207	14.92	16.0	16.4	7.8	14.5	5.1	181.1
208	15.00	16.0	16.4	7.8	14.5	5.1	181.0
209	15.00	16.0	16.4	7.8	14.5	5.1	181.0
210	15.08	16.1	16.4	7.8	14.5	5.1	181.0
211	15.16	16.2	16.4	7.8	14.5	5.1	181.0
212	15.24	16.2	16.4	7.8	14.5	5.1	180.9
213	15.32	16.3	16.4	7.8	14.4	5.1	180.9
214	15.40	16.3	16.4	7.8	14.4	5.1	180.9
215	15.48	16.4	16.4	7.8	14.4	5.1	180.8
216	15.56	16.4	16.4	7.8	14.4	5.1	180.8
217	15.64	16.5	16.4	7.8	14.4	5.1	180.8
218	15.72	16.5	16.4	7.8	14.4	5.1	180.7
219	15.80	16.6	16.4	7.8	14.4	5.1	180.7
220	15.88	16.7	16.4	7.8	14.3	5.1	180.6
221	15.96	16.7	16.4	7.8	14.3	5.1	180.6
222	16.04	16.8	16.4	7.8	14.3	5.1	180.6
223	16.12	16.8	16.4	7.8	14.3	5.1	180.5
224	16.20	16.9	16.4	7.8	14.3	5.1	180.5
225	16.28	16.9	16.4	7.8	14.3	5.1	180.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 218
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	16.36	17.0	16.4	7.8	14.3	5.1	180.4
227	16.44	17.0	16.4	7.8	14.3	5.1	180.3
228	16.52	17.1	16.4	7.8	14.3	5.1	180.3
229	16.60	17.2	16.4	7.8	14.3	5.0	180.2
230	16.60	17.2	16.4	7.8	14.3	5.0	180.2
231	16.68	17.2	16.4	7.8	14.3	5.0	180.2
232	16.76	17.3	16.4	7.8	14.3	5.0	180.1
233	16.84	17.3	16.4	7.8	14.3	5.0	180.1
234	16.92	17.4	16.4	7.8	14.3	5.0	180.0
235	17.00	17.4	16.4	7.8	14.3	5.0	180.0
236	17.08	17.5	16.4	7.8	14.3	5.0	179.9
237	17.16	17.5	16.5	7.8	14.3	5.0	179.8
238	17.24	17.6	16.5	7.8	14.3	5.0	179.8
239	17.32	17.6	16.5	7.8	14.3	5.0	179.7
240	17.40	17.7	16.5	7.8	14.3	5.0	179.6
241	17.48	17.8	16.5	7.8	14.4	5.0	179.6
242	17.56	17.8	16.5	7.8	14.4	5.0	179.5
243	17.64	17.9	16.5	7.8	14.4	5.0	179.4
244	17.72	17.9	16.5	7.8	14.4	4.9	179.4
245	17.80	18.0	16.5	7.8	14.4	4.9	179.3
246	17.88	18.0	16.5	7.8	14.4	4.9	179.2
247	17.96	18.1	16.5	7.8	14.5	4.9	179.2
248	18.04	18.1	16.5	7.8	14.5	4.9	179.1
249	18.12	18.2	16.5	7.8	14.5	4.9	179.0
250	18.20	18.3	16.5	7.8	14.5	4.9	179.0
251	18.20	18.3	16.5	7.8	14.5	4.9	179.0
252	18.28	18.3	16.5	7.8	14.5	4.9	178.9
253	18.36	18.4	16.5	7.8	14.5	4.9	178.8
254	18.44	18.4	16.5	7.8	14.6	4.9	178.8
255	18.52	18.5	16.5	7.8	14.6	4.9	178.7
256	18.60	18.5	16.5	7.8	14.6	4.9	178.6
257	18.68	18.6	16.5	7.8	14.6	4.8	178.5
258	18.76	18.6	16.5	7.8	14.7	4.8	178.5
259	18.84	18.7	16.5	7.8	14.7	4.8	178.4
260	18.92	18.7	16.5	7.8	14.7	4.8	178.3
261	19.00	18.8	16.5	7.8	14.7	4.8	178.2
262	19.08	18.9	16.5	7.8	14.8	4.8	178.2
263	19.16	18.9	16.6	7.8	14.8	4.8	178.1
264	19.24	19.0	16.6	7.8	14.8	4.8	178.0
265	19.32	19.0	16.6	7.8	14.9	4.8	177.9
266	19.40	19.1	16.6	7.8	14.9	4.8	177.8
267	19.48	19.1	16.6	7.8	14.9	4.8	177.8
268	19.56	19.2	16.6	7.8	15.0	4.7	177.7
269	19.64	19.2	16.6	7.8	15.0	4.7	177.6
270	19.72	19.3	16.6	7.8	15.0	4.7	177.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 219
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	19.80	19.3	16.6	7.8	15.0	4.7	177.4
272	19.80	19.3	16.6	7.8	15.0	4.7	177.4
273	19.88	19.4	16.6	7.8	15.1	4.7	177.4
274	19.96	19.5	16.6	7.8	15.1	4.7	177.3
275	20.04	19.5	16.6	7.8	15.2	4.7	177.2
276	20.12	19.6	16.6	7.8	15.2	4.7	177.1
277	20.20	19.6	16.6	7.8	15.2	4.7	177.0
278	20.28	19.7	16.6	7.8	15.3	4.7	177.0
279	20.36	19.7	16.6	7.8	15.3	4.6	176.9
280	20.44	19.8	16.6	7.8	15.3	4.6	176.8
281	20.52	19.8	16.6	7.8	15.4	4.6	176.7
282	20.60	19.9	16.6	7.8	15.4	4.6	176.7
283	20.68	19.9	16.6	7.8	15.4	4.6	176.6
284	20.76	20.0	16.6	7.8	15.5	4.6	176.5
285	20.84	20.1	16.6	7.8	15.5	4.6	176.4
286	20.92	20.1	16.6	7.8	15.6	4.6	176.3
287	21.00	20.2	16.6	7.8	15.6	4.6	176.2
288	21.08	20.2	16.6	7.8	15.6	4.6	176.2
289	21.16	20.3	16.6	7.8	15.7	4.5	176.1
290	21.24	20.3	16.5	7.8	15.7	4.5	176.0
291	21.32	20.4	16.5	7.8	15.7	4.5	176.0
292	21.40	20.4	16.5	7.8	15.7	4.5	175.9
293	21.40	20.4	16.5	7.8	15.7	4.5	175.9
294	21.48	20.5	16.5	7.8	15.8	4.5	175.9
295	21.56	20.5	16.5	7.8	15.8	4.5	175.8
296	21.64	20.6	16.5	7.8	15.8	4.5	175.7
297	21.72	20.6	16.5	7.8	15.9	4.5	175.7
298	21.80	20.7	16.4	7.8	15.9	4.5	175.6
299	21.88	20.8	16.4	7.8	15.9	4.5	175.6
300	21.96	20.8	16.4	7.8	16.0	4.5	175.5
301	22.04	20.9	16.4	7.8	16.0	4.4	175.5
302	22.12	20.9	16.3	7.8	16.0	4.4	175.4
303	22.20	21.0	16.3	7.8	16.1	4.4	175.3
304	22.28	21.0	16.3	7.8	16.1	4.4	175.3
305	22.36	21.1	16.3	7.8	16.1	4.4	175.2
306	22.44	21.1	16.2	7.8	16.1	4.4	175.2
307	22.52	21.2	16.2	7.8	16.2	4.4	175.1
308	22.60	21.2	16.2	7.8	16.2	4.4	175.1
309	22.68	21.3	16.2	7.8	16.2	4.4	175.0
310	22.76	21.4	16.1	7.8	16.3	4.4	175.0
311	22.84	21.4	16.1	7.8	16.3	4.4	174.9
312	22.92	21.5	16.1	7.8	16.3	4.4	174.9
313	23.00	21.5	16.0	7.8	16.4	4.4	174.9
314	23.00	21.5	16.0	7.8	16.3	4.4	174.9
315	23.08	21.6	16.0	7.8	16.4	4.3	174.8

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 220
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	23.16	21.6	16.0	7.8	16.4	4.3	174.8
317	23.24	21.7	15.9	7.8	16.4	4.3	174.8
318	23.32	21.7	15.9	7.8	16.4	4.3	174.7
319	23.40	21.8	15.8	7.8	16.5	4.3	174.7
320	23.48	21.8	15.8	7.8	16.5	4.3	174.7
321	23.56	21.9	15.7	7.8	16.5	4.3	174.7
322	23.64	21.9	15.7	7.8	16.5	4.3	174.6
323	23.72	22.0	15.6	7.8	16.6	4.3	174.6
324	23.80	22.1	15.6	7.8	16.6	4.3	174.6
325	23.88	22.1	15.5	7.8	16.6	4.3	174.6
326	23.96	22.2	15.5	7.8	16.6	4.3	174.6
327	24.04	22.2	15.4	7.8	16.6	4.3	174.6
328	24.12	22.3	15.3	7.8	16.6	4.3	174.6
329	24.20	22.3	15.3	7.8	16.6	4.3	174.6
330	24.28	22.4	15.2	7.8	16.7	4.3	174.6
331	24.36	22.4	15.2	7.8	16.7	4.3	174.6
332	24.44	22.5	15.1	7.8	16.7	4.3	174.6
333	24.52	22.5	15.0	7.8	16.7	4.3	174.6
334	24.60	22.6	14.9	7.8	16.7	4.3	174.6
335	24.60	22.6	14.9	7.8	16.7	4.3	174.6
336	24.68	22.6	14.9	7.8	16.7	4.3	174.6
337	24.76	22.7	14.8	7.8	16.7	4.2	174.7
338	24.84	22.8	14.7	7.8	16.7	4.2	174.7
339	24.92	22.8	14.6	7.8	16.7	4.2	174.7
340	25.00	22.9	14.5	7.8	16.7	4.2	174.7
341	25.08	22.9	14.5	7.8	16.7	4.2	174.7
342	25.16	23.0	14.4	7.8	16.7	4.2	174.8
343	25.24	23.0	14.3	7.8	16.7	4.2	174.8
344	25.32	23.1	14.2	7.8	16.7	4.2	174.8
345	25.40	23.1	14.1	7.8	16.7	4.2	174.9
346	25.48	23.2	14.0	7.8	16.7	4.2	174.9
347	25.56	23.2	13.9	7.8	16.7	4.2	174.9
348	25.64	23.3	13.8	7.8	16.7	4.2	175.0
349	25.72	23.3	13.7	7.8	16.7	4.2	175.0
350	25.80	23.4	13.6	7.8	16.7	4.2	175.1
351	25.88	23.4	13.5	7.9	16.7	4.2	175.1
352	25.96	23.5	13.4	7.9	16.7	4.2	175.2
353	26.04	23.6	13.3	7.9	16.7	4.2	175.2
354	26.12	23.6	13.2	7.9	16.7	4.2	175.3
355	26.20	23.7	13.1	7.9	16.7	4.2	175.3
356	26.20	23.7	13.1	7.9	16.7	4.2	175.3
357	26.28	23.7	13.0	7.9	16.7	4.2	175.4
358	26.36	23.8	12.9	7.9	16.7	4.2	175.5
359	26.44	23.8	12.8	7.9	16.7	4.2	175.5
360	26.52	23.9	12.7	7.9	16.7	4.2	175.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 221
 Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	26.60	23.9	12.6	7.9	16.6	4.2	175.7
362	26.68	24.0	12.5	7.9	16.6	4.2	175.7
363	26.76	24.1	12.3	7.9	16.6	4.2	175.8
364	26.84	24.2	12.2	7.9	16.6	4.2	175.7
365	26.92	24.4	12.1	7.9	16.6	4.2	175.7
366	27.00	24.6	12.0	7.9	16.6	4.2	175.7
367	27.08	24.7	11.9	7.9	16.6	4.2	175.6
368	27.16	24.9	11.7	7.9	16.6	4.2	175.6
369	27.24	25.0	11.6	7.9	16.5	4.2	175.6
370	27.32	25.2	11.5	7.9	16.5	4.2	175.6
371	27.40	25.3	11.4	7.9	16.5	4.2	175.6
372	27.48	25.5	11.3	7.9	16.5	4.2	175.6
373	27.56	25.7	11.1	7.9	16.4	4.2	175.6
374	27.64	25.8	11.0	7.9	16.4	4.2	175.6
375	27.72	26.0	10.9	7.9	16.4	4.2	175.6
376	27.80	26.1	10.8	7.9	16.4	4.2	175.6
377	27.80	26.1	10.8	7.9	16.4	4.2	175.6
378	27.88	26.3	10.7	7.9	16.3	4.1	175.6
379	27.96	26.4	10.5	7.9	16.3	4.1	175.6
380	28.04	26.6	10.4	8.0	16.3	4.1	175.5
381	28.12	26.7	10.3	8.0	16.3	4.1	175.5
382	28.20	26.9	10.2	8.0	16.2	4.1	175.5
383	28.28	27.1	10.0	8.0	16.2	4.1	175.5
384	28.36	27.2	9.9	8.0	16.2	4.1	175.5
385	28.44	27.4	9.8	8.0	16.2	4.1	175.5
386	28.52	27.5	9.7	8.0	16.1	4.1	175.5
387	28.60	27.7	9.5	8.0	16.1	4.1	175.5
388	28.68	27.8	9.4	8.0	16.1	4.1	175.5
389	28.76	28.0	9.3	8.0	16.1	4.1	175.5
390	28.84	28.1	9.2	8.0	16.0	4.1	175.5
391	28.92	28.3	9.1	8.0	16.0	4.1	175.5
392	29.00	28.5	8.9	8.0	16.0	4.1	175.4
393	29.08	28.6	8.8	8.0	16.0	4.1	175.4
394	29.16	28.8	8.7	8.0	15.9	4.0	175.4
395	29.24	28.9	8.6	8.0	15.9	4.0	175.4
396	29.32	29.1	8.5	8.0	15.9	4.0	175.4
397	29.40	29.2	8.4	8.1	15.8	4.0	175.4
398	29.40	29.2	8.4	8.1	15.8	4.0	175.4
399	29.48	29.4	8.2	8.1	15.8	4.0	175.4
400	29.56	29.5	8.1	8.1	15.8	4.0	175.4
401	29.64	29.7	8.0	8.1	15.7	4.0	175.4
402	29.72	29.8	7.9	8.1	15.7	4.0	175.4
403	29.80	30.0	7.8	8.1	15.7	4.0	175.4
404	29.88	30.1	7.7	8.1	15.6	4.0	175.4
405	29.96	30.1	7.6	8.1	15.6	4.0	175.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	30.04	30.2	7.5	8.1	15.6	4.0	175.6
407	30.12	30.3	7.4	8.1	15.6	4.0	175.6
408	30.20	30.3	7.3	8.1	15.5	4.0	175.7
409	30.28	30.4	7.2	8.1	15.5	4.0	175.8
410	30.36	30.4	7.1	8.1	15.5	4.0	175.8
411	30.44	30.5	7.0	8.1	15.5	4.0	175.9
412	30.52	30.5	6.9	8.1	15.5	4.0	175.9
413	30.60	30.6	6.8	8.1	15.4	4.0	176.0
414	30.68	30.6	6.7	8.2	15.4	4.0	176.1
415	30.76	30.7	6.6	8.2	15.4	4.0	176.1
416	30.84	30.7	6.5	8.2	15.4	4.0	176.2
417	30.92	30.8	6.4	8.2	15.4	4.0	176.2
418	31.00	30.8	6.3	8.2	15.4	4.0	176.3
419	31.00	30.8	6.3	8.2	15.3	4.0	176.3
420	31.08	30.9	6.2	8.2	15.3	4.0	176.3
421	31.16	30.9	6.2	8.2	15.3	4.0	176.3
422	31.24	31.0	6.1	8.2	15.3	4.0	176.4
423	31.32	31.0	6.0	8.2	15.3	4.0	176.4
424	31.40	31.1	5.9	8.2	15.3	4.0	176.5
425	31.48	31.1	5.8	8.2	15.3	4.0	176.5
426	31.56	31.2	5.8	8.2	15.2	4.0	176.5
427	31.64	31.3	5.7	8.2	15.2	4.0	176.6
428	31.72	31.3	5.6	8.2	15.2	4.0	176.6
429	31.80	31.4	5.5	8.2	15.2	4.0	176.6
430	31.88	31.4	5.5	8.2	15.2	4.0	176.7
431	31.96	31.5	5.4	8.2	15.2	3.9	176.7
432	32.04	31.5	5.3	8.2	15.2	3.9	176.7
433	32.12	31.6	5.3	8.3	15.1	3.9	176.7
434	32.20	31.6	5.2	8.3	15.1	3.9	176.8
435	32.28	31.7	5.1	8.3	15.1	3.9	176.8
436	32.36	31.7	5.1	8.3	15.1	3.9	176.8
437	32.44	31.8	5.0	8.3	15.1	3.9	176.8
438	32.52	31.8	5.0	8.3	15.1	3.9	176.8
439	32.60	31.9	4.9	8.3	15.1	3.9	176.8
440	32.60	31.9	5.0	8.3	15.3	3.9	176.6
441	32.63	31.9	5.0	8.3	15.4	3.9	176.4
442	32.66	31.9	5.0	8.3	15.5	3.9	176.3
443	32.69	31.9	5.0	8.3	15.6	3.9	176.2
444	32.72	32.0	5.0	8.3	15.7	3.9	176.1
445	32.75	32.0	4.9	8.3	15.8	3.9	176.0
446	32.78	32.0	4.9	8.3	15.9	3.9	175.9
447	32.81	32.0	4.9	8.3	16.0	3.9	175.8
448	32.84	32.0	4.9	8.3	16.1	3.9	175.7
449	32.87	32.1	4.9	8.3	16.2	3.9	175.6
450	32.90	32.1	4.8	8.3	16.3	3.9	175.5

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c2 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

Page: 223

Date: 7/10/11

Summary of tension force losses for cable no. 2, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	32.93	32.1	4.8	8.3	16.4	3.9	175.4
452	32.96	32.1	4.8	8.3	16.6	3.9	175.3

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 213
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.09	0.0	-0.0	8.8	0.0	10.4	221.7
2	0.10	32.2	0.5	8.3	5.4	5.0	189.5
3	0.12	32.2	1.5	8.3	17.4	4.1	177.4
4	0.15	32.2	1.5	8.3	17.2	4.1	177.6
5	0.18	32.2	1.6	8.3	17.0	4.1	177.8
6	0.21	32.1	1.6	8.3	16.8	4.1	178.0
7	0.24	32.1	1.6	8.3	16.6	4.1	178.2
8	0.27	32.1	1.6	8.3	16.5	4.1	178.3
9	0.30	32.1	1.6	8.3	16.4	4.1	178.5
10	0.33	32.1	1.6	8.3	16.3	4.1	178.6
11	0.36	32.0	1.6	8.3	16.2	4.1	178.7
12	0.39	32.0	1.6	8.3	16.1	4.1	178.8
13	0.42	32.0	1.6	8.3	16.0	4.1	178.9
14	0.45	32.0	1.6	8.3	15.8	4.1	179.1
15	0.48	32.0	1.6	8.3	15.7	4.1	179.2
16	0.51	31.9	1.6	8.3	15.6	4.2	179.3
17	0.54	31.9	1.6	8.3	15.5	4.2	179.4
18	0.57	31.9	1.6	8.3	15.4	4.2	179.5
19	0.60	31.9	1.6	8.3	15.3	4.2	179.6
20	0.60	31.9	1.6	8.3	15.1	4.2	179.9
21	0.68	31.8	1.6	8.3	15.1	4.2	179.9
22	0.76	31.8	1.6	8.3	15.1	4.2	179.9
23	0.84	31.7	1.7	8.3	15.1	4.2	179.9
24	0.92	31.7	1.7	8.3	15.2	4.2	179.9
25	1.00	31.6	1.7	8.3	15.2	4.2	179.9
26	1.08	31.6	1.7	8.3	15.2	4.2	180.0
27	1.16	31.5	1.7	8.2	15.2	4.2	180.0
28	1.24	31.5	1.8	8.2	15.2	4.2	180.0
29	1.32	31.4	1.8	8.2	15.2	4.2	180.0
30	1.40	31.4	1.8	8.2	15.2	4.2	180.0
31	1.48	31.3	1.9	8.2	15.3	4.3	180.0
32	1.56	31.3	1.9	8.2	15.3	4.3	180.0
33	1.64	31.2	1.9	8.2	15.3	4.3	180.0
34	1.72	31.1	1.9	8.2	15.3	4.3	180.0
35	1.80	31.1	2.0	8.2	15.3	4.3	180.0
36	1.88	31.0	2.0	8.2	15.3	4.3	180.0
37	1.96	31.0	2.0	8.2	15.4	4.3	180.1
38	2.04	30.9	2.1	8.2	15.4	4.3	180.1
39	2.12	30.9	2.1	8.2	15.4	4.3	180.1
40	2.20	30.8	2.1	8.2	15.4	4.3	180.1
41	2.20	30.8	2.1	8.2	15.4	4.3	180.1
42	2.28	30.8	2.2	8.2	15.4	4.3	180.1
43	2.36	30.7	2.2	8.2	15.4	4.3	180.1
44	2.44	30.7	2.2	8.2	15.5	4.3	180.0
45	2.52	30.6	2.3	8.2	15.5	4.3	180.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

Page: 214

Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	2.60	30.6	2.3	8.1	15.5	4.3	180.0
47	2.68	30.5	2.4	8.1	15.5	4.3	180.0
48	2.76	30.5	2.4	8.1	15.5	4.3	180.0
49	2.84	30.4	2.4	8.1	15.6	4.4	180.0
50	2.92	30.4	2.5	8.1	15.6	4.4	180.0
51	3.00	30.3	2.5	8.1	15.6	4.4	180.0
52	3.08	30.3	2.6	8.1	15.6	4.4	180.0
53	3.16	30.2	2.6	8.1	15.6	4.4	180.0
54	3.24	30.1	2.7	8.1	15.7	4.4	180.0
55	3.32	30.1	2.7	8.1	15.7	4.4	179.9
56	3.40	30.0	2.8	8.1	15.7	4.4	180.0
57	3.48	29.8	2.8	8.1	15.8	4.4	180.0
58	3.56	29.7	2.9	8.1	15.8	4.4	180.1
59	3.64	29.5	2.9	8.1	15.8	4.4	180.2
60	3.72	29.4	3.0	8.1	15.9	4.4	180.2
61	3.80	29.2	3.0	8.1	15.9	4.5	180.3
62	3.80	29.2	3.0	8.1	15.9	4.5	180.3
63	3.88	29.1	3.1	8.0	15.9	4.5	180.3
64	3.96	28.9	3.1	8.0	16.0	4.5	180.4
65	4.04	28.8	3.2	8.0	16.0	4.5	180.5
66	4.12	28.6	3.2	8.0	16.0	4.5	180.5
67	4.20	28.5	3.3	8.0	16.1	4.5	180.6
68	4.28	28.3	3.3	8.0	16.1	4.5	180.6
69	4.36	28.1	3.4	8.0	16.1	4.5	180.7
70	4.44	28.0	3.5	8.0	16.1	4.6	180.8
71	4.52	27.8	3.5	8.0	16.2	4.6	180.8
72	4.60	27.7	3.6	8.0	16.2	4.6	180.9
73	4.68	27.5	3.6	8.0	16.2	4.6	181.0
74	4.76	27.4	3.7	8.0	16.2	4.6	181.0
75	4.84	27.2	3.7	8.0	16.3	4.6	181.1
76	4.92	27.1	3.8	8.0	16.3	4.6	181.2
77	5.00	26.9	3.9	8.0	16.3	4.6	181.2
78	5.08	26.7	3.9	8.0	16.3	4.7	181.3
79	5.16	26.6	4.0	8.0	16.3	4.7	181.4
80	5.24	26.4	4.0	7.9	16.4	4.7	181.4
81	5.32	26.3	4.1	7.9	16.4	4.7	181.5
82	5.40	26.1	4.2	7.9	16.4	4.7	181.6
83	5.40	26.1	4.2	7.9	16.4	4.7	181.6
84	5.48	26.0	4.2	7.9	16.5	4.7	181.6
85	5.56	25.8	4.3	7.9	16.5	4.7	181.7
86	5.64	25.7	4.4	7.9	16.5	4.7	181.7
87	5.72	25.5	4.4	7.9	16.5	4.7	181.8
88	5.80	25.3	4.5	7.9	16.5	4.8	181.9
89	5.88	25.2	4.5	7.9	16.6	4.8	181.9
90	5.96	25.0	4.6	7.9	16.6	4.8	182.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 215
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	6.04	24.9	4.7	7.9	16.6	4.8	182.1
92	6.12	24.7	4.7	7.9	16.6	4.8	182.2
93	6.20	24.6	4.8	7.9	16.6	4.8	182.2
94	6.28	24.4	4.8	7.9	16.6	4.8	182.3
95	6.36	24.2	4.9	7.9	16.7	4.8	182.4
96	6.44	24.1	5.0	7.9	16.7	4.9	182.5
97	6.52	24.0	5.0	7.9	16.7	4.9	182.5
98	6.60	23.9	5.1	7.9	16.7	4.9	182.5
99	6.68	23.9	5.1	7.9	16.7	4.9	182.4
100	6.76	23.8	5.2	7.9	16.7	4.9	182.4
101	6.84	23.8	5.3	7.9	16.7	4.9	182.4
102	6.92	23.7	5.3	7.9	16.7	4.9	182.4
103	7.00	23.7	5.4	7.9	16.7	4.9	182.4
104	7.00	23.7	5.4	7.9	16.7	4.9	182.4
105	7.08	23.6	5.4	7.9	16.7	4.9	182.4
106	7.16	23.6	5.5	7.9	16.8	4.9	182.3
107	7.24	23.5	5.6	7.9	16.8	4.9	182.3
108	7.32	23.4	5.6	7.9	16.8	4.9	182.3
109	7.40	23.4	5.7	7.8	16.8	4.9	182.3
110	7.48	23.3	5.7	7.8	16.8	4.9	182.3
111	7.56	23.3	5.8	7.8	16.8	4.9	182.3
112	7.64	23.2	5.8	7.8	16.8	4.9	182.3
113	7.72	23.2	5.9	7.8	16.8	4.9	182.3
114	7.80	23.1	5.9	7.8	16.8	4.9	182.3
115	7.88	23.1	6.0	7.8	16.8	4.9	182.3
116	7.96	23.0	6.1	7.8	16.8	4.9	182.3
117	8.04	23.0	6.1	7.8	16.8	5.0	182.3
118	8.12	22.9	6.2	7.8	16.8	5.0	182.3
119	8.20	22.9	6.2	7.8	16.7	5.0	182.3
120	8.28	22.8	6.3	7.8	16.7	5.0	182.3
121	8.36	22.8	6.3	7.8	16.7	5.0	182.3
122	8.44	22.7	6.3	7.8	16.7	5.0	182.4
123	8.52	22.6	6.4	7.8	16.7	5.0	182.4
124	8.60	22.6	6.4	7.8	16.7	5.0	182.4
125	8.60	22.6	6.4	7.8	16.7	5.0	182.4
126	8.68	22.5	6.5	7.8	16.7	5.0	182.4
127	8.76	22.5	6.5	7.8	16.7	5.0	182.4
128	8.84	22.4	6.6	7.8	16.7	5.0	182.4
129	8.92	22.4	6.6	7.8	16.7	5.0	182.4
130	9.00	22.3	6.7	7.8	16.7	5.0	182.4
131	9.08	22.3	6.7	7.8	16.6	5.0	182.5
132	9.16	22.2	6.7	7.8	16.6	5.0	182.5
133	9.24	22.2	6.8	7.8	16.6	5.0	182.5
134	9.32	22.1	6.8	7.8	16.6	5.1	182.5
135	9.40	22.1	6.9	7.8	16.6	5.1	182.6

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 216
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	9.48	22.0	6.9	7.8	16.6	5.1	182.6
137	9.56	21.9	6.9	7.8	16.5	5.1	182.6
138	9.64	21.9	7.0	7.8	16.5	5.1	182.7
139	9.72	21.8	7.0	7.8	16.5	5.1	182.7
140	9.80	21.8	7.0	7.8	16.5	5.1	182.7
141	9.88	21.7	7.1	7.8	16.5	5.1	182.8
142	9.96	21.7	7.1	7.8	16.4	5.1	182.8
143	10.04	21.6	7.1	7.8	16.4	5.1	182.8
144	10.12	21.6	7.2	7.8	16.4	5.1	182.9
145	10.20	21.5	7.2	7.8	16.4	5.1	182.9
146	10.20	21.5	7.2	7.8	16.4	5.1	182.9
147	10.28	21.5	7.2	7.8	16.3	5.2	183.0
148	10.36	21.4	7.3	7.8	16.3	5.2	183.0
149	10.44	21.4	7.3	7.8	16.3	5.2	183.0
150	10.52	21.3	7.3	7.8	16.2	5.2	183.1
151	10.60	21.2	7.3	7.8	16.2	5.2	183.1
152	10.68	21.2	7.4	7.8	16.2	5.2	183.2
153	10.76	21.1	7.4	7.8	16.2	5.2	183.2
154	10.84	21.1	7.4	7.8	16.1	5.2	183.3
155	10.92	21.0	7.4	7.8	16.1	5.2	183.4
156	11.00	21.0	7.4	7.8	16.1	5.2	183.4
157	11.08	20.9	7.5	7.8	16.0	5.2	183.5
158	11.16	20.9	7.5	7.8	16.0	5.3	183.5
159	11.24	20.8	7.5	7.8	16.0	5.3	183.6
160	11.32	20.8	7.5	7.8	15.9	5.3	183.6
161	11.40	20.7	7.5	7.8	15.9	5.3	183.7
162	11.48	20.6	7.6	7.8	15.9	5.3	183.7
163	11.56	20.6	7.6	7.8	15.8	5.3	183.8
164	11.64	20.5	7.6	7.8	15.8	5.3	183.9
165	11.72	20.5	7.6	7.8	15.8	5.3	183.9
166	11.80	20.4	7.6	7.8	15.8	5.3	184.0
167	11.80	20.4	7.6	7.8	15.8	5.3	184.0
168	11.88	20.4	7.6	7.8	15.7	5.3	184.0
169	11.96	20.3	7.6	7.8	15.7	5.4	184.1
170	12.04	20.3	7.7	7.8	15.7	5.4	184.2
171	12.12	20.2	7.7	7.8	15.6	5.4	184.2
172	12.20	20.2	7.7	7.8	15.6	5.4	184.3
173	12.28	20.1	7.7	7.8	15.6	5.4	184.4
174	12.36	20.1	7.7	7.8	15.5	5.4	184.5
175	12.44	20.0	7.7	7.8	15.5	5.4	184.5
176	12.52	19.9	7.7	7.8	15.4	5.4	184.6
177	12.60	19.9	7.7	7.8	15.4	5.5	184.7
178	12.68	19.8	7.7	7.8	15.4	5.5	184.8
179	12.76	19.8	7.7	7.8	15.3	5.5	184.9
180	12.84	19.7	7.7	7.8	15.3	5.5	185.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 217
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	12.92	19.7	7.7	7.8	15.3	5.5	185.0
182	13.00	19.6	7.7	7.8	15.2	5.5	185.1
183	13.08	19.6	7.7	7.8	15.2	5.5	185.2
184	13.16	19.5	7.7	7.8	15.2	5.5	185.3
185	13.24	19.5	7.7	7.8	15.1	5.5	185.4
186	13.32	19.4	7.7	7.8	15.1	5.6	185.4
187	13.40	19.3	7.6	7.8	15.1	5.6	185.5
188	13.40	19.3	7.6	7.8	15.1	5.6	185.5
189	13.48	19.3	7.6	7.8	15.0	5.6	185.6
190	13.56	19.2	7.6	7.8	15.0	5.6	185.7
191	13.64	19.2	7.6	7.8	15.0	5.6	185.7
192	13.72	19.1	7.6	7.8	14.9	5.6	185.8
193	13.80	19.1	7.6	7.8	14.9	5.6	185.9
194	13.88	19.0	7.6	7.8	14.9	5.6	186.0
195	13.96	19.0	7.6	7.8	14.8	5.7	186.0
196	14.04	18.9	7.6	7.8	14.8	5.7	186.1
197	14.12	18.9	7.6	7.8	14.8	5.7	186.2
198	14.20	18.8	7.6	7.8	14.7	5.7	186.3
199	14.28	18.7	7.6	7.8	14.7	5.7	186.3
200	14.36	18.7	7.6	7.8	14.7	5.7	186.4
201	14.44	18.6	7.6	7.8	14.7	5.7	186.5
202	14.52	18.6	7.6	7.8	14.6	5.7	186.6
203	14.60	18.5	7.6	7.8	14.6	5.7	186.6
204	14.68	18.5	7.6	7.8	14.6	5.7	186.7
205	14.76	18.4	7.6	7.8	14.6	5.8	186.8
206	14.84	18.4	7.6	7.8	14.6	5.8	186.8
207	14.92	18.3	7.6	7.8	14.5	5.8	186.9
208	15.00	18.3	7.6	7.8	14.5	5.8	187.0
209	15.00	18.3	7.6	7.8	14.5	5.8	187.0
210	15.08	18.2	7.6	7.8	14.5	5.8	187.0
211	15.16	18.1	7.6	7.8	14.5	5.8	187.1
212	15.24	18.1	7.6	7.8	14.5	5.8	187.2
213	15.32	18.0	7.6	7.8	14.4	5.8	187.2
214	15.40	18.0	7.6	7.8	14.4	5.8	187.3
215	15.48	17.9	7.6	7.8	14.4	5.8	187.4
216	15.56	17.9	7.6	7.8	14.4	5.8	187.4
217	15.64	17.8	7.6	7.8	14.4	5.9	187.5
218	15.72	17.8	7.6	7.8	14.4	5.9	187.6
219	15.80	17.7	7.6	7.8	14.4	5.9	187.6
220	15.88	17.6	7.6	7.8	14.3	5.9	187.7
221	15.96	17.6	7.6	7.8	14.3	5.9	187.7
222	16.04	17.5	7.6	7.8	14.3	5.9	187.8
223	16.12	17.5	7.6	7.8	14.3	5.9	187.9
224	16.20	17.4	7.6	7.8	14.3	5.9	187.9
225	16.28	17.4	7.6	7.8	14.3	5.9	188.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 218
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	16.36	17.3	7.6	7.8	14.3	5.9	188.0
227	16.44	17.3	7.6	7.8	14.3	5.9	188.1
228	16.52	17.2	7.6	7.8	14.3	5.9	188.1
229	16.60	17.2	7.6	7.8	14.3	6.0	188.2
230	16.60	17.2	7.6	7.8	14.3	6.0	188.2
231	16.68	17.1	7.6	7.8	14.3	6.0	188.2
232	16.76	17.0	7.6	7.8	14.3	6.0	188.3
233	16.84	17.0	7.6	7.8	14.3	6.0	188.3
234	16.92	16.9	7.6	7.8	14.3	6.0	188.4
235	17.00	16.9	7.6	7.8	14.3	6.0	188.4
236	17.08	16.8	7.6	7.8	14.3	6.0	188.4
237	17.16	16.8	7.6	7.8	14.3	6.0	188.5
238	17.24	16.7	7.6	7.8	14.3	6.0	188.5
239	17.32	16.7	7.6	7.8	14.3	6.0	188.6
240	17.40	16.6	7.6	7.8	14.3	6.0	188.6
241	17.48	16.5	7.6	7.8	14.4	6.0	188.6
242	17.56	16.5	7.6	7.8	14.4	6.0	188.7
243	17.64	16.4	7.6	7.8	14.4	6.0	188.7
244	17.72	16.4	7.6	7.8	14.4	6.0	188.7
245	17.80	16.3	7.6	7.8	14.4	6.0	188.8
246	17.88	16.3	7.6	7.8	14.4	6.0	188.8
247	17.96	16.2	7.6	7.8	14.5	6.0	188.8
248	18.04	16.2	7.6	7.8	14.5	6.0	188.9
249	18.12	16.1	7.6	7.8	14.5	6.0	188.9
250	18.20	16.0	7.6	7.8	14.5	6.0	188.9
251	18.20	16.0	7.6	7.8	14.5	6.0	188.9
252	18.28	16.0	7.6	7.8	14.5	6.0	189.0
253	18.36	15.9	7.6	7.8	14.5	6.0	189.0
254	18.44	15.9	7.6	7.8	14.6	6.0	189.0
255	18.52	15.8	7.6	7.8	14.6	6.0	189.1
256	18.60	15.8	7.6	7.8	14.6	6.0	189.1
257	18.68	15.7	7.6	7.8	14.6	6.0	189.1
258	18.76	15.7	7.6	7.8	14.7	6.0	189.1
259	18.84	15.6	7.6	7.8	14.7	6.0	189.2
260	18.92	15.6	7.6	7.8	14.7	6.0	189.2
261	19.00	15.5	7.6	7.8	14.7	6.0	189.2
262	19.08	15.4	7.6	7.8	14.8	6.0	189.2
263	19.16	15.4	7.6	7.8	14.8	6.0	189.3
264	19.24	15.3	7.6	7.8	14.8	6.0	189.3
265	19.32	15.3	7.6	7.8	14.9	6.0	189.3
266	19.40	15.2	7.6	7.8	14.9	6.0	189.3
267	19.48	15.2	7.6	7.8	14.9	6.0	189.4
268	19.56	15.1	7.6	7.8	15.0	6.0	189.4
269	19.64	15.1	7.6	7.8	15.0	6.0	189.4
270	19.72	15.0	7.6	7.8	15.0	6.0	189.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 219
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	19.80	14.9	7.6	7.8	15.0	6.0	189.4
272	19.80	14.9	7.6	7.8	15.0	6.0	189.4
273	19.88	14.9	7.7	7.8	15.1	6.0	189.5
274	19.96	14.9	7.7	7.8	15.1	6.0	189.4
275	20.04	15.0	7.7	7.8	15.2	6.0	189.3
276	20.12	15.0	7.7	7.8	15.2	6.0	189.2
277	20.20	15.1	7.7	7.8	15.2	6.0	189.2
278	20.28	15.2	7.7	7.8	15.3	6.0	189.1
279	20.36	15.2	7.7	7.8	15.3	6.0	189.0
280	20.44	15.3	7.7	7.8	15.3	6.0	188.9
281	20.52	15.3	7.7	7.8	15.4	5.9	188.8
282	20.60	15.4	7.7	7.8	15.4	5.9	188.8
283	20.68	15.4	7.7	7.8	15.4	5.9	188.7
284	20.76	15.5	7.7	7.8	15.5	5.9	188.6
285	20.84	15.5	7.7	7.8	15.5	5.9	188.5
286	20.92	15.6	7.7	7.8	15.6	5.9	188.4
287	21.00	15.7	7.7	7.8	15.6	5.9	188.3
288	21.08	15.7	7.7	7.8	15.6	5.8	188.3
289	21.16	15.8	7.7	7.8	15.7	5.8	188.2
290	21.24	15.8	7.6	7.8	15.7	5.8	188.1
291	21.32	15.9	7.6	7.8	15.7	5.8	188.1
292	21.40	15.9	7.6	7.8	15.7	5.8	188.0
293	21.40	15.9	7.6	7.8	15.7	5.8	188.0
294	21.48	16.0	7.6	7.8	15.8	5.8	188.0
295	21.56	16.1	7.6	7.8	15.8	5.8	187.9
296	21.64	16.1	7.6	7.8	15.8	5.8	187.8
297	21.72	16.2	7.6	7.8	15.9	5.8	187.8
298	21.80	16.2	7.5	7.8	15.9	5.7	187.7
299	21.88	16.3	7.5	7.8	15.9	5.7	187.7
300	21.96	16.3	7.5	7.8	16.0	5.7	187.6
301	22.04	16.4	7.5	7.8	16.0	5.7	187.5
302	22.12	16.4	7.5	7.8	16.0	5.7	187.5
303	22.20	16.5	7.4	7.8	16.1	5.7	187.4
304	22.28	16.6	7.4	7.8	16.1	5.7	187.4
305	22.36	16.6	7.4	7.8	16.1	5.7	187.3
306	22.44	16.7	7.4	7.8	16.1	5.7	187.3
307	22.52	16.7	7.4	7.8	16.2	5.6	187.2
308	22.60	16.8	7.3	7.8	16.2	5.6	187.2
309	22.68	16.8	7.3	7.8	16.2	5.6	187.1
310	22.76	16.9	7.3	7.8	16.3	5.6	187.1
311	22.84	16.9	7.3	7.8	16.3	5.6	187.0
312	22.92	17.0	7.2	7.8	16.3	5.6	187.0
313	23.00	17.1	7.2	7.8	16.4	5.6	186.9
314	23.00	17.1	7.2	7.8	16.3	5.6	186.9
315	23.08	17.3	7.2	7.8	16.4	5.6	186.7

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 220
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	23.16	17.4	7.1	7.8	16.4	5.5	186.6
317	23.24	17.6	7.1	7.8	16.4	5.5	186.5
318	23.32	17.8	7.1	7.8	16.4	5.5	186.4
319	23.40	17.9	7.0	7.8	16.5	5.5	186.2
320	23.48	18.1	7.0	7.8	16.5	5.5	186.1
321	23.56	18.2	6.9	7.8	16.5	5.4	186.0
322	23.64	18.4	6.9	7.8	16.5	5.4	185.9
323	23.72	18.6	6.9	7.8	16.5	5.4	185.8
324	23.80	18.7	6.8	7.8	16.5	5.4	185.6
325	23.88	18.9	6.8	7.8	16.5	5.4	185.5
326	23.96	19.0	6.7	7.8	16.6	5.4	185.4
327	24.04	19.2	6.7	7.8	16.6	5.3	185.3
328	24.12	19.4	6.6	7.8	16.6	5.3	185.2
329	24.20	19.5	6.6	7.8	16.6	5.3	185.1
330	24.28	19.7	6.5	7.8	16.6	5.3	185.0
331	24.36	19.9	6.5	7.8	16.6	5.3	184.9
332	24.44	20.0	6.4	7.8	16.6	5.3	184.8
333	24.52	20.2	6.4	7.8	16.6	5.2	184.7
334	24.60	20.3	6.3	7.8	16.6	5.2	184.6
335	24.60	20.3	6.3	7.8	16.6	5.2	184.7
336	24.68	20.5	6.3	7.8	16.6	5.2	184.6
337	24.76	20.7	6.2	7.8	16.5	5.2	184.5
338	24.84	20.8	6.1	7.8	16.5	5.2	184.4
339	24.92	21.0	6.1	7.8	16.5	5.2	184.3
340	25.00	21.1	6.0	7.9	16.5	5.1	184.2
341	25.08	21.3	6.0	7.9	16.5	5.1	184.2
342	25.16	21.5	5.9	7.9	16.5	5.1	184.1
343	25.24	21.6	5.8	7.9	16.5	5.1	184.0
344	25.32	21.8	5.8	7.9	16.5	5.1	183.9
345	25.40	21.9	5.7	7.9	16.4	5.1	183.9
346	25.48	22.1	5.6	7.9	16.4	5.1	183.8
347	25.56	22.3	5.6	7.9	16.4	5.0	183.7
348	25.64	22.4	5.5	7.9	16.4	5.0	183.7
349	25.72	22.6	5.5	7.9	16.4	5.0	183.6
350	25.80	22.8	5.4	7.9	16.3	5.0	183.5
351	25.88	22.9	5.3	7.9	16.3	5.0	183.5
352	25.96	23.1	5.3	7.9	16.3	5.0	183.4
353	26.04	23.2	5.2	7.9	16.2	5.0	183.4
354	26.12	23.4	5.1	7.9	16.2	5.0	183.3
355	26.20	23.6	5.1	7.9	16.2	4.9	183.3
356	26.20	23.6	5.0	7.9	16.2	4.9	183.3
357	26.28	23.7	5.0	7.9	16.1	4.9	183.2
358	26.36	23.9	4.9	7.9	16.1	4.9	183.2
359	26.44	24.0	4.9	7.9	16.0	4.9	183.1
360	26.52	24.2	4.8	7.9	16.0	4.9	183.1

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 221
 Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
361	26.60	24.4	4.7	8.0	16.0	4.9	183.0
362	26.68	24.5	4.6	8.0	15.9	4.9	183.0
363	26.76	24.7	4.6	8.0	15.9	4.9	182.9
364	26.84	24.9	4.5	8.0	15.8	4.8	182.9
365	26.92	25.0	4.5	8.0	15.8	4.8	182.8
366	27.00	25.2	4.4	8.0	15.8	4.8	182.8
367	27.08	25.3	4.3	8.0	15.7	4.8	182.7
368	27.16	25.5	4.3	8.0	15.7	4.8	182.7
369	27.24	25.6	4.2	8.0	15.6	4.8	182.7
370	27.32	25.6	4.2	8.0	15.5	4.8	182.8
371	27.40	25.7	4.1	8.0	15.5	4.8	182.8
372	27.48	25.7	4.0	8.0	15.5	4.8	182.9
373	27.56	25.8	4.0	8.0	15.4	4.8	182.9
374	27.64	25.9	3.9	8.0	15.4	4.8	182.9
375	27.72	25.9	3.9	8.0	15.3	4.8	183.0
376	27.80	26.0	3.8	8.1	15.3	4.8	183.0
377	27.80	26.0	3.8	8.1	15.3	4.8	183.0
378	27.88	26.0	3.8	8.1	15.2	4.8	183.0
379	27.96	26.1	3.7	8.1	15.2	4.8	183.1
380	28.04	26.1	3.7	8.1	15.2	4.8	183.1
381	28.12	26.2	3.6	8.1	15.1	4.8	183.1
382	28.20	26.3	3.6	8.1	15.1	4.8	183.1
383	28.28	26.3	3.6	8.1	15.0	4.8	183.2
384	28.36	26.4	3.5	8.1	15.0	4.8	183.2
385	28.44	26.4	3.5	8.1	15.0	4.7	183.2
386	28.52	26.5	3.4	8.1	14.9	4.7	183.2
387	28.60	26.5	3.4	8.1	14.9	4.7	183.3
388	28.68	26.6	3.4	8.1	14.8	4.7	183.3
389	28.76	26.7	3.3	8.1	14.8	4.7	183.3
390	28.84	26.7	3.3	8.1	14.8	4.7	183.3
391	28.92	26.8	3.2	8.1	14.7	4.7	183.3
392	29.00	26.8	3.2	8.2	14.7	4.7	183.3
393	29.08	26.9	3.2	8.2	14.6	4.7	183.3
394	29.16	26.9	3.1	8.2	14.6	4.7	183.3
395	29.24	27.0	3.1	8.2	14.6	4.7	183.4
396	29.32	27.1	3.1	8.2	14.5	4.7	183.4
397	29.40	27.1	3.1	8.2	14.5	4.7	183.4
398	29.40	27.1	3.1	8.2	14.5	4.7	183.4
399	29.48	27.2	3.0	8.2	14.4	4.7	183.4
400	29.56	27.2	3.0	8.2	14.4	4.7	183.4
401	29.64	27.3	3.0	8.2	14.4	4.7	183.4
402	29.72	27.3	3.0	8.2	14.3	4.7	183.4
403	29.80	27.4	2.9	8.2	14.3	4.7	183.4
404	29.88	27.5	2.9	8.2	14.2	4.7	183.4
405	29.96	27.5	2.9	8.2	14.2	4.7	183.4

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
 viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

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 Page: 222
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Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
406	30.04	27.6	2.9	8.2	14.2	4.7	183.4
407	30.12	27.6	2.9	8.2	14.1	4.6	183.4
408	30.20	27.7	2.8	8.2	14.1	4.6	183.4
409	30.28	27.7	2.8	8.2	14.1	4.6	183.4
410	30.36	27.8	2.8	8.3	14.0	4.6	183.4
411	30.44	27.9	2.8	8.3	14.0	4.6	183.4
412	30.52	27.9	2.8	8.3	14.0	4.6	183.4
413	30.60	28.0	2.8	8.3	13.9	4.6	183.4
414	30.68	28.0	2.8	8.3	13.9	4.6	183.4
415	30.76	28.1	2.8	8.3	13.8	4.6	183.3
416	30.84	28.1	2.7	8.3	13.8	4.6	183.3
417	30.92	28.2	2.7	8.3	13.8	4.6	183.3
418	31.00	28.3	2.7	8.3	13.7	4.6	183.3
419	31.00	28.3	2.7	8.3	13.7	4.6	183.3
420	31.08	28.3	2.7	8.3	13.7	4.6	183.3
421	31.16	28.4	2.7	8.3	13.7	4.6	183.3
422	31.24	28.4	2.7	8.3	13.6	4.6	183.3
423	31.32	28.5	2.7	8.3	13.6	4.6	183.2
424	31.40	28.5	2.7	8.3	13.5	4.6	183.2
425	31.48	28.6	2.7	8.3	13.5	4.5	183.2
426	31.56	28.7	2.7	8.3	13.5	4.5	183.2
427	31.64	28.7	2.7	8.3	13.4	4.5	183.2
428	31.72	28.8	2.7	8.3	13.4	4.5	183.2
429	31.80	28.8	2.7	8.3	13.4	4.5	183.1
430	31.88	28.9	2.7	8.3	13.3	4.5	183.1
431	31.96	28.9	2.8	8.3	13.3	4.5	183.1
432	32.04	29.0	2.8	8.4	13.2	4.5	183.1
433	32.12	29.1	2.8	8.4	13.2	4.5	183.0
434	32.20	29.1	2.8	8.4	13.1	4.5	183.0
435	32.28	29.2	2.8	8.4	13.1	4.5	183.0
436	32.36	29.2	2.8	8.4	13.1	4.5	183.0
437	32.44	29.3	2.8	8.4	13.0	4.5	182.9
438	32.52	29.3	2.8	8.4	13.0	4.5	182.9
439	32.60	29.4	2.9	8.4	12.9	4.5	182.9
440	32.60	29.4	2.9	8.4	13.1	4.5	182.7
441	32.63	29.4	2.9	8.4	13.1	4.5	182.7
442	32.66	29.4	2.9	8.4	13.2	4.4	182.6
443	32.69	29.5	2.9	8.4	13.2	4.4	182.5
444	32.72	29.5	2.9	8.4	13.3	4.4	182.4
445	32.75	29.5	2.9	8.4	13.3	4.4	182.4
446	32.78	29.5	2.9	8.4	13.4	4.4	182.3
447	32.81	29.6	2.9	8.4	13.4	4.4	182.2
448	32.84	29.6	2.9	8.4	13.5	4.4	182.1
449	32.87	29.6	2.9	8.4	13.5	4.4	182.1
450	32.90	29.6	2.9	8.4	13.5	4.4	182.0

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
viga int 33m cabo c3 perdas t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

Page: 223

Date: 7/10/11

Summary of tension force losses for cable no. 3, at t = 30000, beam no. 2

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
451	32.93	29.6	2.9	8.4	13.6	4.4	181.9
452	32.96	29.7	3.0	8.4	13.6	4.4	181.9
453	32.99	29.7	3.0	8.4	13.7	4.4	181.8
454	33.02	29.7	3.0	8.4	13.7	4.4	181.7
455	33.05	29.7	3.0	8.4	13.8	4.4	181.7
456	33.08	29.8	3.0	8.4	13.8	4.4	181.6
457	33.10	29.8	1.0	8.4	4.6	5.3	191.9

Time-steps analysis was performed.

VERIFICAÇÃO DE SEÇÕES PROTENDIDAS

<VerProtFint>

OBRA: VIADUTO NA PE-060

1. Dados de Entrada

VIGA INTERNA 33.2 m

Base Superior Base Inferior Altura As <cm²> Prof. <m> Prealon. <%>

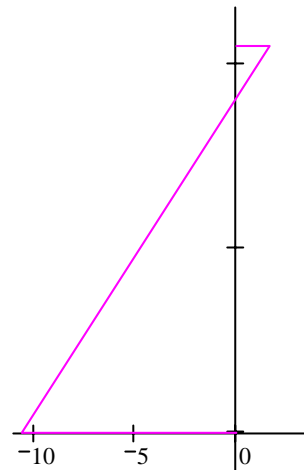
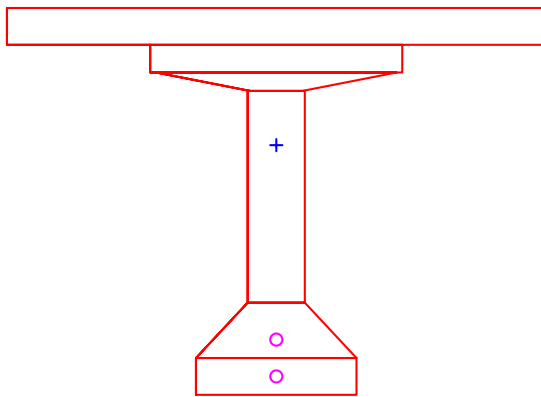
trap :=

	1	2	3
	2.35	2.35	0.2
	1.1	1.1	0.15
	1.05	0.23	0.1
	0.25	0.25	1.15
	0.25	0.7	0.3
	0.7	0.7	0.2

	1	2	3
1	34.4	2	5
2	17.2	1.8	5

c/toda carga movel

Fator do conc. $\gamma_c := 1.4$ Resistencia carac. <tf/m²> $f_{ck} := 3500$ $f_c := 0.85 \cdot \frac{f_{ck}}{\gamma_c}$
 Fator dos esf. $\gamma_f := 1.4$



Momento último de projeto $M_r(D) = 1451$

Momento de serviço $\frac{M_r(D)}{\gamma_f} = 1036$

$$M_d := 1.35 \cdot 584 + 1.5 \cdot 268$$

$$M_d = 1190$$

menor que $M_r(D)$

Altura total $h_{total} = 2.1$

Profundidade do CG $y_s = 0.744$

Deformação de compressão $\epsilon_{c1} = 1.637$

Profundidade do eixo neutro $p_{en} = 0.281$

OBRA: VIADUTO NA BR PE-060 33.2m

VIGA INTERNA

Dados gerais

- . número de seções ns := 6
 . cortantes de carga permanente, carga móvel e protensão (KN) i := 1..ns

carga permanente

$vg1_i :=$

714
594
454
314
173
0

$vg2_i := 0$

carga móvel

$vcm1_i :=$

476
424
324
236
164
136

$vcm2_i :=$

-0
-35
-73
-153
-235
-311

protensão

$vp_i :=$

-552
-530
-353
-96
-0
0

v g1 - refere-se a G1+ G2 + G3

$vg12_i := vg1_i + vg2_i$

$vm_{i,1} := vcm1_i$

$vm_{i,2} := vcm2_i$

. momento torsor (KN)

$Mt := (0 \ 0 \ 0 \ 0 \ 0 \ 0)$

. geometria (mm,mm2)

largura nominal

altura

área efetiva

espessura da parede

$b_i := 210$

$h_i := 2100$

$A_i := 100000$

$ef_i := b_i$

$b_1 := 660$

. distância p/centro armadura (m)

$c := 100$

. coeficiente

majoração das cargas

$K1_i :=$

1.35
1.00

$K2_i :=$

1.50
0

$K3_i :=$

1.20
0.90

. coeficiente

minoração do concreto

$\gamma_c := 1.5$

minoração do aço

$\gamma_s := 1.15$

redução da carga móvel p/fadiga

$\gamma_f := 0.5$

. resistência característica do concreto a compressão (MPa)

$f_{ck} := 35$

. resistência característica do aço a tração (MPa)

$f_{yk} := 500$

. variação de tensão na armadura para fadiga (MPa)

$\Delta\sigma := 85$

. número de vigas para os esforços dados

$nv := 1$

$$f_{yd} := \frac{f_{yk}}{\gamma_s} \quad \alpha_{v2} := \left(1 - \frac{f_{ck}}{250}\right) \quad f_{ctm} := 0.3 \cdot f_{ck}^{\frac{2}{3}} \quad f_{ctdinf} := 0.7 \cdot f_{ctm} \quad d_1 := h_1 - c$$

$$f_{cd} := \frac{f_{ck}}{\gamma_c} \quad f_{ctd} := \frac{f_{ctdinf}}{\gamma_c} \quad v_{c1} := 0.6 \cdot f_{ctd} \cdot b_1 \cdot d_1 \quad d_1 := 0.001 \cdot d_1$$

. número de pernas do estribo **cortante** **np₁ := 2**

torção **nt₁ := 1**

$$\rho_{min} := 0.2 \cdot \frac{f_{ctm}}{f_{yk}} \quad \rho_{min} = 0.00128 \quad K_v := \frac{1}{n_v}$$

**RUPTURA****EM SERVIÇO****CORTANTE****CORTANTE**

$$v_{sd1}_i := K_v \cdot \max\left(\left| m_{max}_{i,1} \right|, \left| m_{min}_{i,1} \right|\right)$$

$$v_{11}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm1}_i + v_{p1}_i)$$

TORÇÃO

$$v_{12}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm2}_i + v_{p1}_i)$$

$$M_{tsd}_i := 1.5 \cdot \left| M_t \right|$$

$$\Delta 1_i := \begin{cases} |v_{11}_i - v_{12}_i| & \text{if } v_{11}_i \cdot v_{12}_i \geq 0 \\ \max(|v_{11}_i|, |v_{12}_i|) & \text{otherwise} \end{cases}$$

$$V_{1_i} := \max(|v_{11}_i|, |v_{12}_i|)$$

$$v_{sd1} = \begin{pmatrix} 1181100 \\ 960900 \\ 781200 \\ 691500 \\ 479550 \\ 466500 \end{pmatrix} \quad b = \begin{pmatrix} 660 \\ 210 \\ 210 \\ 210 \\ 210 \\ 210 \end{pmatrix} \quad \Delta 1 = \begin{pmatrix} 238000 \\ 229500 \\ 198500 \\ 194500 \\ 199500 \\ 155500 \end{pmatrix} \quad V1 = \begin{pmatrix} 400000 \\ 276000 \\ 263000 \\ 336000 \\ 255000 \\ 155500 \end{pmatrix} \quad v_c = \begin{pmatrix} 1186402.12 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \\ 377491.58 \end{pmatrix}$$

ARMADURA

$$v_{sd}_i := v_{sd1}_i \quad V_i := V_{1_i} \quad \Delta_i := \Delta_{1_i}$$

ruptura**fadiga**

$$AS1_i := \begin{cases} \frac{v_{sd}_i - v_c}{0.9 \cdot d_1 \cdot f_{yd}} & \text{if } v_{sd}_i \geq v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS2_i := \begin{cases} \frac{V_i - 0.5 \cdot v_c}{0.9 \cdot d_1 \cdot \Delta \sigma} \cdot \frac{\Delta_i}{V_i} & \text{if } V_i \geq 0.5 \cdot v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS3_i := \max(AS1_i, AS2_i)$$

$$AS4_i := \frac{M_{tsd}_i}{2 \cdot A_1 \cdot f_{yd}} \cdot 1000$$

$$d_i := 1000 \cdot d_1$$

SOLICITAÇÕES COMBINADAS**ARMAÇÃO TOTAL /PERNA**

$$\text{TRD1}_1 := 0.5 \cdot \alpha v_2 \cdot f_{cd} \cdot A_1 \cdot e_{f_1} \quad \text{VRD2}_1 := 0.27 \cdot \alpha v_2 \cdot f_{cd} \cdot b_1 \cdot d_1 \quad \text{AS}_1 := \max \left(\frac{\text{AS4}_1}{n t_1} + \frac{\text{AS3}_1}{n p_1}, \frac{1000 \cdot \rho_{\min} \cdot b_1}{n p_1} \right)$$

$$\text{TRD1} = \begin{pmatrix} 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \\ 210700000 \end{pmatrix} \quad \text{VRD2} = \begin{pmatrix} 7151760 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \\ 2275560 \end{pmatrix} \quad \text{AS} = \begin{pmatrix} 423.72 \\ 372.73 \\ 257.92 \\ 278.57 \\ 169.39 \\ 134.82 \end{pmatrix} \quad (\text{mm}^2)/\text{perna}/\text{m}$$

$$v1_1 := \frac{\text{vsd}_1}{\text{VRD2}_1} \quad v2_1 := \frac{\text{Mtsd}_1}{\text{TRD1}_1} \quad v := v1 + v2$$

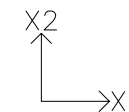
$$v1 = \begin{pmatrix} 0.17 \\ 0.42 \\ 0.34 \\ 0.3 \\ 0.21 \\ 0.21 \end{pmatrix} \quad v2 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad v = \begin{pmatrix} 0.17 \\ 0.42 \\ 0.34 \\ 0.3 \\ 0.21 \\ 0.21 \end{pmatrix}$$

5.2.1.4 LAJE

5.2.1.4.1 LAJE (TRECHO 37M)

VIADUTO NA RODOVIA PE-060 laje 37 m

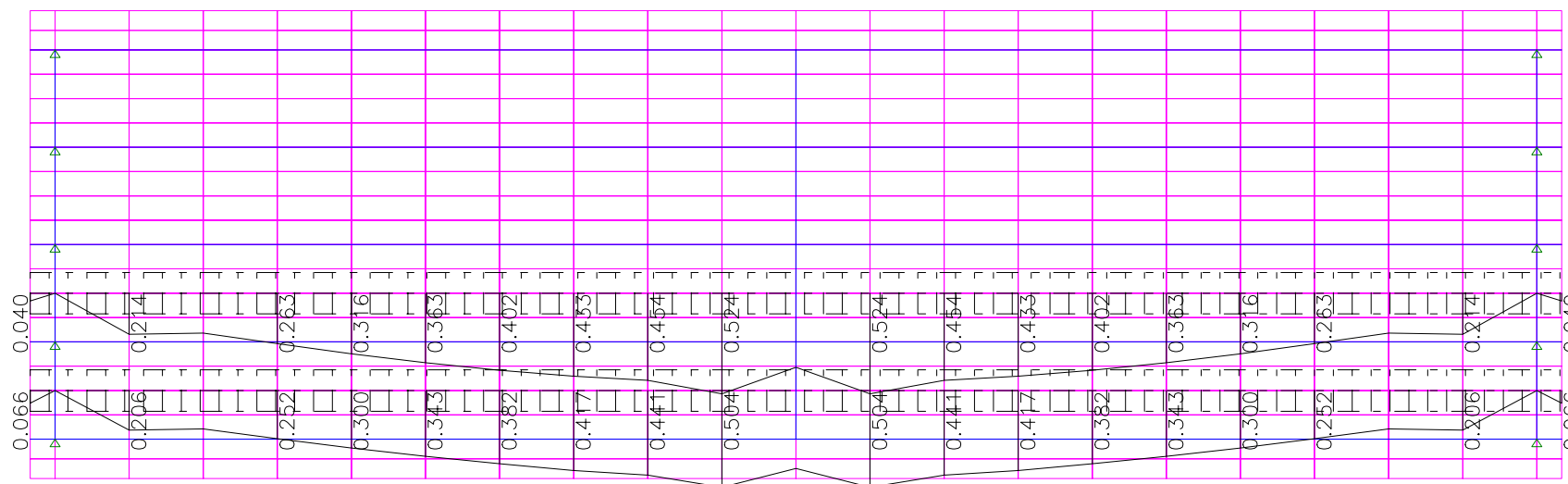
laje 37m mx inf g1+g2+g3
 VISTA: mx



ESCALA= 1:169

UNIDS: tf*m

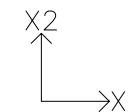
DATA: 4/10/11



SOMATÓRIO DE $-M_X^*$ NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 37 m

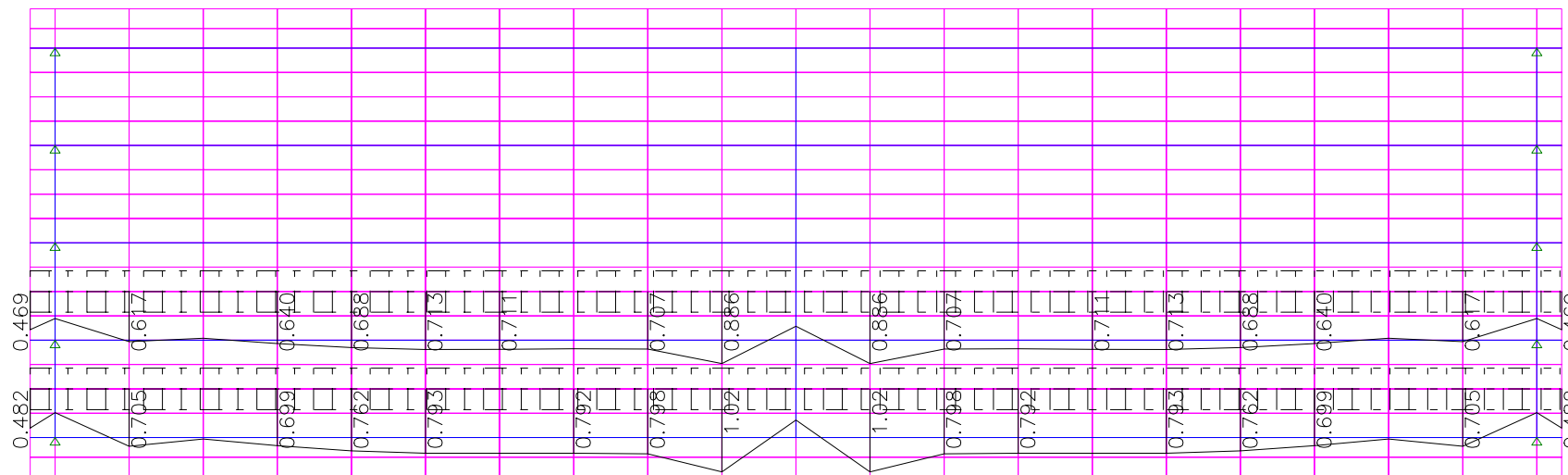
laje 37m mx inf cmovei
VISTA: mx



ESCALA= 1:169

UNIDS: tf*m

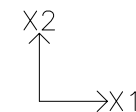
DATA: 4/10/11



SOMATÓRIO DE $-M_x$ NA LARGURA= 1. COMB. MÁXIMA ENVOLTÓRIA

VIADUTO NA RODOVIA PE-060 laje 37 m

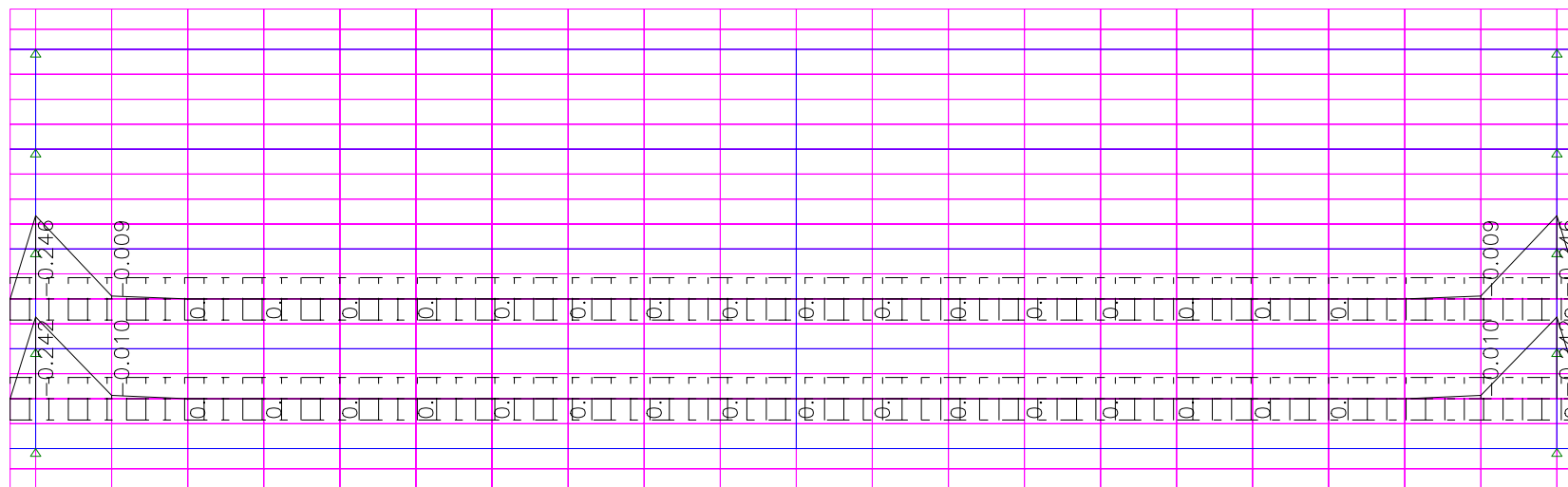
laje 37m mx sup g1+g2+g3
VISTA: mx



ESCALA= 1:169

UNIDS: tf*m

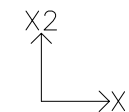
DATA: 4/10/11



SOMATÓRIO DE +MX* NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 37 m

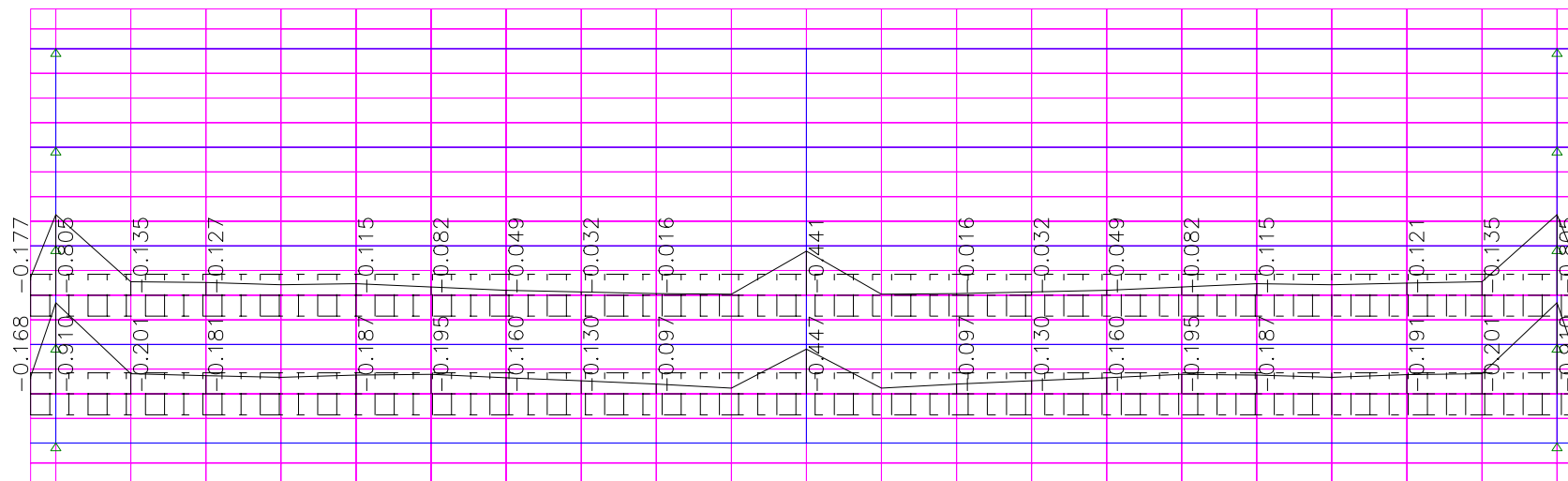
laje 37m mx sup cmovei
VISTA: mx



ESCALA= 1:169

UNIDS: tf*m

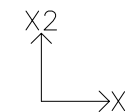
DATA: 4/10/11



SOMATÓRIO DE +MX* NA LARGURA= 1. COMB. MÍNIMA ENVOLTÓRIA

VIADUTO NA RODOVIA PE-060 laje 37 m

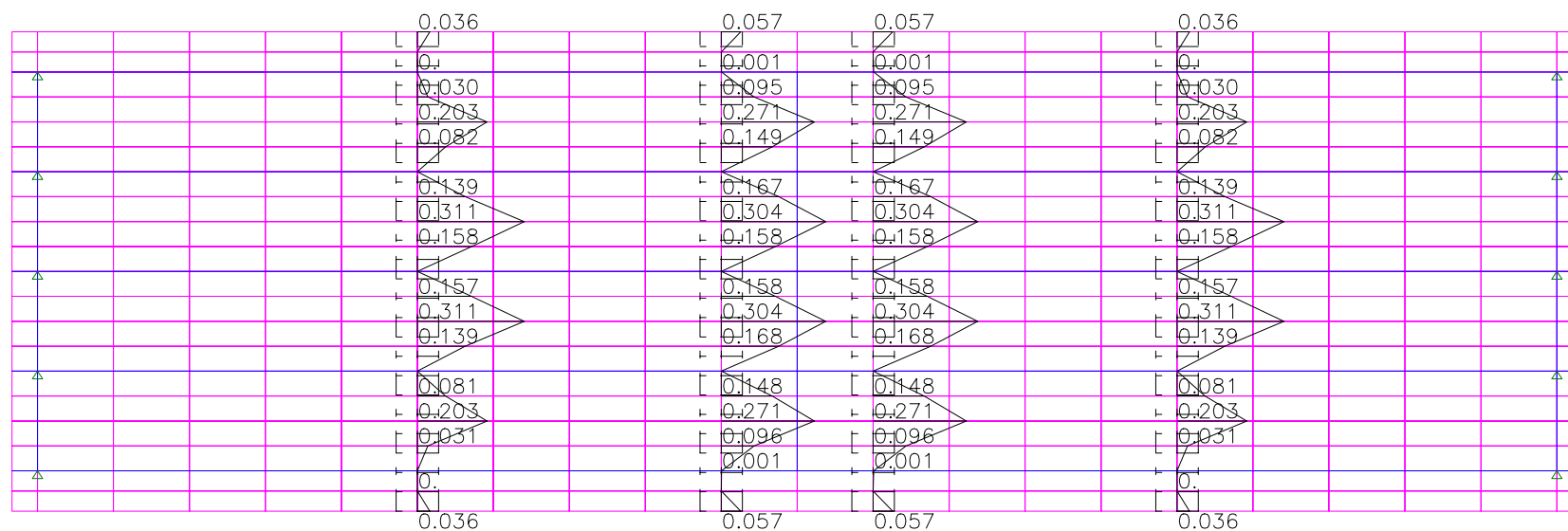
laje 37m my inf g1+g2+g3
VISTA: my



ESCALA= 1:169

UNIDS: tf*m

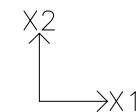
DATA: 4/10/11



SOMATÓRIO DE -MX* NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 37 m

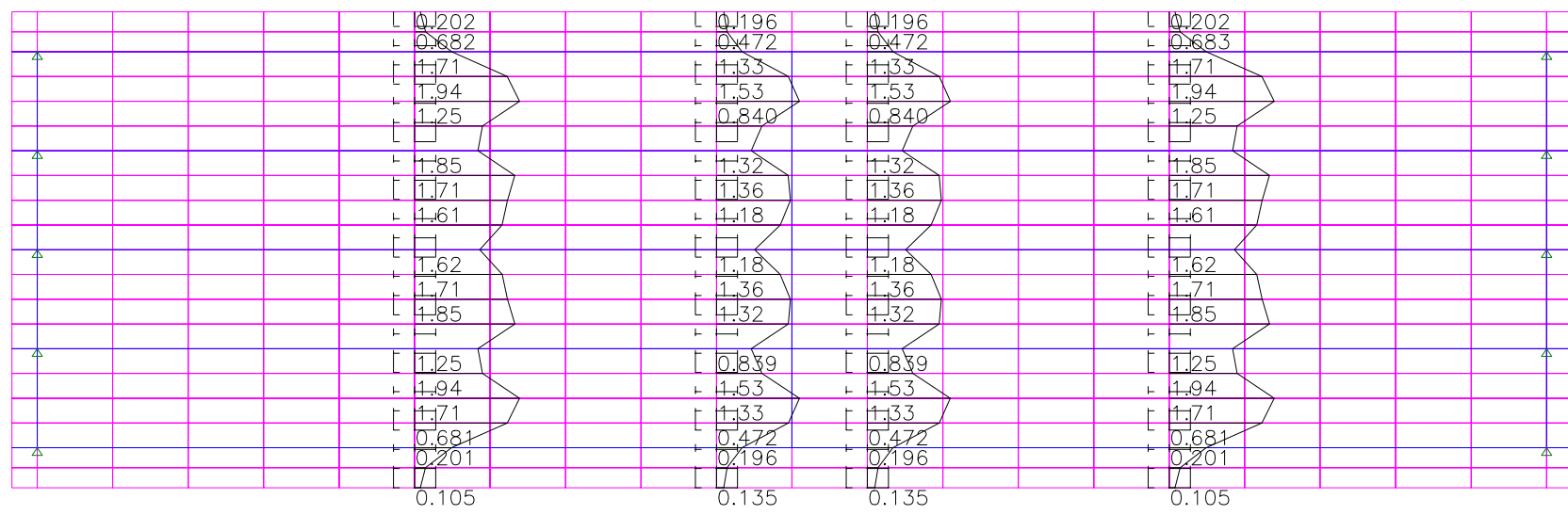
laje 37m my inf cmovei
VISTA: my



ESCALA= 1:169

UNIDS: tf*m

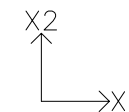
DATA: 4/10/11



SOMATÓRIO DE -MX* NA LARGURA= 1. COMB. MÁXIMA ENVOLTÓRIA

VIADUTO NA RODOVIA PE-060 laje 37 m

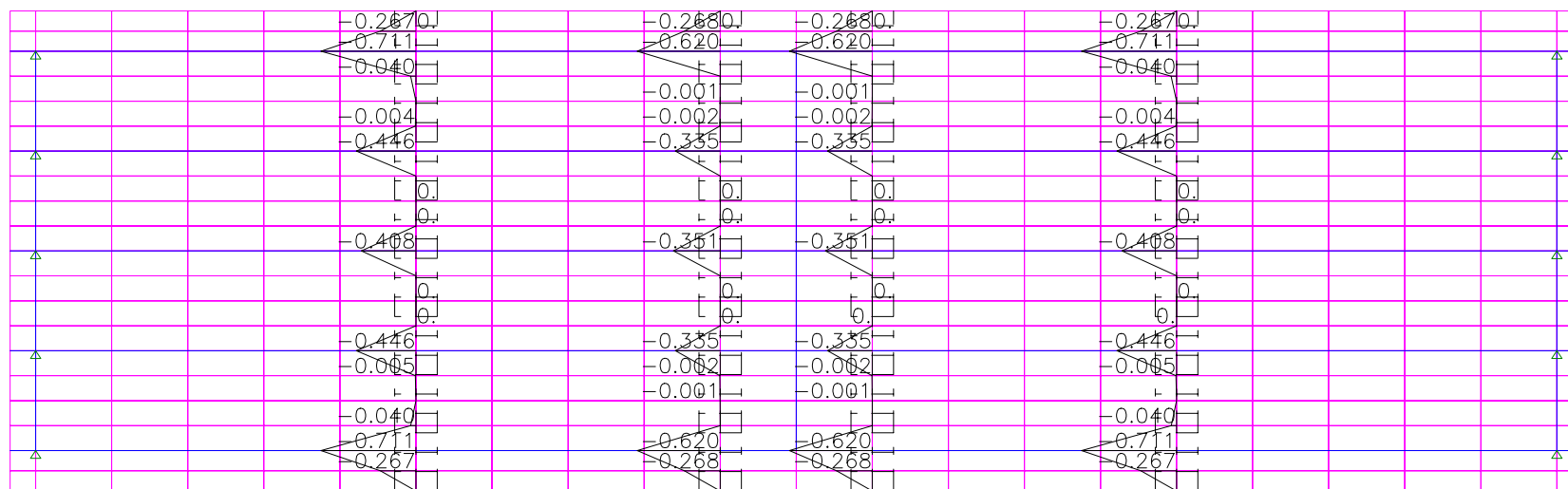
laje 37m my sup g1+g2+g3
 VISTA: my



ESCALA= 1:169

UNIDS: tf*m

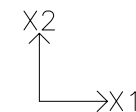
DATA: 4/10/11



SOMATÓRIO DE +MX* NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 37 m

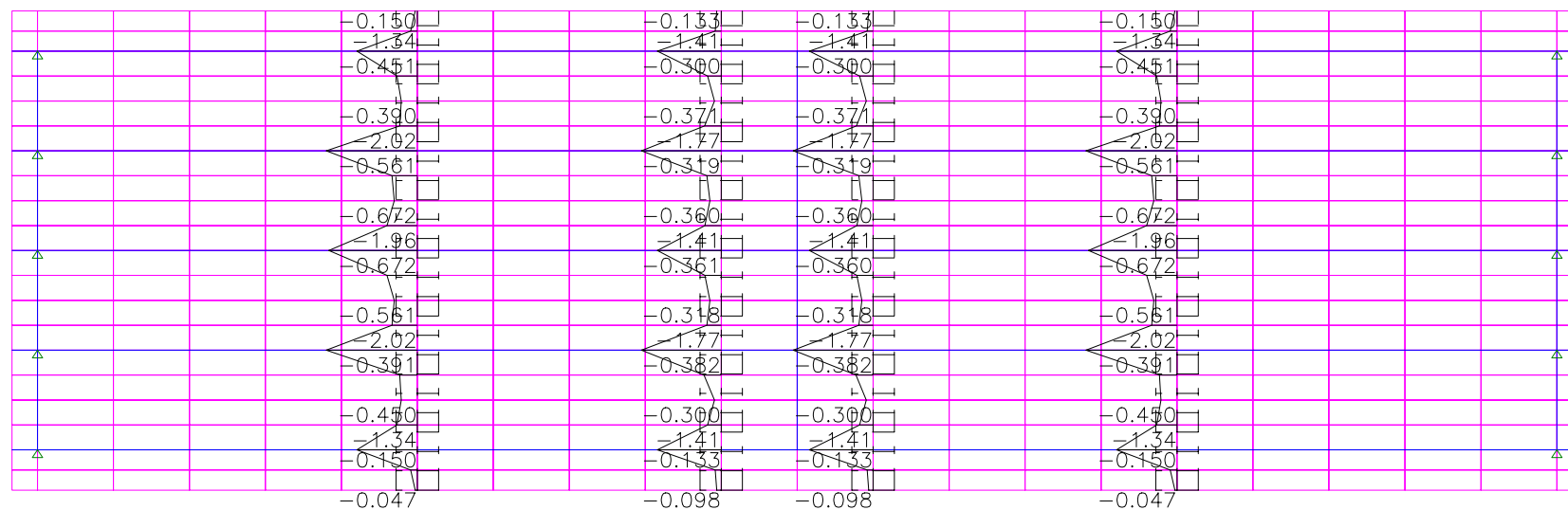
laje 37m my sup cmovei
VISTA: my



ESCALA= 1:169

UNIDS: tf*m

DATA: 4/10/11



SOMATÓRIO DE +MX* NA LARGURA= 1. COMB. MÍNIMA ENVOLTÓRIA

LAJE

M X LONG INF

OBRA: VIADUTO NA PE-060 37m

Dados gerais

resistência característica a compressão do concreto	f_{ck}	(MPa)
resistência característica do aço	$f_{yk} := 500$	(MPa)
módulo de elasticidade do aço	$E_s := 210000$	(MPa)
coeficiente de minoração do concreto/aço	$\gamma_c := 1.5$	$\gamma_s := 1.15$
altura da viga	$h := 130$	(mm)
largura da mesa	$bf := 0$	(mm)
espessura da mesa	$e := 0$	(mm)
espessura da nervura	$bw := 1000$	(mm)
distância do c.g. da armadura tracionada à fibra inferior	$ci := 35$	(mm)
distância do c.g. da armadura comprimida à fibra superior	$cs := 40$	(mm)
opção viga = 1 transversina = 2 laje = 3	$op := 3$	
tipo de obra rodoviaria = 1 ferroviaria = 2 ponte rolante = 3	$tipo := 1$	
forma da seção retangular = 1 T (mesa comprimida) = 2		
circular = 4 T (mesa tracionada) = 3	$k1 := 1$	

$\rho :=$

	1	2	3	4	5	6	7
1	150	150	173	201	230	259	288
2	150	150	150	150	158	177	197
3	150	150	153	178	204	229	255
4	230	288	345	403	460	518	575

concreto

$k2 := 4$

$f_{ck} :=$

	1	2	3	4	5	6	7
1	20	25	30	35	40	45	50

$$f_{ck} := f_{ck,1,k2}$$

$$f_{ck} = 35$$

$$\rho_{min} := \frac{\rho_{k1,k2}}{100000}$$

$$\rho_{min} = 0.00201$$

Esforços (kNm) Mg2, Mg3 incluídos no Mg1

$Mg1 := 5.04$

$Mg2 := 0$

$Mcm1 := 10.2$

$Mcm2 := -0.97$

$Mtemp := 0$

Estado limite último

$$M_d := 1.35 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm1 + 1.2 \cdot Mtemp$$

□



$$AS = 576 \quad (\text{mm}^2)$$

Fadiga

diâmetro da armadura $\phi := 10$ (mm) $as := 0.25 \cdot \pi \cdot \phi^2$ $as = 78.54$ (mm²)

$$\Delta_{fsdfad} := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases} \quad \psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

resistência característica à fadiga $\Delta_{fsdfad} = 190$ (MPa)

coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente) $\psi1 = 0.8$

número de camadas $i_c := 1$ $k := 1..i_c$ $cc := 35$

número de barras por camada (de baixo para cima) $yd_k := cc + \frac{\phi}{2} + (k - 1) \cdot (\phi + \max(20, \phi))$

$nb_k := 10$ ϕ 10.0 c 10 $yd = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 40 \\ \hline \end{array}$

área das armaduras de tração $ASi := \sum_{i=1}^{i_c} nb_i \cdot as$ $ASi = 785$ (mm²)

área das armaduras de compressão $ASs := 0$ (mm²) $cs := cc + \frac{\phi}{2}$ $cs = 40$ (mm)

$E_{cs} := 0.85 \cdot 5600 \cdot f_{ck}^{0.5}$ $E_{cs} = 28160.54$ $\alpha_E := \frac{Es}{E_{cs}}$ $\alpha_E = 7.46$

$M1 := Mg1 + Mg2 + \psi1 \cdot M_{cm1}$

$M2 := Mg1 + Mg2 + \psi1 \cdot M_{cm2}$ $\Delta M := \begin{cases} M1 - M2 & \text{if } M2 \geq 0 \\ M1 + 0.5 \cdot |M2| & \text{otherwise} \end{cases}$



$\Delta\sigma_s = 151.72$ (MPa) menor que Δ_{fsdfad}

Fissuração $\alpha_E := 15$

barra a ser analisada $ii := i_c$ $di := h - yd_{ii}$ $di = 90$ mm

$M := Mg1 + Mg2 + \psi1 \cdot M_{cm1}$





coeficiente de deformação superficial

$$\eta_1 := 2.25$$

tensão na barra $\sigma_s = 215.24$ (MPa)

envolvimento da barra $ah_1 := 50$ $ah_2 := 50$ (mm) (em relação ao eixo da barra)

$av_1 := 40$ $av_2 := 100$ (mm)

tirante fictício $b_t := \min(ah_1, 7.5 \cdot \phi) + \min(ah_2, 7.5 \cdot \phi)$ $b_t = 100$ (mm)

$h_t := \min(av_1, 7.5 \cdot \phi) + \min(av_2, 7.5 \cdot \phi)$ $h_t = 115$ (mm)

taxa de armadura $\rho_r := \frac{as}{b_t \cdot h_t}$ $\rho_r = 0.00683$

resistencia média à tração $f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$ $f_{ctm} = 3.214$ (MPa)

$w_k := \min \left[\frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{Es} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{Es} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$ $w_k = 0.073$ (mm)



$$AS = 474 \quad (\text{mm}^2)$$

Fadiga

$$\text{diâmetro da armadura } \phi := 12.5 \text{ (mm)} \quad as := 0.25 \cdot \pi \cdot \phi^2 \quad as = 122.72 \text{ (mm}^2)$$

$$\Delta_{fsdfad} := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases} \quad \psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

$$\text{resistência característica à fadiga} \quad \Delta_{fsdfad} = 190 \quad (\text{MPa})$$

$$\text{coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente)} \quad \psi1 = 0.8$$

$$\text{número de camadas} \quad i_c := 1 \quad k := 1 .. i_c \quad cc := 35$$

$$\text{número de barras por camada (de baixo para cima)} \quad yd_k := cc + \frac{\phi}{2} + (k - 1) \cdot (\phi + \max(20, \phi))$$

$$nb_k := 6.66$$

$$\phi \text{ } 12.5 \text{ c } 15$$

$$yd = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 41.25 \\ \hline \end{array}$$

$$\text{área das armaduras de tração} \quad ASi := \sum_{i=1}^{i_c} nb_i \cdot as \quad ASi = 817 \quad (\text{mm}^2)$$

$$\text{área das armaduras de compressão} \quad ASs := 0 \quad (\text{mm}^2) \quad cs := cc + \frac{\phi}{2} \quad cs = 41.25(\text{mm})$$

$$E_{cs} := 0.85 \cdot 5600 \cdot f_{ck}^{0.5} \quad E_{cs} = 28160.54 \quad \alpha_E := \frac{Es}{E_{cs}} \quad \alpha_E = 7.46$$

$$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$$

$$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2 \quad \Delta M := \begin{cases} M1 - M2 & \text{if } M2 \geq 0 \\ M1 + 0.5 \cdot |M2| & \text{otherwise} \end{cases}$$



$$\Delta\sigma_s = 153.68 \text{ (MPa)} \quad \text{menor que} \quad \Delta_{fsdfad}$$

Fissuração

$$\alpha_E := 15$$

$$\text{barra a ser analisada} \quad ii := i_c \quad di := h - yd_{ii} \quad di = 158.75 \text{ mm}$$

$$M := Mg1 + Mg2 + \psi1 \cdot Mcm1$$



coeficiente de deformação superficial		$\eta_1 := 2.25$
tensão na barra	$\sigma_s = 151.6$	(MPa)
envolvimento da barra	$ah_1 := 75$	$ah_2 := 75$ (mm) (em relação ao eixo da barra)
	$av_1 := 60$	$av_2 := 160$ (mm)
tirante fictício	$b_t := \min(ah_1, 7.5 \cdot \phi) + \min(ah_2, 7.5 \cdot \phi)$	$b_t = 150$ (mm)
	$h_t := \min(av_1, 7.5 \cdot \phi) + \min(av_2, 7.5 \cdot \phi)$	$h_t = 153.75$ (mm)
taxa de armadura	$\rho_r := \frac{a_s}{b_t \cdot h_t}$	$\rho_r = 0.00532$
resistencia média à tração	$f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$	$f_{ctm} = 3.214$ (MPa)
$w_k := \min \left[\frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$		$w_k = 0.045$ (mm)

LAJE

MY TRANSV SUP

OBRA: VIADUTO NA PE-060 37m

Dados gerais

resistência característica a compressão do concreto	f_{ck}	(MPa)
resistência característica do aço	$f_{yk} := 500$	(MPa)
módulo de elasticidade do aço	$E_s := 210000$	(MPa)
coeficiente de minoração do concreto/aço	$\gamma_c := 1.5$	$\gamma_s := 1.15$
altura da viga	$h := 200$	(mm)
largura da mesa	$bf := 0$	(mm)
espessura da mesa	$e := 0$	(mm)
espessura da nervura	$bw := 1000$	(mm)
distância do c.g. da armadura tracionada à fibra inferior	$ci := 40$	(mm)
distância do c.g. da armadura comprimida à fibra superior	$cs := 40$	(mm)
opção viga =1 transversina = 2 laje = 3	$op := 3$	
tipo de obra rodoviaria = 1 ferroviaria = 2 ponte rolante = 3	$tipo := 1$	
forma da seção retangular =1 T (mesa comprimida) = 2 circular = 4 T (mesa tracionada) = 3	$k1 := 1$	

$\rho :=$

	1	2	3	4	5	6	7
1	150	150	173	201	230	259	288
2	150	150	150	150	158	177	197
3	150	150	153	178	204	229	255
4	230	288	345	403	460	518	575

concreto

$k2 := 4$

$f_{ck} :=$

	1	2	3	4	5	6	7
1	20	25	30	35	40	45	50

$$f_{ck} := f_{ck,1,k2}$$

$$f_{ck} = 35$$

$$\rho_{min} := \frac{\rho_{k1,k2}}{100000}$$

$$\rho_{min} = 0.00201$$

Esforços (kNm) Mg 2 incluído no Mg1

$Mg1 := 4.46$

$Mg2 := 0$

$Mcm1 := 20.2$

$Mcm2 := -12.5$

$Mtemp := 0$

Estado limite último

$$M_d := 1.35 \cdot (Mg1 + Mg2) + 1.5 \cdot M_{cm1} + 1.2 \cdot M_{temp}$$



$$AS = 544 \quad (\text{mm}^2)$$

Fadiga

diâmetro da armadura $\phi := 12.5$ (mm) $as := 0.25 \cdot \pi \cdot \phi^2$ $as = 122.72$ (mm²)

$$\Delta_{fsdfad} := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases} \quad \psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

resistência característica à fadiga $\Delta_{fsdfad} = 190$ (MPa)

coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente) $\psi1 = 0.8$

número de camadas $i_c := 1$ $k := 1 \dots i_c$ $cc := 35$

número de barras por camada (de baixo para cima) $yd_k := cc + \frac{\phi}{2} + (k - 1) \cdot (\phi + \max(20, \phi))$

$nb_k := 8$ ϕ 12.5 c 12.5 $yd = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 41.25 \\ \hline \end{array}$

área das armaduras de tração $ASi := \sum_{i=1}^{i_c} nb_i \cdot as$ $ASi = 982$ (mm²)

área das armaduras de compressão $ASs := 0$ (mm²) $cs := cc + \frac{\phi}{2}$ $cs = 41.25$ (mm)

$E_{cs} := 0.85 \cdot 5600 \cdot f_{ck}^{0.5}$ $E_{cs} = 28160.54$ $\alpha_E := \frac{Es}{E_{cs}}$ $\alpha_E = 7.46$

$$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$$

$$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2 \quad \Delta M := \begin{cases} M1 - M2 & \text{if } M2 \geq 0 \\ M1 + 0.5 \cdot |M2| & \text{otherwise} \end{cases}$$



$\Delta\sigma_s = 166.13$ (MPa) menor que Δ_{fsdfad}

Fissuração $\alpha_E := 15$

barra a ser analisada $ii := i_c$ $di := h - yd_{ii}$ $di = 158.75$ mm

$$M := Mg1 + Mg2 + \psi1 \cdot Mcm1$$



coeficiente de deformação superficial

$$\eta_1 := 2.25$$

tensão na barra $\sigma_s = 149.66$ (MPa)

envolvimento da barra $ah_1 := 62.5$ $ah_2 := 62.5$ (mm) (em relação ao eixo da barra)

$$av_1 := 40 \quad av_2 := 160 \quad (\text{mm})$$

tirante fictício $b_t := \min(ah_1, 7.5 \cdot \phi) + \min(ah_2, 7.5 \cdot \phi)$ $b_t = 125$ (mm)

$$h_t := \min(av_1, 7.5 \cdot \phi) + \min(av_2, 7.5 \cdot \phi) \quad h_t = 133.75 \quad (\text{mm})$$

taxa de armadura

$$\rho_r := \frac{a_s}{b_t \cdot h_t}$$

$$\rho_r = 0.00734$$

resistência média
à tração

$$f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$$

$$f_{ctm} = 3.214 \quad (\text{MPa})$$

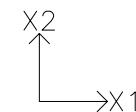
$$w_k := \min \left[\frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$$

$$w_k = 0.044 \quad (\text{mm})$$

5.2.1.4.2 LAJE (TRECHO 33,2M)

VIADUTO NA RODOVIA PE-060 laje 33.2 m

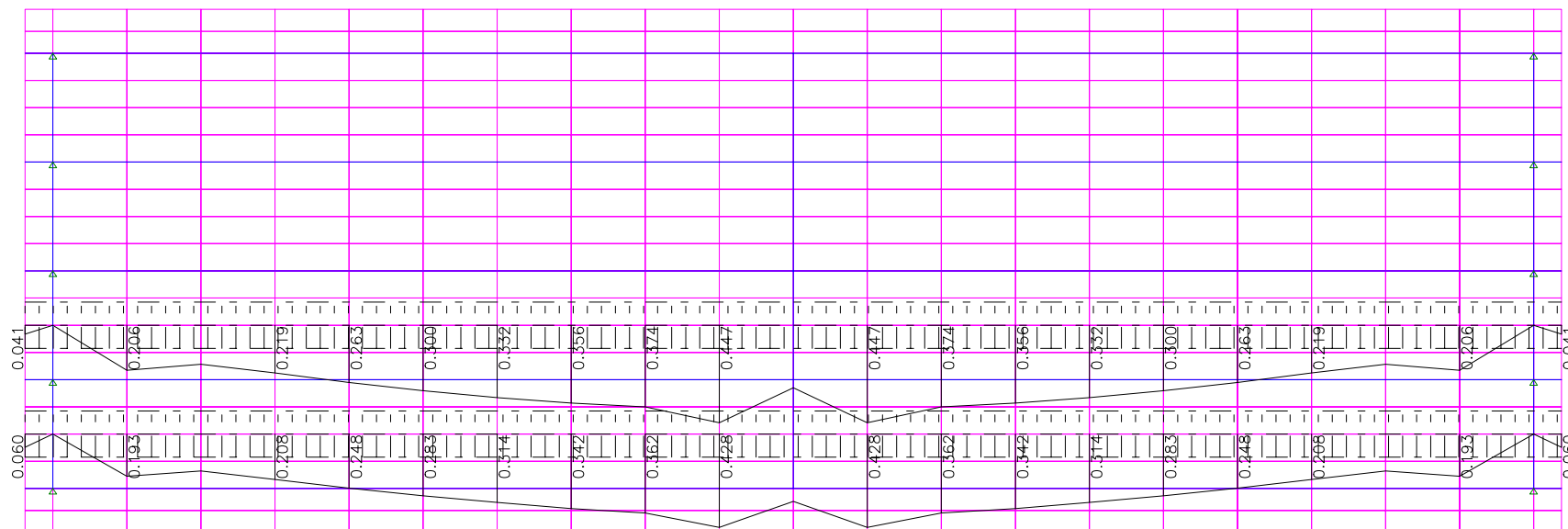
laje 33.2 m mx inf g1+g2+g3
VISTA: mx



ESCALA= 1:150

UNIDS: tf*m

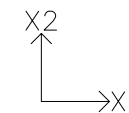
DATA:15/10/11



SOMATÓRIO DE -MX* NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 33.2 m

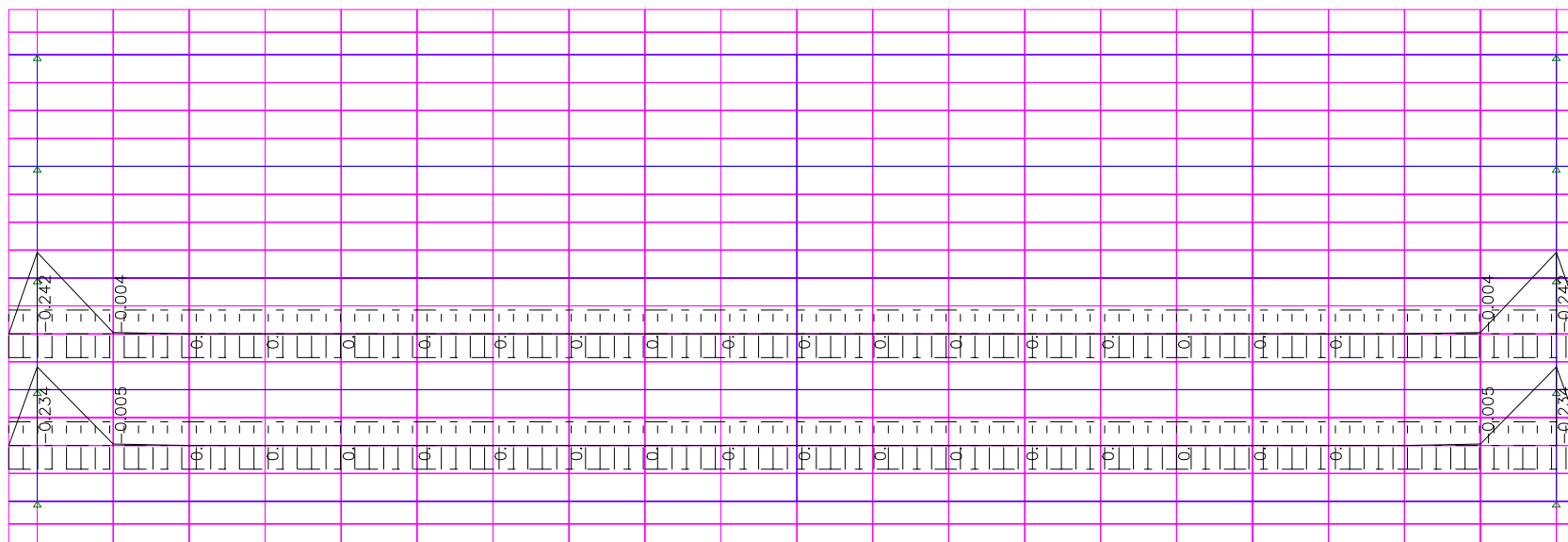
laje 33.2 m mx sup g1+g2+g3
VISTA: mx



ESCALA= 1:150

UNIDS: tf*m

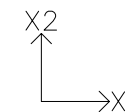
DATA:15/10/11



SOMATÓRIO DE +MX* NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 33.2 m

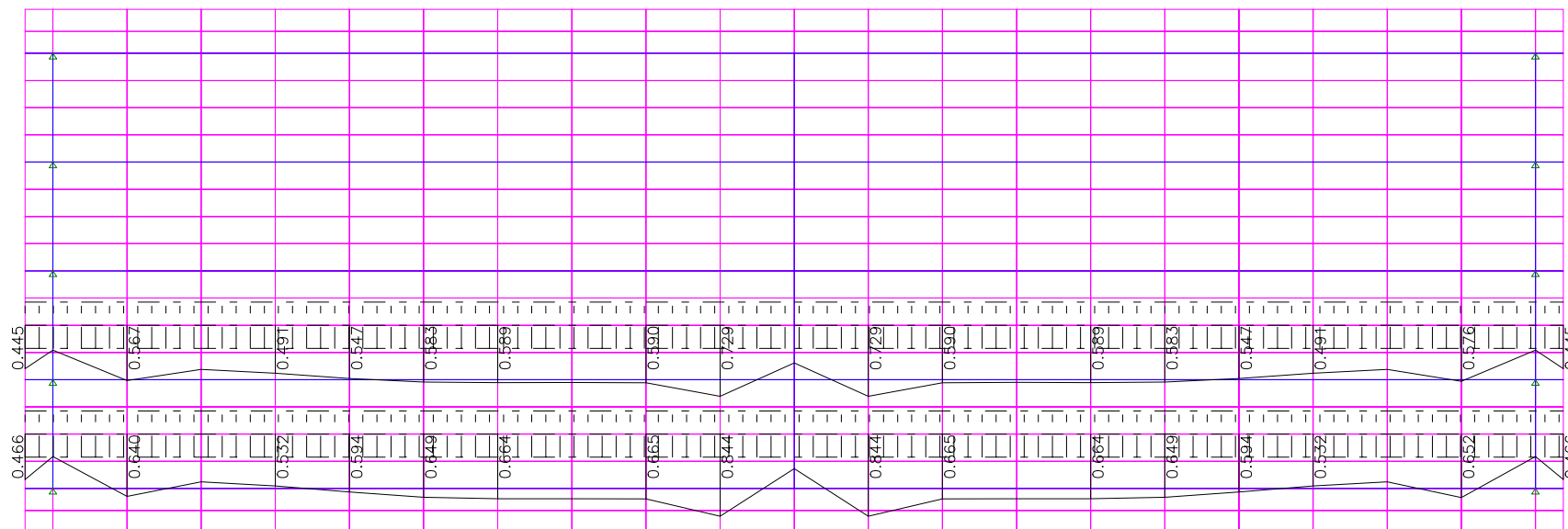
laje 33.2 m mx inf cmovei
VISTA: mx



ESCALA= 1:150

UNIDS: tf*m

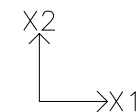
DATA:15/10/11



SOMATÓRIO DE -MX* NA LARGURA= 1. COMB. MÁXIMA ENVOLTÓRIA

VIADUTO NA RODOVIA PE-060 laje 33.2 m

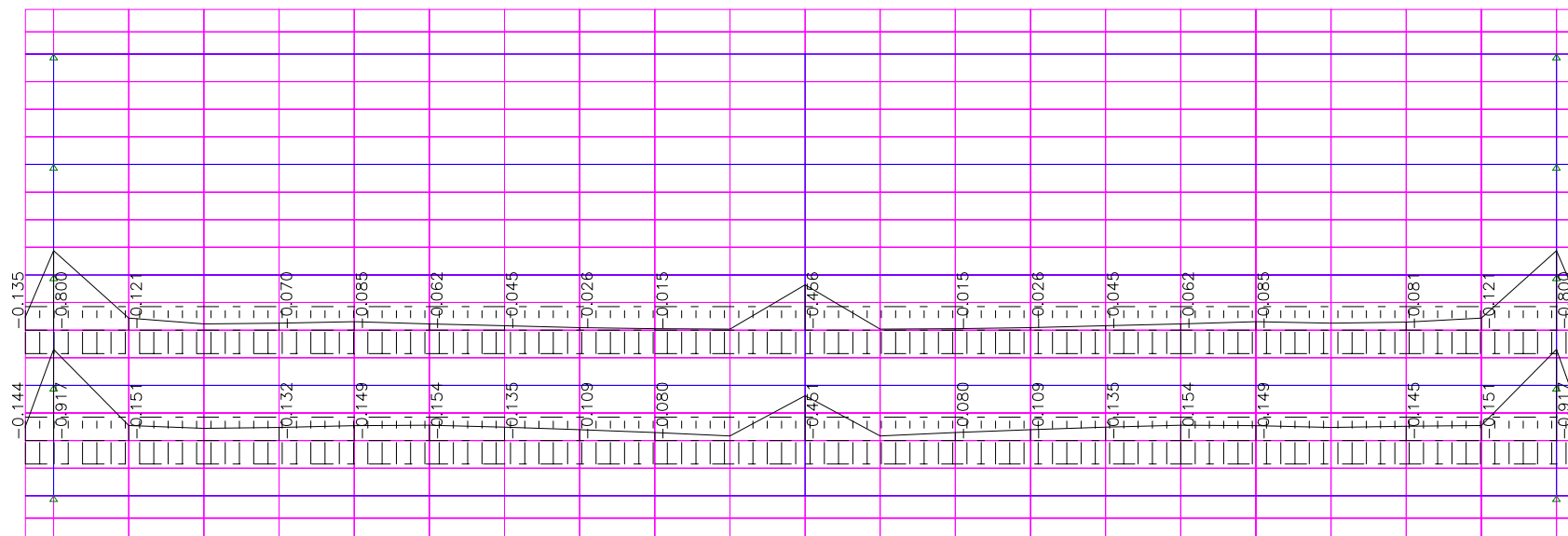
laje 33.2 m mx sup movel
VISTA: mx



ESCALA= 1:150

UNIDS: tf*m

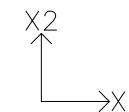
DATA:15/10/11



SOMATÓRIO DE +MX* NA LARGURA= 1. COMB. MÍNIMA ENVOLTÓRIA

VIADUTO NA RODOVIA PE-060 laje 33.2 m

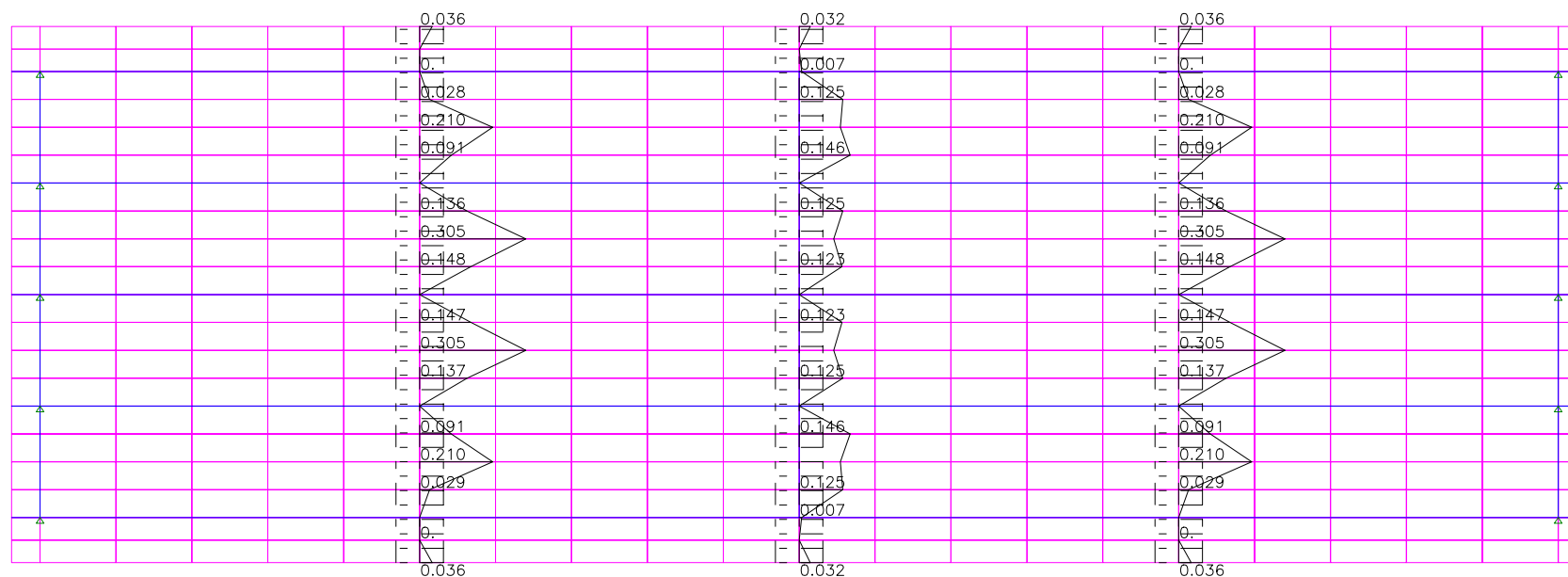
laje 33.2 m my inf g1+g2+g3
 VISTA: my



ESCALA= 1:150

UNIDS: tf*m

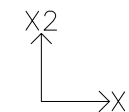
DATA:15/10/11



SOMATÓRIO DE -MX* NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 33.2 m

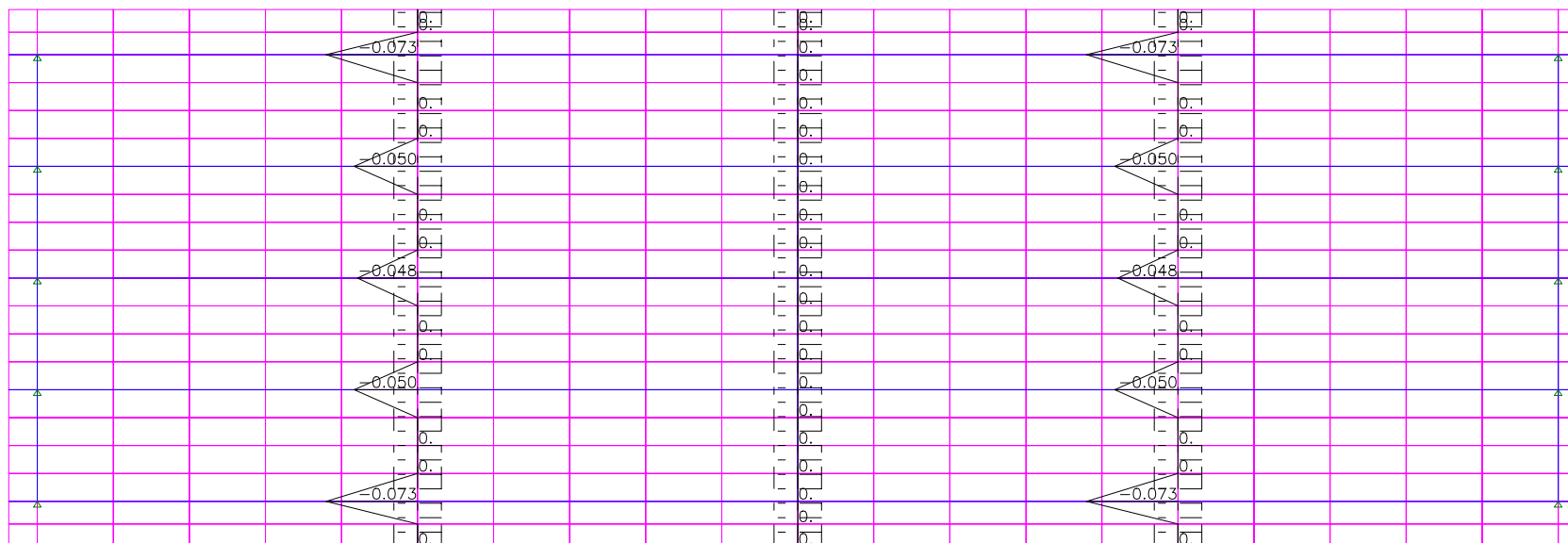
laje 33.2 m my sup g1+g2+g3
VISTA: my



ESCALA= 1:150

UNIDS: tf*m

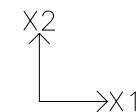
DATA:15/10/11



SOMATÓRIO DE +MY* NA LARGURA= 1. COMB. N° 1 g1+g2+g3

VIADUTO NA RODOVIA PE-060 laje 33.2 m

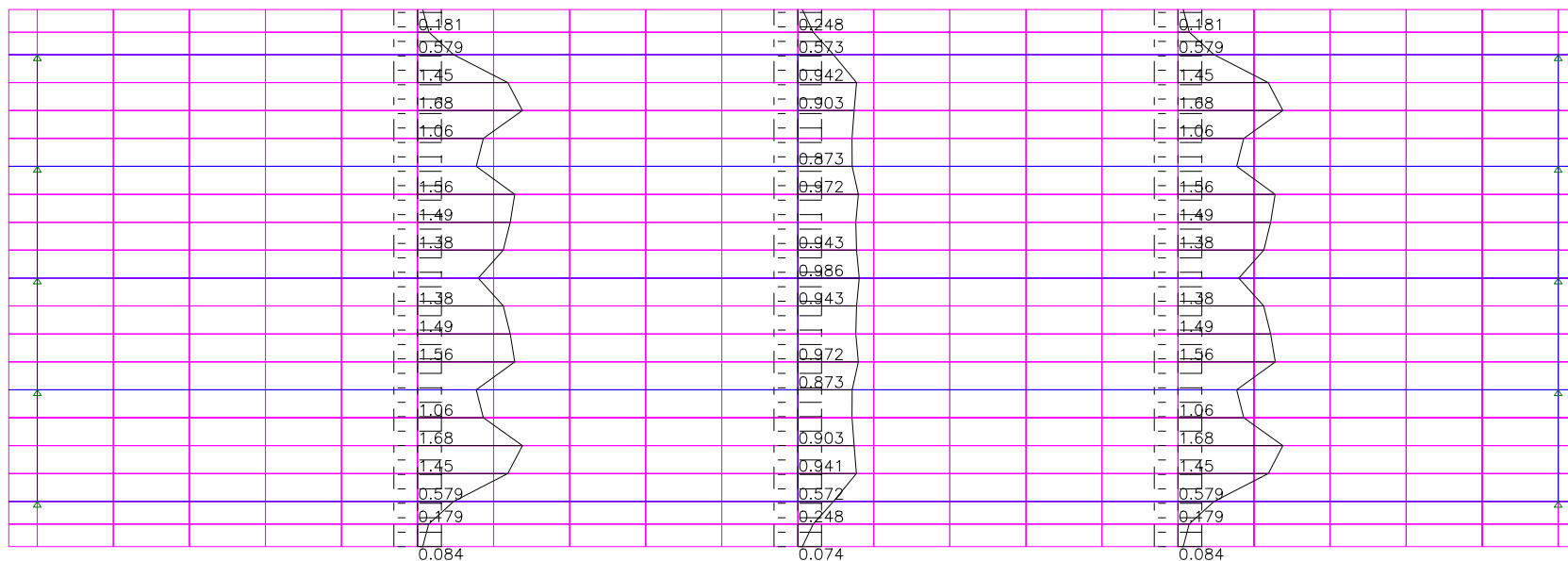
laje 33.2 m my inf movel
VISTA: my



ESCALA= 1:150

UNIDS: tf*m

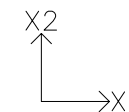
DATA:15/10/11



SOMATÓRIO DE -MX* NA LARGURA= 1. COMB. MÁXIMA ENVOLTÓRIA

VIADUTO NA RODOVIA PE-060 laje 33.2 m

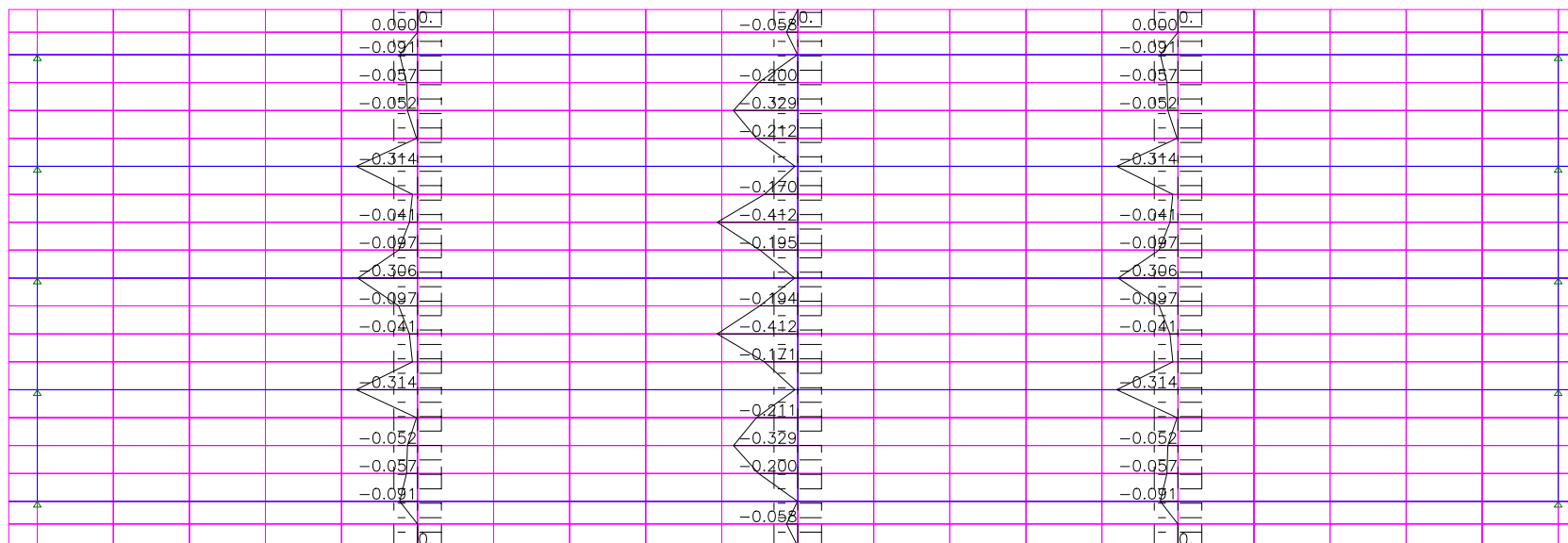
laje 33.2 m my sup movel
 VISTA: my



ESCALA= 1:150

UNIDS: tf*m

DATA:15/10/11



SOMATÓRIO DE +MY* NA LARGURA= 1. COMB. MÍNIMA ENVOLTÓRIA

LAJE

M X LONG INF

OBRA: VIADUTO NA PE-060 33.2m

Dados gerais

resistência característica a compressão do concreto	f_{ck}	(MPa)
resistência característica do aço	$f_{yk} := 500$	(MPa)
módulo de elasticidade do aço	$E_s := 210000$	(MPa)
coeficiente de minoração do concreto/aço	$\gamma_c := 1.5$	$\gamma_s := 1.15$
altura da viga	$h := 130$	(mm)
largura da mesa	$bf := 0$	(mm)
espessura da mesa	$e := 0$	(mm)
espessura da nervura	$bw := 1000$	(mm)
distância do c.g. da armadura tracionada à fibra inferior	$ci := 35$	(mm)
distância do c.g. da armadura comprimida à fibra superior	$cs := 40$	(mm)
opção viga =1 transversina = 2 laje = 3	$op := 3$	
tipo de obra rodoviaria = 1 ferroviaria = 2 ponte rolante = 3	$tipo := 1$	
forma da seção retangular =1 T (mesa comprimida) = 2 circular = 4 T (mesa tracionada) = 3	$k1 := 1$	

$\rho :=$

	1	2	3	4	5	6	7
1	150	150	173	201	230	259	288
2	150	150	150	150	158	177	197
3	150	150	153	178	204	229	255
4	230	288	345	403	460	518	575

concreto

$k2 := 4$

$f_{ck} :=$

	1	2	3	4	5	6	7
1	20	25	30	35	40	45	50

$$f_{ck} := f_{ck,1,k2}$$

$$f_{ck} = 35$$

$$\rho_{min} := \frac{\rho_{k1,k2}}{100000}$$

$$\rho_{min} = 0.00201$$

Esforços (kNm) Mg2, Mg3 incluídos no Mg1

$Mg1 := 4.20$

$Mg2 := 0$

$Mcm1 := 8.44$

$Mcm2 := -0$

$Mtemp := 0$

Estado limite último

$$M_d := 1.35 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm1 + 1.2 \cdot Mtemp$$

□



$$AS = 544 \quad (\text{mm}^2)$$

Fadiga

diâmetro da armadura $\phi := 10$ (mm) $as := 0.25 \cdot \pi \cdot \phi^2$ $as = 78.54$ (mm²)

$$\Delta_{fsdfad} := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases} \quad \psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

resistência característica à fadiga $\Delta_{fsdfad} = 190$ (MPa)

coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente) $\psi1 = 0.8$

número de camadas $i_c := 1$ $k := 1..i_c$ $cc := 35$

número de barras por camada (de baixo para cima) $yd_k := cc + \frac{\phi}{2} + (k - 1) \cdot (\phi + \max(20, \phi))$

$nb_k := 10$ ϕ 10.0 c 10 $yd = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 40 \\ \hline \end{array}$

área das armaduras de tração $ASi := \sum_{i=1}^{i_c} nb_i \cdot as$ $ASi = 785$ (mm²)

área das armaduras de compressão $ASs := 0$ (mm²) $cs := cc + \frac{\phi}{2}$ $cs = 40$ (mm)

$E_{cs} := 0.85 \cdot 5600 \cdot f_{ck}^{0.5}$ $E_{cs} = 28160.54$ $\alpha_E := \frac{Es}{E_{cs}}$ $\alpha_E = 7.46$

$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$

$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2$ $\Delta M := \begin{cases} M1 - M2 & \text{if } M2 \geq 0 \\ M1 + 0.5 \cdot |M2| & \text{otherwise} \end{cases}$



$\Delta\sigma_s = 114.64$ (MPa) menor que Δ_{fsdfad}

Fissuração $\alpha_E := 15$

barra a ser analisada $ii := i_c$ $di := h - yd_{ii}$ $di = 90$ mm

$M := Mg1 + Mg2 + \psi1 \cdot Mcm1$





coeficiente de deformação superficial

$$\eta_1 := 2.25$$

tensão na barra $\sigma_s = 178.59$ (MPa)

envolvimento da barra $ah_1 := 50$ $ah_2 := 50$ (mm) (em relação ao eixo da barra)

$av_1 := 40$ $av_2 := 100$ (mm)

tirante fictício $b_t := \min(ah_1, 7.5 \cdot \phi) + \min(ah_2, 7.5 \cdot \phi)$ $b_t = 100$ (mm)

$h_t := \min(av_1, 7.5 \cdot \phi) + \min(av_2, 7.5 \cdot \phi)$ $h_t = 115$ (mm)

taxa de armadura $\rho_r := \frac{a_s}{b_t \cdot h_t}$ $\rho_r = 0.00683$

resistencia média à tração $f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$ $f_{ctm} = 3.214$ (MPa)

$w_k := \min \left[\frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$ $w_k = 0.05$ (mm)

LAJE

MY TRANSV INF

OBRA: VIADUTO NA PE-060 33.2m

Dados gerais

resistência característica a compressão do concreto	f_{ck}	(MPa)
resistência característica do aço	$f_{yk} := 500$	(MPa)
módulo de elasticidade do aço	$E_s := 210000$	(MPa)
coeficiente de minoração do concreto/aço	$\gamma_c := 1.5$	$\gamma_s := 1.15$
altura da viga	$h := 200$	(mm)
largura da mesa	$bf := 0$	(mm)
espessura da mesa	$e := 0$	(mm)
espessura da nervura	$bw := 1000$	(mm)
distância do c.g. da armadura tracionada à fibra inferior	$ci := 40$	(mm)
distância do c.g. da armadura comprimida à fibra superior	$cs := 40$	(mm)
opção viga = 1 transversina = 2 laje = 3	$op := 3$	
tipo de obra rodoviaria = 1 ferroviaria = 2 ponte rolante = 3	$tipo := 1$	
forma da seção retangular = 1 T (mesa comprimida) = 2 circular = 4 T (mesa tracionada) = 3	$k1 := 1$	

$\rho :=$

	1	2	3	4	5	6	7
1	150	150	173	201	230	259	288
2	150	150	150	150	158	177	197
3	150	150	153	178	204	229	255
4	230	288	345	403	460	518	575

concreto

$k2 := 4$

$f_{ck} :=$

	1	2	3	4	5	6	7
1	20	25	30	35	40	45	50

$$f_{ck} := f_{ck,1,k2}$$

$$f_{ck} = 35$$

$$\rho_{min} := \frac{\rho_{k1,k2}}{100000}$$

$$\rho_{min} = 0.00201$$

Esforços (kNm) Mg 2 incluído no Mg1

$$Mg1 := 3.05$$

$$Mg2 := 0$$

$$Mcm1 := 16.8$$

$$Mcm2 := -0.57$$

$$Mtemp := 0$$

Estado limite último

$$M_d := 1.35 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm1 + 1.2 \cdot Mtemp$$



$$AS = 435 \quad (\text{mm}^2)$$

Fadiga

$$\text{diâmetro da armadura } \phi := 12.5 \text{ (mm)} \quad as := 0.25 \cdot \pi \cdot \phi^2 \quad as = 122.72 \text{ (mm}^2)$$

$$\Delta_{fsdfad} := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases} \quad \psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

$$\text{resistência característica à fadiga} \quad \Delta_{fsdfad} = 190 \quad (\text{MPa})$$

$$\text{coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente)} \quad \psi1 = 0.8$$

$$\text{número de camadas} \quad i_c := 1 \quad k := 1 \dots i_c \quad cc := 35$$

$$\text{número de barras por camada (de baixo para cima)} \quad yd_k := cc + \frac{\phi}{2} + (k - 1) \cdot (\phi + \max(20, \phi))$$

$$nb_k := 6.66 \quad \phi \ 12.5 \ c \ 15 \quad yd = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 41.25 \\ \hline \end{array}$$

$$\text{área das armaduras de tração} \quad ASi := \sum_{i=1}^{i_c} nb_i \cdot as \quad ASi = 817 \quad (\text{mm}^2)$$

$$\text{área das armaduras de compressão} \quad ASs := 0 \quad (\text{mm}^2) \quad cs := cc + \frac{\phi}{2} \quad cs = 41.25 \text{ (mm)}$$

$$E_{cs} := 0.85 \cdot 5600 \cdot f_{ck}^{0.5} \quad E_{cs} = 28160.54 \quad \alpha_E := \frac{Es}{E_{cs}} \quad \alpha_E = 7.46$$

$$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$$

$$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2 \quad \Delta M := \begin{cases} M1 - M2 & \text{if } M2 \geq 0 \\ M1 + 0.5 \cdot |M2| & \text{otherwise} \end{cases}$$



$$\Delta\sigma_s = 116.47 \text{ (MPa)} \quad \text{menor que} \quad \Delta_{fsdfad}$$

Fissuração

$$\alpha_E := 15$$

$$\text{barra a ser analisada} \quad ii := i_c \quad di := h - yd_{ii} \quad di = 158.75 \text{ mm}$$

$$M := Mg1 + Mg2 + \psi1 \cdot Mcm1$$



coeficiente de deformação superficial		$\eta_1 := 2.25$
tensão na barra	$\sigma_s = 142.44$	(MPa)
envolvimento da barra	$ah_1 := 75$	$ah_2 := 75$ (mm) (em relação ao eixo da barra)
	$av_1 := 60$	$av_2 := 160$ (mm)
tirante fictício	$b_t := \min(ah_1, 7.5 \cdot \phi) + \min(ah_2, 7.5 \cdot \phi)$	$b_t = 150$ (mm)
	$h_t := \min(av_1, 7.5 \cdot \phi) + \min(av_2, 7.5 \cdot \phi)$	$h_t = 153.75$ (mm)
taxa de armadura	$\rho_r := \frac{a_s}{b_t \cdot h_t}$	$\rho_r = 0.00532$
resistencia média à tração	$f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$	$f_{ctm} = 3.214$ (MPa)
$w_k := \min \left[\frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$		$w_k = 0.04$ (mm)

LAJE

MY TRANSV SUP

OBRA: VIADUTO NA PE-060 33.2m

Dados gerais

resistência característica a compressão do concreto	f_{ck}	(MPa)
resistência característica do aço	$f_{yk} := 500$	(MPa)
módulo de elasticidade do aço	$E_s := 210000$	(MPa)
coeficiente de minoração do concreto/aço	$\gamma_c := 1.5$	$\gamma_s := 1.15$
altura da viga	$h := 200$	(mm)
largura da mesa	$bf := 0$	(mm)
espessura da mesa	$e := 0$	(mm)
espessura da nervura	$bw := 1000$	(mm)
distância do c.g. da armadura tracionada à fibra inferior	$ci := 40$	(mm)
distância do c.g. da armadura comprimida à fibra superior	$cs := 40$	(mm)
opção viga =1 transversina = 2 laje = 3	$op := 3$	
tipo de obra rodoviaria = 1 ferroviaria = 2 ponte rolante = 3	$tipo := 1$	
forma da seção retangular =1 T (mesa comprimida) = 2 circular = 4 T (mesa tracionada) = 3	$k1 := 1$	

$\rho :=$

	1	2	3	4	5	6	7
1	150	150	173	201	230	259	288
2	150	150	150	150	158	177	197
3	150	150	153	178	204	229	255
4	230	288	345	403	460	518	575

concreto

$k2 := 4$

$f_{ck} :=$

	1	2	3	4	5	6	7
1	20	25	30	35	40	45	50

$$f_{ck} := f_{ck,1,k2}$$

$$f_{ck} = 35$$

$$\rho_{min} := \frac{\rho_{k1,k2}}{100000}$$

$$\rho_{min} = 0.00201$$

Esforços (kNm) Mg 2 incluído no Mg1

$Mg1 := 4.11$

$Mg2 := 0$

$Mcm1 := 17.6$

$Mcm2 := -10.4$

$Mtemp := 0$

Estado limite último

$$M_d := 1.35 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm1 + 1.2 \cdot Mtemp$$



$$AS = 476 \quad (\text{mm}^2)$$

Fadiga

diâmetro da armadura $\phi := 12.5$ (mm) $as := 0.25 \cdot \pi \cdot \phi^2$ $as = 122.72$ (mm²)

$$\Delta_{fsdfad} := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases} \quad \psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

resistência característica à fadiga $\Delta_{fsdfad} = 190$ (MPa)

coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente) $\psi1 = 0.8$

número de camadas $i_c := 1$ $k := 1..i_c$ $cc := 35$

número de barras por camada (de baixo para cima) $yd_k := cc + \frac{\phi}{2} + (k - 1) \cdot (\phi + \max(20, \phi))$

$nb_k := 8$ ϕ 12.5 c 12.5 $yd = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 41.25 \\ \hline \end{array}$

área das armaduras de tração $ASi := \sum_{i=1}^{i_c} nb_i \cdot as$ $ASi = 982$ (mm²)

área das armaduras de compressão $ASs := 0$ (mm²) $cs := cc + \frac{\phi}{2}$ $cs = 41.25$ (mm)

$E_{cs} := 0.85 \cdot 5600 \cdot f_{ck}^{0.5}$ $E_{cs} = 28160.54$ $\alpha_E := \frac{Es}{E_{cs}}$ $\alpha_E = 7.46$

$$M1 := Mg1 + Mg2 + \psi1 \cdot M_{cm1}$$

$$M2 := Mg1 + Mg2 + \psi1 \cdot M_{cm2} \quad \Delta M := \begin{cases} M1 - M2 & \text{if } M2 \geq 0 \\ M1 + 0.5 \cdot |M2| & \text{otherwise} \end{cases}$$



$\Delta\sigma_s = 144.15$ (MPa) menor que Δ_{fsdfad}

Fissuração $\alpha_E := 15$

barra a ser analisada $ii := i_c$ $di := h - yd_{ii}$ $di = 158.75$ mm

$$M := Mg1 + Mg2 + \psi1 \cdot M_{cm1}$$



coeficiente de deformação superficial

$$\eta_1 := 2.25$$

tensão na barra $\sigma_s = 132.02$ (MPa)

envolvimento da barra $ah_1 := 62.5$ $ah_2 := 62.5$ (mm) (em relação ao eixo da barra)

$$av_1 := 40 \quad av_2 := 160 \quad (\text{mm})$$

tirante fictício $b_t := \min(ah_1, 7.5 \cdot \phi) + \min(ah_2, 7.5 \cdot \phi)$ $b_t = 125$ (mm)

$$h_t := \min(av_1, 7.5 \cdot \phi) + \min(av_2, 7.5 \cdot \phi) \quad h_t = 133.75 \quad (\text{mm})$$

taxa de armadura

$$\rho_r := \frac{a_s}{b_t \cdot h_t}$$

$$\rho_r = 0.00734$$

resistência média
à tração

$$f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$$

$$f_{ctm} = 3.214 \quad (\text{MPa})$$

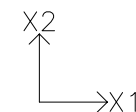
$$w_k := \min \left[\frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi}{12.5 \cdot \eta_1} \cdot \frac{\sigma_s}{E_s} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$$

$$w_k = 0.034 \quad (\text{mm})$$

5.2.1.4.3 LAJE DE LIGAÇÃO DOS TABULEIROS

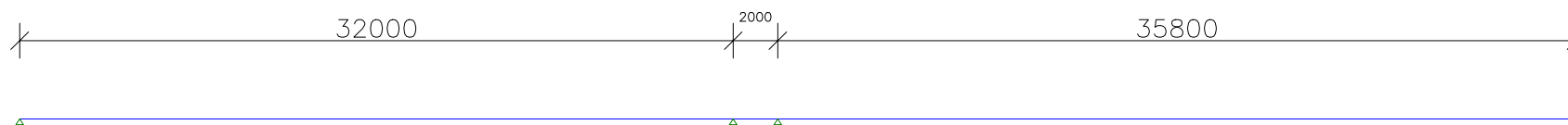
ligação dos tabuleiros

DIMENSÕES

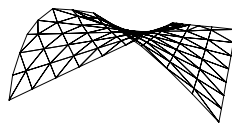


ESCALA= 1:315

DATA:15/10/11



STRAP



PROGRAMAS DE ANÁLISE ESTRUTURAL

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Prado - Recife - PE - CEP 50.720-140

Strap 2011.00

ligação dos tabuleiros
lig tab geometria e materiais
Preparado por:

Página:1
Data:15/10/11

TABELA DE MATERIAIS (unidades - tf metros)

N.º	Nome	Módulo de Elasticidade	Coefic. Poisson	Densidade	Dilatação Térmica	Módulo Transv. (G)
1	C40	0.3010E+07	0.200	0.2500E+01	0.00001000	0.1254E+07
2	C30	0.2607E+07	0.200	0.2500E+01	0.00001000	0.1086E+07

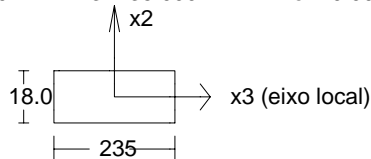
TABELA DE PROPRIEDADES (unidades - cm.)

PROPRIEDADE N. 1

A=0.1272E+05 I2=0.2470E+08 I3=0.6694E+08 J=0.4643E+07 SF2=0.500
Material = 2 - C30 Perímetro=932.321 SF3=0.500
h2=210.000 h3=235.000 e2=135.650 e3=117.500
_Solid vin

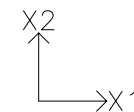
PROPRIEDADE N. 2

A=0.4230E+04 I2=0.1947E+08 I3=0.1142E+06 J=0.4348E+06 SF2=0.850
Material = 2 - C30 Perímetro=506.000 SF3=0.850
h2=18.000 h3=235.000 e2=9.000 e3=117.500



ligação dos tabuleiros

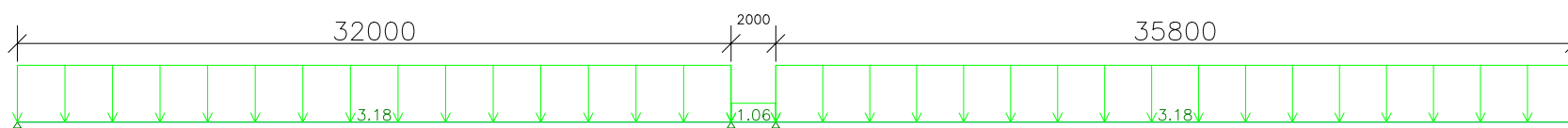
Carga 1: peso viga+laje



ESCALA = 1:319

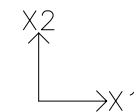
UNID.: ton m

DATA:15/10/11



ligação dos tabuleiros

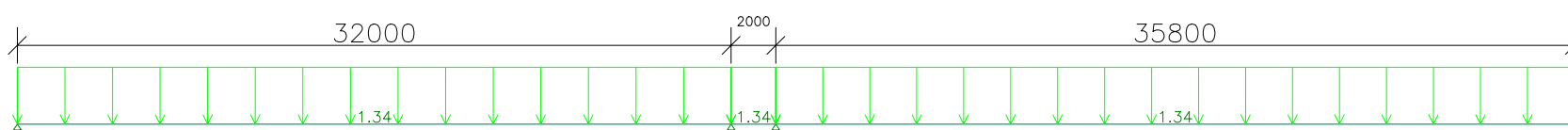
Carga 2: pav+defensa



ESCALA = 1:319

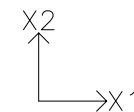
UNID.: ton m

DATA: 15/10/11



ligação dos tabuleiros

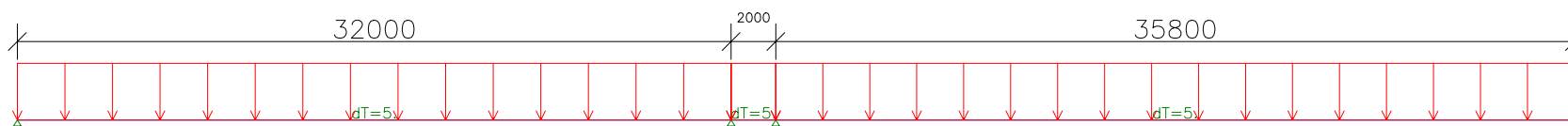
Carga 3: grad temp 5



ESCALA = 1:319

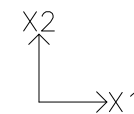
UNID.: ton m

DATA: 15/10/11



ligação dos tabuleiros

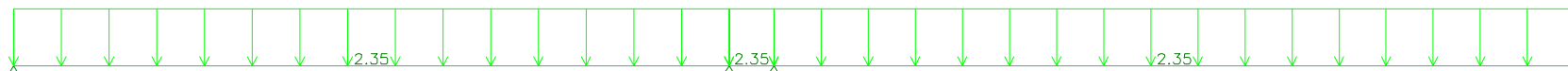
Carga 4: cm



ESCALA = 1:319

UNID.: ton m

DATA:15/10/11



Reference:C:\m.doc\programa 2004\Chicoef.mcd

1/10/2011

LAJE DE LIGAÇÃO DOS TRECHOS

OBRA :VIADUTO NA PE-060

1. DADOS INICIAIS

. idade da aplicação carga : viga +laje+prot.	viga	t11 := 35	(dia)
	laje	t12 := 3	(dia)
. idade da aplicação carga: pavimentação+ defesa	viga	t21 := 100	(dia)
	laje	t22 := 68	(dia)
. tensão característica de compressão do concreto a 28 dias		fck := 3000	(t/m2)
. umidade relativa.....		RH := 75	(%)

2. PARÂMETROS DA DEFORMAÇÃO LENTA

. área da seção transversal		Ac := 0.893	(m2)
. perímetro da seção em contato com a atmosfera		u := 4.5	(m)
$ho := \frac{2 \cdot Ac}{u}$	$Ec(a) := E_c(fck \cdot 0.01, a) \cdot 100$	ho = 0.4	(m)
$\chi(a, b) := \chi(RH, ho \cdot 1000, fck \cdot 0.01, a, b)$	$\phi(a, b) := \phi(RH, ho \cdot 1000, fck \cdot 0.01, a, b)$		
$Eec(a, b) := \frac{Ec(a)}{1 + \chi(a, b) \cdot \phi(a, b)}$			

3. VARIAÇÃO NO TEMPO t11 ao INFINITO G1 (da concretagem da laje ao infinito)

viga (t11 a ∞)	t11 = 35	t1f := ∞	laje (t12 a ∞)	t12 = 3	t1f := ∞
$\phi(t11, t1f) = 1.732$			$\phi(t21, t1f) = 1.48$		
$\chi(t11, t1f) = 0.81$			$\chi(t21, t1f) = 0.88$		
$Eec(t11, t1f) = 1412379$	t /m2		$Eec(t21, t1f) = 1548096$	t /m2	
$\phi_{a1} := \phi(t11, t1f) \cdot \frac{Ec(28)}{Ec(t11)}$			$\phi_{a2} := \phi(t21, t1f) \cdot \frac{Ec(28)}{Ec(t21)}$		
$\phi_{a1} = 1.71$			$\phi_{a2} = 1.4$		
$Ec(t11) = 3399624$	t /m2		$Ec(t21) = 3558448$	t /m2	

PESO PROPRIO DA VIGA + LAJE +PROTENSÃO

VIGA	$\alpha_{v_g} := 0.007200 \quad \text{rad}$	$L_v := 35.8 \quad \text{m}$	$J_v := 0.6694 \quad \text{m}^4$
	$\alpha_{v_p} := -0.0071525 \quad \text{rad}$	$\alpha_v := \frac{L_v}{3 \cdot J_v}$	$\alpha_v = 17.83$
	$\alpha_{v_g} + \alpha_{v_p} = 0.00005$		
LAJE	$L := 2 \quad \text{m}$	$e := 0.18 \quad \text{m}$	$b := 2.35 \quad \text{m}$
			$J_L := \frac{b \cdot e^3}{12} \quad \text{m}^4$
	$\alpha_L := \frac{L}{3 \cdot J_L}$	$\beta_L := \frac{L}{6 \cdot J_L}$	
	$X := - \frac{(\alpha_{v_g} + \alpha_{v_p}) \cdot \phi_{a1} \cdot \frac{E_c(28)}{E_c(t11)}}{\frac{\alpha_v}{E_c(t11, t1f)} + \frac{(\alpha_L + \beta_L)}{E_c(t12, t1f)}}$		$X = -0.106 \quad \text{tm}$

DIMENSIONAMENTO DA LAJE DE LIGAÇÃO ENTRE TABULEIROS

OBRA : VIADUTO NA PE-060

$$\sigma_{fck} := 30 \quad \text{MPa} \quad \psi := 0.8 \quad d := 0.15 \quad \text{m} \quad b := 2.35 \quad \text{m}$$

MOMENTOS /PARA FAIXA DE b=2.35 m

$$Mg1 := -0.106 \quad \text{tm}$$

$$Mg2 := -5.8 \quad \text{tm}$$

$$Mcm1 := -0 \quad \text{tm} \quad Mtemp := 1.6 \quad \text{tm}$$

$$Mcm2 := -10.2 \quad \text{tm}$$

por metro temos

$$Mg1 := \frac{Mg1}{b} \quad Mg1 = -0.045 \quad \text{tm /m}$$
$$Mg2 := \frac{Mg2}{b} \quad Mg2 = -2.468 \quad \text{tm /m}$$
$$Mcm1 := \frac{Mcm1}{b} \quad Mcm1 = 0 \quad \text{tm /m}$$
$$Mcm2 := \frac{Mcm2}{b} \quad Mcm2 = -4.34 \quad \text{tm /m}$$
$$Mtemp := \frac{Mtemp}{b} \quad Mtemp = 0.681 \quad \text{tm /m}$$

$$Mg := Mg1 + Mg2 \quad Mg = -2.513 \quad \text{tm /m}$$

$$Msd1 := 1.4 \cdot Mg + 1.5 \cdot Mcm1 + 1.2 \cdot Mtemp \quad Msd1 = -2.701 \quad \text{tm/m}$$

$$Msd2 := 0.9 \cdot Mg + 1.5 \cdot Mcm2 \quad Msd2 = -8.773 \quad \text{tm/m}$$

ARMADURA INFERIOR $Msd1 := 0$

$$Asf1 := \frac{|Msd1|}{0.9 \cdot d \cdot 4.35} \quad Asf1 = 0 \quad \text{cm}^2/\text{m}$$

Fadiga

$$m1 := Mg + \psi \cdot Mcm1 \quad m2 := Mg + \psi \cdot Mcm2$$

$$m1 = -2.513 \quad \text{tm /m} \quad m2 = -5.986 \quad \text{tm /m}$$

$$\Delta m := 0 \quad \text{tm /m} \quad Asf := \frac{\Delta m}{0.9 \cdot d \cdot 1.9} \quad Asf = 0 \quad \text{cm}^2 / \text{m}$$

$$As := \max(Asf1, Asf, 0.0015 \cdot 100 \cdot 18) \quad As = 2.7 \quad \text{cm}^2 / \text{m}$$

ADOTAR $\phi 12.5 \text{ c}10$

ARMADURA SUPERIOR

$$M_g = -2.513$$

$$M_{cm1} = 0$$

$$M_{cm2} = -4.34$$

$$M_{sd1} := 0.9 \cdot M_g + 1.5 \cdot M_{cm1} + 1.2 \cdot M_{temp} \quad M_{sd1} = -1.445$$

$$M_{sd2} := 1.4 \cdot M_g + 1.5 \cdot M_{cm2} \quad M_{sd2} = -10.029$$

$$A_{sf1} := \frac{|M_{sd2}|}{0.9 \cdot d \cdot 4.35} \quad A_{sf1} = 17.08 \text{ cm}^2/\text{m}$$

Fadiga

$$m_1 := M_g + \psi \cdot M_{cm1} \quad m_2 := M_g + \psi \cdot M_{cm2}$$

$$m_1 = -2.513 \text{ tm/m} \quad m_2 = -5.986 \text{ tm/m}$$

$$\Delta m := |m_1 - m_2| \quad \Delta m = 3.472$$

$$\Delta m = 3.472 \text{ tm/m} \quad A_{sf} := \frac{\Delta m}{0.9 \cdot d \cdot 1.9} \quad A_{sf} = 13.537 \text{ cm}^2/\text{m}$$

$$A_s := \max(A_{sf1}, A_{sf}, 0.0015 \cdot 100 \cdot 18) \quad A_s = 17.078 \text{ cm}^2/\text{m}$$

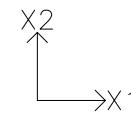
ADOTAR $\phi 16.0 \text{ c}10$

5.2.1.5 CORTINA E TRANSVERSINA

5.2.1.5.1 TRANSVERSINA CENTRAL (TRECHOS DE 37M E 33,2M)

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m

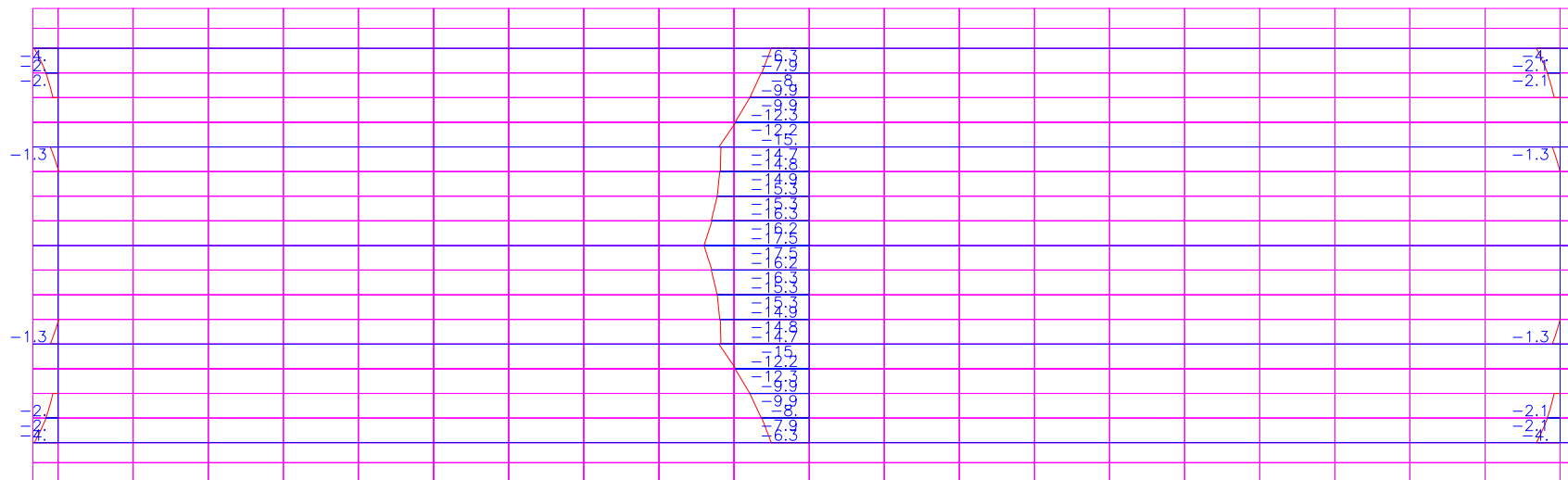
transversina mom g1+g2+g3 37 m



ESCALA= 1:167

UNIDS: tf*m

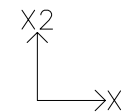
DATA: 7/10/11



MOM. FLETOR M2 COMB. N° 3 g1+g2+g3

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas – transversinas 37 m

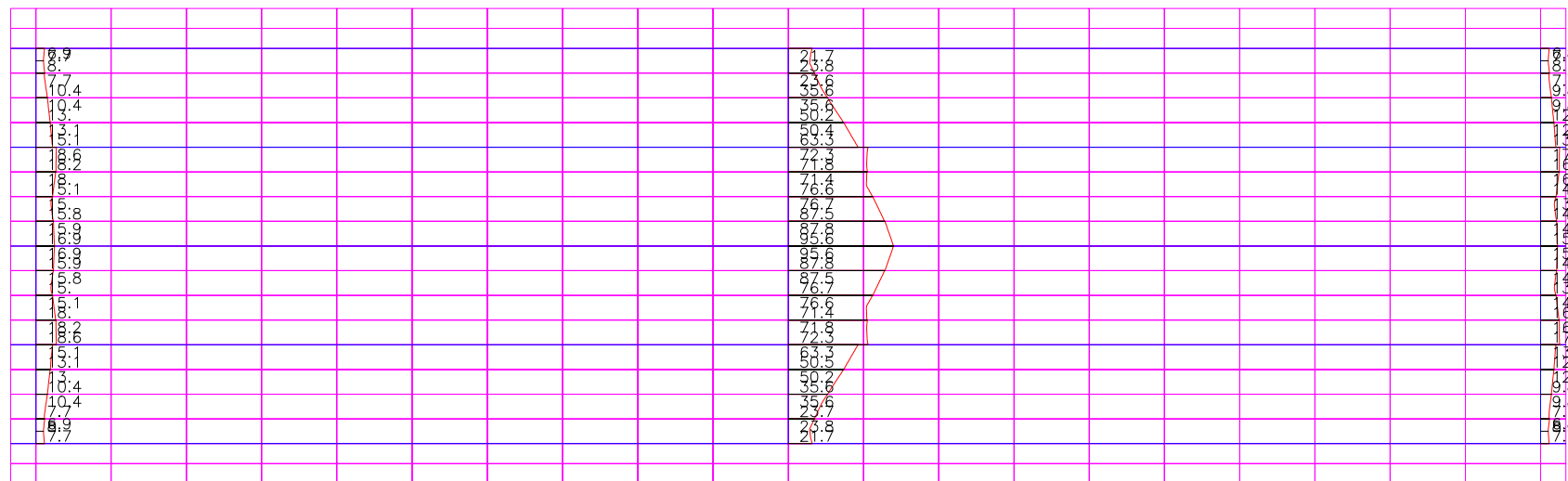
transversina mom 100%cmovel+ 37m



ESCALA= 1:167

UNIDS: tf*m

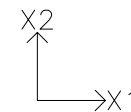
DATA: 7/10/11



MOM. FLETOR M2 CARREG. N°17 100%cmovel+

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas – transversinas 37 m

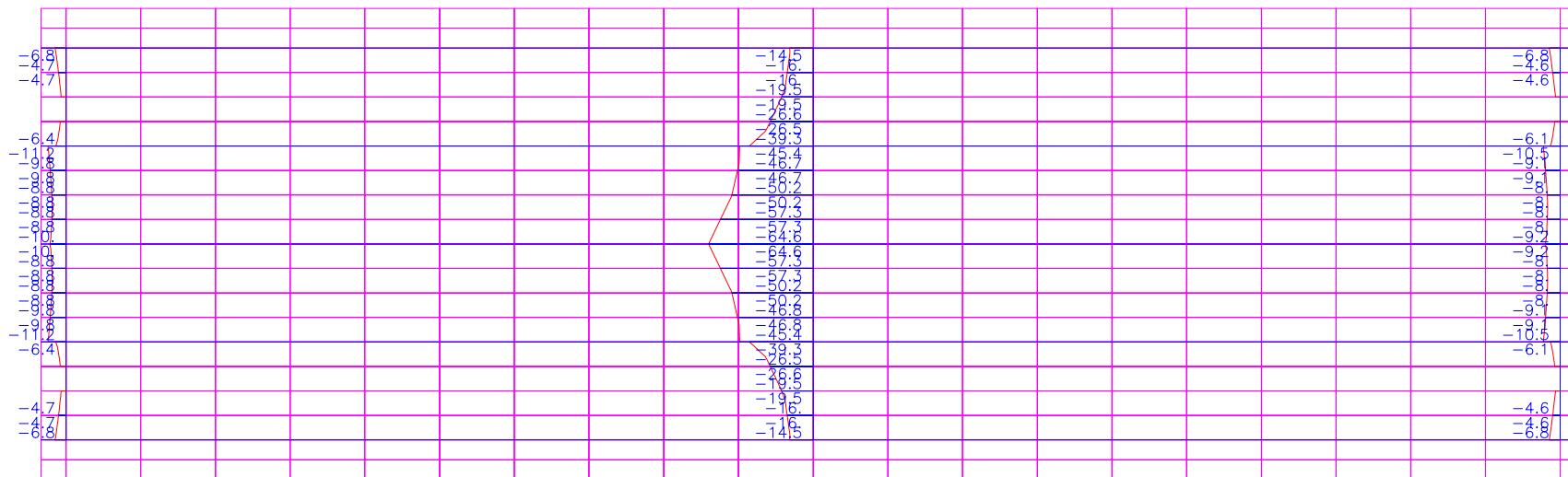
transversina mom 100%cmovel– 37m



ESCALA= 1:167

UNIDS: tf*m

DATA: 7/10/11

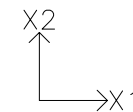


MOM. FLETOR M2

CARREG. N°18 100%cmovel–

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas – transversinas 37 m

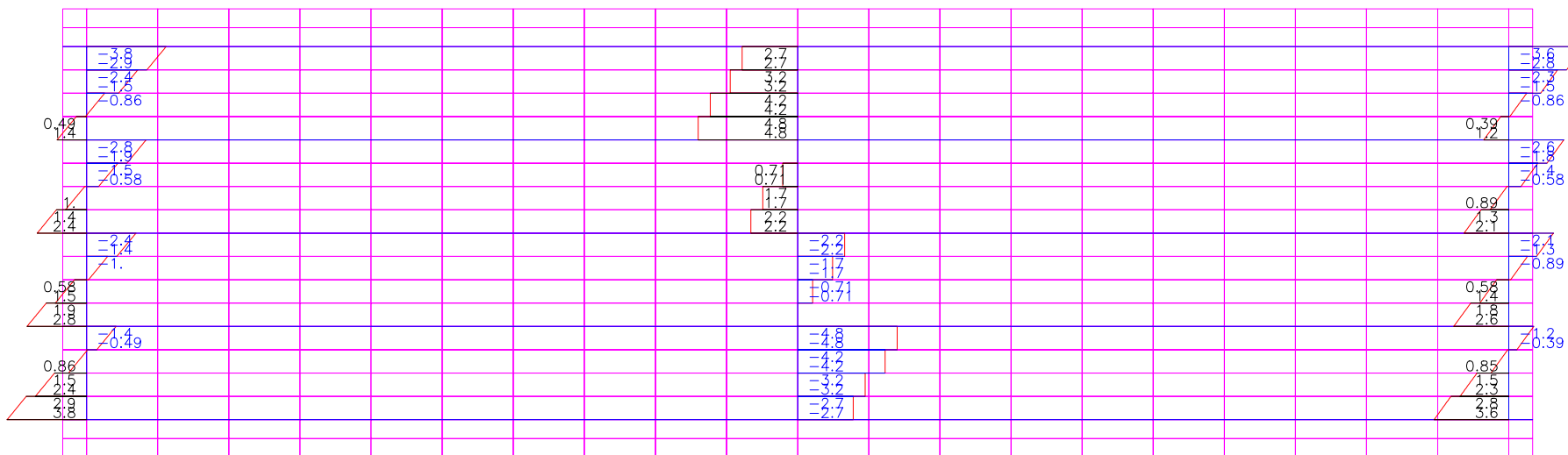
transversina cort g1+g2+g3 37 m



ESCALA= 1:167

UNIDS: tf

DATA: 7/10/11

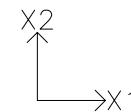


CORTANTE V3

COMB. N° 3 g1+g2+g3

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas – transversinas 37 m

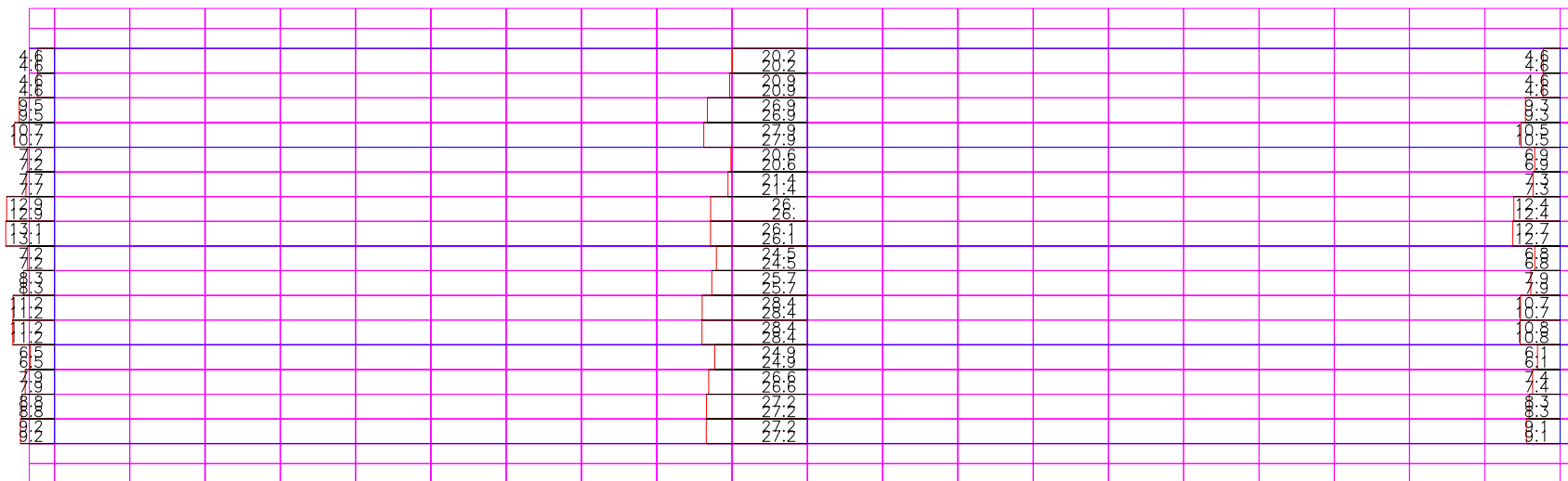
transversina cort 100%cmovel+ 37m



ESCALA= 1:167

UNIDS: tf

DATA: 7/10/11

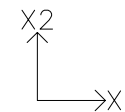


CORTANTE V3

CARREG. N°17 100%cmovel+

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas – transversinas 37 m

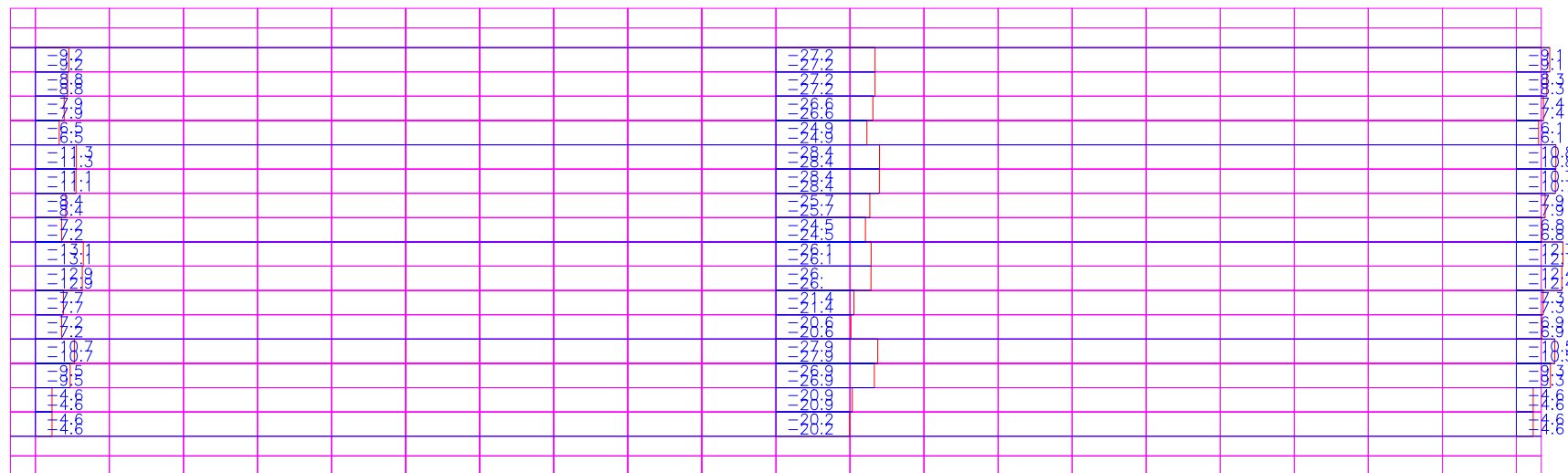
transversina cort 100%cmovel- 37m



ESCALA= 1:167

UNIDS: tf

DATA: 7/10/11

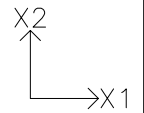


CORTANTE V3

CARREG. N°18 100%cmovel-

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas – transversinas 37 m

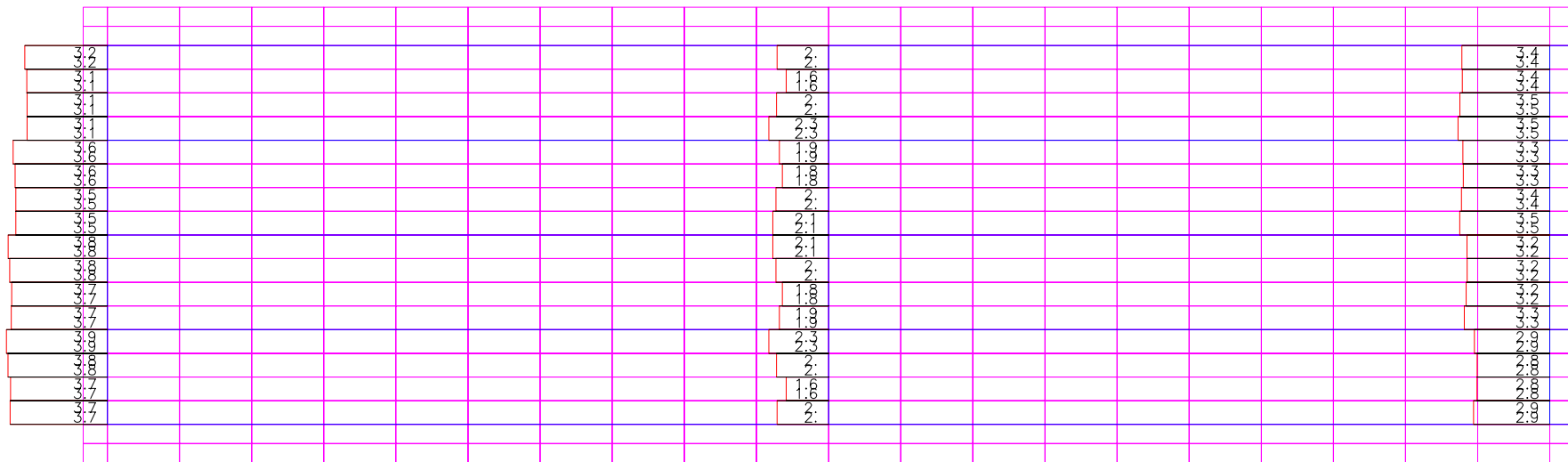
transversina torção 100%cmovel



ESCALA= 1:167

UNIDS: tf*m

DATA: 7/10/11



MOMENTO TORSOR CARREG. N°17 100%cmovel+

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m project data table
Prepared by:

Units: ton meter

Code: EuroCode
Page: 94
Date: 7/10/11

PROJECT DATA TABLE

STAGES

Name	Start time (days)	Allow. tens. (MPa)	Allow. compr. (MPa)	model stage	add creep forces after schm. cng.
TRANSFER	14	1.	20.	pre-moldado	not relevant
conclaje	30	2.3	25.	pre-moldado	not relevant
ligação	33	2.3	25.	Whole model	Yes
TRANSFER2	37	2.3	25.	Whole model	not relevant
pavimentação	80	2.3	25.	Whole model	not relevant
serviço	100	2.3	25.	Whole model	not relevant

TIME STEPS IN ADDITION TO THE TIME OF THE STAGES (DAYS)

time = 0
 time = 30
 time = 33
 time = 37
 time = 50
 time = 60
 time = 80
 time = 100
 time = 120
 time = 365
 time = 730
 time = 30000

LOAD COMBINATIONS

Name	Start time (days)	End time (days)	perman.	type
g1	14	30	Yes	fact. & serv.
g1+g2	30	80	Yes	fact. & serv.
g1+g2+g3	80	infinity	Yes	fact. & serv.
g1+g2+g3+cm	100	infinity	No	fact. & serv.

STRAND TYPES

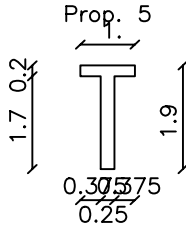
Name	Strand area (mm ²)	Max. stress (MPa)	Steel type
7WS15.2MM	143.4	1400.	TYPE-1860

GEOMETRY DATA TABLE

BEAM NO. B3

el. =	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224
prop.=	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	0.588	0.587	0.588	0.587	0.588	0.587	0.588	0.587	0.588	0.587	0.588	0.587	0.588	0.587	0.588	0.587
As top	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
As bot	12.	12.	12.	12.	12.	12.	12.	12.	12.	12.	12.	12.	12.	12.	12.	12.
ds top	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
ds bot	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
casting t=	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.

SECTIONS



PARAMETERS

Design Code = EuroCode, conc. $f_c = 35.$, reinf. $f_y = 500.$, shear reinf. $f_y = 500.$
 Reinf. modulus $E = 200000.$, conc. modulus $E = 30000.$, cables modulus $E = 205000.$
 Humidity = 75.%, cement type = normal, temperature = 30.
 Calculation methods: Ultimate moment = include decompression strain,
 Shear = inclined struts method, Deflections = use effective I at each point.

CABLE NO. = 1

No. of strands = 4, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 80.304[t]
 Cable is bonded
 JACKING SEQUENCE :
 Stage 4/2: TRANSFER2
 Strands 1-4 jacked from right side to 100.%, Total force of jacked strands =80.304[t]

CABLE GEOMETRY :

CABLE COORDINATES (mm), relative to section top

x	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	
y	-600	-600	-600	-600	-600	-600	-600	-600	-600	-600	-600	-600	
x	6000	6500	7000	7500	8000	8500	9000	9400					
y	-600	-600	-600	-600	-600	-600	-600	-600					

CABLE NO. = 2

No. of strands = 4, Strand type : 7WS15.2MM, % of jacking = 100., Total force of all strands= 80.304[t]
 Cable is bonded
 JACKING SEQUENCE :
 Stage 4/1: TRANSFER2
 Strands 1-4 jacked from left side to 100.%, Total force of jacked strands =80.304[t]

CABLE GEOMETRY :

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
transversina central 37m geometry data table

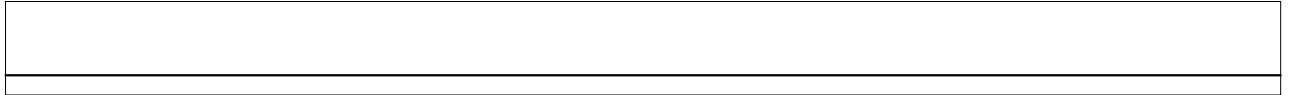
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CABLE COORDINATES (mm), relative to section top

x	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
y	-1500	-1500	-1500	-1500	-1500	-1500	-1500	-1500	-1500	-1500	-1500	-1500
x	6000	6500	7000	7500	8000	8500	9000	9400				
y	-1500	-1500	-1500	-1500	-1500	-1500	-1500	-1500				

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
transversina central 37m stages data table
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STAGES DATA TABLE

BEAM NO. 3

Stage 1: TRANSFER, t = 14.

Combinations that start at this stage:

Comb. no.1: g1

Stage 2: conclaje, t = 30.

Combinations that start at this stage:

Comb. no.2: g1+g2

Combinations, that end at this stage:

Comb. no.1: g1

Stage 3: ligação, t = 33.

--

Stage 4: TRANSFER2, t = 37.

Cables jacked at this stage:

Cable no. 1: force = 80.304[t]

Cable no. 2: force = 80.304[t]

C1
C2

Stage 5: pavimentação, t = 80.

Combinations that start at this stage:

Comb. no.3: g1+g2+g3

Combinations, that end at this stage:

Comb. no.2: g1+g2

Stage 6: serviço, t = 100.

Combinations that start at this stage:

Comb. no.4: g1+g2+g3+cm

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 transversina central 37m cabo c1 perdas t=30000 dias
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.00	7.5	0.0	3.2	1.3	2.1	66.3
2	0.03	7.5	0.0	3.2	1.3	2.1	66.3
3	0.06	7.5	0.0	3.2	1.3	2.1	66.3
4	0.09	7.5	0.0	3.2	1.3	2.1	66.3
5	0.12	7.5	0.0	3.2	1.3	2.1	66.2
6	0.15	7.6	0.0	3.2	1.3	2.1	66.2
7	0.18	7.6	0.0	3.2	1.3	2.1	66.2
8	0.21	7.6	0.0	3.2	1.3	2.1	66.2
9	0.24	7.6	0.0	3.2	1.3	2.1	66.2
10	0.26	7.6	0.0	3.2	1.3	2.1	66.2
11	0.29	7.6	0.0	3.2	1.3	2.1	66.2
12	0.32	7.6	0.0	3.2	1.3	2.1	66.2
13	0.35	7.6	0.0	3.2	1.3	2.1	66.2
14	0.38	7.6	0.0	3.2	1.3	2.1	66.2
15	0.41	7.6	0.0	3.2	1.3	2.1	66.2
16	0.44	7.6	0.0	3.2	1.3	2.1	66.2
17	0.47	7.6	0.0	3.2	1.3	2.1	66.2
18	0.50	7.6	0.0	3.2	1.3	2.1	66.2
19	0.53	7.6	0.0	3.2	1.3	2.1	66.2
20	0.56	7.6	0.0	3.2	1.3	2.1	66.2
21	0.59	7.7	0.0	3.2	1.3	2.1	66.2
22	0.59	7.7	0.0	3.2	1.2	2.1	66.2
23	0.62	7.7	0.0	3.2	1.2	2.1	66.1
24	0.65	7.7	0.0	3.2	1.2	2.1	66.1
25	0.68	7.7	0.0	3.2	1.2	2.1	66.1
26	0.71	7.7	0.0	3.2	1.2	2.1	66.1
27	0.73	7.7	0.0	3.2	1.2	2.1	66.1
28	0.76	7.7	0.0	3.2	1.2	2.1	66.1
29	0.79	7.7	0.0	3.2	1.2	2.1	66.1
30	0.82	7.7	0.0	3.2	1.2	2.1	66.1
31	0.85	7.7	0.0	3.2	1.2	2.1	66.1
32	0.88	7.7	0.0	3.2	1.2	2.1	66.1
33	0.91	7.7	0.0	3.2	1.3	2.1	66.1
34	0.94	7.7	0.0	3.2	1.3	2.1	66.1
35	0.97	7.7	0.0	3.2	1.3	2.1	66.1
36	1.00	7.8	0.0	3.2	1.3	2.1	66.1
37	1.03	7.8	0.0	3.2	1.3	2.1	66.1
38	1.06	7.8	0.0	3.2	1.3	2.1	66.1
39	1.09	7.8	0.0	3.2	1.3	2.1	66.0
40	1.12	7.8	0.0	3.2	1.3	2.1	66.0
41	1.15	7.8	0.0	3.2	1.3	2.1	66.0
42	1.17	7.8	0.0	3.2	1.3	2.1	66.0
43	1.17	7.8	0.0	3.2	1.2	2.1	66.0
44	1.20	7.8	0.0	3.2	1.2	2.1	66.0
45	1.23	7.8	0.0	3.2	1.2	2.1	66.0

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c1 perdas t=30000 dias
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	1.26	7.8	0.0	3.2	1.2	2.1	66.0
47	1.29	7.8	0.0	3.2	1.2	2.1	66.0
48	1.32	7.8	0.0	3.2	1.2	2.1	66.0
49	1.35	7.8	0.0	3.2	1.2	2.1	66.0
50	1.38	7.8	0.0	3.2	1.2	2.1	66.0
51	1.41	7.8	0.0	3.2	1.2	2.1	66.0
52	1.44	7.9	0.0	3.2	1.2	2.1	66.0
53	1.47	7.9	0.0	3.2	1.2	2.1	66.0
54	1.50	7.9	0.0	3.2	1.2	2.1	66.0
55	1.53	7.9	0.0	3.2	1.2	2.1	66.0
56	1.56	7.9	0.0	3.2	1.2	2.1	66.0
57	1.59	7.9	0.0	3.2	1.2	2.1	65.9
58	1.62	7.9	0.0	3.2	1.2	2.1	65.9
59	1.65	7.9	0.0	3.2	1.2	2.1	65.9
60	1.67	7.9	0.0	3.2	1.2	2.1	65.9
61	1.70	7.9	0.0	3.2	1.2	2.1	65.9
62	1.73	7.9	0.0	3.2	1.2	2.1	65.9
63	1.76	7.9	0.0	3.2	1.2	2.1	65.9
64	1.76	7.9	0.0	3.2	1.2	2.1	65.9
65	1.79	7.9	0.0	3.2	1.2	2.1	65.9
66	1.82	7.9	0.0	3.2	1.2	2.1	65.9
67	1.85	8.0	0.0	3.2	1.2	2.0	65.9
68	1.88	8.0	0.0	3.2	1.2	2.0	65.9
69	1.91	8.0	0.0	3.2	1.2	2.0	65.9
70	1.94	8.0	0.0	3.2	1.2	2.0	65.9
71	1.97	8.0	0.0	3.2	1.2	2.0	65.9
72	2.00	8.0	0.0	3.2	1.2	2.0	65.9
73	2.03	8.0	0.0	3.2	1.2	2.0	65.9
74	2.06	8.0	0.0	3.2	1.2	2.0	65.9
75	2.09	8.0	0.0	3.2	1.2	2.0	65.8
76	2.12	8.0	0.0	3.2	1.2	2.0	65.8
77	2.14	8.0	0.0	3.2	1.2	2.0	65.8
78	2.17	8.0	0.0	3.2	1.2	2.0	65.8
79	2.20	8.0	0.0	3.2	1.2	2.0	65.8
80	2.23	8.0	0.0	3.2	1.2	2.0	65.8
81	2.26	8.0	0.0	3.2	1.2	2.0	65.8
82	2.29	8.1	0.0	3.2	1.2	2.0	65.8
83	2.32	8.1	0.0	3.2	1.2	2.0	65.8
84	2.35	8.1	0.0	3.2	1.2	2.0	65.8
85	2.35	8.1	0.0	3.2	1.2	2.0	65.8
86	2.38	8.1	0.0	3.2	1.2	2.0	65.8
87	2.41	8.1	0.0	3.2	1.2	2.0	65.8
88	2.44	8.1	0.0	3.2	1.2	2.0	65.8
89	2.47	8.1	0.0	3.2	1.2	2.0	65.8
90	2.50	8.1	0.0	3.2	1.2	2.0	65.8

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c1 perdas t=30000 dias
Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	2.53	8.1	0.0	3.2	1.2	2.0	65.8
92	2.56	8.1	0.0	3.2	1.2	2.0	65.8
93	2.59	8.1	0.0	3.2	1.2	2.0	65.8
94	2.61	8.1	0.0	3.2	1.2	2.0	65.8
95	2.64	8.1	0.0	3.2	1.2	2.0	65.8
96	2.67	8.1	0.0	3.2	1.2	2.0	65.8
97	2.70	8.2	0.0	3.2	1.2	2.0	65.8
98	2.73	8.2	0.0	3.2	1.2	2.0	65.8
99	2.76	8.2	0.0	3.2	1.2	2.0	65.7
100	2.79	8.2	0.0	3.2	1.2	2.0	65.7
101	2.82	8.2	0.0	3.2	1.2	2.0	65.7
102	2.85	8.2	0.0	3.2	1.2	2.0	65.7
103	2.88	8.2	0.0	3.2	1.2	2.0	65.7
104	2.91	8.2	0.0	3.2	1.2	2.0	65.7
105	2.94	8.2	0.0	3.2	1.2	2.0	65.7
106	2.94	8.2	0.0	3.2	1.2	2.0	65.7
107	2.97	8.2	0.0	3.2	1.2	2.0	65.7
108	3.00	8.2	0.0	3.2	1.2	2.0	65.7
109	3.03	8.2	0.0	3.2	1.2	2.0	65.7
110	3.06	8.2	0.0	3.2	1.2	2.0	65.7
111	3.08	8.2	0.0	3.2	1.2	2.0	65.7
112	3.11	8.2	0.0	3.2	1.2	2.0	65.7
113	3.14	8.3	0.0	3.2	1.2	2.0	65.7
114	3.17	8.3	0.0	3.2	1.2	2.0	65.7
115	3.20	8.3	0.0	3.2	1.2	2.0	65.7
116	3.23	8.3	0.0	3.2	1.2	2.0	65.6
117	3.26	8.3	0.0	3.2	1.2	2.0	65.6
118	3.29	8.3	0.0	3.2	1.2	2.0	65.6
119	3.32	8.3	0.0	3.2	1.2	2.0	65.6
120	3.35	8.3	0.0	3.2	1.2	2.0	65.6
121	3.38	8.3	0.0	3.2	1.2	2.0	65.6
122	3.41	8.3	0.0	3.2	1.2	2.0	65.6
123	3.44	8.3	0.0	3.2	1.2	2.0	65.6
124	3.47	8.3	0.0	3.2	1.2	2.0	65.6
125	3.50	8.3	0.0	3.2	1.2	2.0	65.6
126	3.52	8.3	0.0	3.2	1.2	2.0	65.6
127	3.52	8.3	0.0	3.2	1.2	2.0	65.6
128	3.55	8.4	0.0	3.2	1.2	2.0	65.6
129	3.58	8.4	0.0	3.2	1.2	2.0	65.6
130	3.61	8.4	0.0	3.2	1.2	2.0	65.6
131	3.64	8.4	0.0	3.2	1.2	2.0	65.6
132	3.67	8.4	0.0	3.2	1.2	2.0	65.6
133	3.70	8.4	0.0	3.2	1.2	2.0	65.6
134	3.73	8.4	0.0	3.2	1.2	2.0	65.5
135	3.76	8.4	0.0	3.2	1.2	2.0	65.5

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c1 perdas t=30000 dias
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	3.79	8.4	0.0	3.2	1.2	2.0	65.5
137	3.82	8.4	0.0	3.2	1.2	2.0	65.5
138	3.85	8.4	0.0	3.2	1.2	2.0	65.5
139	3.88	8.4	0.0	3.2	1.2	2.0	65.5
140	3.91	8.4	0.0	3.2	1.2	2.0	65.5
141	3.94	8.4	0.0	3.2	1.2	2.0	65.5
142	3.97	8.5	0.0	3.2	1.2	2.0	65.5
143	4.00	8.5	0.0	3.2	1.2	2.0	65.5
144	4.02	8.5	0.0	3.2	1.2	2.0	65.5
145	4.05	8.5	0.0	3.2	1.2	2.0	65.5
146	4.08	8.5	0.0	3.2	1.2	2.0	65.5
147	4.11	8.5	0.0	3.2	1.2	2.0	65.5
148	4.11	8.5	0.0	3.2	1.2	2.0	65.5
149	4.14	8.5	0.0	3.2	1.2	2.0	65.5
150	4.17	8.5	0.0	3.2	1.2	2.0	65.5
151	4.20	8.5	0.0	3.2	1.2	2.0	65.4
152	4.23	8.5	0.0	3.2	1.2	2.0	65.4
153	4.26	8.5	0.0	3.2	1.2	2.0	65.4
154	4.29	8.5	0.0	3.2	1.2	2.0	65.4
155	4.32	8.5	0.0	3.2	1.2	2.0	65.4
156	4.35	8.5	0.0	3.2	1.2	2.0	65.4
157	4.38	8.5	0.0	3.2	1.2	2.0	65.4
158	4.41	8.6	0.0	3.2	1.2	2.0	65.4
159	4.44	8.6	0.0	3.2	1.2	2.0	65.4
160	4.47	8.6	0.0	3.2	1.2	2.0	65.4
161	4.49	8.6	0.0	3.2	1.2	2.0	65.4
162	4.52	8.6	0.0	3.2	1.2	2.0	65.4
163	4.55	8.6	0.0	3.2	1.2	2.0	65.4
164	4.58	8.6	0.0	3.2	1.2	2.0	65.4
165	4.61	8.6	0.0	3.2	1.2	2.0	65.4
166	4.64	8.6	0.0	3.2	1.2	2.0	65.4
167	4.67	8.6	0.0	3.2	1.2	2.0	65.3
168	4.70	8.6	0.0	3.2	1.2	2.0	65.3
169	4.70	8.6	0.0	3.2	1.2	2.0	65.3
170	4.73	8.6	0.0	3.2	1.2	2.0	65.3
171	4.76	8.6	0.0	3.2	1.2	2.0	65.3
172	4.79	8.6	0.0	3.2	1.2	2.0	65.3
173	4.82	8.7	0.0	3.2	1.2	2.0	65.3
174	4.85	8.7	0.0	3.2	1.2	2.0	65.3
175	4.88	8.7	0.0	3.2	1.2	2.0	65.3
176	4.91	8.7	0.0	3.2	1.2	2.0	65.3
177	4.94	8.7	0.0	3.2	1.2	2.0	65.3
178	4.96	8.7	0.0	3.2	1.2	2.0	65.3
179	4.99	8.7	0.0	3.2	1.2	2.0	65.3
180	5.02	8.7	0.0	3.2	1.2	2.0	65.3

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	5.05	8.7	0.0	3.2	1.2	2.0	65.3
182	5.08	8.7	0.0	3.2	1.2	2.0	65.3
183	5.11	8.7	0.0	3.2	1.2	2.0	65.3
184	5.14	8.7	0.0	3.2	1.2	2.0	65.2
185	5.17	8.7	0.0	3.2	1.2	2.0	65.2
186	5.20	8.7	0.0	3.2	1.2	2.0	65.2
187	5.23	8.8	0.0	3.2	1.2	2.0	65.2
188	5.26	8.8	0.0	3.2	1.2	2.0	65.2
189	5.29	8.8	0.0	3.2	1.2	2.0	65.2
190	5.29	8.8	0.0	3.2	1.2	2.0	65.2
191	5.32	8.8	0.0	3.2	1.2	2.0	65.2
192	5.35	8.8	0.0	3.2	1.2	2.0	65.2
193	5.38	8.8	0.0	3.2	1.2	2.0	65.2
194	5.41	8.8	0.0	3.2	1.2	2.0	65.2
195	5.43	8.8	0.0	3.2	1.2	2.0	65.2
196	5.46	8.8	0.0	3.2	1.2	2.0	65.2
197	5.49	8.8	0.0	3.2	1.2	2.0	65.2
198	5.52	8.8	0.0	3.2	1.2	2.0	65.2
199	5.55	8.8	0.0	3.2	1.2	2.0	65.2
200	5.58	8.8	0.0	3.2	1.2	2.0	65.2
201	5.61	8.8	0.0	3.2	1.2	2.0	65.1
202	5.64	8.8	0.0	3.2	1.2	2.0	65.1
203	5.67	8.9	0.0	3.2	1.2	2.0	65.1
204	5.70	8.9	0.0	3.2	1.2	2.0	65.1
205	5.73	8.9	0.0	3.2	1.2	2.0	65.1
206	5.76	8.9	0.0	3.2	1.2	2.0	65.1
207	5.79	8.9	0.0	3.2	1.2	1.9	65.1
208	5.82	8.9	0.0	3.2	1.2	1.9	65.1
209	5.85	8.9	0.0	3.2	1.2	1.9	65.1
210	5.87	8.9	0.0	3.2	1.2	1.9	65.1
211	5.87	8.9	0.0	3.2	1.2	1.9	65.1
212	5.90	8.9	0.0	3.2	1.2	1.9	65.1
213	5.93	8.9	0.0	3.2	1.2	1.9	65.1
214	5.96	8.9	0.0	3.2	1.2	1.9	65.1
215	5.99	8.9	0.0	3.2	1.2	1.9	65.1
216	6.02	8.9	0.0	3.2	1.2	1.9	65.1
217	6.05	8.9	0.0	3.2	1.2	1.9	65.1
218	6.08	9.0	0.0	3.2	1.2	1.9	65.0
219	6.11	9.0	0.0	3.2	1.2	1.9	65.0
220	6.14	9.0	0.0	3.2	1.2	1.9	65.0
221	6.17	9.0	0.0	3.2	1.2	1.9	65.0
222	6.20	9.0	0.0	3.2	1.2	1.9	65.0
223	6.23	9.0	0.0	3.2	1.2	1.9	65.0
224	6.26	9.0	0.0	3.2	1.2	1.9	65.0
225	6.29	9.0	0.0	3.2	1.2	1.9	65.0

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c1 perdas t=30000 dias
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Units: ton meter

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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	6.32	9.0	0.0	3.2	1.2	1.9	65.0
227	6.35	9.0	0.0	3.2	1.2	1.9	65.0
228	6.37	9.0	0.0	3.2	1.2	1.9	65.0
229	6.40	9.0	0.0	3.2	1.2	1.9	65.0
230	6.43	9.0	0.0	3.2	1.2	1.9	65.0
231	6.46	9.0	0.0	3.2	1.2	1.9	65.0
232	6.46	9.0	0.0	3.2	1.2	1.9	65.0
233	6.49	9.1	0.0	3.2	1.2	1.9	65.0
234	6.52	9.1	0.0	3.2	1.2	1.9	65.0
235	6.55	9.1	0.0	3.2	1.2	1.9	65.0
236	6.58	9.1	0.0	3.2	1.2	1.9	64.9
237	6.61	9.1	0.0	3.2	1.2	1.9	64.9
238	6.64	9.1	0.0	3.2	1.2	1.9	64.9
239	6.67	9.1	0.0	3.2	1.2	1.9	64.9
240	6.70	9.1	0.0	3.2	1.2	1.9	64.9
241	6.73	9.1	0.0	3.2	1.2	1.9	64.9
242	6.76	9.1	0.0	3.2	1.2	1.9	64.9
243	6.79	9.1	0.0	3.2	1.2	1.9	64.9
244	6.82	9.1	0.0	3.2	1.2	1.9	64.9
245	6.84	9.1	0.0	3.2	1.2	1.9	64.9
246	6.87	9.1	0.0	3.2	1.2	1.9	64.9
247	6.90	9.1	0.0	3.2	1.2	1.9	64.9
248	6.93	9.2	0.0	3.2	1.2	1.9	64.9
249	6.96	9.2	0.0	3.2	1.2	1.9	64.9
250	6.99	9.2	0.0	3.2	1.2	1.9	64.9
251	7.02	9.2	0.0	3.2	1.2	1.9	64.9
252	7.05	9.2	0.0	3.2	1.2	1.9	64.8
253	7.05	9.2	0.0	3.2	1.2	1.9	64.8
254	7.08	9.2	0.0	3.2	1.2	1.9	64.8
255	7.11	9.2	0.0	3.2	1.2	1.9	64.8
256	7.14	9.2	0.0	3.2	1.2	1.9	64.8
257	7.17	9.2	0.0	3.2	1.2	1.9	64.8
258	7.20	9.2	0.0	3.2	1.2	1.9	64.8
259	7.23	9.2	0.0	3.2	1.2	1.9	64.8
260	7.26	9.2	0.0	3.2	1.2	1.9	64.8
261	7.29	9.2	0.0	3.2	1.2	1.9	64.8
262	7.31	9.2	0.0	3.2	1.2	1.9	64.7
263	7.34	9.3	0.0	3.2	1.2	1.9	64.7
264	7.37	9.3	0.0	3.2	1.2	1.9	64.7
265	7.40	9.3	0.0	3.2	1.2	1.9	64.7
266	7.43	9.3	0.0	3.2	1.2	1.9	64.7
267	7.46	9.3	0.0	3.2	1.2	1.9	64.7
268	7.49	9.3	0.0	3.2	1.2	1.9	64.7
269	7.52	9.3	0.0	3.2	1.2	1.9	64.7
270	7.55	9.3	0.0	3.2	1.2	1.9	64.7

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	7.58	9.3	0.0	3.2	1.2	1.9	64.7
272	7.61	9.3	0.0	3.2	1.2	1.9	64.7
273	7.64	9.3	0.0	3.2	1.2	1.9	64.7
274	7.64	9.3	0.0	3.2	1.2	1.9	64.7
275	7.67	9.3	0.0	3.2	1.2	1.9	64.7
276	7.70	9.3	0.0	3.2	1.2	1.9	64.7
277	7.73	9.3	0.0	3.2	1.2	1.9	64.7
278	7.76	9.4	0.0	3.2	1.2	1.9	64.7
279	7.78	9.4	0.0	3.2	1.2	1.9	64.6
280	7.81	9.4	0.0	3.2	1.2	1.9	64.6
281	7.84	9.4	0.0	3.2	1.2	1.9	64.6
282	7.87	9.4	0.0	3.2	1.2	1.9	64.6
283	7.90	9.4	0.0	3.2	1.2	1.9	64.6
284	7.93	9.4	0.0	3.2	1.2	1.9	64.6
285	7.96	9.4	0.0	3.2	1.2	1.9	64.6
286	7.99	9.4	0.0	3.2	1.2	1.9	64.6
287	8.02	9.4	0.0	3.2	1.2	1.9	64.6
288	8.05	9.4	0.0	3.2	1.2	1.9	64.6
289	8.08	9.4	0.0	3.2	1.2	1.9	64.6
290	8.11	9.4	0.0	3.2	1.2	1.9	64.6
291	8.14	9.4	0.0	3.2	1.2	1.9	64.6
292	8.17	9.5	0.0	3.2	1.2	1.9	64.6
293	8.20	9.5	0.0	3.2	1.2	1.9	64.6
294	8.23	9.5	0.0	3.2	1.2	1.9	64.6
295	8.23	9.5	0.0	3.2	1.2	1.9	64.5
296	8.25	9.5	0.0	3.2	1.2	1.9	64.5
297	8.28	9.5	0.0	3.2	1.2	1.9	64.5
298	8.31	9.5	0.0	3.2	1.2	1.9	64.5
299	8.34	9.5	0.0	3.2	1.2	1.9	64.5
300	8.37	9.5	0.0	3.2	1.2	1.9	64.5
301	8.40	9.5	0.0	3.2	1.2	1.9	64.5
302	8.43	9.5	0.0	3.2	1.2	1.9	64.5
303	8.46	9.5	0.0	3.2	1.2	1.9	64.5
304	8.49	9.5	0.0	3.2	1.2	1.9	64.5
305	8.52	9.5	0.0	3.2	1.2	1.9	64.5
306	8.55	9.5	0.0	3.2	1.2	1.9	64.5
307	8.58	9.6	0.0	3.2	1.2	1.9	64.5
308	8.61	9.6	0.0	3.2	1.2	1.9	64.5
309	8.64	9.6	0.0	3.2	1.2	1.9	64.5
310	8.67	9.6	0.0	3.2	1.2	1.9	64.5
311	8.70	9.6	0.0	3.2	1.2	1.9	64.4
312	8.72	9.6	0.0	3.2	1.2	1.9	64.4
313	8.75	9.6	0.0	3.2	1.2	1.9	64.4
314	8.78	9.6	0.0	3.2	1.2	1.9	64.4
315	8.81	9.6	0.0	3.2	1.2	1.9	64.4

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c1 perdas t=30000 dias
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Summary of tension force losses for cable no. 1, at t = 30000, beam no. 3

*Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel*

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	8.81	9.6	0.0	3.2	1.2	1.9	64.4
317	8.84	9.6	0.0	3.2	1.2	1.9	64.4
318	8.87	9.6	0.0	3.2	1.2	1.9	64.4
319	8.90	9.6	0.0	3.2	1.2	1.9	64.4
320	8.93	9.6	0.0	3.2	1.2	1.9	64.4
321	8.96	9.6	0.0	3.2	1.2	1.9	64.4
322	8.99	9.7	0.0	3.2	1.2	1.9	64.4
323	9.02	9.7	0.0	3.2	1.2	1.9	64.4
324	9.05	9.7	0.0	3.2	1.2	1.9	64.4
325	9.08	9.7	0.0	3.2	1.2	1.9	64.4
326	9.11	9.7	0.0	3.2	1.2	1.9	64.4
327	9.14	9.7	0.0	3.2	1.2	1.9	64.4
328	9.17	9.7	0.0	3.2	1.2	1.9	64.3
329	9.19	9.7	0.0	3.2	1.2	1.9	64.3
330	9.22	9.7	0.0	3.2	1.2	1.9	64.3
331	9.25	9.7	0.0	3.2	1.2	1.9	64.3
332	9.28	9.7	0.0	3.2	1.2	1.9	64.3
333	9.31	9.7	0.0	3.2	1.2	1.9	64.3
334	9.34	9.7	0.0	3.2	1.2	1.9	64.3
335	9.37	9.7	0.0	3.2	1.2	1.9	64.3
336	9.40	9.7	0.0	3.2	1.2	1.9	64.3

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
Prepared by:

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
1	0.00	9.7	0.3	3.1	2.5	1.7	62.9
2	0.03	9.7	0.3	3.1	2.5	1.7	62.9
3	0.06	9.7	0.3	3.1	2.5	1.7	62.9
4	0.09	9.7	0.3	3.1	2.5	1.7	63.0
5	0.12	9.7	0.3	3.1	2.5	1.7	63.0
6	0.15	9.7	0.3	3.1	2.5	1.7	63.0
7	0.18	9.7	0.3	3.1	2.5	1.7	63.0
8	0.21	9.7	0.3	3.1	2.5	1.7	63.0
9	0.24	9.7	0.3	3.1	2.5	1.7	63.0
10	0.26	9.7	0.3	3.1	2.5	1.7	63.0
11	0.29	9.7	0.3	3.1	2.5	1.7	63.0
12	0.32	9.7	0.3	3.1	2.5	1.7	63.0
13	0.35	9.7	0.3	3.1	2.5	1.7	63.0
14	0.38	9.7	0.3	3.1	2.5	1.7	63.0
15	0.41	9.6	0.3	3.1	2.5	1.7	63.0
16	0.44	9.6	0.3	3.1	2.5	1.7	63.0
17	0.47	9.6	0.3	3.1	2.5	1.7	63.0
18	0.50	9.6	0.3	3.1	2.5	1.7	63.0
19	0.53	9.6	0.3	3.1	2.5	1.7	63.1
20	0.56	9.6	0.3	3.1	2.5	1.7	63.1
21	0.59	9.6	0.3	3.1	2.5	1.7	63.1
22	0.59	9.6	0.3	3.1	2.5	1.7	63.1
23	0.62	9.6	0.3	3.1	2.5	1.7	63.1
24	0.65	9.6	0.3	3.1	2.5	1.7	63.1
25	0.68	9.6	0.3	3.1	2.5	1.7	63.1
26	0.71	9.6	0.3	3.1	2.5	1.7	63.1
27	0.73	9.6	0.3	3.1	2.5	1.7	63.1
28	0.76	9.6	0.3	3.1	2.5	1.7	63.1
29	0.79	9.6	0.3	3.1	2.5	1.7	63.1
30	0.82	9.6	0.3	3.1	2.5	1.7	63.1
31	0.85	9.5	0.3	3.1	2.5	1.7	63.1
32	0.88	9.5	0.3	3.1	2.5	1.7	63.1
33	0.91	9.5	0.3	3.1	2.5	1.7	63.1
34	0.94	9.5	0.3	3.1	2.5	1.7	63.2
35	0.97	9.5	0.3	3.1	2.5	1.7	63.2
36	1.00	9.5	0.3	3.1	2.5	1.7	63.2
37	1.03	9.5	0.3	3.1	2.5	1.7	63.2
38	1.06	9.5	0.3	3.1	2.5	1.7	63.2
39	1.09	9.5	0.3	3.1	2.5	1.7	63.2
40	1.12	9.5	0.3	3.1	2.5	1.7	63.2
41	1.15	9.5	0.3	3.1	2.5	1.7	63.2
42	1.17	9.5	0.3	3.1	2.5	1.7	63.2
43	1.17	9.5	0.3	3.1	2.5	1.7	63.2
44	1.20	9.5	0.3	3.1	2.5	1.7	63.2
45	1.23	9.5	0.3	3.1	2.5	1.7	63.2

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
Prepared by:

Units: ton meter

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
46	1.26	9.4	0.3	3.1	2.5	1.7	63.2
47	1.29	9.4	0.3	3.1	2.5	1.7	63.2
48	1.32	9.4	0.3	3.1	2.5	1.7	63.2
49	1.35	9.4	0.3	3.1	2.5	1.7	63.2
50	1.38	9.4	0.3	3.1	2.5	1.7	63.3
51	1.41	9.4	0.3	3.1	2.5	1.7	63.3
52	1.44	9.4	0.3	3.1	2.5	1.7	63.3
53	1.47	9.4	0.3	3.1	2.5	1.7	63.3
54	1.50	9.4	0.3	3.1	2.5	1.7	63.3
55	1.53	9.4	0.3	3.1	2.5	1.7	63.3
56	1.56	9.4	0.3	3.1	2.5	1.7	63.3
57	1.59	9.4	0.3	3.1	2.5	1.7	63.3
58	1.62	9.4	0.3	3.1	2.5	1.7	63.3
59	1.65	9.4	0.3	3.1	2.5	1.7	63.3
60	1.67	9.3	0.3	3.1	2.5	1.7	63.3
61	1.70	9.3	0.3	3.1	2.5	1.7	63.3
62	1.73	9.3	0.3	3.1	2.5	1.7	63.3
63	1.76	9.3	0.3	3.1	2.5	1.7	63.3
64	1.76	9.3	0.3	3.1	2.5	1.7	63.3
65	1.79	9.3	0.3	3.1	2.5	1.7	63.3
66	1.82	9.3	0.3	3.1	2.5	1.7	63.4
67	1.85	9.3	0.3	3.1	2.5	1.7	63.4
68	1.88	9.3	0.3	3.1	2.5	1.7	63.4
69	1.91	9.3	0.3	3.1	2.5	1.7	63.4
70	1.94	9.3	0.3	3.1	2.5	1.7	63.4
71	1.97	9.3	0.3	3.1	2.5	1.7	63.4
72	2.00	9.3	0.3	3.1	2.5	1.7	63.4
73	2.03	9.3	0.3	3.1	2.5	1.7	63.4
74	2.06	9.3	0.3	3.1	2.5	1.7	63.4
75	2.09	9.2	0.3	3.1	2.5	1.7	63.4
76	2.12	9.2	0.3	3.1	2.5	1.7	63.4
77	2.14	9.2	0.3	3.1	2.5	1.7	63.4
78	2.17	9.2	0.3	3.1	2.5	1.7	63.4
79	2.20	9.2	0.3	3.1	2.5	1.7	63.4
80	2.23	9.2	0.3	3.1	2.5	1.7	63.4
81	2.26	9.2	0.3	3.1	2.5	1.7	63.4
82	2.29	9.2	0.3	3.1	2.5	1.7	63.4
83	2.32	9.2	0.3	3.1	2.5	1.7	63.5
84	2.35	9.2	0.3	3.1	2.5	1.7	63.5
85	2.35	9.2	0.3	3.1	2.5	1.7	63.5
86	2.38	9.2	0.3	3.1	2.5	1.7	63.5
87	2.41	9.2	0.3	3.1	2.5	1.7	63.5
88	2.44	9.2	0.3	3.1	2.5	1.7	63.6
89	2.47	9.2	0.3	3.1	2.5	1.7	63.6
90	2.50	9.1	0.3	3.1	2.5	1.7	63.6

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
91	2.53	9.1	0.3	3.1	2.5	1.7	63.6
92	2.56	9.1	0.3	3.1	2.5	1.7	63.6
93	2.59	9.1	0.3	3.1	2.5	1.7	63.6
94	2.61	9.1	0.3	3.1	2.5	1.7	63.6
95	2.64	9.1	0.3	3.1	2.5	1.7	63.6
96	2.67	9.1	0.3	3.1	2.5	1.7	63.6
97	2.70	9.1	0.3	3.1	2.5	1.7	63.6
98	2.73	9.1	0.3	3.1	2.5	1.7	63.6
99	2.76	9.1	0.3	3.1	2.5	1.7	63.6
100	2.79	9.1	0.3	3.1	2.5	1.8	63.6
101	2.82	9.1	0.3	3.1	2.5	1.8	63.6
102	2.85	9.1	0.3	3.1	2.5	1.8	63.7
103	2.88	9.1	0.3	3.1	2.5	1.8	63.7
104	2.91	9.1	0.3	3.1	2.5	1.8	63.7
105	2.94	9.0	0.3	3.1	2.5	1.8	63.7
106	2.94	9.0	0.3	3.1	2.5	1.8	63.7
107	2.97	9.0	0.3	3.1	2.5	1.8	63.7
108	3.00	9.0	0.3	3.1	2.5	1.8	63.7
109	3.03	9.0	0.3	3.1	2.5	1.8	63.7
110	3.06	9.0	0.3	3.1	2.5	1.8	63.7
111	3.08	9.0	0.3	3.1	2.5	1.8	63.7
112	3.11	9.0	0.3	3.1	2.5	1.8	63.7
113	3.14	9.0	0.3	3.1	2.5	1.8	63.7
114	3.17	9.0	0.3	3.1	2.5	1.8	63.7
115	3.20	9.0	0.3	3.1	2.5	1.8	63.7
116	3.23	9.0	0.3	3.1	2.5	1.8	63.7
117	3.26	9.0	0.3	3.1	2.5	1.8	63.7
118	3.29	9.0	0.3	3.1	2.5	1.8	63.7
119	3.32	9.0	0.3	3.1	2.5	1.8	63.8
120	3.35	8.9	0.3	3.1	2.5	1.8	63.8
121	3.38	8.9	0.3	3.1	2.4	1.8	63.8
122	3.41	8.9	0.3	3.1	2.4	1.8	63.8
123	3.44	8.9	0.3	3.1	2.4	1.8	63.8
124	3.47	8.9	0.3	3.1	2.4	1.8	63.8
125	3.50	8.9	0.3	3.1	2.4	1.8	63.8
126	3.52	8.9	0.3	3.1	2.4	1.8	63.8
127	3.52	8.9	0.3	3.1	2.4	1.8	63.8
128	3.55	8.9	0.3	3.1	2.4	1.8	63.8
129	3.58	8.9	0.3	3.1	2.4	1.8	63.8
130	3.61	8.9	0.3	3.1	2.4	1.8	63.8
131	3.64	8.9	0.3	3.1	2.4	1.8	63.8
132	3.67	8.9	0.3	3.1	2.4	1.8	63.8
133	3.70	8.9	0.3	3.1	2.4	1.8	63.8
134	3.73	8.9	0.3	3.1	2.4	1.8	63.8
135	3.76	8.8	0.3	3.1	2.4	1.8	63.9

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
136	3.79	8.8	0.3	3.1	2.5	1.8	63.9
137	3.82	8.8	0.3	3.1	2.5	1.8	63.9
138	3.85	8.8	0.3	3.1	2.5	1.8	63.9
139	3.88	8.8	0.3	3.1	2.5	1.8	63.9
140	3.91	8.8	0.3	3.1	2.5	1.8	63.9
141	3.94	8.8	0.3	3.1	2.5	1.8	63.9
142	3.97	8.8	0.3	3.1	2.5	1.8	63.9
143	4.00	8.8	0.3	3.1	2.5	1.8	63.9
144	4.02	8.8	0.3	3.1	2.5	1.8	63.9
145	4.05	8.8	0.3	3.1	2.5	1.8	63.9
146	4.08	8.8	0.3	3.1	2.5	1.8	63.9
147	4.11	8.8	0.3	3.1	2.5	1.8	63.9
148	4.11	8.8	0.3	3.1	2.5	1.8	63.9
149	4.14	8.8	0.3	3.1	2.5	1.8	63.9
150	4.17	8.8	0.3	3.1	2.5	1.8	63.9
151	4.20	8.7	0.3	3.1	2.5	1.8	63.9
152	4.23	8.7	0.3	3.1	2.5	1.8	64.0
153	4.26	8.7	0.3	3.1	2.5	1.8	64.0
154	4.29	8.7	0.3	3.1	2.5	1.8	64.0
155	4.32	8.7	0.3	3.1	2.5	1.8	64.0
156	4.35	8.7	0.3	3.1	2.5	1.8	64.0
157	4.38	8.7	0.3	3.1	2.5	1.8	64.0
158	4.41	8.7	0.3	3.1	2.5	1.8	64.0
159	4.44	8.7	0.3	3.1	2.5	1.8	64.0
160	4.47	8.7	0.3	3.1	2.5	1.8	64.0
161	4.49	8.7	0.3	3.1	2.5	1.8	64.0
162	4.52	8.7	0.3	3.1	2.5	1.8	64.0
163	4.55	8.7	0.3	3.1	2.5	1.8	64.0
164	4.58	8.7	0.3	3.1	2.5	1.8	64.0
165	4.61	8.6	0.3	3.1	2.5	1.8	64.0
166	4.64	8.6	0.3	3.1	2.5	1.8	64.0
167	4.67	8.6	0.3	3.1	2.5	1.8	64.0
168	4.70	8.6	0.3	3.1	2.5	1.8	64.0
169	4.70	8.6	0.3	3.1	2.5	1.8	64.0
170	4.73	8.6	0.3	3.1	2.5	1.8	64.1
171	4.76	8.6	0.3	3.1	2.5	1.8	64.1
172	4.79	8.6	0.3	3.1	2.5	1.8	64.1
173	4.82	8.6	0.3	3.1	2.5	1.8	64.1
174	4.85	8.6	0.3	3.1	2.5	1.8	64.1
175	4.88	8.6	0.3	3.1	2.5	1.8	64.1
176	4.91	8.6	0.3	3.1	2.5	1.8	64.1
177	4.94	8.6	0.3	3.1	2.5	1.8	64.1
178	4.96	8.6	0.3	3.1	2.5	1.8	64.1
179	4.99	8.6	0.3	3.1	2.5	1.8	64.1
180	5.02	8.5	0.3	3.1	2.5	1.8	64.1

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
Prepared by:

Units: ton meter

Code: EuroCode
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006 low relaxation steel							
Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
181	5.05	8.5	0.3	3.1	2.5	1.8	64.1
182	5.08	8.5	0.3	3.1	2.5	1.8	64.1
183	5.11	8.5	0.3	3.1	2.5	1.8	64.1
184	5.14	8.5	0.3	3.1	2.5	1.8	64.1
185	5.17	8.5	0.3	3.1	2.5	1.8	64.1
186	5.20	8.5	0.3	3.1	2.5	1.8	64.2
187	5.23	8.5	0.3	3.1	2.5	1.8	64.2
188	5.26	8.5	0.3	3.1	2.5	1.8	64.2
189	5.29	8.5	0.3	3.1	2.5	1.8	64.2
190	5.29	8.5	0.3	3.1	2.5	1.8	64.2
191	5.32	8.5	0.3	3.1	2.5	1.8	64.2
192	5.35	8.5	0.3	3.1	2.5	1.8	64.2
193	5.38	8.5	0.3	3.1	2.5	1.8	64.2
194	5.41	8.5	0.3	3.1	2.5	1.8	64.2
195	5.43	8.5	0.3	3.1	2.5	1.8	64.2
196	5.46	8.4	0.3	3.1	2.5	1.8	64.2
197	5.49	8.4	0.3	3.1	2.5	1.8	64.2
198	5.52	8.4	0.3	3.1	2.5	1.8	64.2
199	5.55	8.4	0.3	3.1	2.5	1.8	64.2
200	5.58	8.4	0.3	3.1	2.5	1.8	64.2
201	5.61	8.4	0.3	3.1	2.5	1.8	64.2
202	5.64	8.4	0.3	3.1	2.5	1.8	64.2
203	5.67	8.4	0.3	3.1	2.5	1.8	64.3
204	5.70	8.4	0.3	3.1	2.5	1.8	64.3
205	5.73	8.4	0.3	3.1	2.5	1.8	64.3
206	5.76	8.4	0.3	3.1	2.5	1.8	64.3
207	5.79	8.4	0.3	3.1	2.5	1.8	64.3
208	5.82	8.4	0.3	3.1	2.5	1.8	64.3
209	5.85	8.4	0.3	3.1	2.5	1.8	64.3
210	5.87	8.3	0.3	3.1	2.5	1.8	64.3
211	5.87	8.3	0.3	3.1	2.5	1.8	64.3
212	5.90	8.3	0.3	3.1	2.5	1.8	64.3
213	5.93	8.3	0.3	3.1	2.5	1.8	64.3
214	5.96	8.3	0.3	3.1	2.5	1.8	64.3
215	5.99	8.3	0.3	3.1	2.5	1.8	64.3
216	6.02	8.3	0.3	3.1	2.5	1.8	64.3
217	6.05	8.3	0.3	3.1	2.5	1.8	64.3
218	6.08	8.3	0.3	3.1	2.5	1.8	64.3
219	6.11	8.3	0.3	3.1	2.5	1.8	64.3
220	6.14	8.3	0.3	3.1	2.5	1.8	64.3
221	6.17	8.3	0.3	3.1	2.5	1.8	64.4
222	6.20	8.3	0.3	3.1	2.5	1.8	64.4
223	6.23	8.3	0.3	3.1	2.5	1.8	64.4
224	6.26	8.3	0.3	3.1	2.5	1.8	64.4
225	6.29	8.2	0.3	3.1	2.5	1.8	64.4

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
Prepared by:

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
226	6.32	8.2	0.3	3.1	2.5	1.8	64.4
227	6.35	8.2	0.3	3.1	2.5	1.8	64.4
228	6.37	8.2	0.2	3.1	2.5	1.8	64.4
229	6.40	8.2	0.2	3.1	2.5	1.8	64.4
230	6.43	8.2	0.2	3.1	2.5	1.8	64.4
231	6.46	8.2	0.2	3.1	2.5	1.8	64.4
232	6.46	8.2	0.2	3.1	2.5	1.8	64.4
233	6.49	8.2	0.2	3.1	2.5	1.8	64.4
234	6.52	8.2	0.2	3.1	2.5	1.8	64.4
235	6.55	8.2	0.2	3.1	2.5	1.8	64.4
236	6.58	8.2	0.2	3.1	2.5	1.8	64.4
237	6.61	8.2	0.2	3.1	2.5	1.8	64.4
238	6.64	8.2	0.2	3.1	2.5	1.8	64.4
239	6.67	8.2	0.2	3.1	2.5	1.8	64.4
240	6.70	8.2	0.2	3.1	2.5	1.8	64.5
241	6.73	8.1	0.2	3.1	2.5	1.8	64.5
242	6.76	8.1	0.2	3.1	2.5	1.8	64.5
243	6.79	8.1	0.2	3.1	2.5	1.8	64.5
244	6.82	8.1	0.2	3.1	2.5	1.8	64.5
245	6.84	8.1	0.2	3.1	2.5	1.8	64.5
246	6.87	8.1	0.2	3.1	2.5	1.8	64.5
247	6.90	8.1	0.2	3.1	2.5	1.8	64.5
248	6.93	8.1	0.2	3.1	2.5	1.8	64.5
249	6.96	8.1	0.2	3.1	2.5	1.8	64.5
250	6.99	8.1	0.2	3.1	2.5	1.8	64.5
251	7.02	8.1	0.2	3.1	2.5	1.9	64.5
252	7.05	8.1	0.2	3.1	2.5	1.9	64.5
253	7.05	8.1	0.3	3.1	2.6	1.8	64.4
254	7.08	8.1	0.3	3.1	2.6	1.8	64.5
255	7.11	8.1	0.3	3.1	2.6	1.8	64.5
256	7.14	8.0	0.3	3.1	2.6	1.8	64.5
257	7.17	8.0	0.3	3.1	2.6	1.8	64.5
258	7.20	8.0	0.3	3.1	2.6	1.8	64.5
259	7.23	8.0	0.3	3.1	2.6	1.8	64.5
260	7.26	8.0	0.3	3.1	2.6	1.8	64.5
261	7.29	8.0	0.3	3.1	2.6	1.9	64.5
262	7.31	8.0	0.3	3.1	2.6	1.9	64.5
263	7.34	8.0	0.3	3.1	2.6	1.9	64.5
264	7.37	8.0	0.3	3.1	2.6	1.9	64.5
265	7.40	8.0	0.3	3.1	2.6	1.9	64.5
266	7.43	8.0	0.3	3.1	2.6	1.9	64.5
267	7.46	8.0	0.3	3.1	2.6	1.9	64.5
268	7.49	8.0	0.3	3.1	2.6	1.9	64.5
269	7.52	8.0	0.3	3.1	2.6	1.9	64.5
270	7.55	8.0	0.3	3.1	2.6	1.9	64.6

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
Prepared by:

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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
271	7.58	7.9	0.3	3.1	2.6	1.9	64.6
272	7.61	7.9	0.3	3.1	2.6	1.9	64.6
273	7.64	7.9	0.3	3.1	2.6	1.9	64.6
274	7.64	7.9	0.3	3.1	2.6	1.9	64.6
275	7.67	7.9	0.3	3.1	2.6	1.9	64.6
276	7.70	7.9	0.3	3.1	2.6	1.9	64.6
277	7.73	7.9	0.3	3.1	2.6	1.9	64.6
278	7.76	7.9	0.3	3.1	2.6	1.9	64.6
279	7.78	7.9	0.3	3.1	2.6	1.9	64.6
280	7.81	7.9	0.3	3.1	2.6	1.9	64.6
281	7.84	7.9	0.3	3.1	2.6	1.9	64.6
282	7.87	7.9	0.3	3.1	2.6	1.9	64.6
283	7.90	7.9	0.3	3.1	2.6	1.9	64.6
284	7.93	7.9	0.3	3.1	2.6	1.9	64.6
285	7.96	7.9	0.3	3.1	2.6	1.9	64.6
286	7.99	7.8	0.3	3.1	2.6	1.9	64.6
287	8.02	7.8	0.3	3.1	2.6	1.9	64.6
288	8.05	7.8	0.3	3.1	2.6	1.9	64.7
289	8.08	7.8	0.3	3.1	2.6	1.9	64.7
290	8.11	7.8	0.3	3.1	2.6	1.9	64.7
291	8.14	7.8	0.3	3.1	2.6	1.9	64.7
292	8.17	7.8	0.3	3.1	2.6	1.9	64.7
293	8.20	7.8	0.3	3.1	2.6	1.9	64.7
294	8.23	7.8	0.3	3.1	2.6	1.9	64.7
295	8.23	7.8	0.3	3.1	2.6	1.9	64.7
296	8.25	7.8	0.3	3.1	2.6	1.9	64.7
297	8.28	7.8	0.3	3.1	2.6	1.9	64.7
298	8.31	7.8	0.3	3.1	2.6	1.9	64.7
299	8.34	7.8	0.3	3.1	2.6	1.9	64.7
300	8.37	7.8	0.3	3.1	2.6	1.9	64.7
301	8.40	7.8	0.3	3.1	2.6	1.9	64.7
302	8.43	7.7	0.3	3.1	2.6	1.9	64.7
303	8.46	7.7	0.3	3.1	2.6	1.9	64.7
304	8.49	7.7	0.3	3.1	2.6	1.9	64.7
305	8.52	7.7	0.3	3.1	2.6	1.9	64.7
306	8.55	7.7	0.3	3.1	2.6	1.9	64.7
307	8.58	7.7	0.3	3.1	2.6	1.9	64.8
308	8.61	7.7	0.3	3.1	2.6	1.9	64.8
309	8.64	7.7	0.3	3.1	2.6	1.9	64.8
310	8.67	7.7	0.3	3.1	2.6	1.9	64.8
311	8.70	7.7	0.3	3.1	2.6	1.9	64.8
312	8.72	7.7	0.3	3.1	2.6	1.9	64.8
313	8.75	7.7	0.3	3.1	2.6	1.9	64.8
314	8.78	7.7	0.3	3.1	2.6	1.9	64.8
315	8.81	7.7	0.3	3.1	2.6	1.9	64.8

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m cabo c2 perdas t=30000 dias
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Summary of tension force losses for cable no. 2, at t = 30000, beam no. 3

*Parameters: curvature frict.: $\mu=0.220$, wobble frict.: $K=0.003$, draw-in: dist=0.006
 low relaxation steel*

Point no.	Coord. x[m]	Losses [t]					Force after losses[t]
		friction + draw-in	elastic shorten.	shrinkage	creep	relaxation	
316	8.81	7.7	0.3	3.1	2.6	1.9	64.8
317	8.84	7.6	0.3	3.1	2.6	1.9	64.8
318	8.87	7.6	0.3	3.1	2.6	1.9	64.8
319	8.90	7.6	0.3	3.1	2.6	1.9	64.8
320	8.93	7.6	0.3	3.1	2.6	1.9	64.8
321	8.96	7.6	0.3	3.1	2.6	1.9	64.8
322	8.99	7.6	0.3	3.1	2.6	1.9	64.8
323	9.02	7.6	0.3	3.1	2.6	1.9	64.8
324	9.05	7.6	0.3	3.1	2.6	1.9	64.8
325	9.08	7.6	0.3	3.1	2.6	1.9	64.8
326	9.11	7.6	0.3	3.1	2.6	1.9	64.8
327	9.14	7.6	0.3	3.1	2.6	1.9	64.9
328	9.17	7.6	0.3	3.1	2.6	1.9	64.9
329	9.19	7.6	0.3	3.1	2.6	1.9	64.9
330	9.22	7.6	0.3	3.1	2.6	1.9	64.9
331	9.25	7.6	0.3	3.1	2.6	1.9	64.9
332	9.28	7.5	0.3	3.1	2.6	1.9	64.9
333	9.31	7.5	0.3	3.1	2.6	1.9	64.9
334	9.34	7.5	0.3	3.1	2.6	1.9	64.9
335	9.37	7.5	0.3	3.1	2.6	1.9	64.9
336	9.40	7.5	0.3	3.1	2.6	1.9	64.9

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias
 Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
209	0.00	4	0.97	3	4.04	3	0.40	4	3.15
	0.03	4	0.96	3	4.04	3	0.39	4	3.16
	0.06	4	0.95	3	4.04	3	0.39	4	3.18
	0.09	4	0.94	3	4.04	3	0.39	4	3.19
	0.12	4	0.93	3	4.05	3	0.39	4	3.21
	0.15	4	0.93	3	4.05	3	0.39	4	3.22
	0.18	4	0.92	3	4.05	3	0.39	4	3.22
	0.21	4	0.91	3	4.05	3	0.38	4	3.23
	0.24	4	0.91	3	4.06	3	0.38	4	3.24
	0.26	4	0.90	3	4.06	3	0.38	4	3.25
	0.29	4	0.90	3	4.06	3	0.38	4	3.26
	0.32	4	0.89	3	4.06	3	0.38	4	3.27
	0.35	4	0.89	3	4.07	3	0.38	4	3.27
	0.38	4	0.90	3	4.07	3	0.37	4	3.25
	0.41	4	0.92	3	4.07	3	0.37	4	3.23
	0.44	4	0.93	3	4.07	3	0.37	4	3.21
	0.47	4	0.94	3	4.08	3	0.37	4	3.19
	0.50	4	0.95	3	4.08	3	0.37	4	3.17
	0.53	4	0.97	3	4.08	3	0.37	4	3.15
	0.56	4	0.98	3	4.08	3	0.37	4	3.13
	0.59	4	0.99	3	4.09	3	0.36	4	3.11
210	0.59	4	0.98	3	4.09	3	0.36	4	3.12
	0.62	4	0.99	3	4.09	3	0.35	4	3.10
	0.65	4	1.01	3	4.09	3	0.35	4	3.08
	0.68	4	1.02	3	4.10	3	0.35	4	3.07
	0.71	4	1.03	3	4.10	3	0.35	4	3.05
	0.73	4	1.04	3	4.10	3	0.35	4	3.03
	0.76	4	1.05	3	4.11	3	0.34	4	3.01
	0.79	4	1.06	3	4.11	3	0.34	4	2.99
	0.82	4	1.08	3	4.11	3	0.34	4	2.97
	0.85	4	1.09	3	4.12	3	0.34	4	2.96
	0.88	4	1.10	3	4.12	3	0.33	4	2.94
	0.91	4	1.11	3	4.12	3	0.33	4	2.92
	0.94	4	1.12	3	4.13	3	0.33	4	2.90
	0.97	4	1.14	3	4.13	3	0.33	4	2.88
	1.00	4	1.15	3	4.14	3	0.33	4	2.86
	1.03	4	1.17	3	4.14	3	0.32	4	2.83
	1.06	4	1.19	3	4.14	3	0.32	4	2.81
	1.09	4	1.20	3	4.15	3	0.32	4	2.78
	1.12	4	1.22	3	4.15	3	0.32	4	2.75
	1.15	4	1.24	3	4.15	3	0.32	4	2.73
	1.17	4	1.25	3	4.16	3	0.31	4	2.70

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias

Prepared by:

Units: ton meter

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Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
211	1.17	4	1.25	3	4.15	3	0.31	4	2.70
	1.20	4	1.27	3	4.16	3	0.31	4	2.67
	1.23	4	1.28	3	4.16	3	0.30	4	2.65
	1.26	4	1.30	3	4.17	3	0.30	4	2.62
	1.29	4	1.31	3	4.17	3	0.30	4	2.60
	1.32	4	1.33	3	4.18	3	0.29	4	2.57
	1.35	4	1.35	3	4.18	3	0.29	4	2.55
	1.38	4	1.36	3	4.19	3	0.29	4	2.52
	1.41	4	1.38	3	4.19	3	0.28	4	2.50
	1.44	4	1.39	3	4.20	3	0.28	4	2.47
	1.47	4	1.41	3	4.20	3	0.28	4	2.45
	1.50	4	1.43	3	4.20	3	0.28	4	2.42
	1.53	4	1.44	3	4.21	3	0.27	4	2.40
	1.56	4	1.46	3	4.21	3	0.27	4	2.37
	1.59	4	1.48	3	4.22	3	0.27	4	2.35
	1.62	4	1.49	3	4.22	3	0.26	4	2.32
	1.65	4	1.51	3	4.23	3	0.26	4	2.30
	1.67	4	1.53	3	4.23	3	0.26	4	2.27
	1.70	4	1.54	3	4.24	3	0.25	4	2.24
	1.73	4	1.56	3	4.24	3	0.25	4	2.22
	1.76	4	1.57	3	4.25	3	0.25	4	2.19
212	1.76	4	1.58	3	4.24	3	0.25	4	2.18
	1.79	4	1.59	3	4.25	3	0.24	4	2.16
	1.82	4	1.61	3	4.25	3	0.24	4	2.14
	1.85	4	1.62	3	4.26	3	0.24	4	2.12
	1.88	4	1.63	3	4.26	3	0.23	4	2.10
	1.91	4	1.64	3	4.27	3	0.23	4	2.08
	1.94	4	1.66	3	4.27	3	0.23	4	2.06
	1.97	4	1.67	3	4.28	3	0.22	4	2.04
	2.00	4	1.68	3	4.28	3	0.22	4	2.02
	2.03	4	1.70	3	4.29	3	0.21	4	2.00
	2.06	4	1.71	3	4.30	3	0.21	4	1.97
	2.09	4	1.72	3	4.30	3	0.21	4	1.95
	2.12	4	1.74	3	4.31	3	0.20	4	1.93
	2.14	4	1.75	3	4.31	3	0.20	4	1.91
	2.17	4	1.77	3	4.32	3	0.20	4	1.89
	2.20	4	1.78	3	4.32	3	0.19	4	1.87
	2.23	4	1.79	3	4.33	3	0.19	4	1.85
	2.26	4	1.81	3	4.34	3	0.18	4	1.83
	2.29	4	1.82	3	4.34	3	0.18	4	1.81
	2.32	4	1.83	3	4.35	3	0.18	4	1.78
	2.35	4	1.85	3	4.35	3	0.17	4	1.76

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
213	2.35	4	2.05	3	4.24	3	0.14	4	1.29
	2.38	4	2.05	3	4.24	3	0.14	4	1.29
	2.41	4	2.04	3	4.24	3	0.14	4	1.30
	2.44	4	2.04	3	4.24	3	0.14	4	1.31
	2.47	4	2.03	3	4.24	3	0.14	4	1.31
	2.50	4	2.03	3	4.24	3	0.14	4	1.32
	2.53	4	2.03	3	4.24	3	0.14	4	1.32
	2.56	4	2.03	3	4.24	3	0.14	4	1.32
	2.59	4	2.03	3	4.24	3	0.14	4	1.32
	2.61	4	2.03	3	4.24	3	0.14	4	1.32
	2.64	4	2.03	3	4.24	3	0.14	4	1.33
	2.67	4	2.03	3	4.24	3	0.14	4	1.33
	2.70	4	2.02	3	4.24	3	0.14	4	1.33
	2.73	4	2.02	3	4.24	3	0.14	4	1.33
	2.76	4	2.02	3	4.24	3	0.14	4	1.33
	2.79	4	2.02	3	4.24	3	0.14	4	1.33
	2.82	4	2.03	3	4.24	3	0.14	4	1.33
	2.85	4	2.03	3	4.24	3	0.14	4	1.32
	2.88	4	2.03	3	4.24	3	0.14	4	1.32
	2.91	4	2.04	3	4.24	3	0.14	4	1.31
	2.94	4	2.04	3	4.24	3	0.14	4	1.31
214	2.94	4	2.02	3	4.25	3	0.14	4	1.33
	2.97	4	2.02	3	4.25	3	0.14	4	1.33
	3.00	4	2.02	3	4.25	3	0.14	4	1.33
	3.03	4	2.02	3	4.25	3	0.14	4	1.34
	3.06	4	2.02	3	4.25	3	0.14	4	1.34
	3.08	4	2.02	3	4.25	3	0.14	4	1.34
	3.11	4	2.01	3	4.25	3	0.14	4	1.34
	3.14	4	2.01	3	4.25	3	0.13	4	1.35
	3.17	4	2.01	3	4.25	3	0.13	4	1.35
	3.20	4	2.01	3	4.25	3	0.13	4	1.35
	3.23	4	2.01	3	4.25	3	0.13	4	1.35
	3.26	4	2.01	3	4.25	3	0.13	4	1.34
	3.29	4	2.02	3	4.25	3	0.13	4	1.33
	3.32	4	2.04	3	4.25	3	0.13	4	1.31
	3.35	4	2.05	3	4.25	3	0.13	4	1.28
	3.38	4	2.07	3	4.25	3	0.13	4	1.26
	3.41	4	2.09	3	4.26	3	0.13	4	1.23
	3.44	4	2.10	3	4.26	3	0.13	4	1.20
	3.47	4	2.12	3	4.26	3	0.13	4	1.18
	3.50	4	2.14	3	4.26	3	0.13	4	1.15
	3.52	4	2.15	3	4.26	3	0.13	4	1.13

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
215	3.52	4	2.16	3	4.26	3	0.13	4	1.12
	3.55	4	2.17	3	4.26	3	0.13	4	1.10
	3.58	4	2.18	3	4.26	3	0.13	4	1.08
	3.61	4	2.19	3	4.26	3	0.12	4	1.06
	3.64	4	2.21	3	4.27	3	0.12	4	1.04
	3.67	4	2.22	3	4.27	3	0.12	4	1.02
	3.70	4	2.23	3	4.27	3	0.12	4	1.00
	3.73	4	2.25	3	4.27	3	0.12	4	0.98
	3.76	4	2.26	3	4.27	3	0.12	4	0.96
	3.79	4	2.27	3	4.28	3	0.12	4	0.94
	3.82	4	2.29	3	4.28	3	0.12	4	0.92
	3.85	4	2.30	3	4.28	3	0.11	4	0.90
	3.88	4	2.31	3	4.28	3	0.11	4	0.88
	3.91	4	2.32	3	4.28	3	0.11	4	0.86
	3.94	4	2.34	3	4.29	3	0.11	4	0.84
	3.97	4	2.35	3	4.29	3	0.11	4	0.82
	4.00	4	2.36	3	4.29	3	0.11	4	0.80
	4.02	4	2.38	3	4.29	3	0.11	4	0.78
	4.05	4	2.39	3	4.29	3	0.10	4	0.76
	4.08	4	2.40	3	4.30	3	0.10	4	0.74
	4.11	4	2.41	3	4.30	3	0.10	4	0.72
216	4.11	4	2.42	3	4.29	3	0.10	4	0.70
	4.14	4	2.43	3	4.30	3	0.10	4	0.69
	4.17	4	2.44	3	4.30	3	0.10	4	0.68
	4.20	4	2.45	3	4.30	3	0.10	4	0.66
	4.23	4	2.46	3	4.30	3	0.10	4	0.65
	4.26	4	2.47	3	4.31	3	0.10	4	0.64
	4.29	4	2.47	3	4.31	3	0.09	4	0.63
	4.32	4	2.48	3	4.31	3	0.09	4	0.61
	4.35	4	2.49	3	4.32	3	0.09	4	0.60
	4.38	4	2.50	3	4.32	3	0.09	4	0.59
	4.41	4	2.51	3	4.32	3	0.09	4	0.57
	4.44	4	2.52	3	4.32	3	0.08	4	0.56
	4.47	4	2.53	3	4.33	3	0.08	4	0.55
	4.49	4	2.53	3	4.33	3	0.08	4	0.53
	4.52	4	2.54	3	4.33	3	0.08	4	0.52
	4.55	4	2.55	3	4.34	3	0.08	4	0.51
	4.58	4	2.56	3	4.34	3	0.07	4	0.49
	4.61	4	2.57	3	4.34	3	0.07	4	0.48
	4.64	4	2.58	3	4.34	3	0.07	4	0.47
	4.67	4	2.58	3	4.35	3	0.07	4	0.46
	4.70	4	2.59	3	4.35	3	0.07	4	0.44

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias
 Prepared by:

Units: ton meter

Code: EuroCode
 Page: 102
 Date: 7/10/11

Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
217	4.73	4	2.58	3	4.35	3	0.07	4	0.46
	4.76	4	2.58	3	4.35	3	0.07	4	0.47
	4.79	4	2.57	3	4.34	3	0.07	4	0.48
	4.82	4	2.56	3	4.34	3	0.07	4	0.50
	4.85	4	2.55	3	4.34	3	0.07	4	0.51
	4.88	4	2.54	3	4.34	3	0.08	4	0.52
	4.91	4	2.53	3	4.33	3	0.08	4	0.54
	4.94	4	2.52	3	4.33	3	0.08	4	0.55
	4.96	4	2.51	3	4.33	3	0.08	4	0.57
	4.99	4	2.50	3	4.33	3	0.08	4	0.58
	5.02	4	2.50	3	4.32	3	0.08	4	0.59
	5.05	4	2.49	3	4.32	3	0.09	4	0.61
	5.08	4	2.48	3	4.32	3	0.09	4	0.62
	5.11	4	2.47	3	4.32	3	0.09	4	0.63
	5.14	4	2.46	3	4.32	3	0.09	4	0.65
	5.17	4	2.45	3	4.31	3	0.09	4	0.66
	5.20	4	2.44	3	4.31	3	0.09	4	0.67
	5.23	4	2.43	3	4.31	3	0.09	4	0.69
	5.26	4	2.43	3	4.31	3	0.10	4	0.70
	5.29	4	2.42	3	4.30	3	0.10	4	0.71
218	5.29	4	2.41	3	4.31	3	0.09	4	0.73
	5.32	4	2.39	3	4.31	3	0.10	4	0.75
	5.35	4	2.38	3	4.31	3	0.10	4	0.77
	5.38	4	2.37	3	4.31	3	0.10	4	0.80
	5.41	4	2.35	3	4.30	3	0.10	4	0.82
	5.43	4	2.34	3	4.30	3	0.10	4	0.84
	5.46	4	2.33	3	4.30	3	0.10	4	0.86
	5.49	4	2.31	3	4.30	3	0.10	4	0.88
	5.52	4	2.30	3	4.30	3	0.10	4	0.90
	5.55	4	2.29	3	4.30	3	0.10	4	0.92
	5.58	4	2.27	3	4.29	3	0.10	4	0.94
	5.61	4	2.26	3	4.29	3	0.11	4	0.96
	5.64	4	2.25	3	4.29	3	0.11	4	0.98
	5.67	4	2.23	3	4.29	3	0.11	4	1.00
	5.70	4	2.22	3	4.29	3	0.11	4	1.02
	5.73	4	2.21	3	4.29	3	0.11	4	1.04
	5.76	4	2.19	3	4.29	3	0.11	4	1.06
	5.79	4	2.18	3	4.28	3	0.11	4	1.08
	5.82	4	2.17	3	4.28	3	0.11	4	1.10
	5.85	4	2.15	3	4.28	3	0.11	4	1.12
	5.87	4	2.14	3	4.28	3	0.11	4	1.14

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
219	5.87	4	2.14	3	4.28	3	0.12	4	1.15
	5.90	4	2.12	3	4.28	3	0.12	4	1.18
	5.93	4	2.10	3	4.28	3	0.12	4	1.20
	5.96	4	2.09	3	4.28	3	0.12	4	1.23
	5.99	4	2.07	3	4.28	3	0.12	4	1.25
	6.02	4	2.05	3	4.28	3	0.12	4	1.28
	6.05	4	2.04	3	4.28	3	0.12	4	1.31
	6.08	4	2.02	3	4.28	3	0.12	4	1.33
	6.11	4	2.00	3	4.28	3	0.12	4	1.36
	6.14	4	2.00	3	4.28	3	0.12	4	1.37
	6.17	4	1.99	3	4.28	3	0.12	4	1.38
	6.20	4	1.99	3	4.28	3	0.12	4	1.38
	6.23	4	1.99	3	4.28	3	0.12	4	1.38
	6.26	4	1.99	3	4.28	3	0.12	4	1.38
	6.29	4	1.99	3	4.28	3	0.12	4	1.37
	6.32	4	2.00	3	4.28	3	0.12	4	1.37
	6.35	4	2.00	3	4.28	3	0.12	4	1.37
	6.37	4	2.00	3	4.28	3	0.12	4	1.37
	6.40	4	2.00	3	4.28	3	0.12	4	1.36
	6.43	4	2.00	3	4.28	3	0.12	4	1.36
	6.46	4	2.00	3	4.28	3	0.12	4	1.36
220	6.46	4	2.02	3	4.27	3	0.12	4	1.34
	6.49	4	2.01	3	4.28	3	0.12	4	1.35
	6.52	4	2.01	3	4.28	3	0.12	4	1.35
	6.55	4	2.01	3	4.28	3	0.12	4	1.36
	6.58	4	2.00	3	4.28	3	0.12	4	1.36
	6.61	4	2.00	3	4.28	3	0.12	4	1.37
	6.64	4	2.00	3	4.28	3	0.12	4	1.37
	6.67	4	2.00	3	4.28	3	0.12	4	1.37
	6.70	4	2.00	3	4.28	3	0.12	4	1.37
	6.73	4	2.00	3	4.28	3	0.12	4	1.37
	6.76	4	2.00	3	4.28	3	0.11	4	1.36
	6.79	4	2.00	3	4.28	3	0.11	4	1.36
	6.82	4	2.00	3	4.28	3	0.11	4	1.36
	6.84	4	2.00	3	4.28	3	0.11	4	1.36
	6.87	4	2.00	3	4.29	3	0.11	4	1.36
	6.90	4	2.00	3	4.29	3	0.11	4	1.36
	6.93	4	2.01	3	4.29	3	0.11	4	1.36
	6.96	4	2.01	3	4.29	3	0.11	4	1.35
	6.99	4	2.01	3	4.29	3	0.11	4	1.35
	7.02	4	2.02	3	4.29	3	0.11	4	1.34
	7.05	4	2.02	3	4.29	3	0.11	4	1.33

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
221	7.05	4	1.82	3	4.40	3	0.14	4	1.81
	7.08	4	1.80	3	4.39	3	0.15	4	1.83
	7.11	4	1.79	3	4.39	3	0.15	4	1.85
	7.14	4	1.78	3	4.38	3	0.15	4	1.87
	7.17	4	1.76	3	4.38	3	0.16	4	1.90
	7.20	4	1.75	3	4.37	3	0.16	4	1.92
	7.23	4	1.73	3	4.37	3	0.16	4	1.94
	7.26	4	1.72	3	4.36	3	0.17	4	1.96
	7.29	4	1.71	3	4.36	3	0.17	4	1.98
	7.31	4	1.69	3	4.35	3	0.17	4	2.00
	7.34	4	1.68	3	4.35	3	0.18	4	2.03
	7.37	4	1.66	3	4.34	3	0.18	4	2.05
	7.40	4	1.65	3	4.34	3	0.18	4	2.07
	7.43	4	1.64	3	4.33	3	0.19	4	2.09
	7.46	4	1.62	3	4.33	3	0.19	4	2.11
	7.49	4	1.61	3	4.32	3	0.19	4	2.13
	7.52	4	1.59	3	4.32	3	0.20	4	2.15
	7.55	4	1.58	3	4.31	3	0.20	4	2.17
	7.58	4	1.57	3	4.31	3	0.20	4	2.19
	7.61	4	1.56	3	4.30	3	0.21	4	2.21
	7.64	4	1.54	3	4.30	3	0.21	4	2.23
222	7.64	4	1.54	3	4.30	3	0.21	4	2.25
	7.67	4	1.52	3	4.30	3	0.21	4	2.28
	7.70	4	1.50	3	4.30	3	0.22	4	2.30
	7.73	4	1.49	3	4.29	3	0.22	4	2.33
	7.76	4	1.47	3	4.29	3	0.22	4	2.36
	7.78	4	1.45	3	4.28	3	0.22	4	2.38
	7.81	4	1.44	3	4.28	3	0.23	4	2.41
	7.84	4	1.42	3	4.27	3	0.23	4	2.43
	7.87	4	1.40	3	4.27	3	0.23	4	2.46
	7.90	4	1.39	3	4.27	3	0.24	4	2.48
	7.93	4	1.37	3	4.26	3	0.24	4	2.51
	7.96	4	1.35	3	4.26	3	0.24	4	2.54
	7.99	4	1.34	3	4.25	3	0.24	4	2.56
	8.02	4	1.32	3	4.25	3	0.25	4	2.59
	8.05	4	1.30	3	4.25	3	0.25	4	2.61
	8.08	4	1.29	3	4.24	3	0.25	4	2.64
	8.11	4	1.27	3	4.24	3	0.25	4	2.66
	8.14	4	1.25	3	4.23	3	0.26	4	2.69
	8.17	4	1.24	3	4.23	3	0.26	4	2.71
	8.20	4	1.22	3	4.22	3	0.26	4	2.74
	8.23	4	1.21	3	4.22	3	0.27	4	2.76

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=30000 dias
Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 30000, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
223	8.23	4	1.21	3	4.22	3	0.27	4	2.77
	8.25	4	1.19	3	4.22	3	0.27	4	2.79
	8.28	4	1.18	3	4.22	3	0.27	4	2.82
	8.31	4	1.16	3	4.21	3	0.27	4	2.85
	8.34	4	1.14	3	4.21	3	0.28	4	2.88
	8.37	4	1.12	3	4.21	3	0.28	4	2.90
	8.40	4	1.11	3	4.21	3	0.28	4	2.93
	8.43	4	1.09	3	4.20	3	0.28	4	2.95
	8.46	4	1.08	3	4.20	3	0.28	4	2.97
	8.49	4	1.06	3	4.20	3	0.29	4	2.99
	8.52	4	1.05	3	4.19	3	0.29	4	3.01
	8.55	4	1.04	3	4.19	3	0.29	4	3.03
	8.58	4	1.03	3	4.19	3	0.29	4	3.05
	8.61	4	1.02	3	4.19	3	0.29	4	3.07
	8.64	4	1.00	3	4.18	3	0.29	4	3.09
	8.67	4	0.99	3	4.18	3	0.30	4	3.11
	8.70	4	0.98	3	4.18	3	0.30	4	3.13
	8.72	4	0.97	3	4.18	3	0.30	4	3.14
	8.75	4	0.95	3	4.17	3	0.30	4	3.16
	8.78	4	0.94	3	4.17	3	0.30	4	3.18
	8.81	4	0.93	3	4.17	3	0.31	4	3.20
224	8.81	4	0.94	3	4.17	3	0.31	4	3.19
	8.84	4	0.93	3	4.16	3	0.31	4	3.21
	8.87	4	0.91	3	4.16	3	0.31	4	3.23
	8.90	4	0.90	3	4.16	3	0.32	4	3.25
	8.93	4	0.89	3	4.16	3	0.32	4	3.27
	8.96	4	0.88	3	4.16	3	0.32	4	3.29
	8.99	4	0.86	3	4.15	3	0.32	4	3.31
	9.02	4	0.85	3	4.15	3	0.32	4	3.33
	9.05	4	0.84	3	4.15	3	0.32	4	3.36
	9.08	4	0.84	3	4.15	3	0.32	4	3.35
	9.11	4	0.84	3	4.15	3	0.32	4	3.34
	9.14	4	0.85	3	4.14	3	0.33	4	3.34
	9.17	4	0.85	3	4.14	3	0.33	4	3.33
	9.19	4	0.86	3	4.14	3	0.33	4	3.32
	9.22	4	0.86	3	4.14	3	0.33	4	3.31
	9.25	4	0.87	3	4.14	3	0.33	4	3.30
	9.28	4	0.87	3	4.13	3	0.33	4	3.30
	9.31	4	0.88	3	4.13	3	0.33	4	3.28
	9.34	4	0.89	3	4.13	3	0.33	4	3.27
	9.37	4	0.90	3	4.13	3	0.34	4	3.25
	9.40	4	0.91	3	4.13	3	0.34	4	3.24

Time-steps analysis was performed.

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias
 Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
209	0.00	2	0.65	2	4.14	2	0.65	2	4.14
	0.03	2	0.65	2	4.14	2	0.65	2	4.14
	0.06	2	0.65	2	4.14	2	0.65	2	4.14
	0.09	2	0.65	2	4.14	2	0.65	2	4.14
	0.12	2	0.65	2	4.14	2	0.65	2	4.14
	0.15	2	0.65	2	4.13	2	0.65	2	4.13
	0.18	2	0.66	2	4.13	2	0.66	2	4.13
	0.21	2	0.66	2	4.13	2	0.66	2	4.13
	0.24	2	0.66	2	4.13	2	0.66	2	4.13
	0.26	2	0.66	2	4.13	2	0.66	2	4.13
	0.29	2	0.66	2	4.13	2	0.66	2	4.13
	0.32	2	0.66	2	4.13	2	0.66	2	4.13
	0.35	2	0.66	2	4.13	2	0.66	2	4.13
	0.38	2	0.66	2	4.13	2	0.66	2	4.13
	0.41	2	0.66	2	4.13	2	0.66	2	4.13
	0.44	2	0.66	2	4.13	2	0.66	2	4.13
	0.47	2	0.66	2	4.13	2	0.66	2	4.13
	0.50	2	0.66	2	4.13	2	0.66	2	4.13
	0.53	2	0.66	2	4.13	2	0.66	2	4.13
	0.56	2	0.66	2	4.13	2	0.66	2	4.13
	0.59	2	0.66	2	4.12	2	0.66	2	4.12
210	0.59	2	0.66	2	4.12	2	0.66	2	4.12
	0.62	2	0.66	2	4.12	2	0.66	2	4.12
	0.65	2	0.66	2	4.12	2	0.66	2	4.12
	0.68	2	0.66	2	4.12	2	0.66	2	4.12
	0.71	2	0.66	2	4.12	2	0.66	2	4.12
	0.73	2	0.66	2	4.12	2	0.66	2	4.12
	0.76	2	0.66	2	4.12	2	0.66	2	4.12
	0.79	2	0.66	2	4.12	2	0.66	2	4.12
	0.82	2	0.66	2	4.11	2	0.66	2	4.11
	0.85	2	0.66	2	4.11	2	0.66	2	4.11
	0.88	2	0.66	2	4.11	2	0.66	2	4.11
	0.91	2	0.66	2	4.11	2	0.66	2	4.11
	0.94	2	0.66	2	4.11	2	0.66	2	4.11
	0.97	2	0.66	2	4.11	2	0.66	2	4.11
	1.00	2	0.66	2	4.11	2	0.66	2	4.11
	1.03	2	0.66	2	4.11	2	0.66	2	4.11
	1.06	2	0.66	2	4.11	2	0.66	2	4.11
	1.09	2	0.67	2	4.11	2	0.67	2	4.11
	1.12	2	0.67	2	4.11	2	0.67	2	4.11
	1.15	2	0.67	2	4.11	2	0.67	2	4.11
	1.17	2	0.67	2	4.11	2	0.67	2	4.11

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias

Prepared by:

Units: ton meter

Code: EuroCode
 Page: 107
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Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
211	1.17	2	0.66	2	4.10	2	0.66	2	4.10
	1.20	2	0.66	2	4.10	2	0.66	2	4.10
	1.23	2	0.66	2	4.10	2	0.66	2	4.10
	1.26	2	0.66	2	4.10	2	0.66	2	4.10
	1.29	2	0.66	2	4.10	2	0.66	2	4.10
	1.32	2	0.66	2	4.10	2	0.66	2	4.10
	1.35	2	0.67	2	4.10	2	0.67	2	4.10
	1.38	2	0.67	2	4.10	2	0.67	2	4.10
	1.41	2	0.67	2	4.10	2	0.67	2	4.10
	1.44	2	0.67	2	4.10	2	0.67	2	4.10
	1.47	2	0.67	2	4.10	2	0.67	2	4.10
	1.50	2	0.67	2	4.09	2	0.67	2	4.09
	1.53	2	0.67	2	4.09	2	0.67	2	4.09
	1.56	2	0.67	2	4.09	2	0.67	2	4.09
	1.59	2	0.67	2	4.09	2	0.67	2	4.09
	1.62	2	0.67	2	4.09	2	0.67	2	4.09
	1.65	2	0.67	2	4.09	2	0.67	2	4.09
	1.67	2	0.67	2	4.09	2	0.67	2	4.09
	1.70	2	0.67	2	4.09	2	0.67	2	4.09
	1.73	2	0.67	2	4.09	2	0.67	2	4.09
	1.76	2	0.67	2	4.09	2	0.67	2	4.09
212	1.76	2	0.67	2	4.08	2	0.67	2	4.08
	1.79	2	0.67	2	4.08	2	0.67	2	4.08
	1.82	2	0.67	2	4.08	2	0.67	2	4.08
	1.85	2	0.67	2	4.08	2	0.67	2	4.08
	1.88	2	0.67	2	4.08	2	0.67	2	4.08
	1.91	2	0.67	2	4.08	2	0.67	2	4.08
	1.94	2	0.67	2	4.08	2	0.67	2	4.08
	1.97	2	0.67	2	4.08	2	0.67	2	4.08
	2.00	2	0.67	2	4.08	2	0.67	2	4.08
	2.03	2	0.67	2	4.08	2	0.67	2	4.08
	2.06	2	0.67	2	4.08	2	0.67	2	4.08
	2.09	2	0.67	2	4.08	2	0.67	2	4.08
	2.12	2	0.67	2	4.08	2	0.67	2	4.08
	2.14	2	0.67	2	4.08	2	0.67	2	4.08
	2.17	2	0.67	2	4.07	2	0.67	2	4.07
	2.20	2	0.67	2	4.07	2	0.67	2	4.07
	2.23	2	0.67	2	4.07	2	0.67	2	4.07
	2.26	2	0.68	2	4.07	2	0.68	2	4.07
	2.29	2	0.68	2	4.07	2	0.68	2	4.07
	2.32	2	0.68	2	4.07	2	0.68	2	4.07
	2.35	2	0.68	2	4.07	2	0.68	2	4.07

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias
 Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
213	2.35	2	0.63	2	3.96	2	0.63	2	3.96
	2.38	2	0.63	2	3.96	2	0.63	2	3.96
	2.41	2	0.63	2	3.96	2	0.63	2	3.96
	2.44	2	0.63	2	3.96	2	0.63	2	3.96
	2.47	2	0.63	2	3.96	2	0.63	2	3.96
	2.50	2	0.63	2	3.96	2	0.63	2	3.96
	2.53	2	0.63	2	3.96	2	0.63	2	3.96
	2.56	2	0.63	2	3.96	2	0.63	2	3.96
	2.59	2	0.63	2	3.96	2	0.63	2	3.96
	2.61	2	0.63	2	3.96	2	0.63	2	3.96
	2.64	2	0.63	2	3.96	2	0.63	2	3.96
	2.67	2	0.63	2	3.96	2	0.63	2	3.96
	2.70	2	0.63	2	3.96	2	0.63	2	3.96
	2.73	2	0.63	2	3.96	2	0.63	2	3.96
	2.76	2	0.63	2	3.96	2	0.63	2	3.96
	2.79	2	0.63	2	3.96	2	0.63	2	3.96
	2.82	2	0.63	2	3.96	2	0.63	2	3.96
	2.85	2	0.63	2	3.96	2	0.63	2	3.96
	2.88	2	0.63	2	3.96	2	0.63	2	3.96
	2.91	2	0.63	2	3.96	2	0.63	2	3.96
	2.94	2	0.63	2	3.96	2	0.63	2	3.96
214	2.97	2	0.63	2	3.96	2	0.63	2	3.96
	3.00	2	0.63	2	3.96	2	0.63	2	3.96
	3.03	2	0.63	2	3.96	2	0.63	2	3.96
	3.06	2	0.63	2	3.96	2	0.63	2	3.96
	3.08	2	0.63	2	3.96	2	0.63	2	3.96
	3.11	2	0.63	2	3.96	2	0.63	2	3.96
	3.14	2	0.63	2	3.96	2	0.63	2	3.96
	3.17	2	0.63	2	3.96	2	0.63	2	3.96
	3.20	2	0.63	2	3.96	2	0.63	2	3.96
	3.23	2	0.63	2	3.96	2	0.63	2	3.96
	3.26	2	0.63	2	3.96	2	0.63	2	3.96
	3.29	2	0.63	2	3.96	2	0.63	2	3.96
	3.32	2	0.63	2	3.96	2	0.63	2	3.96
	3.35	2	0.63	2	3.96	2	0.63	2	3.96
	3.38	2	0.63	2	3.96	2	0.63	2	3.96
	3.41	2	0.63	2	3.96	2	0.63	2	3.96
	3.44	2	0.63	2	3.96	2	0.63	2	3.96
	3.47	2	0.63	2	3.96	2	0.63	2	3.96
	3.50	2	0.63	2	3.96	2	0.63	2	3.96
	3.52	2	0.63	2	3.96	2	0.63	2	3.96

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
215	3.52	2	0.63	2	3.95	2	0.63	2	3.95
	3.55	2	0.63	2	3.95	2	0.63	2	3.95
	3.58	2	0.63	2	3.95	2	0.63	2	3.95
	3.61	2	0.63	2	3.95	2	0.63	2	3.95
	3.64	2	0.63	2	3.95	2	0.63	2	3.95
	3.67	2	0.63	2	3.95	2	0.63	2	3.95
	3.70	2	0.63	2	3.95	2	0.63	2	3.95
	3.73	2	0.63	2	3.95	2	0.63	2	3.95
	3.76	2	0.63	2	3.95	2	0.63	2	3.95
	3.79	2	0.63	2	3.95	2	0.63	2	3.95
	3.82	2	0.63	2	3.95	2	0.63	2	3.95
	3.85	2	0.63	2	3.95	2	0.63	2	3.95
	3.88	2	0.63	2	3.95	2	0.63	2	3.95
	3.91	2	0.63	2	3.95	2	0.63	2	3.95
	3.94	2	0.63	2	3.95	2	0.63	2	3.95
	3.97	2	0.63	2	3.95	2	0.63	2	3.95
	4.00	2	0.63	2	3.95	2	0.63	2	3.95
	4.02	2	0.63	2	3.95	2	0.63	2	3.95
	4.05	2	0.63	2	3.95	2	0.63	2	3.95
	4.08	2	0.63	2	3.95	2	0.63	2	3.95
	4.11	2	0.63	2	3.95	2	0.63	2	3.95
216	4.11	2	0.63	2	3.95	2	0.63	2	3.95
	4.14	2	0.63	2	3.95	2	0.63	2	3.95
	4.17	2	0.63	2	3.95	2	0.63	2	3.95
	4.20	2	0.63	2	3.95	2	0.63	2	3.95
	4.23	2	0.63	2	3.95	2	0.63	2	3.95
	4.26	2	0.63	2	3.95	2	0.63	2	3.95
	4.29	2	0.63	2	3.95	2	0.63	2	3.95
	4.32	2	0.63	2	3.95	2	0.63	2	3.95
	4.35	2	0.63	2	3.95	2	0.63	2	3.95
	4.38	2	0.63	2	3.95	2	0.63	2	3.95
	4.41	2	0.63	2	3.95	2	0.63	2	3.95
	4.44	2	0.63	2	3.95	2	0.63	2	3.95
	4.47	2	0.63	2	3.95	2	0.63	2	3.95
	4.49	2	0.63	2	3.95	2	0.63	2	3.95
	4.52	2	0.63	2	3.95	2	0.63	2	3.95
	4.55	2	0.63	2	3.95	2	0.63	2	3.95
	4.58	2	0.63	2	3.95	2	0.63	2	3.95
	4.61	2	0.63	2	3.95	2	0.63	2	3.95
	4.64	2	0.63	2	3.95	2	0.63	2	3.95
	4.67	2	0.63	2	3.95	2	0.63	2	3.95
	4.70	2	0.63	2	3.95	2	0.63	2	3.95

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias

Prepared by:

Units: ton meter

Code: EuroCode

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Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
217	4.73	2	0.63	2	3.95	2	0.63	2	3.95
	4.76	2	0.63	2	3.95	2	0.63	2	3.95
	4.79	2	0.63	2	3.95	2	0.63	2	3.95
	4.82	2	0.63	2	3.95	2	0.63	2	3.95
	4.85	2	0.63	2	3.95	2	0.63	2	3.95
	4.88	2	0.63	2	3.95	2	0.63	2	3.95
	4.91	2	0.63	2	3.95	2	0.63	2	3.95
	4.94	2	0.63	2	3.95	2	0.63	2	3.95
	4.96	2	0.63	2	3.95	2	0.63	2	3.95
	4.99	2	0.63	2	3.95	2	0.63	2	3.95
	5.02	2	0.63	2	3.96	2	0.63	2	3.96
	5.05	2	0.63	2	3.96	2	0.63	2	3.96
	5.08	2	0.63	2	3.96	2	0.63	2	3.96
	5.11	2	0.63	2	3.96	2	0.63	2	3.96
	5.14	2	0.63	2	3.96	2	0.63	2	3.96
	5.17	2	0.63	2	3.96	2	0.63	2	3.96
	5.20	2	0.62	2	3.96	2	0.62	2	3.96
	5.23	2	0.62	2	3.96	2	0.62	2	3.96
	5.26	2	0.62	2	3.96	2	0.62	2	3.96
	5.29	2	0.62	2	3.96	2	0.62	2	3.96
218	5.29	2	0.62	2	3.96	2	0.62	2	3.96
	5.32	2	0.62	2	3.96	2	0.62	2	3.96
	5.35	2	0.62	2	3.97	2	0.62	2	3.97
	5.38	2	0.62	2	3.97	2	0.62	2	3.97
	5.41	2	0.62	2	3.97	2	0.62	2	3.97
	5.43	2	0.62	2	3.97	2	0.62	2	3.97
	5.46	2	0.62	2	3.97	2	0.62	2	3.97
	5.49	2	0.62	2	3.97	2	0.62	2	3.97
	5.52	2	0.62	2	3.97	2	0.62	2	3.97
	5.55	2	0.62	2	3.97	2	0.62	2	3.97
	5.58	2	0.62	2	3.97	2	0.62	2	3.97
	5.61	2	0.62	2	3.97	2	0.62	2	3.97
	5.64	2	0.62	2	3.97	2	0.62	2	3.97
	5.67	2	0.62	2	3.97	2	0.62	2	3.97
	5.70	2	0.62	2	3.98	2	0.62	2	3.98
	5.73	2	0.62	2	3.98	2	0.62	2	3.98
	5.76	2	0.62	2	3.98	2	0.62	2	3.98
	5.79	2	0.61	2	3.98	2	0.61	2	3.98
	5.82	2	0.61	2	3.98	2	0.61	2	3.98
	5.85	2	0.61	2	3.98	2	0.61	2	3.98
	5.87	2	0.61	2	3.98	2	0.61	2	3.98

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias
 Prepared by:

Units: ton meter

Code: EuroCode
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Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
219	5.87	2	0.61	2	3.98	2	0.61	2	3.98
	5.90	2	0.61	2	3.98	2	0.61	2	3.98
	5.93	2	0.61	2	3.98	2	0.61	2	3.98
	5.96	2	0.61	2	3.98	2	0.61	2	3.98
	5.99	2	0.61	2	3.98	2	0.61	2	3.98
	6.02	2	0.61	2	3.99	2	0.61	2	3.99
	6.05	2	0.61	2	3.99	2	0.61	2	3.99
	6.08	2	0.61	2	3.99	2	0.61	2	3.99
	6.11	2	0.61	2	3.99	2	0.61	2	3.99
	6.14	2	0.61	2	3.99	2	0.61	2	3.99
	6.17	2	0.61	2	3.99	2	0.61	2	3.99
	6.20	2	0.61	2	3.99	2	0.61	2	3.99
	6.23	2	0.61	2	3.99	2	0.61	2	3.99
	6.26	2	0.61	2	3.99	2	0.61	2	3.99
	6.29	2	0.61	2	3.99	2	0.61	2	3.99
	6.32	2	0.61	2	3.99	2	0.61	2	3.99
	6.35	2	0.61	2	3.99	2	0.61	2	3.99
	6.37	2	0.61	2	4.00	2	0.61	2	4.00
	6.40	2	0.60	2	4.00	2	0.60	2	4.00
	6.43	2	0.60	2	4.00	2	0.60	2	4.00
	6.46	2	0.60	2	4.00	2	0.60	2	4.00
220	6.49	2	0.60	2	4.00	2	0.60	2	4.00
	6.52	2	0.60	2	4.00	2	0.60	2	4.00
	6.55	2	0.60	2	4.00	2	0.60	2	4.00
	6.58	2	0.60	2	4.00	2	0.60	2	4.00
	6.61	2	0.60	2	4.00	2	0.60	2	4.00
	6.64	2	0.60	2	4.00	2	0.60	2	4.00
	6.67	2	0.60	2	4.00	2	0.60	2	4.00
	6.70	2	0.60	2	4.01	2	0.60	2	4.01
	6.73	2	0.60	2	4.01	2	0.60	2	4.01
	6.76	2	0.60	2	4.01	2	0.60	2	4.01
	6.79	2	0.60	2	4.01	2	0.60	2	4.01
	6.82	2	0.60	2	4.01	2	0.60	2	4.01
	6.84	2	0.60	2	4.01	2	0.60	2	4.01
	6.87	2	0.60	2	4.01	2	0.60	2	4.01
	6.90	2	0.60	2	4.01	2	0.60	2	4.01
	6.93	2	0.60	2	4.01	2	0.60	2	4.01
	6.96	2	0.60	2	4.01	2	0.60	2	4.01
	6.99	2	0.60	2	4.01	2	0.60	2	4.01
	7.02	2	0.59	2	4.01	2	0.59	2	4.01
	7.05	2	0.59	2	4.02	2	0.59	2	4.02

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias
 Prepared by:

Units: ton meter

Code: EuroCode
 Page: 112
 Date: 7/10/11

Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
221	7.05	2	0.64	2	4.12	2	0.64	2	4.12
	7.08	2	0.64	2	4.12	2	0.64	2	4.12
	7.11	2	0.64	2	4.12	2	0.64	2	4.12
	7.14	2	0.64	2	4.13	2	0.64	2	4.13
	7.17	2	0.64	2	4.13	2	0.64	2	4.13
	7.20	2	0.64	2	4.13	2	0.64	2	4.13
	7.23	2	0.64	2	4.13	2	0.64	2	4.13
	7.26	2	0.64	2	4.13	2	0.64	2	4.13
	7.29	2	0.64	2	4.13	2	0.64	2	4.13
	7.31	2	0.64	2	4.13	2	0.64	2	4.13
	7.34	2	0.63	2	4.14	2	0.63	2	4.14
	7.37	2	0.63	2	4.14	2	0.63	2	4.14
	7.40	2	0.63	2	4.14	2	0.63	2	4.14
	7.43	2	0.63	2	4.14	2	0.63	2	4.14
	7.46	2	0.63	2	4.14	2	0.63	2	4.14
	7.49	2	0.63	2	4.14	2	0.63	2	4.14
	7.52	2	0.63	2	4.14	2	0.63	2	4.14
	7.55	2	0.63	2	4.14	2	0.63	2	4.14
	7.58	2	0.63	2	4.15	2	0.63	2	4.15
	7.61	2	0.63	2	4.15	2	0.63	2	4.15
	7.64	2	0.63	2	4.15	2	0.63	2	4.15
222	7.64	2	0.63	2	4.15	2	0.63	2	4.15
	7.67	2	0.63	2	4.15	2	0.63	2	4.15
	7.70	2	0.63	2	4.16	2	0.63	2	4.16
	7.73	2	0.63	2	4.16	2	0.63	2	4.16
	7.76	2	0.63	2	4.16	2	0.63	2	4.16
	7.78	2	0.63	2	4.16	2	0.63	2	4.16
	7.81	2	0.62	2	4.16	2	0.62	2	4.16
	7.84	2	0.62	2	4.16	2	0.62	2	4.16
	7.87	2	0.62	2	4.16	2	0.62	2	4.16
	7.90	2	0.62	2	4.16	2	0.62	2	4.16
	7.93	2	0.62	2	4.17	2	0.62	2	4.17
	7.96	2	0.62	2	4.17	2	0.62	2	4.17
	7.99	2	0.62	2	4.17	2	0.62	2	4.17
	8.02	2	0.62	2	4.17	2	0.62	2	4.17
	8.05	2	0.62	2	4.17	2	0.62	2	4.17
	8.08	2	0.62	2	4.17	2	0.62	2	4.17
	8.11	2	0.62	2	4.17	2	0.62	2	4.17
	8.14	2	0.62	2	4.18	2	0.62	2	4.18
	8.17	2	0.61	2	4.18	2	0.61	2	4.18
	8.20	2	0.61	2	4.18	2	0.61	2	4.18
	8.23	2	0.61	2	4.18	2	0.61	2	4.18

VIADUTO NA RODOVIA PE-060 (prot) 4 cordoalhas - transversinas 37 m
 transversina central 37m tensões t=37 dias
 Prepared by:

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Stresses [MPa] , at t = 37, beam no. 3

Member no.	Dist. [m]	Maximum				Minimum			
		Top		Bottom		Top		Bottom	
		Comb	Stress	Comb	Stress	Comb	Stress	Comb	Stress
223	8.23	2	0.62	2	4.18	2	0.62	2	4.18
	8.25	2	0.62	2	4.18	2	0.62	2	4.18
	8.28	2	0.62	2	4.19	2	0.62	2	4.19
	8.31	2	0.61	2	4.19	2	0.61	2	4.19
	8.34	2	0.61	2	4.19	2	0.61	2	4.19
	8.37	2	0.61	2	4.19	2	0.61	2	4.19
	8.40	2	0.61	2	4.19	2	0.61	2	4.19
	8.43	2	0.61	2	4.19	2	0.61	2	4.19
	8.46	2	0.61	2	4.19	2	0.61	2	4.19
	8.49	2	0.61	2	4.20	2	0.61	2	4.20
	8.52	2	0.61	2	4.20	2	0.61	2	4.20
	8.55	2	0.61	2	4.20	2	0.61	2	4.20
	8.58	2	0.61	2	4.20	2	0.61	2	4.20
	8.61	2	0.61	2	4.20	2	0.61	2	4.20
	8.64	2	0.60	2	4.20	2	0.60	2	4.20
	8.67	2	0.60	2	4.20	2	0.60	2	4.20
	8.70	2	0.60	2	4.21	2	0.60	2	4.21
	8.72	2	0.60	2	4.21	2	0.60	2	4.21
	8.75	2	0.60	2	4.21	2	0.60	2	4.21
	8.78	2	0.60	2	4.21	2	0.60	2	4.21
	8.81	2	0.60	2	4.21	2	0.60	2	4.21
224	8.81	2	0.60	2	4.21	2	0.60	2	4.21
	8.84	2	0.60	2	4.22	2	0.60	2	4.22
	8.87	2	0.60	2	4.22	2	0.60	2	4.22
	8.90	2	0.60	2	4.22	2	0.60	2	4.22
	8.93	2	0.60	2	4.22	2	0.60	2	4.22
	8.96	2	0.60	2	4.22	2	0.60	2	4.22
	8.99	2	0.60	2	4.22	2	0.60	2	4.22
	9.02	2	0.60	2	4.22	2	0.60	2	4.22
	9.05	2	0.60	2	4.23	2	0.60	2	4.23
	9.08	2	0.60	2	4.23	2	0.60	2	4.23
	9.11	2	0.59	2	4.23	2	0.59	2	4.23
	9.14	2	0.59	2	4.23	2	0.59	2	4.23
	9.17	2	0.59	2	4.23	2	0.59	2	4.23
	9.19	2	0.59	2	4.23	2	0.59	2	4.23
	9.22	2	0.59	2	4.23	2	0.59	2	4.23
	9.25	2	0.59	2	4.23	2	0.59	2	4.23
	9.28	2	0.59	2	4.24	2	0.59	2	4.24
	9.31	2	0.59	2	4.24	2	0.59	2	4.24
	9.34	2	0.59	2	4.24	2	0.59	2	4.24
	9.37	2	0.59	2	4.24	2	0.59	2	4.24
	9.40	2	0.59	2	4.24	2	0.59	2	4.24

Time-steps analysis was performed.

VERIFICAÇÃO DE SEÇÕES PROTENDIDAS

<VerProtFint>

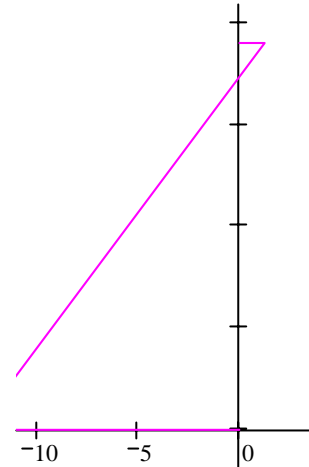
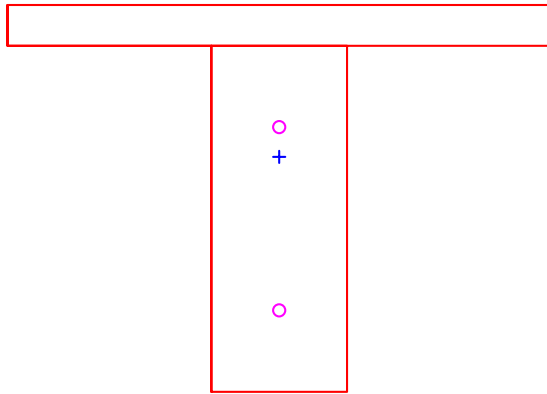
OBRA: VIADUTO NA PE-060

1. Dados de Entrada TRANSVERSINA CENTRAL POSITIVO 37 m

	<u>Base Superior</u>	<u>Base Inferior</u>	<u>Altura</u>	<u>As</u> <cm ² >	<u>Prof.</u> <m>	<u>Prealon.</u> <%>
trap :=	1	2	3			
	1	1	0.2	5.736	1.5	5
	0.25	0.25	1.7	5.736	0.6	5

c/toda carga movel

Fator do conc. $\gamma_c := 1.4$ Resistencia carac. <tf/m²> $f_{ck} := 3500$ $f_c := 0.85 \cdot \frac{f_{ck}}{\gamma_c}$
 Fator dos esf. $\gamma_f := 1.4$



Momento último de projeto $M_r(D) = 173$

Momento de serviço $\frac{M_r(D)}{\gamma_f} = 123$

$$M_d := 0.9 \cdot (-17.5) + 1.5 \cdot 95.6$$

$$M_d = 128$$

menor que $M_r(D)$

Altura total $h_{total} = 1.9$

Profundidade do CG $y_s = 0.746$

Deformação de compressão $\epsilon_{c1} = 1.242$

Profundidade do eixo neutro $p_{en} = 0.166$

VERIFICAÇÃO DE SEÇÕES PROTENDIDAS

<VerProtFint>

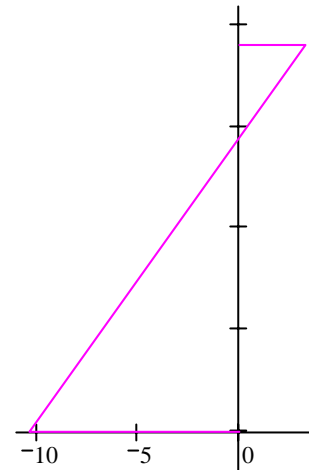
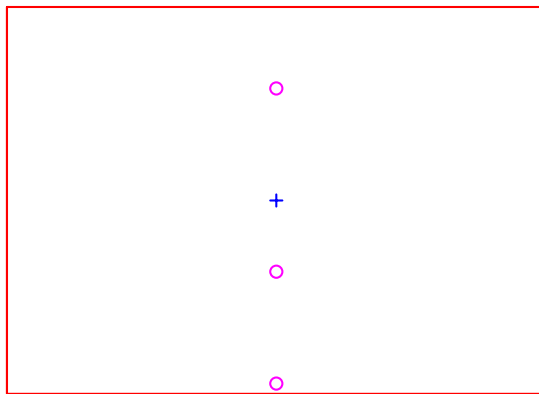
OBRA: VIADUTO NA PE-060

1. Dados de Entrada TRANSVERSINA CENTRAL NEGATIVO 37 m

	<u>Base Superior</u>	<u>Base Inferior</u>	<u>Altura</u>	<u>As</u> <cm ² >	<u>Prof.</u> <m>	<u>Prealon.</u> <%>
trap :=	1	2	3	1	2	3
	0.25	0.25	1.9	5.736	1.3	5
				5.736	0.4	5
				12.4	1.85	0

c/toda carga movel

Fator do conc. $\gamma_c := 1.4$ Resistencia carac. <tf/m²> $f_{ck} := 3500$ $f_c := 0.85 \cdot \frac{f_{ck}}{\gamma_c}$
 Fator dos esf. $\gamma_f := 1.4$



Momento último de projeto $M_r(D) = 197$

Momento de serviço $\frac{M_r(D)}{\gamma_f} = 141$

$$M_d := 1.35 \cdot 17.5 + 1.5 \cdot 64.6$$

$$M_d = 121$$

menor que $M_r(D)$

Altura total $h_{total} = 1.9$

Profundidade do CG $y_s = 0.95$

Deformação de compressão $\epsilon_{c1} = 3.256$

Profundidade do eixo neutro $pen = 0.454$

OBRA: VIADUTO NA BR PE-060 37m

TRANSVERSINA CENTRAL

Dados gerais

- . número de seções ns := 2
 . cortantes de carga permanente, carga móvel e protensão (KN) i := 1..ns

<u>carga permanente</u>		<u>carga móvel</u>		<u>protensão</u>
$vg1_i :=$	$vg2_i := 0$	$vcm1_i :=$	$vcm2_i :=$	$vp_i :=$
27 48		202 279	-272 249	0 0

v g1 - refere-se a G1+ G2 + G3

$$vg12_i := vg1_i + vg2_i \quad vm_{i,1} := vcm1_i \quad vm_{i,2} := vcm2_i$$

- . momento torsor (KN) Mt := (20 23)

. geometria (mm,mm2)

largura nominal	altura	área efetiva	espessura da parede
$b_i := 225$	$h_i := 1900$	$A_i := 309400$	$ef_i := 80$

- . distância p/centro armadura (m) c := 100

. coeficiente

majoração das cargas	$K1_i :=$	$K2_i :=$	$K3_i :=$
	1.35 1.00	1.50 0	1.20 0.90

. coeficiente

minoração do concreto	$\gamma_c := 1.5$
minoração do aço	$\gamma_s := 1.15$
redução da carga móvel p/fadiga	$\gamma_f := 0.7$

- . resistência característica do concreto a compressão (MPa) fck := 35

- . resistência característica do aço a tração (MPa) fyk := 500

- . variação de tensão na armadura para fadiga (MPa) $\Delta\sigma := 85$

- . número de vigas para os esforços dados nv := 1

$$f_{yd} := \frac{f_{yk}}{\gamma_s} \quad \alpha_{v2} := \left(1 - \frac{f_{ck}}{250}\right) \quad f_{ctm} := 0.3 \cdot f_{ck}^{\frac{2}{3}} \quad f_{ctdinf} := 0.7 \cdot f_{ctm} \quad d_1 := h_1 - c$$

$$f_{cd} := \frac{f_{ck}}{\gamma_c} \quad f_{ctd} := \frac{f_{ctdinf}}{\gamma_c} \quad v_{c1} := 0.6 \cdot f_{ctd} \cdot b_1 \cdot d_1 \quad d_1 := 0.001 \cdot d_1$$

. número de pernas do estribo **cortante**

torção

$$\rho_{min} := 0.2 \cdot \frac{f_{ctm}}{f_{yk}} \quad \rho_{min} = 0.00128 \quad K_v := \frac{1}{n_v}$$

$np_1 := 2$
 $nt_1 := 1$

**RUPTURA****EM SERVIÇO****CORTANTE****CORTANTE**

$$v_{sd1}_i := K_v \cdot \max\left(\left|m_{max}_{i,1}\right|, \left|m_{min}_{i,1}\right|\right)$$

$$v_{11}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm1}_i + v_{p1}_i)$$

TORÇÃO

$$v_{12}_i := K_v \cdot (v_{g12}_i + \gamma_f \cdot v_{cm2}_i + v_{p1}_i)$$

$$M_{tsd}_i := 1.5 \cdot \left| M_t^{(\dot{\varphi})} \right|$$

$$\Delta 1_i := \begin{cases} |v_{11}_i - v_{12}_i| & \text{if } v_{11}_i \cdot v_{12}_i \geq 0 \\ \max(|v_{11}_i|, |v_{12}_i|) & \text{otherwise} \end{cases}$$

$$V_{1_i} := \max(|v_{11}_i|, |v_{12}_i|)$$

$$v_{sd1} = \begin{pmatrix} 381000 \\ 483300 \end{pmatrix} \quad b = \begin{pmatrix} 225 \\ 225 \end{pmatrix} \quad \Delta 1 = \begin{pmatrix} 168400 \\ 21000 \end{pmatrix} \quad V1 = \begin{pmatrix} 168400 \\ 243300 \end{pmatrix} \quad v_c = \begin{pmatrix} 364009.74 \\ 364009.74 \end{pmatrix}$$

ARMADURA

$$v_{sd}_i := v_{sd1}_i \quad V_i := V_{1_i} \quad \Delta_i := \Delta_{1_i}$$

ruptura**fadiga**

$$AS1_i := \begin{cases} \frac{v_{sd}_i - v_c}{0.9 \cdot d_1 \cdot f_{yd}} & \text{if } v_{sd}_i \geq v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS2_i := \begin{cases} \frac{V_i - 0.5 \cdot v_c}{0.9 \cdot d_1 \cdot \Delta \sigma} \cdot \frac{\Delta_i}{V_i} & \text{if } V_i \geq 0.5 \cdot v_c \\ 0 & \text{otherwise} \end{cases}$$

$$AS3_i := \max(AS1_i, AS2_i)$$

$$AS4_i := \frac{M_{tsd}_i}{2 \cdot A_1 \cdot f_{yd}} \cdot 1000$$

$$d_1 := 1000 \cdot d_1$$

SOLICITAÇÕES COMBINADAS**ARMAÇÃO TOTAL /PERNA**

$$\text{TRD1}_i := 0.5 \cdot \alpha v_2 \cdot \text{fcd} \cdot A_i \cdot e_{f_i} \quad \text{VRD2}_i := 0.27 \cdot \alpha v_2 \cdot \text{fcd} \cdot b_i \cdot d_i \quad \text{AS}_i := \max\left(\frac{\text{AS4}_i}{n_{t_i}} + \frac{\text{AS3}_i}{n_{p_i}}, \frac{1000 \cdot \rho_{\text{min}} \cdot b_i}{n_{p_i}}\right)$$

$$\text{TRD1} = \begin{pmatrix} 248345066.67 \\ 248345066.67 \end{pmatrix} \quad \text{VRD2} = \begin{pmatrix} 2194290 \\ 2194290 \end{pmatrix} \quad \text{AS} = \begin{pmatrix} 144.45 \\ 212.91 \end{pmatrix} \quad (\text{mm}^2)/\text{perna}/\text{m}$$

$$v1_i := \frac{\text{vsd}_i}{\text{VRD2}_i} \quad v2_i := \frac{\text{Mtsd}_i}{\text{TRD1}_i} \quad v := v1 + v2$$

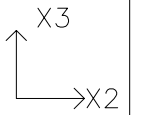
$$v1 = \begin{pmatrix} 0.17 \\ 0.22 \end{pmatrix} \quad v2 = \begin{pmatrix} 0.12 \\ 0.14 \end{pmatrix} \quad v = \begin{pmatrix} 0.29 \\ 0.36 \end{pmatrix}$$

5.2.2 INFRA-ESTRUTURA

5.2.2.1 TRAVESSA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

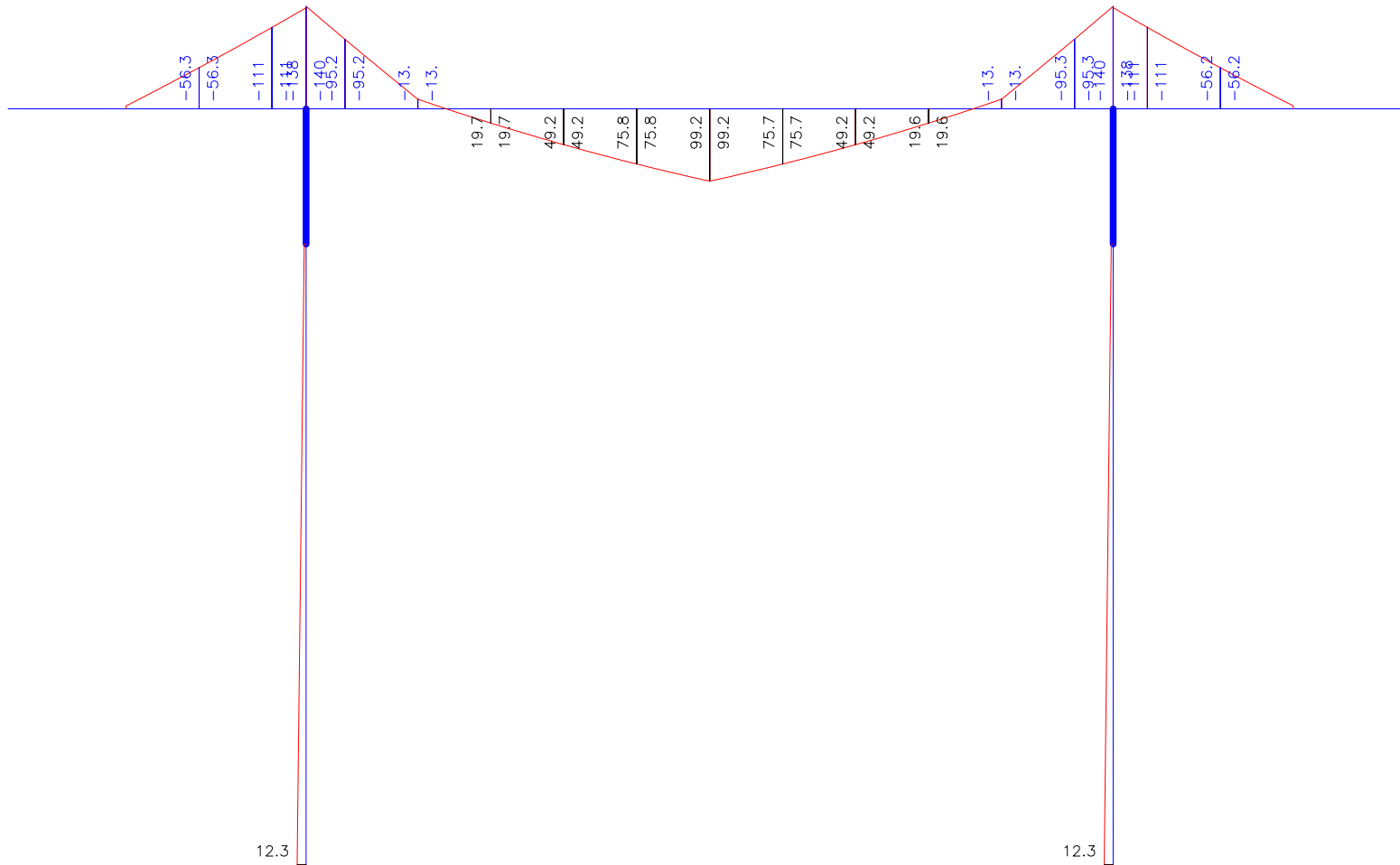
travessa apoio 1=4 mom g1+g2
VISTA: travessa apoio 1=4



ESCALA= 1:55

UNIDS: tf*m

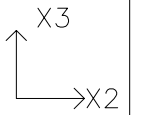
DATA: 9/10/11



MOM. FLETOR M2 COMB. N° 1 g1+g2

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

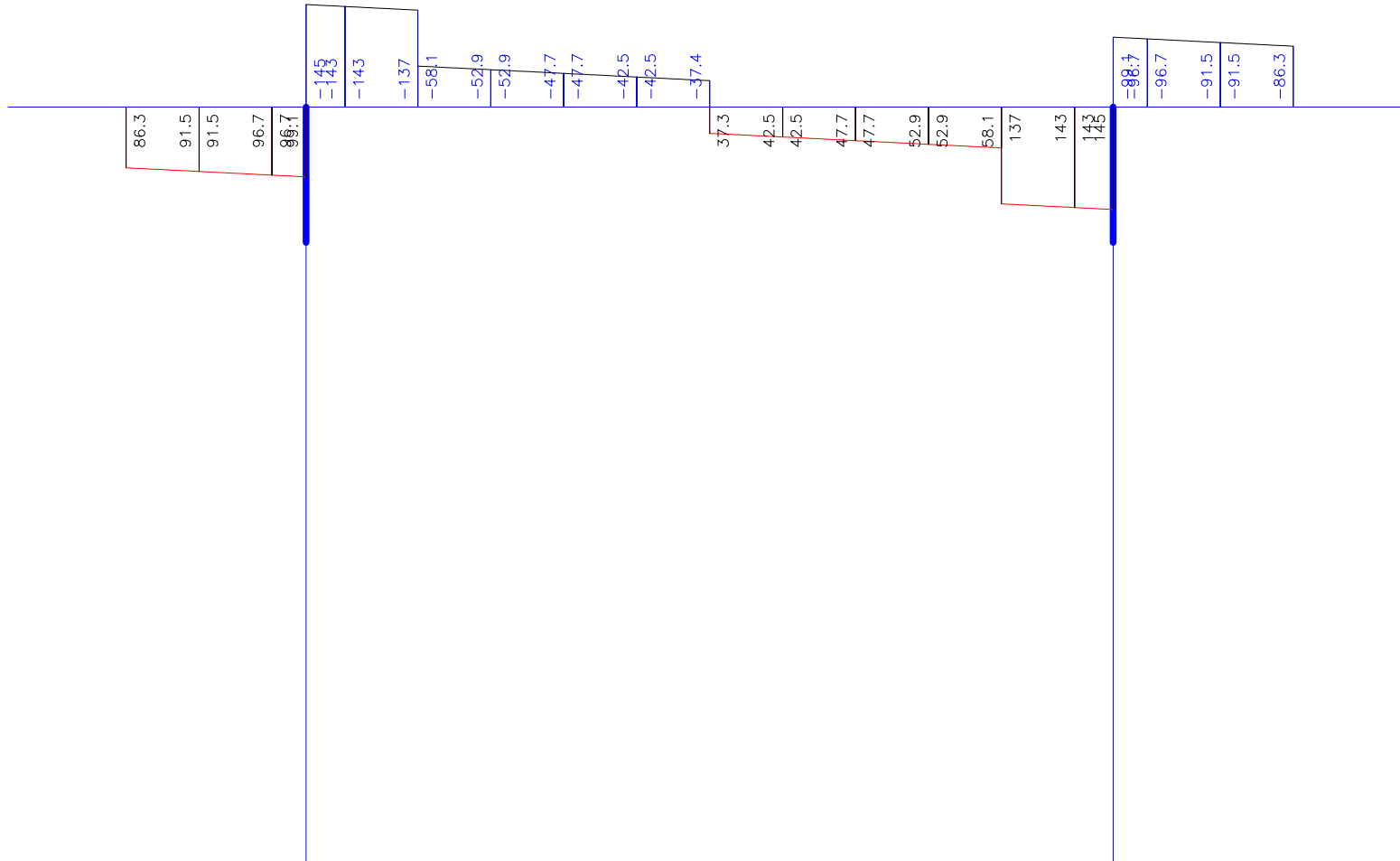
travessa apoio 1=4 cort g1+g2
VISTA: travessa apoio 1=4



ESCALA= 1:55

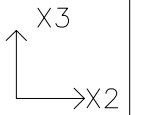
UNIDS: tf

DATA:12/10/11



ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

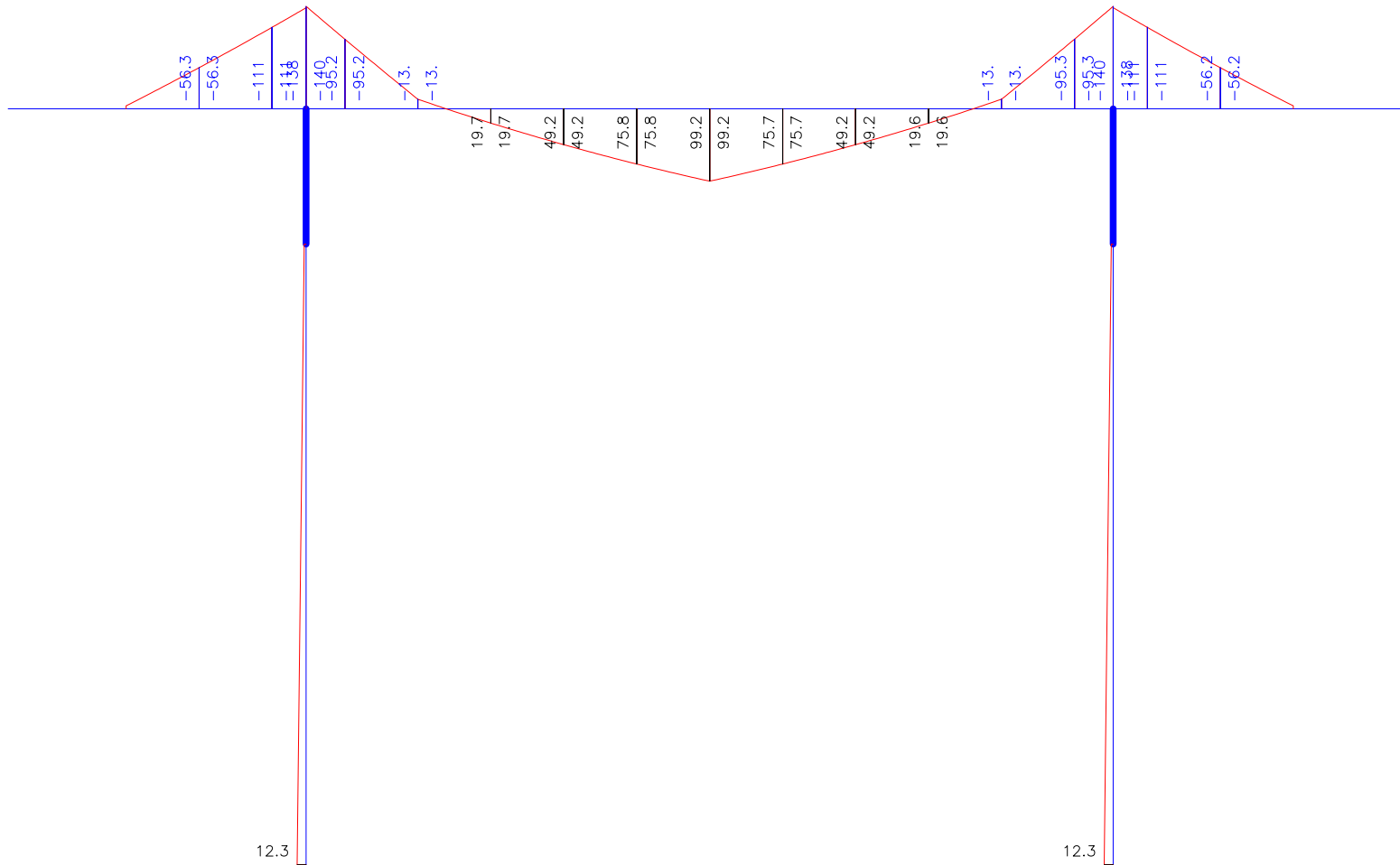
travessa apoio 1=4 mom g1+g2
VISTA: travessa apoio 1=4



ESCALA= 1:55

UNIDS: tf*m

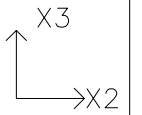
DATA: 9/10/11



MOM. FLETOR M2 COMB. N° 1 g1+g2

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

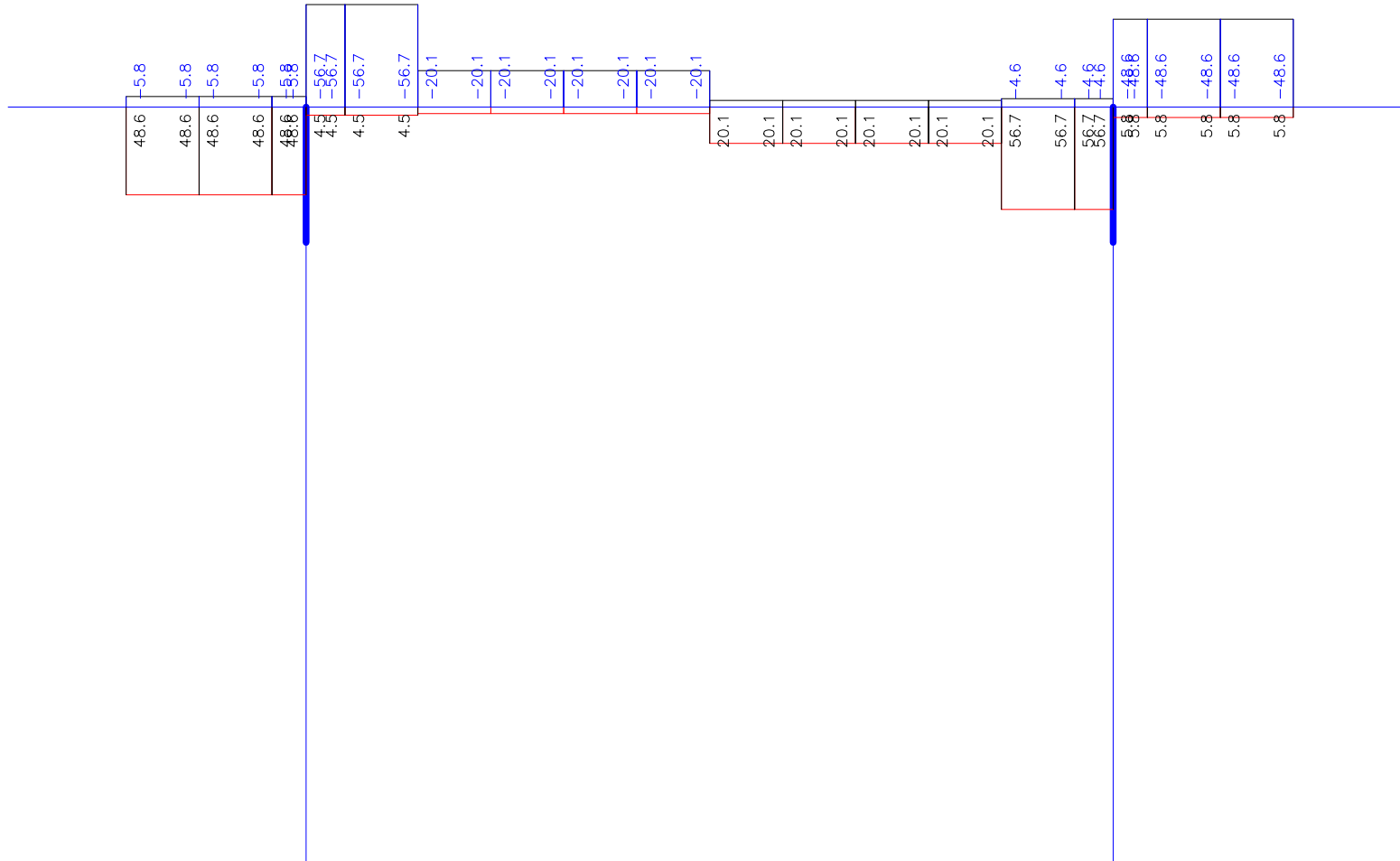
travessa apoio 1=4 cort movel
VISTA: travessa apoio 1=4



ESCALA= 1:55

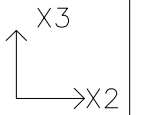
UNIDS: tf

DATA:12/10/11



ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

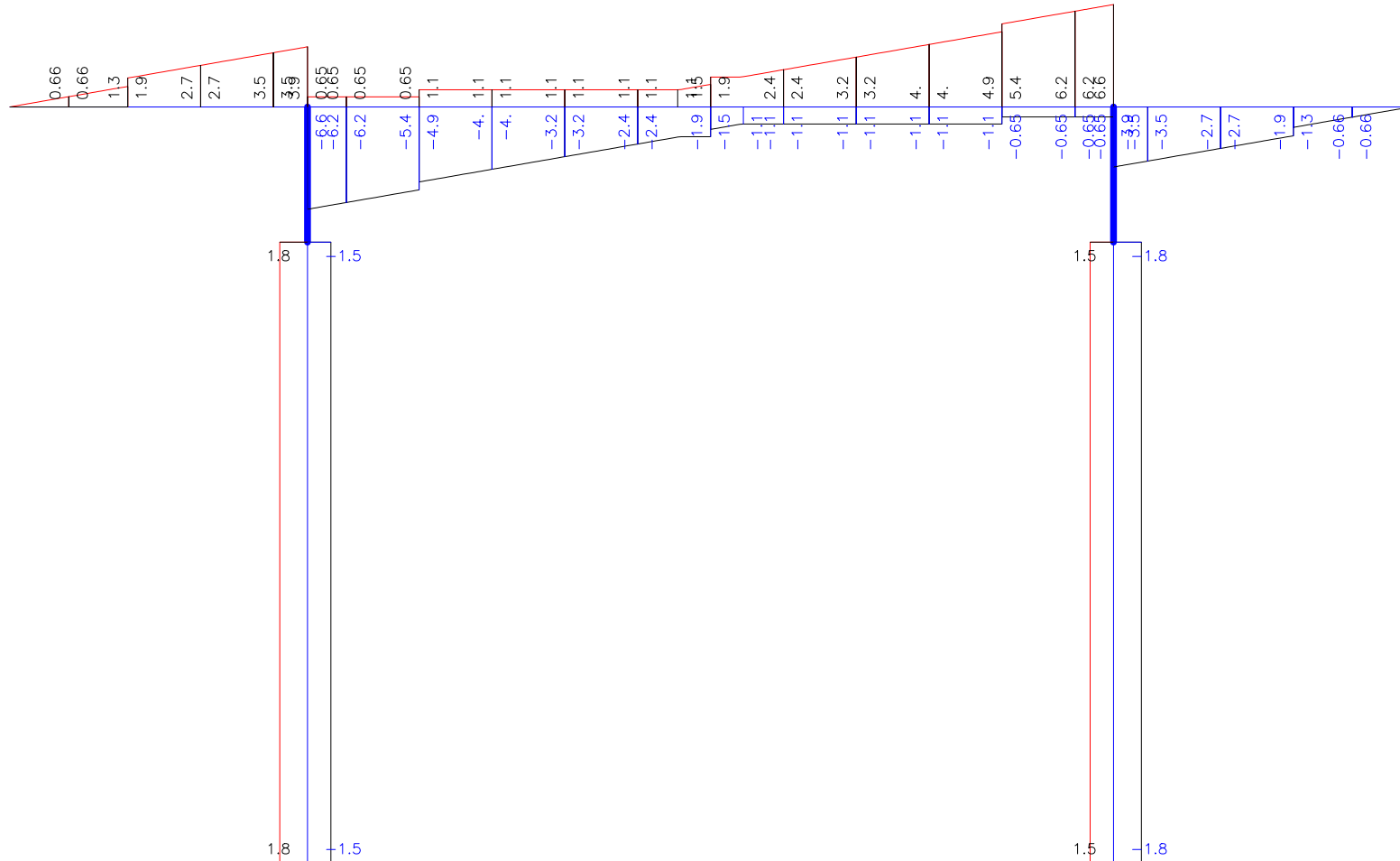
travessa apoio 1=4 torção envolt
VISTA: travessa apoio 1=4



ESCALA= 1:55

UNIDS: tf*m

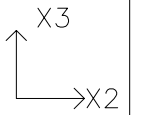
DATA:12/10/11



MOMENTO TORSOR COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

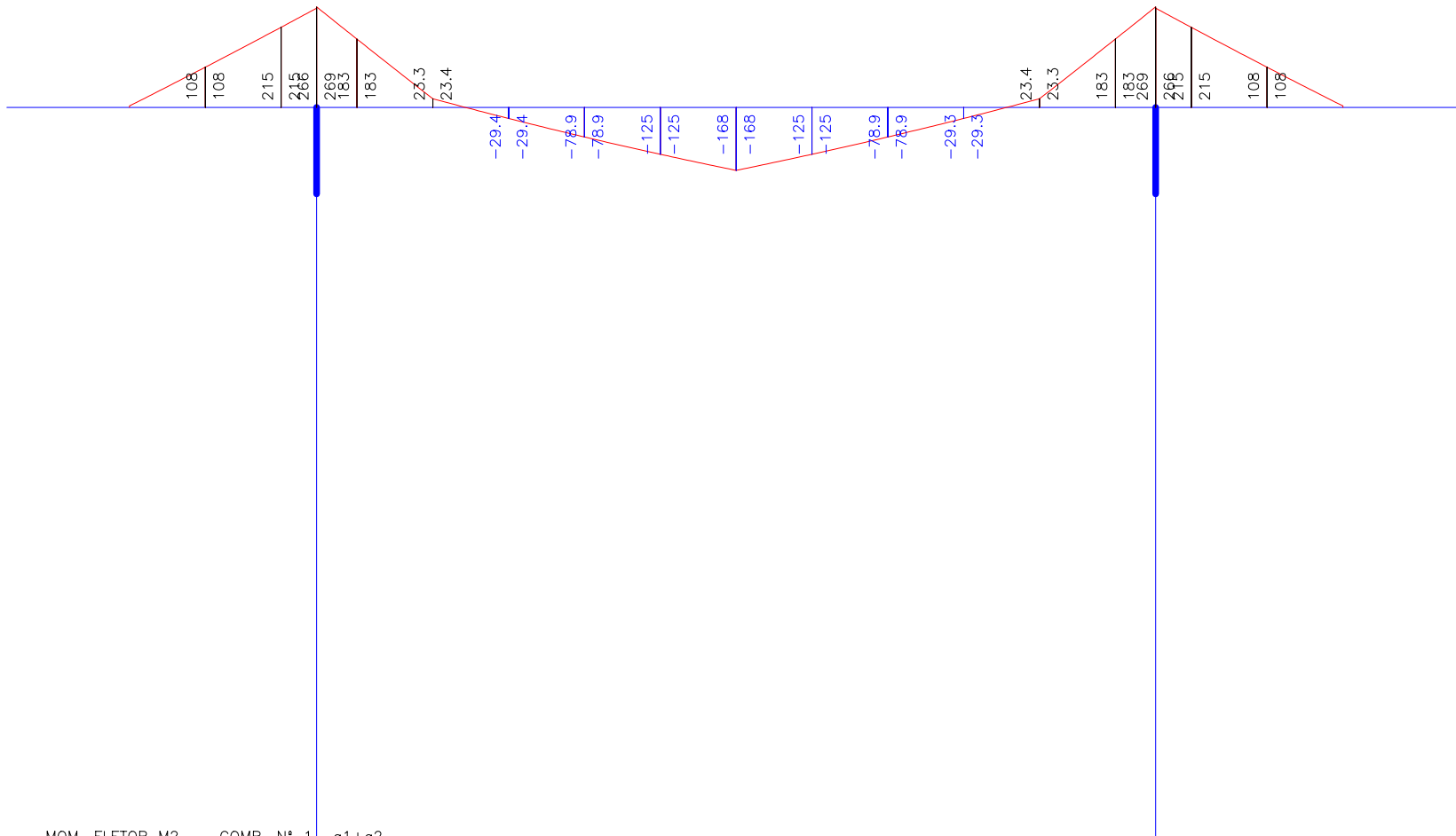
travessa apoio 2=3 mom g1+g2
VISTA: travessa apoio 2=3



ESCALA= 1:52

UNIDS: tf*m

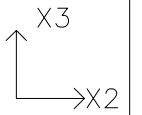
DATA: 9/10/11



MOM. FLETOR M2 COMB. N° 1 g1+g2

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

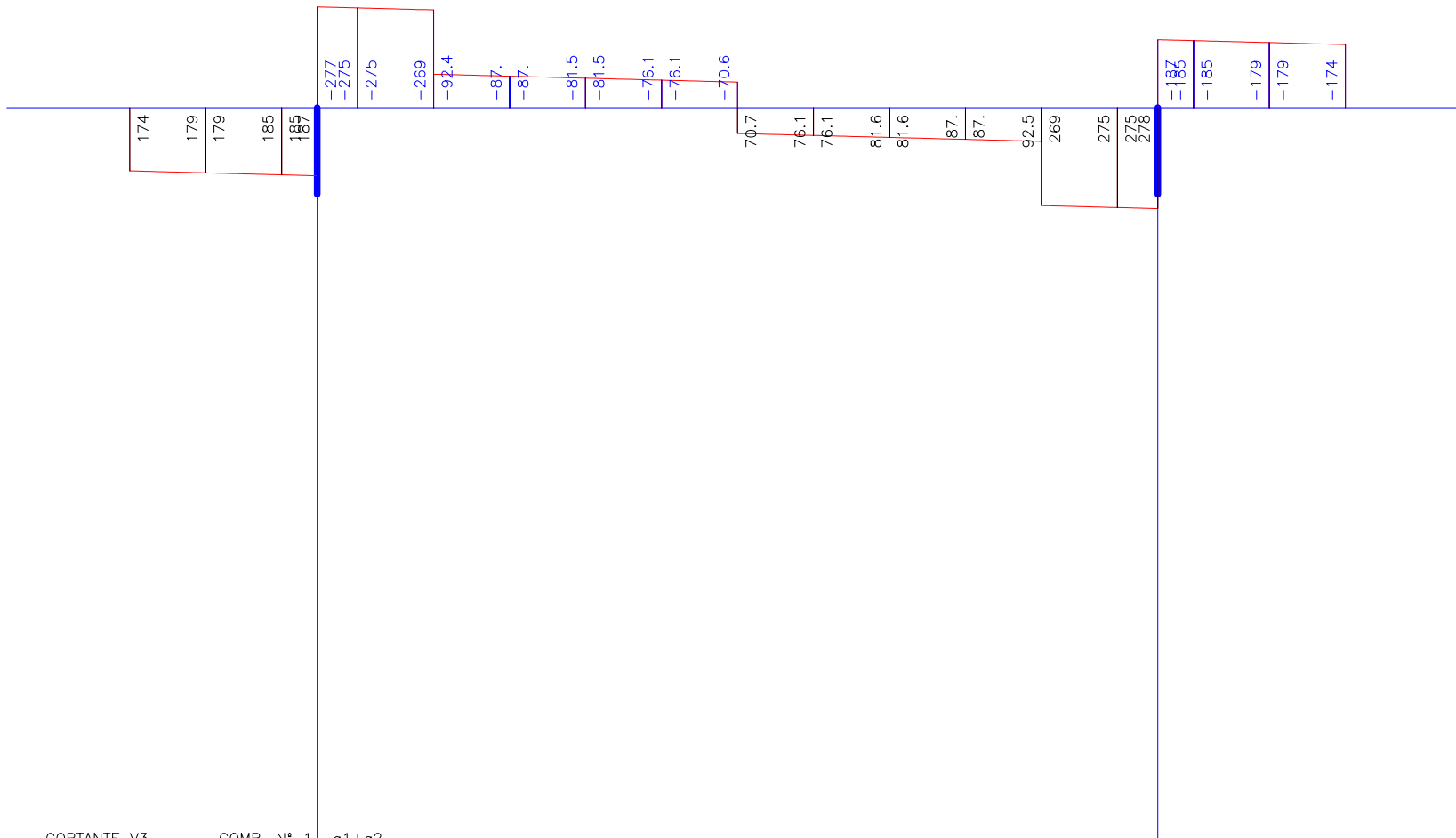
travessa apoio 2=3 cort g1+g2
VISTA: travessa apoio 2=3



ESCALA= 1:52

UNIDS: tf

DATA: 9/10/11

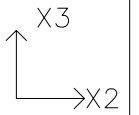


CORTANTE V3

COMB. N° 1 g1+g2

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

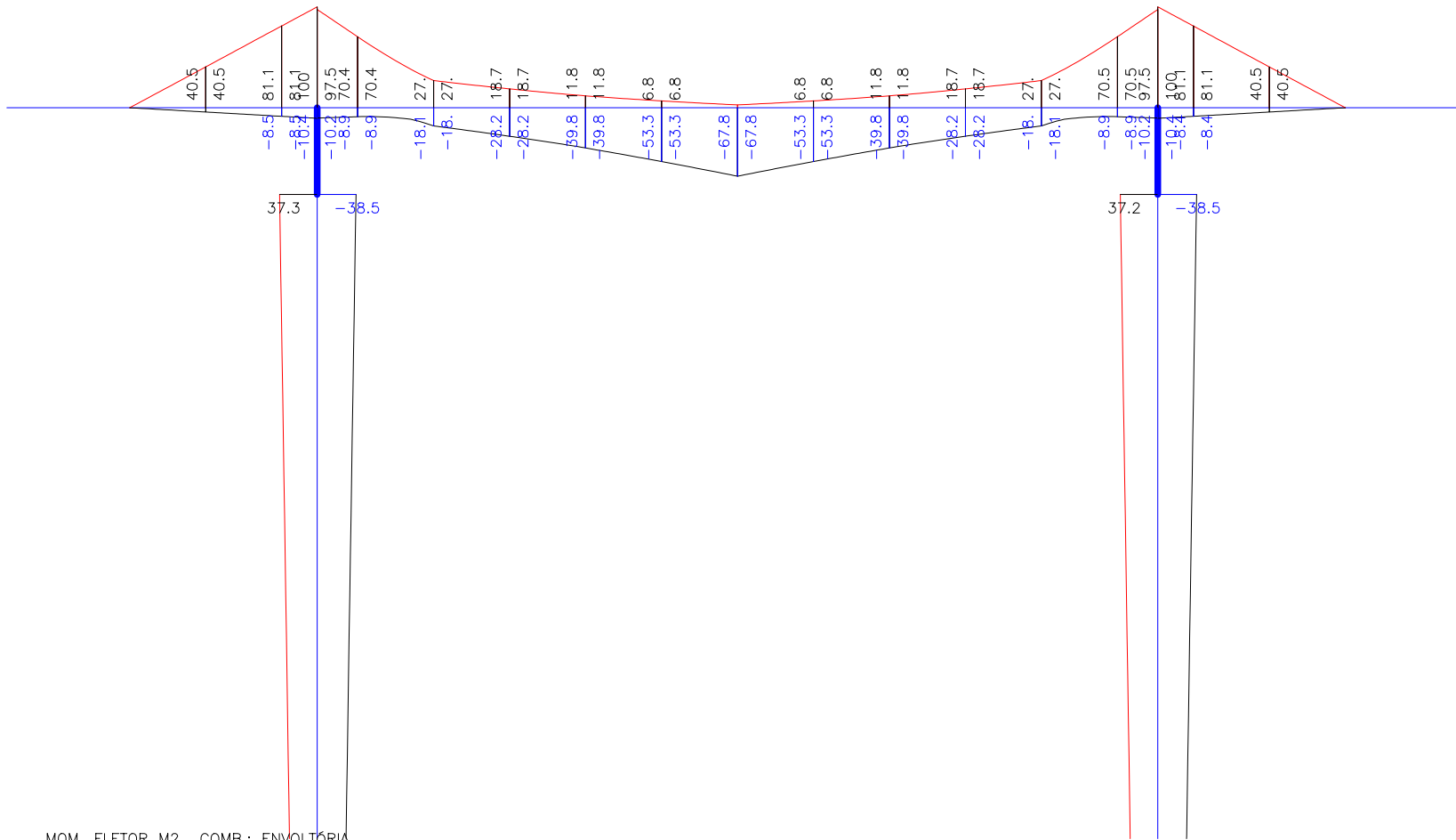
travessa apoio 2=3 mom movel
VISTA: travessa apoio 2=3



ESCALA= 1:52

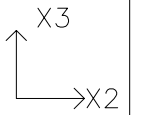
UNIDS: tf*m

DATA: 9/10/11



ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

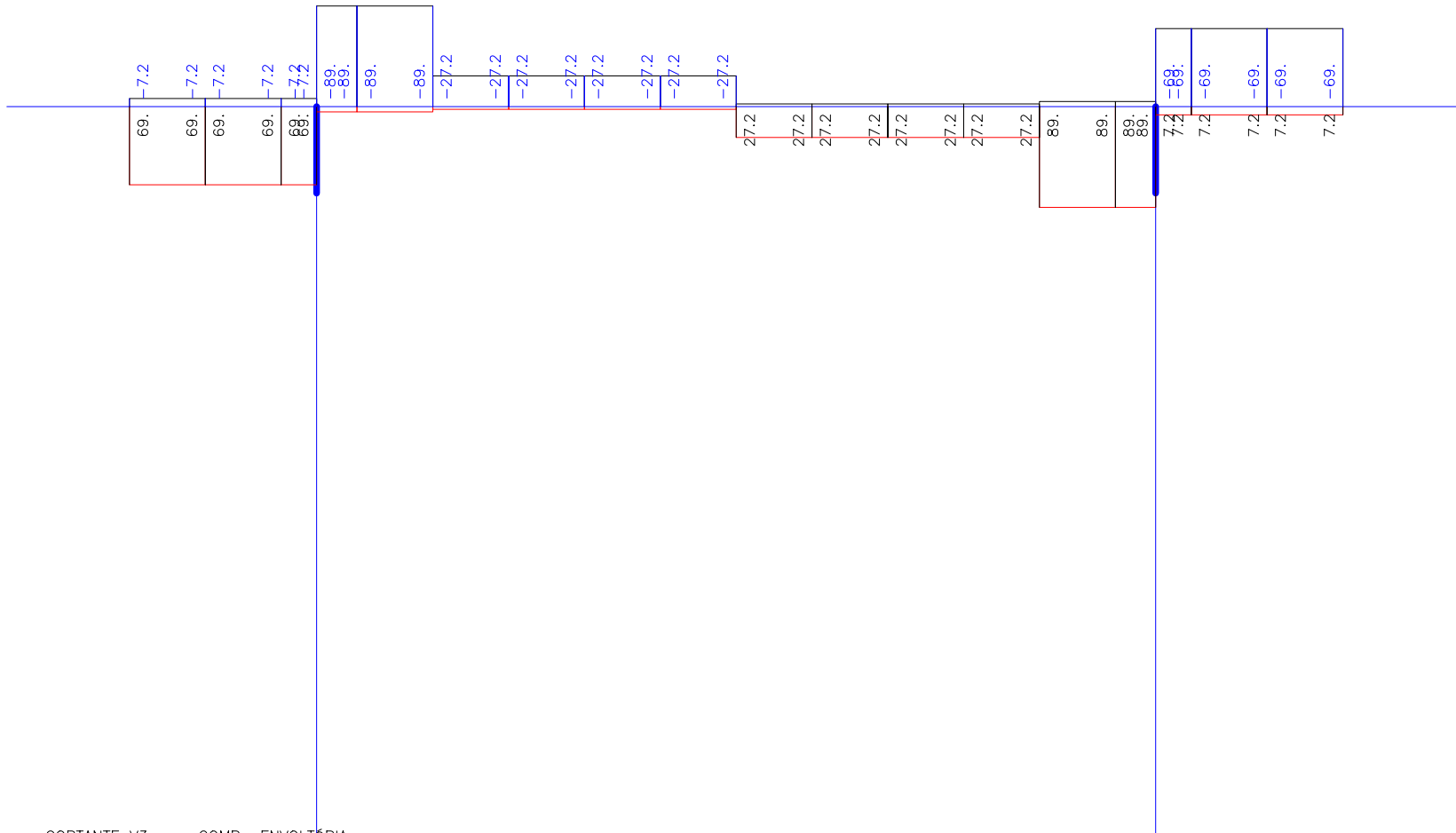
travessa apoio 2=3 cort movel
VISTA: travessa apoio 2=3



ESCALA= 1:52

UNIDS: tf

DATA: 9/10/11

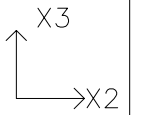


CORTANTE V3

COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

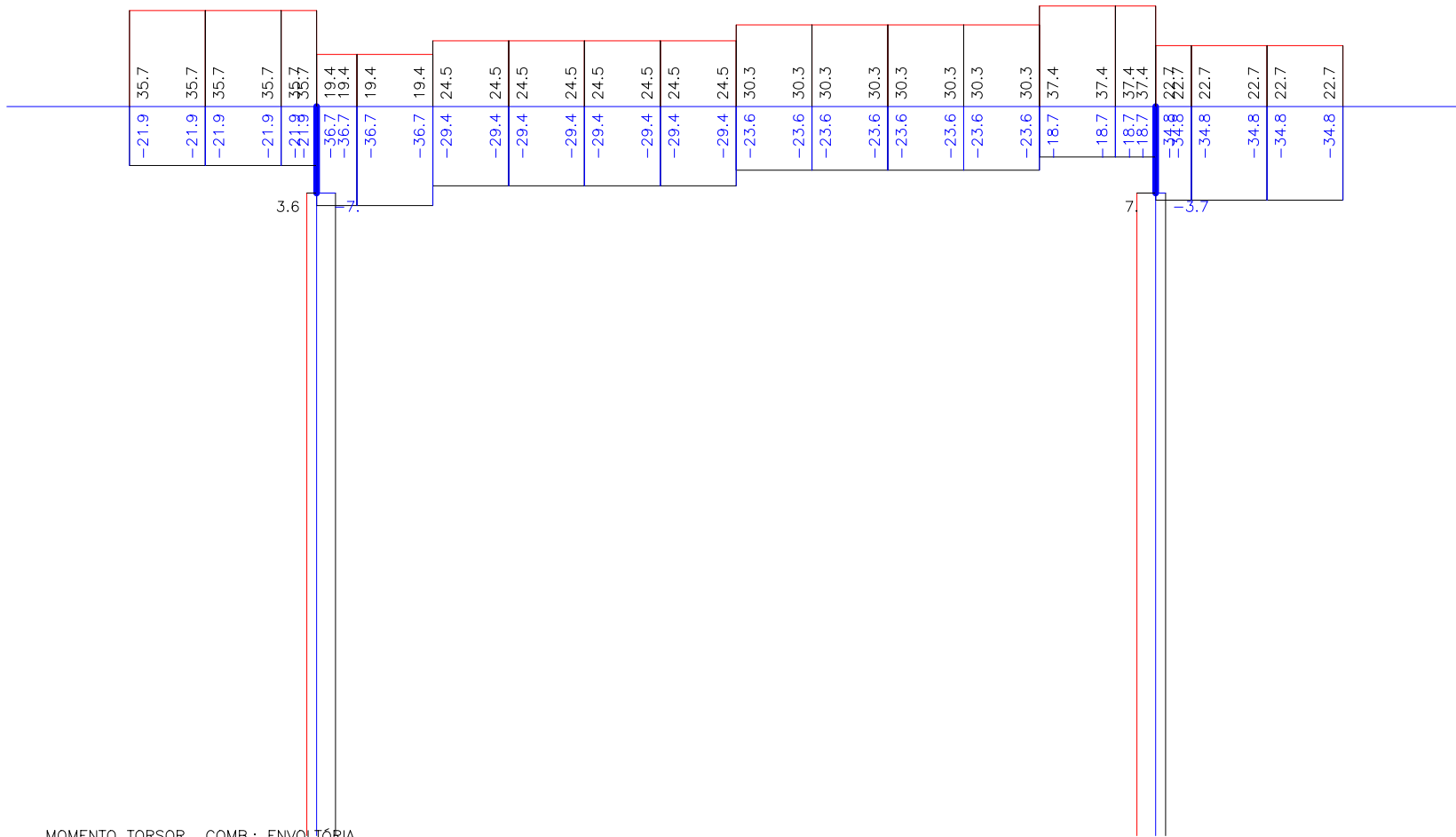
travessa apoio 2=3 torção envolt
VISTA: travessa apoio 2=3



ESCALA= 1:52

UNIDS: tf*m

DATA: 9/10/11



MOMENTO TORSOR COMB.: ENVOLTÓRIA

TRAVESSA vão

OBRA : VIADUTO NA PE-060

APOIO 1=4

Dados gerais

resistência característica do aço (MPa)

$f_{yk} := 500$

módulo de elasticidade do aço (MPa)

$E_s := 210000$

resistência característica a compressão do concreto f_{ck} (MPa)

$k_2 := 3$

 $f_{ck} :=$

	1	2	3	4	5	6	7
1	20	25	30	35	40	45	50

$f_{ck} := f_{ck}_{1,k2}$

$f_{ck} = 30$

resistencia média à tração (MPa)

$f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$

$f_{ctm} = 2.9$

resistência característica do aço (MPa)

$f_{yk} := 500$

módulo de elasticidade do aço (MPa)

$E_s := 210000$

coeficiente de minoração do concreto/aço

$\gamma_c := 1.5$

$\gamma_s := 1.15$

coeficiente de deformação superficial

$\eta_1 := 2.25$

altura da viga (mm)

$h := 1400$

largura da mesa inf/sup (mm)

$bf_1 := 0$

$bf_2 := 0$

espessura da mesa inf/sup (mm)

$e_1 := 0$

$e_2 := 0$

espessura da nervura (mm)

$bw := 1800$

distância do c.g. da armadura inferior à fibra extrema inferior (mm)

$ci := 85$

distância do c.g. da armadura superior à fibra extrema superior (mm)

$cs := 85$

opção viga = 1 transversina = 2 laje = 3

$op := 2$

tipo de obra rodoviaria = 1 ferroviaria = 2 ponte rolante = 3

$tipo := 1$

forma da seção retangular = 1

T (mesa comprimida) = 1

circular = 4

T (mesa tracionada) = 3

$k_1 := 1$

 $\rho :=$

	1	2	3	4	5	6	7
1	150	150	173	201	230	259	288
2	150	150	150	150	158	177	197
3	150	150	153	178	204	229	255
4	230	288	345	403	460	518	575

$f_{ck} := f_{ck}_{1,k2}$

$\rho_{min} := \frac{\rho_{k1,k2}}{100000}$

$\rho_{min} = 0.00173$

Esforços (kNm) Mg 2 incluído no Mg 1

$Mg_1 := 992$

$Mg_2 := 0$

$Mcm_1 := 608$

$Mcm_2 := -88$

$Mtemp := 0$

Estado limite último

$M11_d := 1.35 \cdot (Mg_1 + Mg_2) + 1.5 \cdot Mcm_1 + 1.2 \cdot Mtemp$

$$M21_d := 1.00 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm1 + 1.2 \cdot Mtemp \quad M1_d := \max(M11_d, M21_d)$$

$$M12_d := 1.35 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm2 + 1.2 \cdot Mtemp$$

$$M22_d := 1.00 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm2 + 1.2 \cdot Mtemp \quad M2_d := \min(M12_d, M22_d)$$

$$M1_d = 2251.2 \quad (\text{kNm}) \quad M2_d = 860 \quad (\text{kNm})$$



$$ASinf = 4360 \quad (\text{mm}^2) \quad ASsup = 0 \quad (\text{mm}^2)$$

Fadiga

$$\alpha_E := 10$$

$$\text{diâmetro da armadura inf (mm)} \quad \phi1 := 25 \quad as1 := 0.25 \cdot \pi \cdot \phi1^2 \quad as1 = 490.87$$

$$\text{diâmetro da armadura sup (mm)} \quad \phi2 := 25 \quad as2 := 0.25 \cdot \pi \cdot \phi2^2 \quad as2 = 490.87$$

$$\Delta_{fsdfad}(\phi) := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases}$$

$$\psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

$$\Delta1_{fsdfad} := \Delta_{fsdfad}(\phi1) \quad \Delta2_{fsdfad} := \Delta_{fsdfad}(\phi2)$$

$$\text{resistência característica à fadiga da arm. inferior (MPa)} \quad \Delta1_{fsdfad} = 175$$

$$\text{resistência característica à fadiga da arm. superior (MPa)} \quad \Delta2_{fsdfad} = 175$$

$$\text{coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente)} \quad \psi1 = 0.7$$

ARMADURA INFERIOR

$$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$$

$$\text{número de camadas} \quad i_c := 1$$

$$k := 1 .. i_c$$

$$\text{número de barras por camada (de baixo para cima)}$$

$$yd1_k := 56 + \frac{\phi1}{2} + (k - 1) \cdot (\phi1 + \max(20, \phi1))$$

$$nb1_k := 12$$

$$ASi = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 68.5 \\ \hline \end{array} \quad ASi := \sum_{i=1}^{i_c} nb1_i \cdot as1$$

$$\text{área das armaduras inferiores (mm}^2\text{)}$$

$$ASi = 5890 \quad ASim := \sum_{i=1}^{i_c} nb1_i \cdot as1 \cdot yd1_i$$

$$\text{distância da arm. fibra extrema (mm)}$$

$$yi := \frac{ASim}{ASi} \quad yi = 68.5$$

ARMADURA SUPERIOR

$$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2$$

$$\text{número de camadas} \quad j_c := 2$$

$$k := 1 .. j_c$$

$$\text{número de barras por camada (de cima para baixo)}$$

$$nb2_k :=$$

$$yd2_k := 56 + \frac{\phi2}{2} + (k - 1) \cdot (\phi2 + \max(20, \phi2))$$

$$yd2 = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 68.5 \\ \hline 2 & 118.5 \\ \hline \end{array} \quad ASs := \sum_{i=1}^{j_c} nb2_i \cdot as2$$

área das armaduras superiores (mm ²)	ASs = 7854	$ASsm := \sum_{i=1}^{j_c} nb2_i \cdot as2 \cdot yd2_i$
distancia da arm. para fibra extrema (mm)	$y_s := \frac{ASsm}{ASs}$	y _s = 81
barra a serem analisadas	inf	ii := 1 di := h - yd1 _{ii} di = 1331.5
	sup	jj := 1 ds := h - yd2 _{jj} ds = 1331.5



variação de tensão nas armaduras analisadas

$\Delta\sigma_{inf} = 66$	(MPa)	menor que	$\Delta 1_{fsdfad}$
$\Delta\sigma_{sup} = 0$	(MPa)	menor que	$\Delta 2_{fsdfad}$

Fissuração

$$\alpha_E := 15$$

ARMADURA INFERIOR

$$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$$

barra a ser analisada

$$ii := 1 \quad di := h - yd1_{ii} \quad di = 1331.5$$



tensão na barra (MPa)	$\sigma_s = 194$
envolvimento da barra (mm) (em relação ao eixo da barra)	ah1 := 75 ah2 := 75 av1 := 70 av2 := 1300
tirante fictício (mm)	$b_t := \min(ah1, 7.5 \cdot \phi1) + \min(ah2, 7.5 \cdot \phi1) \quad b_t = 150$
	$h_t := \min(av1, 7.5 \cdot \phi1) + \min(av2, 7.5 \cdot \phi1) \quad h_t = 257.5$
taxa de armadura	$\rho_r := \frac{as1}{b_t \cdot h_t} \quad \rho_r = 0.01271$
valor característico da abertura de fissura (mm)	$w_k := \min \left[\frac{\phi1}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi1}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right] \quad w_k = 0.164$

ARMADURA SUPERIOR

$$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2$$

barra a ser analisada

$$jj := 1 \quad ds := h - yd2_{jj} \quad ds = 1331.5$$



tensão na barra (MPa)	$\sigma_s = 0$
envolvimento da barra (mm) (em relação ao eixo da barra)	ah1 := 75 ah2 := 75 av1 := 70 av2 := 1300
tirante fictício (mm)	$b_t := \min(ah1, 7.5 \cdot \phi2) + \min(ah2, 7.5 \cdot \phi2) \quad b_t = 150$
	$h_t := \min(av1, 7.5 \cdot \phi1) + \min(av2, 7.5 \cdot \phi1) \quad h_t = 257.5$
taxa de armadura	$\rho_r := \frac{as2}{b_t \cdot h_t} \quad \rho_r = 0.01271$
valor característico da abertura de fissura (mm)	$w_k := \min \left[\frac{\phi2}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi2}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right] \quad w_k = 0$

TRAVESSA vão

OBRA : VIADUTO NA PE-060

APOIO 2=3

Dados gerais

resistência característica do aço (MPa)

$f_{yk} := 500$

módulo de elasticidade do aço (MPa)

$E_s := 210000$

resistência característica a compressão do concreto f_{ck} (MPa)

$k_2 := 3$

 $f_{ck} :=$

	1	2	3	4	5	6	7
1	20	25	30	35	40	45	50

$f_{ck} := f_{ck}_{1,k2}$

$f_{ck} = 30$

resistencia média à tração (MPa)

$f_{ctm} := 0.3 \cdot (f_{ck})^{0.667}$

$f_{ctm} = 2.9$

resistência característica do aço (MPa)

$f_{yk} := 500$

módulo de elasticidade do aço (MPa)

$E_s := 210000$

coeficiente de minoração do concreto/aço

$\gamma_c := 1.5$

$\gamma_s := 1.15$

coeficiente de deformação superficial

$\eta_1 := 2.25$

altura da viga (mm)

$h := 1400$

largura da mesa inf/sup (mm)

$bf_1 := 0$

$bf_2 := 0$

espessura da mesa inf/sup (mm)

$e_1 := 0$

$e_2 := 0$

espessura da nervura (mm)

$bw := 2200$

distância do c.g. da armadura inferior à fibra extrema inferior (mm)

$ci := 85$

distância do c.g. da armadura superior à fibra extrema superior (mm)

$cs := 85$

opção viga = 1 transversina = 2 laje = 3

$op := 2$

tipo de obra rodoviaria = 1 ferroviaria = 2 ponte rolante = 3

$tipo := 1$

forma da seção retangular = 1

T (mesa comprimida) = 1

circular = 4

T (mesa tracionada) = 3

$k_1 := 1$

 $\rho :=$

	1	2	3	4	5	6	7
1	150	150	173	201	230	259	288
2	150	150	150	150	158	177	197
3	150	150	153	178	204	229	255
4	230	288	345	403	460	518	575

$f_{ck} := f_{ck}_{1,k2}$

$\rho_{min} := \frac{\rho_{k1,k2}}{100000}$

$\rho_{min} = 0.00173$

Esforços (kNm) Mg 2 incluído no Mg 1

$Mg_1 := 1680$

$Mg_2 := 0$

$M_{cm1} := 678$

$M_{cm2} := -68$

$M_{temp} := 0$

Estado limite último

$M_{11d} := 1.35 \cdot (Mg_1 + Mg_2) + 1.5 \cdot M_{cm1} + 1.2 \cdot M_{temp}$

$$M21_d := 1.00 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm1 + 1.2 \cdot Mtemp \quad M1_d := \max(M11_d, M21_d)$$

$$M12_d := 1.35 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm2 + 1.2 \cdot Mtemp$$

$$M22_d := 1.00 \cdot (Mg1 + Mg2) + 1.5 \cdot Mcm2 + 1.2 \cdot Mtemp \quad M2_d := \min(M12_d, M22_d)$$

$$M1_d = 3285 \quad (\text{kNm}) \quad M2_d = 1578 \quad (\text{kNm})$$



$$ASinf = 5910 \quad (\text{mm}^2) \quad ASSup = 0 \quad (\text{mm}^2)$$

Fadiga

$$\alpha_E := 10$$

$$\text{diâmetro da armadura inf (mm)} \quad \phi1 := 25 \quad as1 := 0.25 \cdot \pi \cdot \phi1^2 \quad as1 = 490.87$$

$$\text{diâmetro da armadura sup (mm)} \quad \phi2 := 25 \quad as2 := 0.25 \cdot \pi \cdot \phi2^2 \quad as2 = 490.87$$

$$\Delta_{fsdfad}(\phi) := \begin{cases} 190 & \text{if } \phi \leq 16 \\ 185 & \text{if } \phi = 20 \\ 180 & \text{if } \phi = 22 \\ 175 & \text{if } \phi = 25 \\ 165 & \text{if } \phi = 32 \\ 150 & \text{if } \phi = 40 \end{cases}$$

$$\psi1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } op = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } op = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } op = 3 \wedge \text{tipo} = 1 \end{cases}$$

$$\Delta1_{fsdfad} := \Delta_{fsdfad}(\phi1) \quad \Delta2_{fsdfad} := \Delta_{fsdfad}(\phi2)$$

$$\text{resistência característica à fadiga da arm. inferior (MPa)} \quad \Delta1_{fsdfad} = 175$$

$$\text{resistência característica à fadiga da arm. superior (MPa)} \quad \Delta2_{fsdfad} = 175$$

$$\text{coeficiente de ponderação das cargas no estado limite de serviço (ELS) (combinação frequente)} \quad \psi1 = 0.7$$

ARMADURA INFERIOR

$$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$$

número de camadas

$$i_c := 2$$

$$k := 1 .. i_c$$

número de barras por camada
(de baixo para cima)

$$yd1_k := 56 + \frac{\phi1}{2} + (k - 1) \cdot (\phi1 + \max(20, \phi1))$$

$$nb1_k :=$$

15
4

$$ASi := \sum_{i=1}^{i_c} nb1_i \cdot as1$$

	1
1	68.5
2	118.5

área das armaduras inferiores (mm²)

$$ASi = 9327$$

$$ASim := \sum_{i=1}^{i_c} nb1_i \cdot as1 \cdot yd1_i$$

distancia da arm. fibra extrema (mm)

$$yi := \frac{ASim}{ASi} \quad yi = 79.03$$

ARMADURA SUPERIOR

$$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2$$

número de camadas

$$j_c := 1$$

$$k := 1 .. j_c$$

número de barras por camada
(de cima para baixo)

$$yd2_k := 56 + \frac{\phi2}{2} + (k - 1) \cdot (\phi2 + \max(20, \phi2))$$

$$nb2_k := 22$$

$$ASs := \sum_{i=1}^{j_c} nb2_i \cdot as2$$

	1
1	68.5

área das armaduras superiores (mm ²)	ASs = 10799	$ASsm := \sum_{i=1}^{j_c} nb2_i \cdot as2 \cdot yd2_i$
distancia da arm. para fibra extrema (mm)	$y_s := \frac{ASsm}{ASs}$	y _s = 68.5
barra a serem analisadas	inf	ii := 1 di := h - yd1 _{ii} di = 1331.5
	sup	jj := 1 ds := h - yd2 _{jj} ds = 1331.5



variação de tensão nas armaduras analisadas

$\Delta\sigma_{inf} = 46$	(MPa)	menor que	$\Delta 1_{fsdfad}$
$\Delta\sigma_{sup} = 0$	(MPa)	menor que	$\Delta 2_{fsdfad}$

Fissuração

$$\alpha_E := 15$$

ARMADURA INFERIOR

$$M1 := Mg1 + Mg2 + \psi1 \cdot Mcm1$$

barra a ser analisada

$$ii := 1 \quad di := h - yd1_{ii} \quad di = 1331.5$$



tensão na barra (MPa)	$\sigma_s = 190$
envolvimento da barra (mm) (em relação ao eixo da barra)	ah1 := 75 ah2 := 75 av1 := 70 av2 := 1300
tirante fictício (mm)	$b_t := \min(ah1, 7.5 \cdot \phi1) + \min(ah2, 7.5 \cdot \phi1)$ b _t = 150
	$h_t := \min(av1, 7.5 \cdot \phi1) + \min(av2, 7.5 \cdot \phi1)$ h _t = 257.5
taxa de armadura	$\rho_r := \frac{as1}{b_t \cdot h_t}$ $\rho_r = 0.01271$
valor característico da abertura de fissura (mm)	$w_k := \min \left[\frac{\phi1}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi1}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$ w _k = 0.158

ARMADURA SUPERIOR

$$M2 := Mg1 + Mg2 + \psi1 \cdot Mcm2$$

barra a ser analisada

$$jj := 1 \quad ds := h - yd2_{jj} \quad ds = 1331.5$$



tensão na barra (MPa)	$\sigma_s = 0$
envolvimento da barra (mm) (em relação ao eixo da barra)	ah1 := 75 ah2 := 75 av1 := 70 av2 := 1300
tirante fictício (mm)	$b_t := \min(ah1, 7.5 \cdot \phi2) + \min(ah2, 7.5 \cdot \phi2)$ b _t = 150
	$h_t := \min(av1, 7.5 \cdot \phi1) + \min(av2, 7.5 \cdot \phi1)$ h _t = 257.5
taxa de armadura	$\rho_r := \frac{as2}{b_t \cdot h_t}$ $\rho_r = 0.01271$
valor característico da abertura de fissura (mm)	$w_k := \min \left[\frac{\phi2}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \frac{3 \cdot \sigma_s}{f_{ctm}}, \frac{\phi2}{12.5 \cdot \eta1} \cdot \frac{\sigma_s}{Es} \cdot \left(\frac{4}{\rho_r} + 45 \right) \right]$ w _k = 0

OBRA : VIADUTO NA PE-060

TRAVESSA DOS APOIOS 1 E 4

Dados gerais

. número de seções

ns := 3

. cortantes de carga permanente e carga móvel (KN)

i := 1..ns

carga permanente**carga móvel**vg1_i :=vg2_i :=vcm1_i :=vcm2_i :=

991
-1450
-581

-0
0
0

485
45
45

-58
-567
-201

vg1_i := 1000·vg1_ivcm1_i := 1000·vcm1_ivg2_i := 1000·vg2_ivcm2_i := 1000·vcm2_ivg12_i := vg1_i + vg2_ivm_{i,1} := vcm1_ivm_{i,2} := vcm2_i

. momento torsor (KNm)

Mt := (39 66 49)

Mt := 1000000·Mt

. geometria (mm,mm²)

c1 := 70

largura nominal

altura

b_i := 1800h_i := 1400

$$he_i := \min \left[\frac{b_i \cdot h_i}{2 \cdot (b_i + h_i)}, 2 \cdot c1 \right]$$

área efetiva

espessura da parede

$$A_i := (b_i - he_i) \cdot (h_i - he_i)$$

$$ef_i := 2 \cdot c1$$

A_i =

2.09·10 ⁶
2.09·10 ⁶
2.09·10 ⁶

ef_i =

140
140
140

. distância da borda inf. p/centro armadura (mm)

c := 70

opção viga = 1 transversina = 2 laje = 3

op := 2

tipo de obra rodoviária = 1 ferroviária = 2 ponte rolante = 3

tipo := 1

Fadiga

diâmetro da armadura

φ := 12.5 (mm)

$$as := 0.25 \cdot \pi \cdot \phi^2$$

as = 123

(mm²)

$$\Delta_{fsdfad} := \begin{cases} 85 & \text{if } \phi \leq 10 \\ 105 & \text{if } 10 < \phi < 20 \\ 100 & \text{if } \phi = 22 \\ 95 & \text{if } \phi = 25 \end{cases}$$

$$\gamma_f := \psi_1$$

$$\Delta\sigma := \Delta_{fsdfad}$$

$$\psi_1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

. coeficiente

majoração das cargas

K1_i :=

1.35
1.00

K2_i :=

1.50
0

minoração do concreto

γ_c := 1.5

minoração do aço	$\gamma_s := 1.15$
redução da carga móvel p/fadiga	$\gamma_f := 0.7$
. resistência característica do concreto a compressão (MPa)	$f_{ck} := 30$
. resistência característica do aço a tração (MPa)	$f_{yk} := 500$
. variação de tensão na armadura para fadiga (MPa)	$\Delta\sigma = 105$
. número de vigas para os esforços dados	$nv := 1$
$f_{yd} := \frac{f_{yk}}{\gamma_s}$ $\alpha_{v2} := \left(1 - \frac{f_{ck}}{250}\right)$ $f_{ctm} := 0.3 \cdot f_{ck}^{\frac{2}{3}}$ $f_{ctdinf} := 0.7 \cdot f_{ctm}$	$d_1 := h_1 - c$
$f_{cd} := \frac{f_{ck}}{\gamma_c}$ $f_{ctd} := \frac{f_{ctdinf}}{\gamma_c}$ $vc_1 := 0.6 \cdot f_{ctd} \cdot b_1 \cdot d_1$	$d_1 := 0.001 \cdot d_1$
$\rho_{min} := 0.2 \cdot \frac{f_{ctm}}{f_{yk}}$ $\rho_{min} = 0.00116$	
. número de pernas do estribo	cortante $np_1 := 4$
	torção $nt_1 := 1$



RUPTURA

CORTANTE	TORÇÃO		
$v_{sd1_i} := Kv \cdot \max(m_{max1_i} , m_{min1_i})$	$M_{tsd1_i} := 1.5 \cdot Mt_i $	$v_{sd1} = \begin{pmatrix} 2.07 \times 10^6 \\ 2.81 \times 10^6 \\ 1.09 \times 10^6 \end{pmatrix}$	$M_{tsd} = \begin{pmatrix} 5.85 \times 10^7 \\ 9.9 \times 10^7 \\ 7.35 \times 10^7 \end{pmatrix}$

EM SERVIÇO

$$v_{11_i} := Kv \cdot (vg_{12_i} + \gamma_f \cdot v_{cm1_i}) \quad v_{12_i} := Kv \cdot (vg_{12_i} + \gamma_f \cdot v_{cm2_i}) \quad \Delta_{1_i} := \begin{cases} |v_{11_i} - v_{12_i}| & \text{if } v_{11_i} \cdot v_{12_i} \geq 0 \\ \max(|v_{11_i}|, |v_{12_i}|) & \text{otherwise} \end{cases}$$

$$V_{1_i} := \max(|v_{11_i}|, |v_{12_i}|)$$

ARMADURA

$v_{sd1_i} := v_{sd1_i}$	$V_{1_i} := V_{1_i}$	$\Delta_{1_i} := \Delta_{1_i}$
ruptura $AS_{1_i} := \begin{cases} \frac{v_{sd1_i} - vc_1}{0.9 \cdot d_1 \cdot f_{yd}} & \text{if } v_{sd1_i} \geq vc_1 \\ 0 & \text{otherwise} \end{cases}$	fadiga $AS_{2_i} := \begin{cases} \frac{V_{1_i} - 0.5 \cdot vc_1}{0.9 \cdot d_1 \cdot \Delta\sigma} \cdot \frac{\Delta_{1_i}}{V_{1_i}} & \text{if } V_{1_i} \geq 0.5 \cdot vc_1 \\ 0 & \text{otherwise} \end{cases}$	

$$AS_{3_i} := \max(AS_{1_i}, AS_{2_i}) \quad AS_{4_i} := \frac{M_{tsd1_i} \cdot 1000}{2 \cdot A_1 \cdot f_{yd}}$$

ARMAÇÃO TOTAL /PERNA	$AS_{1_i} := \max\left(\frac{AS_{4_i}}{nt_1} + \frac{AS_{3_i}}{np_1}, \frac{1000 \cdot \rho_{min} \cdot b_1}{np_1}\right)$	$AS = \begin{pmatrix} 521 \\ 521 \\ 521 \end{pmatrix}$	(mm ²) /perna/m
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SOLICITAÇÕES COMBINADAS

$d_1 := 1000 \cdot d_1$				
$TRD_{1_i} := 0.5 \cdot \alpha_{v2} \cdot f_{cd} \cdot A_1 \cdot ef_{1_i}$	$VRD_{2_i} := 0.27 \cdot \alpha_{v2} \cdot f_{cd} \cdot b_1 \cdot d_1$	$v_{1_i} := \frac{v_{sd1_i}}{VRD_{2_i}}$	$v_{2_i} := \frac{M_{tsd1_i}}{TRD_{1_i}}$	$v := v_1 + v_2$
$TRD_1 = \begin{pmatrix} 2576851200 \\ 2576851200 \\ 2576851200 \end{pmatrix}$	$VRD_2 = \begin{pmatrix} 11376288 \\ 11376288 \\ 11376288 \end{pmatrix}$	$v_1 = \begin{pmatrix} 0.18 \\ 0.25 \\ 0.1 \end{pmatrix}$	$v_2 = \begin{pmatrix} 0.02 \\ 0.04 \\ 0.03 \end{pmatrix}$	$v = \begin{pmatrix} 0.2 \\ 0.29 \\ 0.12 \end{pmatrix}$

OBRA : VIADUTO NA PE-060

TRAVESSA DOS APOIOS 2 E 3

Dados gerais

. número de seções

ns := 3

. cortantes de carga permanente e carga móvel (KN)

i := 1..ns

carga permanente**carga móvel**vg1_i :=vg2_i :=vcm1_i :=vcm2_i :=

1870
-2770
-924

-0
0
0

690
0
0

-72
-890
-272

vg1_i := 1000·vg1_ivcm1_i := 1000·vcm1_ivg2_i := 1000·vg2_ivcm2_i := 1000·vcm2_ivg12_i := vg1_i + vg2_ivm_{i,1} := vcm1_ivm_{i,2} := vcm2_i

. momento torsor (KNm)

Mt := (357 367 294) Mt := 1000000·Mt

. geometria (mm,mm²)

c1 := 70

largura nominal

altura

b_i := 2200h_i := 1400

$$he_i := \min \left[\frac{b_i \cdot h_i}{2 \cdot (b_i + h_i)}, 2 \cdot c1 \right]$$

área efetiva

espessura da parede

$$A_i := (b_i - he_i) \cdot (h_i - he_i)$$

$$ef_i := 2 \cdot c1$$

A_i =

2.6·10 ⁶
2.6·10 ⁶
2.6·10 ⁶

ef_i =

140
140
140

. distância da borda inf. p/centro armadura (mm)

c := 70

opção viga = 1 transversina = 2 laje = 3

op := 2

tipo de obra rodoviária = 1 ferroviária = 2 ponte rolante = 3

tipo := 1

Fadiga

diâmetro da armadura

φ := 12.5 (mm)

as := 0.25·π·φ²

as = 123

(mm²)

$$\Delta_{fsdfad} := \begin{cases} 85 & \text{if } \phi \leq 10 \\ 105 & \text{if } 10 < \phi < 20 \\ 100 & \text{if } \phi = 22 \\ 95 & \text{if } \phi = 25 \end{cases}$$

γ_f := ψ₁Δσ := Δ_{fsdfad}

$$\psi_1 := \begin{cases} 1 & \text{if } \text{tipo} \geq 2 \\ 0.5 & \text{if } \text{op} = 1 \wedge \text{tipo} = 1 \\ 0.7 & \text{if } \text{op} = 2 \wedge \text{tipo} = 1 \\ 0.8 & \text{if } \text{op} = 3 \wedge \text{tipo} = 1 \end{cases}$$

. coeficiente

majoração das cargas

K1_i :=

1.35
1.00

K2_i :=

1.50
0

minoração do concreto

γ_c := 1.5

minoração do aço	$\gamma_s := 1.15$
redução da carga móvel p/fadiga	$\gamma_f := 0.7$
. resistência característica do concreto a compressão (MPa)	$f_{ck} := 30$
. resistência característica do aço a tração (MPa)	$f_{yk} := 500$
. variação de tensão na armadura para fadiga (MPa)	$\Delta\sigma = 105$
. número de vigas para os esforços dados	$nv := 1$
$f_{yd} := \frac{f_{yk}}{\gamma_s}$ $\alpha_{v2} := \left(1 - \frac{f_{ck}}{250}\right)$ $f_{ctm} := 0.3 \cdot f_{ck}^{\frac{2}{3}}$ $f_{ctdinf} := 0.7 \cdot f_{ctm}$	$d_1 := h_1 - c$
$f_{cd} := \frac{f_{ck}}{\gamma_c}$ $f_{ctd} := \frac{f_{ctdinf}}{\gamma_c}$ $vc_1 := 0.6 \cdot f_{ctd} \cdot b_1 \cdot d_1$	$d_1 := 0.001 \cdot d_1$
$\rho_{min} := 0.2 \cdot \frac{f_{ctm}}{f_{yk}}$ $\rho_{min} = 0.00116$	
. número de pernas do estribo	cortante $np_1 := 6$
	torção $nt_1 := 1$



RUPTURA

CORTANTE	TORÇÃO
$v_{sd1}_1 := Kv \cdot \max(m_{max}_1 , m_{min}_1)$	$M_{tsd}_1 := 1.5 \cdot Mt $
	$v_{sd1} = \begin{pmatrix} 3.56 \times 10^6 \\ 5.07 \times 10^6 \\ 1.66 \times 10^6 \end{pmatrix}$ $M_{tsd} = \begin{pmatrix} 5.36 \times 10^8 \\ 5.5 \times 10^8 \\ 4.41 \times 10^8 \end{pmatrix}$

EM SERVIÇO

$$v_{11}_1 := Kv \cdot (vg_{12}_1 + \gamma_f \cdot v_{cm1}_1) \quad v_{12}_1 := Kv \cdot (vg_{12}_1 + \gamma_f \cdot v_{cm2}_1) \quad \Delta_1 := \begin{cases} |v_{11}_1 - v_{12}_1| & \text{if } v_{11}_1 \cdot v_{12}_1 \geq 0 \\ \max(|v_{11}_1|, |v_{12}_1|) & \text{otherwise} \end{cases}$$

$$V_1 := \max(|v_{11}_1|, |v_{12}_1|)$$

ARMADURA

$v_{sd}_1 := v_{sd1}_1$	$V_1 := V_1$	$\Delta_1 := \Delta_1$
ruptura $AS1_1 := \begin{cases} \frac{v_{sd}_1 - vc_1}{0.9 \cdot d_1 \cdot f_{yd}} & \text{if } v_{sd}_1 \geq vc_1 \\ 0 & \text{otherwise} \end{cases}$	fadiga $AS2_1 := \begin{cases} \frac{V_1 - 0.5 \cdot vc_1}{0.9 \cdot d_1 \cdot \Delta\sigma} \cdot \frac{\Delta_1}{V_1} & \text{if } V_1 \geq 0.5 \cdot vc_1 \\ 0 & \text{otherwise} \end{cases}$	
$AS3_1 := \max(AS1_1, AS2_1)$	$AS4_1 := \frac{M_{tsd}_1 \cdot 1000}{2 \cdot A_1 \cdot f_{yd}}$	

ARMAÇÃO TOTAL /PERNA	$AS_1 := \max\left(\frac{AS4_1}{nt_1} + \frac{AS3_1}{np_1}, \frac{1000 \cdot \rho_{min} \cdot b_1}{np_1}\right)$	$AS = \begin{pmatrix} 617 \\ 1109 \\ 425 \end{pmatrix}$ (mm ²) /perna/m
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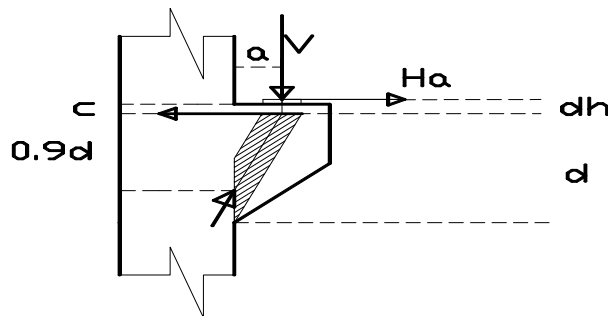
SOLICITAÇÕES COMBINADAS

$d_1 := 1000 \cdot d_1$				
$TRD1_1 := 0.5 \cdot \alpha_{v2} \cdot f_{cd} \cdot A_1 \cdot ef_1$	$VRD2_1 := 0.27 \cdot \alpha_{v2} \cdot f_{cd} \cdot b_1 \cdot d_1$	$v1_1 := \frac{v_{sd}_1}{VRD2_1}$	$v2_1 := \frac{M_{tsd}_1}{TRD1_1}$	$v := v1 + v2$
$TRD1 = \begin{pmatrix} 3197779200 \\ 3197779200 \\ 3197779200 \end{pmatrix}$	$VRD2 = \begin{pmatrix} 13904352 \\ 13904352 \\ 13904352 \end{pmatrix}$	$v1 = \begin{pmatrix} 0.26 \\ 0.36 \\ 0.12 \end{pmatrix}$	$v2 = \begin{pmatrix} 0.17 \\ 0.17 \\ 0.14 \end{pmatrix}$	$v = \begin{pmatrix} 0.42 \\ 0.54 \\ 0.26 \end{pmatrix}$

CONSOLO PARA TROCA DE APARELHO DE APOIO

Segundo Concreto pre-moldado: fundamentos e aplicações - Mounir K. El Debs

CONCRETO	$f_{ck} := 30$ MPa	$\gamma_c := 1.4$	
AÇO CA-50	$f_{yk} := 500$ MPa	$\gamma_a := 1.15$	$f_{yd} := \frac{f_{yk}}{\gamma_a}$
	$\gamma_n := 1.1$	coeficiente de ajustamento para consolos (carga permanente preponderante e elemento não pre-fabricado)	
CORTANTE	$V := \frac{940000}{1}$	$V = 940000$ N	(vão de 37 m)
	$H_a := 0$	N	
DIMENSÕES	$a := 200$ mm	$b := 1000$ mm	$c := 100$ mm
	$h := 900$ mm	$d_h := 50$ mm	$d := h - c = 800$ mm
	$\frac{a}{d} = 0.25$	menor que 0.5 logo consolo muito curto teoria do atrito-cisalhamento	



$$V_d := 1.4 \cdot \gamma_n \cdot V \quad H_d := \max(0.2 \cdot V_d, 1.4 \cdot \gamma_n \cdot H_a)$$

Verificação do esmagamento do concreto

$$\tau_{wd} := \frac{V_d}{b \cdot d} \quad \tau_{wd} = 1.81 \quad \text{menor que} \quad \min\left(0.175 \cdot \frac{f_{ck}}{\gamma_c}, 6.0\right) = 3.8 \text{ MPa}$$

Armadura do tirante

$$\mu := 1.4 \quad \text{concreto lançado monoliticamente}$$

$$\text{Astir} := \max\left(\frac{V_d \cdot a}{0.9 \cdot d} + 1.2 H_d, \frac{0.8 \cdot V_d}{\mu} + H_d\right) \cdot \frac{1}{f_{yd}} \quad \text{Astir} = 2568 \text{ mm}^2/\text{m}$$

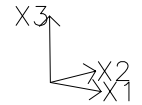
adotar 12 ϕ 20

$$\text{Armadura de costura} \quad A_{sh} := 0.4 \cdot \text{Astir} \quad A_{sh} = 1027 \text{ mm}^2/\text{m}$$

5.2.2.2 PILAR

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

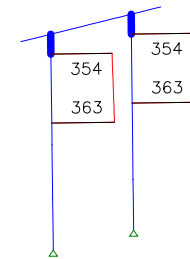
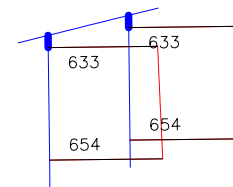
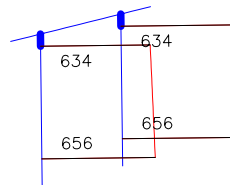
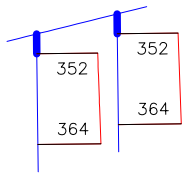
pilares axial envolt
VISTA: pilares



ESCALA= 1:407

UNIDS: tf

DATA:11/10/11

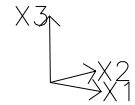


FORÇA AXIAL

COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

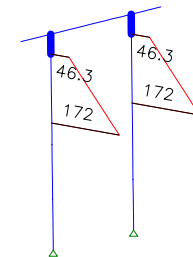
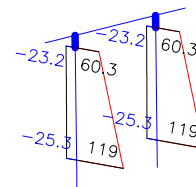
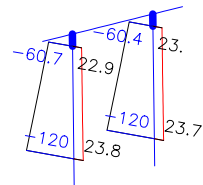
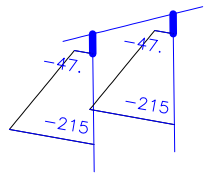
pilares mom long envolt
VISTA: pilares



ESCALA= 1:407

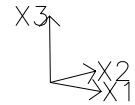
UNIDS: tf*m

DATA:11/10/11



ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

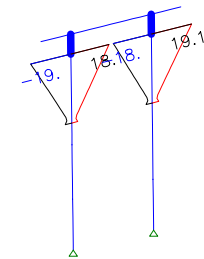
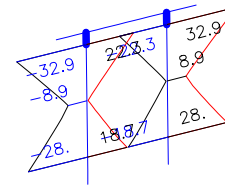
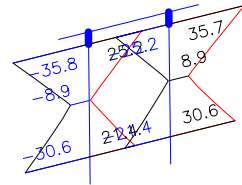
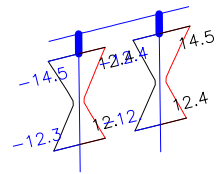
pilares mom transv envolt
VISTA: pilares



ESCALA= 1:407

UNIDS: tf*m

DATA:11/10/11

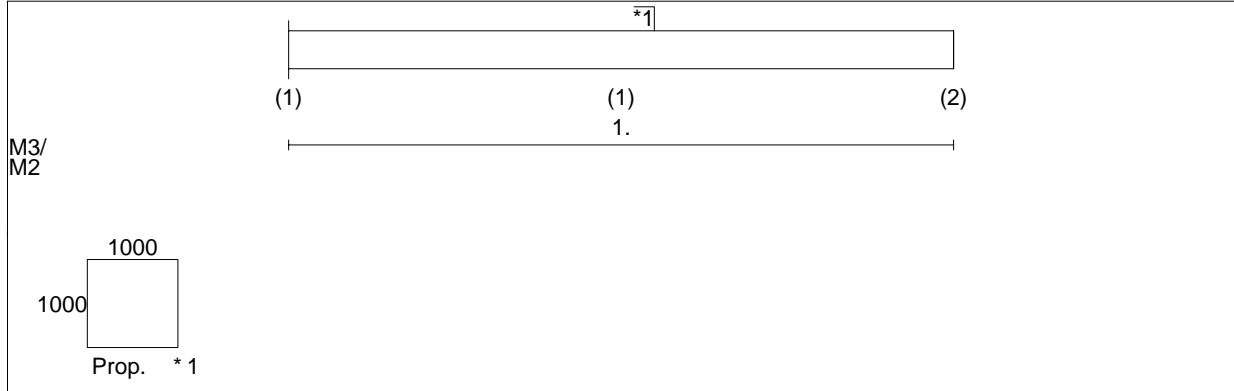


pilar 1=4
 pilar P1=P4
Preparado por:

Norma: NBr 6118
Página: 1
Data: 11/10/11

Resultado Detalhado (PILAR C1)

Geometria



Pilar : C1 Barra nº 1

Combinação crítica = 1

fck = C30	gc=1.4	fyk= 500 MPa	d' = 40 mm			
le =		k *	lo	i	le/i	tipo
M3:	1.00 =	1.00 *	1.00	0.29	3.5	deslocáv
M2:	1.00 =	1.00 *	1.00	0.29	3.5	deslocáv
						Pilar: curto
						Armadura:
						o 16d25 As = 78.5 cm ²
						% = 0.79
Esforços de Cálculo (t · m) :						
		P	M2	M3		
		Atual	: 509.6	301.0	-14.4	
		Dimen.	: 509.6	301.0	-22.9	
		M ad.				
		M mín.	:	22.9	22.9	
Pilar: Capacidade 1.01						

	<table border="0" style="width: 100%;"> <tr> <td style="width: 20%;">ramos:</td> <td style="width: 30%; text-align: center;">3/3</td> <td style="width: 50%;"></td> </tr> <tr> <td>M3/M2</td> <td></td> <td style="text-align: center;">1000</td> </tr> </table>	ramos:	3/3		M3/M2		1000
ramos:	3/3						
M3/M2		1000					

	Estr. fyk = 500 MPa
	M2 M3
	Comb: 1 1
	Vmax: 0.0 0.0
	Vc: 90.1 90.1

M2 momentos (Mi)



Carga axial = -509.6 t

pilar 1=4
 pilar P1=P4
Preparado por:

Norma: NBr 6118
Página: 2
Data: 11/10/11

Resultado Detalhado (PILAR C1)

Armadura:	Diâmetro Mínimo = $\phi 25$ Espaçamento ótimo = 200 mm	Diâmetro Máximo = $\phi 25$ Número de Bitolas = 1
-----------	---	--

Esforços de Cálculo (t · m) :

Posição	P	M2i	M3i	M2t	M3t	(* = dimens.)
Inf.	509.6	301.00	-14.42	301.00	-14.42	
				301.00	-22.93	*
Médio	509.6	301.00	-14.42	301.00	0.00	
Sup.	509.6	301.00	-14.42	301.00	0.00	

Verificação de equilíbrio

Concreto: fck = C30 Tensão máx. = 18.21 MPa Ec = 30.67	Armadura: fyk = 500 MPa = 434 MPa Es = 210 kMPa
--	---

Deform.: $\epsilon = 0.00350 - 0.00080 \cdot x2 - 0.00791 \cdot x3$

Armadura:

Bar	Grupo	ϕ	ϵ	σ (kg/cm ²)	P (t)	x2(m)	P·x2(t·m)	x3(m)	P·x3(t·m)
1	1	25	0.00315	4347.8	21.3	0.04	0.9	0.04	0.9
2	1	25	0.00241	4347.8	21.3	0.96	20.5	0.04	0.9
3	1	25	-0.00486	-4347.8	-21.3	0.96	-20.5	0.96	-20.5
4	1	25	-0.00412	-4347.8	-21.3	0.04	-0.9	0.96	-20.5
5	2	25	0.00297	4347.8	21.3	0.27	5.8	0.04	0.9
6	2	25	0.00278	4347.8	21.3	0.50	10.7	0.04	0.9
7	2	25	0.00260	4347.8	21.3	0.73	15.6	0.04	0.9
8	3	25	0.00059	1245.8	6.1	0.96	5.9	0.27	1.7
9	3	25	-0.00123	-2573.7	-12.6	0.96	-12.1	0.50	-6.3
10	3	25	-0.00304	-4347.8	-21.3	0.96	-20.5	0.73	-15.6
11	2	25	-0.00468	-4347.8	-21.3	0.73	-15.6	0.96	-20.5
12	2	25	-0.00449	-4347.8	-21.3	0.50	-10.7	0.96	-20.5
13	2	25	-0.00431	-4347.8	-21.3	0.27	-5.8	0.96	-20.5
14	3	25	-0.00230	-4347.8	-21.3	0.04	-0.9	0.73	-15.6
15	3	25	-0.00049	-1020.8	-5.0	0.04	-0.2	0.50	-2.5
16	3	25	0.00133	2798.7	13.7	0.04	0.5	0.27	3.7

Concreto: Area Compr. (80%) = 303256. mm ²	$\Sigma =$ <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%; border-top: 1px solid black;">511.9</td> <td style="width: 20%; border-top: 1px solid black;">233.5</td> <td style="width: 20%; border-top: 1px solid black;">-48.3</td> </tr> </table>		511.9	233.5	-48.3
	511.9	233.5	-48.3		

Cargas externas:	P :	509.6	0.500	254.8	0.500	254.8
	M3:			-22.9		
	M2:					-301.0
	$\Sigma =$	509.6		231.9		-46.2

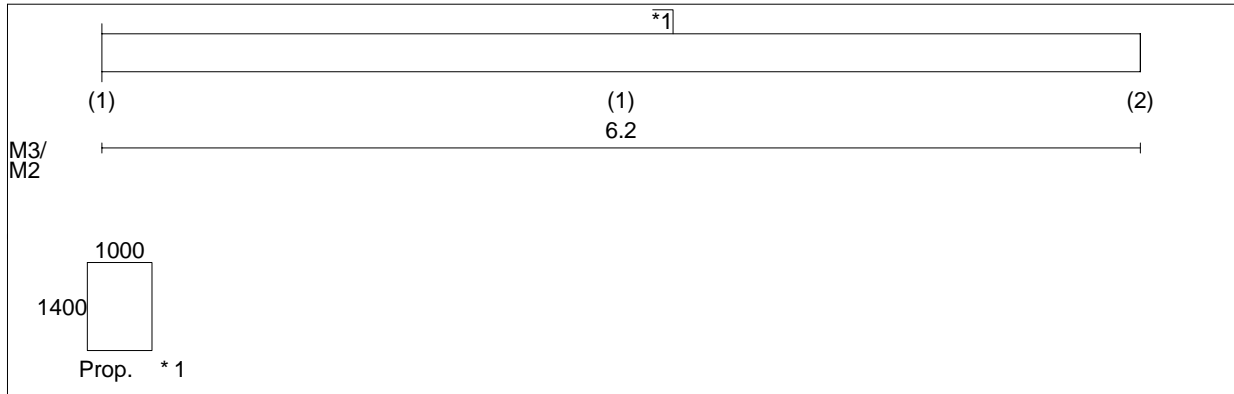
Pilar: Capacidade = 1.01

pilar 2=3
 pilar P2=P3
Preparado por:

Norma: NBr 6118
Página: 3
Data: 11/10/11

Resultado Detalhado (PILAR C1)

Geometria



Pilar : C1 Barra nº 1

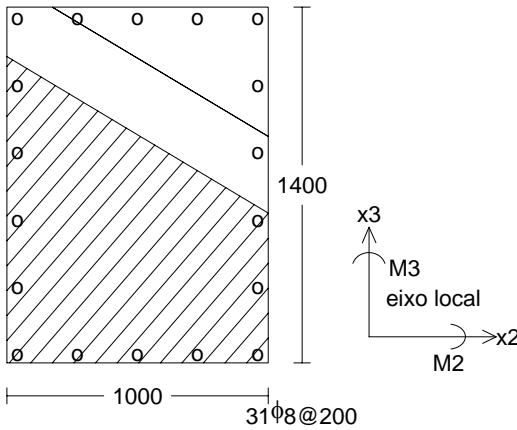
Combinação crítica = 1

fck = C30 gc=1.4 fyk= 500 MPa d' = 40 mm

	le =	k *	lo	i	le/i	tipo
M3:	6.20 =	1.00 *	6.20	0.29	21.5	deslocáv
M2:	12.40 =	2.00 *	6.20	0.40	30.7	deslocáv

Pilar: esbelto

Armadura:
 o 18d25 As = 88.3 cm²
 % = 0.63

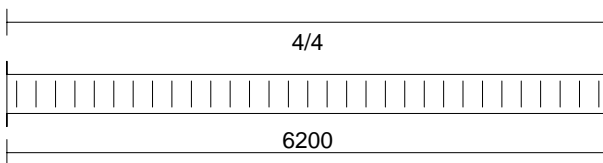


Esforços de Cálculo (t · m) :

	P	M2	M3
Atual :	918.4	168.0	-42.8
Dimen. :	918.4	241.3	-71.9
M ad. :		73.3	29.1
M mín. :		52.3	41.3

Pilar: Capacidade 1.96

ramos:
 M3/M2



Estr. fyk = 500 MPa

	M2	M3
Comb:	1	1
Vmax:	0.0	0.0
Vc:	137.3	135.7

pilar 2=3
 pilar P2=P3
Preparado por:

Norma: NBr 6118
Página: 4
Data: 11/10/11

Resultado Detalhado (PILAR C1)

M2 momentos (Mi)



M3 momentos (Mi)



Carga axial = -918.4 t

Armadura: _____

Diâmetro Mínimo = $\phi 25$
 Espaçamento ótimo = 200 mm

Diâmetro Máximo = $\phi 25$
 Número de Bitolas = 1

Momentos Adicionais: _____

	M2	M3		
h	= 1.400	1.000	m	Mad = N·(e2+ea)
le	= 12.4	6.2	m	e2 = $le^2/10 \cdot (1/r)$
1/r	= 0.004	0.005		1/r = $0.005/h(v+0.5)$
Nsd	= 918.4	918.4	ton	< $0.005/h$
Ac	= 1.400	1.400	m ²	v = Nsd/(Ac fcd)
fcd	= 2142.86	2142.86	t/m ²	ea = $\theta \cdot lo/2$
lo	= 6.2	6.2	m	$\theta = 1/(100\sqrt{H})$
H	= 6.2	6.2	m	
ea	= 0.012	0.012	m	
e2	= 0.055	0.019	m	
Mad	= 61.87	29.09	t · m	

Esforços de Cálculo (t · m) : _____

Posição	P	M2i	M3i	M2t	M3t	(* = dimens.)
Inf.	918.4	168.00	-42.84	241.30	-71.93	
Médio	918.4	168.00	-42.84	168.00	-42.84	
Sup.	918.4	168.00	-42.84	241.30	-71.93	*

pilar 2=3
 pilar P2=P3
Preparado por:

Norma:NBr 6118
Página:5
Data:11/10/11

Resultado Detalhado (PILAR C1)

Momento mínimo = P·emin				
P	emin2	M2min	emin3	M3min
918.4	0.057	52.3	0.045	41.3

Verificação de equilíbrio

Concreto: fck	=	C30	Armadura: fyk=	500	MPa
Tensão máx.	=	18.21 MPa	=	434	MPa
Ec	=	30.67	Es =	210	kMPa
Deform.: $\epsilon = 0.00350 - 0.00143 \cdot x2 - 0.00232 \cdot x3$					

Armadura:

Bar	Grupo	ϕ	ϵ	σ (kg/cm ²)	P (t)	x2(m)	P·x2(t·m)	x3(m)	P·x3(t·m)
1	1	25	0.00335	4347.8	21.3	0.04	0.9	0.04	0.9
2	1	25	0.00203	4271.1	21.0	0.96	20.1	0.04	0.8
3	1	25	-0.00103	-2168.4	-10.6	0.96	-10.2	1.36	-14.5
4	1	25	0.00028	595.2	2.9	0.04	0.1	1.36	4.0
5	2	25	0.00302	4347.8	21.3	0.27	5.8	0.04	0.9
6	2	25	0.00269	4347.8	21.3	0.50	10.7	0.04	0.9
7	2	25	0.00236	4347.8	21.3	0.73	15.6	0.04	0.9
8	3	25	0.00142	2983.2	14.6	0.96	14.1	0.30	4.5
9	3	25	0.00081	1695.3	8.3	0.96	8.0	0.57	4.7
10	3	25	0.00019	407.4	2.0	0.96	1.9	0.83	1.7
11	3	25	-0.00042	-880.5	-4.3	0.96	-4.1	1.10	-4.7
12	2	25	-0.00070	-1477.5	-7.3	0.73	-5.3	1.36	-9.9
13	2	25	-0.00037	-786.6	-3.9	0.50	-1.9	1.36	-5.3
14	2	25	-0.00005	-95.7	-0.5	0.27	-0.1	1.36	-0.6
15	3	25	0.00090	1883.1	9.2	0.04	0.4	1.10	10.1
16	3	25	0.00151	3171.0	15.6	0.04	0.6	0.83	13.0
17	3	25	0.00212	4347.8	21.3	0.04	0.9	0.57	12.1
18	3	25	0.00274	4347.8	21.3	0.04	0.9	0.30	6.5
Concreto:					1634.6	0.44	723.8	0.47	762.2

Area Compr. (80%) =
 897429. mm²

$\Sigma = 1809.8$

781.9

788.0

Cargas externas:

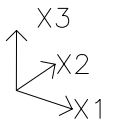
P :	918.4	0.500	459.2	0.700	642.9
M3:			-71.9		
M2:					-241.3
$\Sigma =$	918.4		387.3		401.6

Pilar: Capacidade = 1.96

TUBULÕES

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

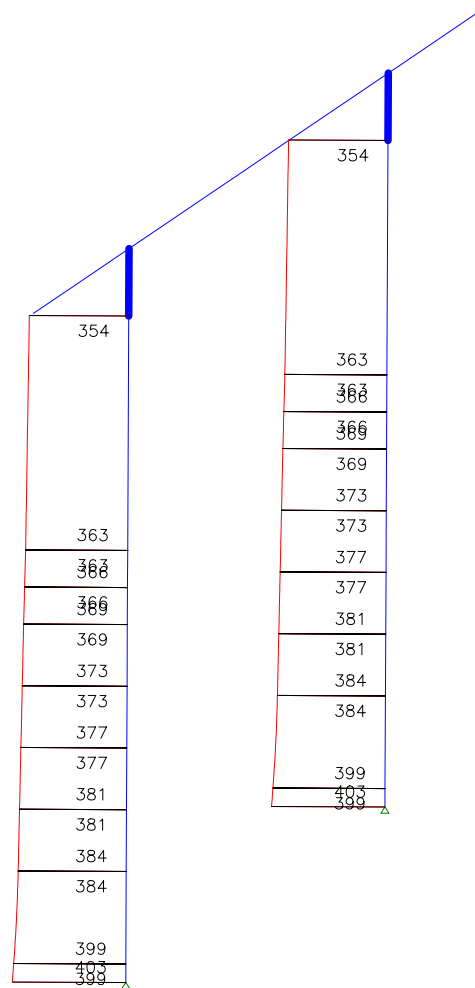
tubulão axial envolt
VISTA: tubulão



ESCALA= 1:108

UNIDS: tf

DATA:11/10/11

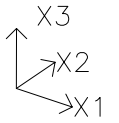


FORÇA AXIAL

COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

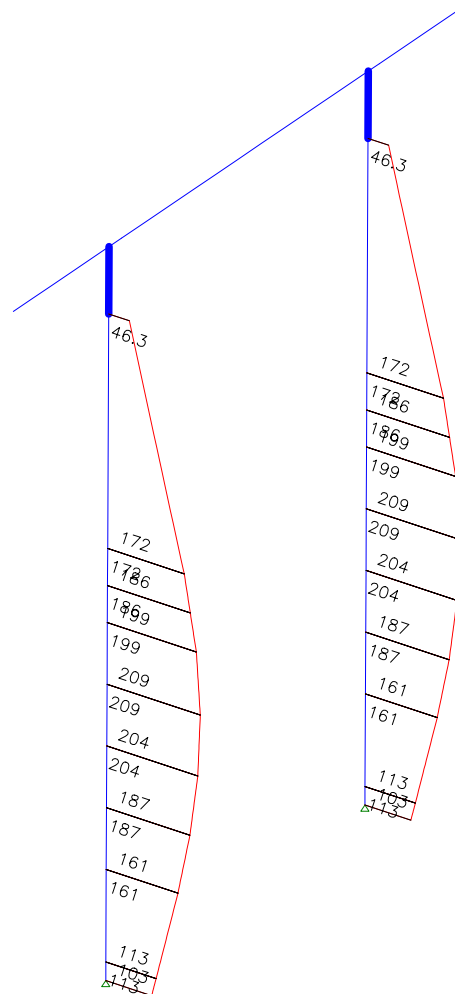
tubulão mom long envolt
VISTA: tubulão



ESCALA= 1:108

UNIDS: tf*m

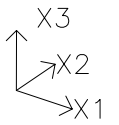
DATA:11/10/11



MOM. FLETOR M2 COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

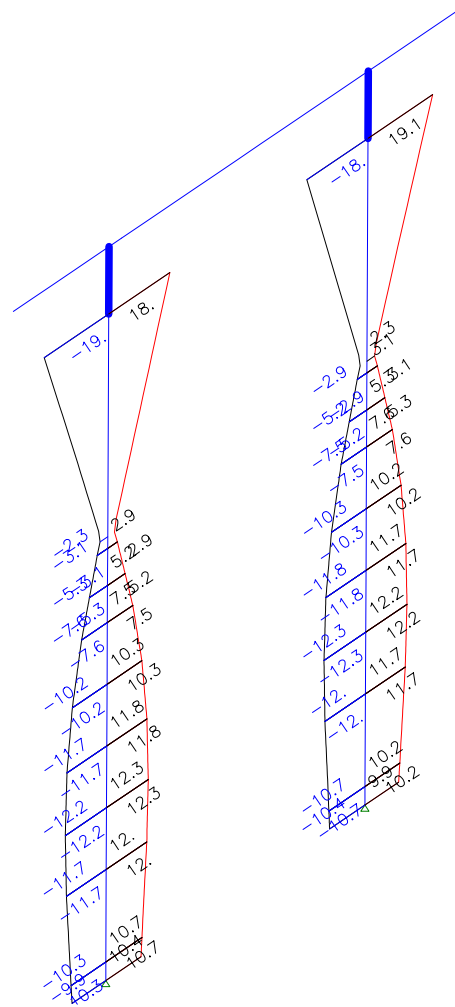
tubulão mom transv envolt
VISTA: tubulão



ESCALA= 1:108

UNIDS: tf*m

DATA:11/10/11



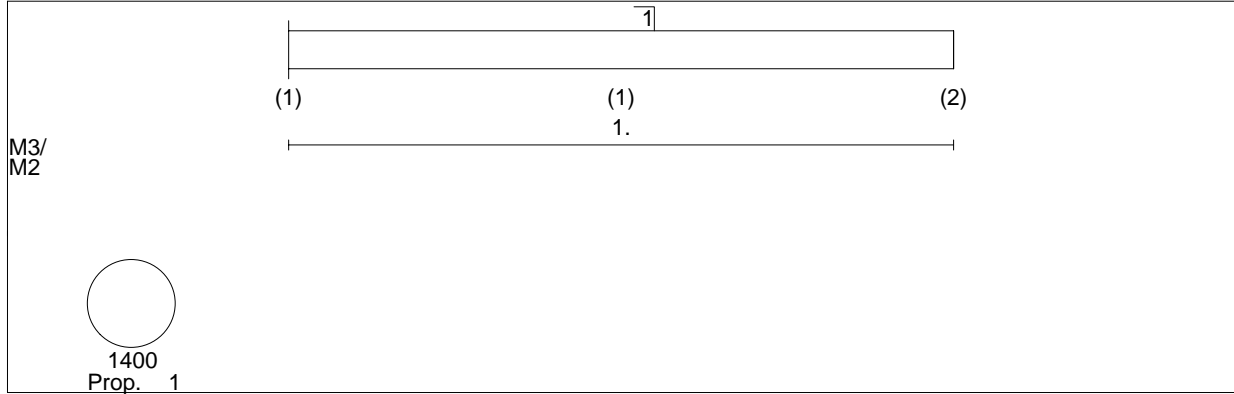
MOM. FLETOR M3 COMB.: ENVOLTÓRIA

tubulão 4
 tubulão 4
Preparado por:

Norma: NBr 6118
Página: 3
Data: 12/10/11

Resultado Detalhado (PILAR C1)

Geometria



Pilar : C1 Barra nº 1

Combinação crítica = 1

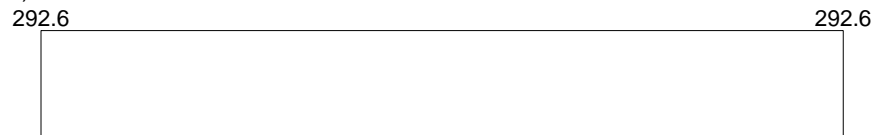
fck = C25	gc=1.4	fyk= 500 MPa	d' = 40 mm			
le =		k *	lo	i	le/i	tipo
M3:	1.00 =	1.00 *	1.00	0.35	2.9	deslocáv
M2:	1.00 =	1.00 *	1.00	0.35	2.9	deslocáv
						Pilar: curto
						Armadura:
						o 20d20 As = 62.8 cm ²
						% = 0.41
Esforços de Cálculo (t · m) :						
						P M2 M3
						Atual : 522.2 292.6 -14.3
						Dimen. : 522.2 292.6 -29.8
						M ad. :
						M mín. : 29.8 29.8
						Pilar: Capacidade 1.40

5φ10@200

ramos:	M3/M2	2/2
1000		

Estr. fyk = 500 MPa		
	M2	M3
Comb:	1	1
Vmax:	0.0	0.0
Vc:	120.1	120.1

M2 momentos (Mi)



Carga axial = -522.2 t

tubulão 4
 tubulão 4
Preparado por:

Norma: NBr 6118
Página: 4
Data: 12/10/11

Resultado Detalhado (PILAR C1)

Armadura: _____ Diâmetro Mínimo = $\phi 20$ Diâmetro Máximo = $\phi 20$
 Espaçamento ótimo = 200 mm

Esforços de Cálculo (t · m) : _____

Posição	P	M2i	M3i	M2t	M3t	(* = dimens.)
Inf.	522.2	292.60	-14.28	292.60	-14.28	
				292.60	-29.77	*
Médio	522.2	292.60	-14.28	292.60	0.00	
Sup.	522.2	292.60	-14.28	292.60	0.00	

Verificação de equilíbrio _____

Concreto: fck = C25 Armadura: fyk = 500 MPa
 Tensão máx. = 15.18 MPa = 434 MPa
 Ec = 28.00 Es = 210 kMPa
 Deform.: $\epsilon = 0.00391 - 0.00057 \cdot x2 - 0.00547 \cdot x3$

Armadura:

Bar	Grupo	ϕ	ϵ	σ (kg/cm ²)	P (t)	x2(m)	P·x2(t·m)	x3(m)	P·x3(t·m)
1	1	20	-0.00179	-3754.2	-11.8	1.33	-15.7	0.90	-10.7
2	1	20	-0.00274	-4347.8	-13.7	1.23	-16.9	1.09	-14.9
3	1	20	-0.00346	-4347.8	-13.7	1.09	-14.9	1.23	-16.9
4	1	20	-0.00386	-4347.8	-13.7	0.90	-12.3	1.33	-18.1
5	1	20	-0.00392	-4347.8	-13.7	0.70	-9.6	1.36	-18.6
6	1	20	-0.00363	-4347.8	-13.7	0.50	-6.8	1.33	-18.1
7	1	20	-0.00302	-4347.8	-13.7	0.31	-4.3	1.23	-16.9
8	1	20	-0.00214	-4347.8	-13.7	0.17	-2.3	1.09	-14.9
9	1	20	-0.00108	-2260.0	-7.1	0.07	-0.5	0.90	-6.4
10	1	20	0.00006	119.7	0.4	0.04	0.0	0.70	0.3
11	1	20	0.00115	2422.6	7.6	0.07	0.6	0.50	3.8
12	1	20	0.00211	4347.8	13.7	0.17	2.3	0.31	4.3
13	1	20	0.00282	4347.8	13.7	0.31	4.3	0.17	2.3
14	1	20	0.00323	4347.8	13.7	0.50	6.8	0.07	1.0
15	1	20	0.00329	4347.8	13.7	0.70	9.6	0.04	0.5
16	1	20	0.00300	4347.8	13.7	0.90	12.3	0.07	1.0
17	1	20	0.00238	4347.8	13.7	1.09	14.9	0.17	2.3
18	1	20	0.00150	3152.1	9.9	1.23	12.2	0.31	3.1
19	1	20	0.00044	928.4	2.9	1.33	3.9	0.50	1.4
20	1	20	-0.00069	-1451.4	-4.6	1.36	-6.2	0.70	-3.2
Concreto:					742.2	0.68	501.4	0.31	229.4

Area Compr. (80%) = 488980. mm²
 $\Sigma =$ 725.9 478.8 110.8

Cargas externas: P: 522.2 0.716 374.1 0.716 374.1
 M3: -29.8
 M2: -292.6
 $\Sigma =$ 522.2 344.4 81.5

Pilar: Capacidade = 1.40

TENSÕES NA BASE DOS TUBULÕES

OBRA : VIADUTO NA PE-060

APOIO P4

UNIDADES (t,tm,m)

Dimensões do tubulão $\phi_t := 1.40$ $S_t := \frac{\pi \cdot \phi_t^2}{4}$ $S_t = 1.539$

Alargamento $h_b := 1.8$ (m) $\phi_b := 3.2$ (m)

$S_b := \frac{\pi \cdot \phi_b^2}{4}$ $S_b = 8.042$ $W_b := \frac{\pi \cdot \phi_b^3}{32}$ $W_b = 3.217$

$N1 := 403$ $ML := 113$ $MT := 10.4$

$N1 = 403$ $M1 := \sqrt{ML^2 + MT^2}$ $M1 = 113.478$

$\sigma_1 := \frac{N1}{S_b} + \frac{M1}{W_b}$ $\sigma_1 = 85$ t/m2

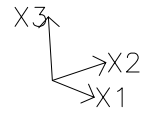
$\sigma_2 := \frac{N1}{S_b} - \frac{M1}{W_b}$ $\sigma_2 = 15$ t/m2

$\sigma_{med} := \frac{N1}{S_b}$ $\sigma_{med} = 50$ t/m2

5.2.2.3 ESTACAS E BLOCOS

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

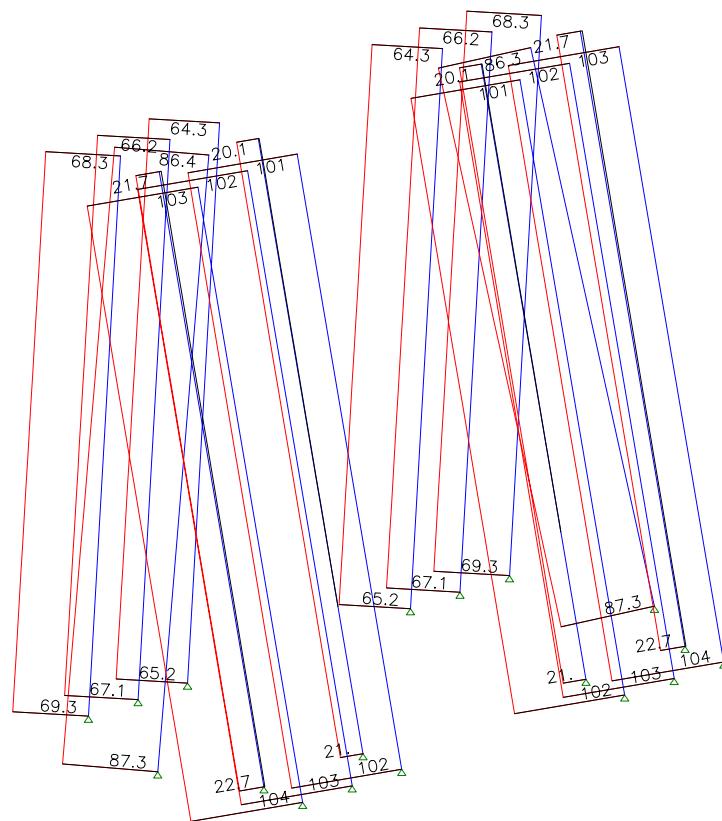
esatacas axial apoio 1
VISTA: estaca 1



ESCALA= 1:120

UNIDS: tf

DATA:11/10/11



FORÇA AXIAL

COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

Página:91
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2636	1	2124	102.007	0.024	0.700	0.000	0.000	0.000
		2122	-101.071	-0.024	-0.535	0.000	-6.266	0.168
	2	2124	91.045	0.018	0.652	0.000	0.000	0.000
		2122	-90.109	-0.018	-0.487	0.000	-5.778	0.255
	3	2124	94.530	0.024	0.640	0.000	0.000	0.000
		2122	-93.595	-0.024	-0.475	0.000	-5.666	0.168
	4	2124	83.569	0.018	0.592	0.000	0.000	0.000
		2122	-82.633	-0.018	-0.427	0.000	-5.178	0.255
	5	2124	71.862	0.024	0.464	0.000	0.000	0.000
		2122	-70.926	-0.024	-0.299	0.000	-3.872	0.168
	6	2124	60.901	0.018	0.416	0.000	0.000	0.000
		2122	-59.965	-0.018	-0.251	0.000	-3.384	0.254
	7	2124	64.386	0.024	0.405	0.000	0.000	0.000
		2122	-63.450	-0.024	-0.240	0.000	-3.272	0.168
	8	2124	53.424	0.018	0.357	0.000	0.000	0.000
		2122	-52.489	-0.018	-0.192	0.000	-2.784	0.254
9	2124	99.290	-0.017	0.694	0.000	0.000	0.000	
	2122	-98.355	0.017	-0.529	0.000	-6.213	-0.248	
10	2124	88.329	-0.023	0.646	0.000	0.000	0.000	
	2122	-87.393	0.023	-0.481	0.000	-5.725	-0.161	
11	2124	91.814	-0.017	0.635	0.000	0.000	0.000	
	2122	-90.878	0.017	-0.470	0.000	-5.613	-0.248	
12	2124	80.853	-0.023	0.587	0.000	0.000	0.000	
	2122	-79.917	0.023	-0.422	0.000	-5.125	-0.161	
13	2124	69.146	-0.017	0.459	0.000	0.000	0.000	
	2122	-68.210	0.017	-0.294	0.000	-3.819	-0.248	
14	2124	58.184	-0.023	0.411	0.000	0.000	0.000	
	2122	-57.249	0.023	-0.246	0.000	-3.331	-0.162	
15	2124	61.669	-0.017	0.399	0.000	0.000	0.000	
	2122	-60.734	0.017	-0.234	0.000	-3.219	-0.248	
16	2124	50.708	-0.023	0.351	0.000	0.000	0.000	
	2122	-49.772	0.023	-0.186	0.000	-2.731	-0.162	
		Máx	102.007	0.024	0.700	0.000	6.266	0.248
		Comb.	1	3	1	1	1	13
		Mín	49.772	-0.023	0.186	0.000	0.000	-0.255
		Comb.	16	14	16	16	2	4
2637	1	2126	103.590	0.024	0.702	0.000	0.000	0.000
		2119	-102.654	-0.024	-0.537	0.000	-6.293	0.168
	2	2126	89.470	0.018	0.652	0.000	0.000	0.000
		2119	-88.535	-0.018	-0.487	0.000	-5.785	0.255
	3	2126	96.101	0.024	0.643	0.000	0.000	0.000
		2119	-95.165	-0.024	-0.478	0.000	-5.693	0.168
	4	2126	81.982	0.018	0.593	0.000	0.000	0.000
		2119	-81.046	-0.018	-0.428	0.000	-5.185	0.255

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2126	73.400	0.024	0.466	0.000	0.000	0.000
	2119	-72.465	-0.024	-0.302	0.000	-3.899	0.168
6	2126	59.281	0.018	0.416	0.000	0.000	0.000
	2119	-58.345	-0.018	-0.251	0.000	-3.391	0.254
7	2126	65.912	0.024	0.407	0.000	0.000	0.000
	2119	-64.976	-0.024	-0.242	0.000	-3.299	0.168
8	2126	51.792	0.018	0.357	0.000	0.000	0.000
	2119	-50.857	-0.018	-0.192	0.000	-2.791	0.254
9	2126	101.826	-0.017	0.696	0.000	0.000	0.000
	2119	-100.890	0.017	-0.531	0.000	-6.226	-0.248
10	2126	87.707	-0.023	0.646	0.000	0.000	0.000
	2119	-86.771	0.023	-0.481	0.000	-5.717	-0.161
11	2126	94.337	-0.017	0.636	0.000	0.000	0.000
	2119	-93.401	0.017	-0.471	0.000	-5.625	-0.248
12	2126	80.218	-0.023	0.586	0.000	0.000	0.000
	2119	-79.282	0.023	-0.421	0.000	-5.117	-0.161
13	2126	71.637	-0.017	0.460	0.000	0.000	0.000
	2119	-70.701	0.017	-0.295	0.000	-3.832	-0.248
14	2126	57.517	-0.023	0.410	0.000	0.000	0.000
	2119	-56.582	0.023	-0.245	0.000	-3.323	-0.162
15	2126	64.148	-0.017	0.401	0.000	0.000	0.000
	2119	-63.212	0.017	-0.236	0.000	-3.231	-0.248
16	2126	50.029	-0.023	0.351	0.000	0.000	0.000
	2119	-49.093	0.023	-0.186	0.000	-2.723	-0.162
	Máx	103.590	0.024	0.702	0.000	6.293	0.248
	Comb.	1	3	1	1	1	13
	Mín	49.093	-0.023	0.186	0.000	0.000	-0.255
	Comb.	16	14	16	16	2	4
2638	1 2125	102.784	0.024	0.701	0.000	0.000	0.000
	2116	-101.848	-0.024	-0.536	0.000	-6.280	0.168
2	2125	90.427	0.018	0.652	0.000	0.000	0.000
	2116	-89.492	-0.018	-0.487	0.000	-5.782	0.255
3	2125	95.302	0.024	0.642	0.000	0.000	0.000
	2116	-94.366	-0.024	-0.477	0.000	-5.679	0.168
4	2125	82.945	0.018	0.593	0.000	0.000	0.000
	2116	-82.009	-0.018	-0.428	0.000	-5.181	0.255
5	2125	72.617	0.024	0.465	0.000	0.000	0.000
	2116	-71.682	-0.024	-0.300	0.000	-3.886	0.168
6	2125	60.260	0.018	0.416	0.000	0.000	0.000
	2116	-59.325	-0.018	-0.251	0.000	-3.388	0.254
7	2125	65.135	0.024	0.406	0.000	0.000	0.000
	2116	-64.199	-0.024	-0.241	0.000	-3.285	0.168

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2638	8	2125	52.778	0.018	0.357	0.000	0.000	0.000
		2116	-51.842	-0.018	-0.192	0.000	-2.787	0.254
	9	2125	100.544	-0.017	0.695	0.000	0.000	0.000
		2116	-99.608	0.017	-0.530	0.000	-6.219	-0.248
	10	2125	88.187	-0.023	0.646	0.000	0.000	0.000
		2116	-87.252	0.023	-0.481	0.000	-5.721	-0.161
	11	2125	93.062	-0.017	0.636	0.000	0.000	0.000
		2116	-92.126	0.017	-0.471	0.000	-5.619	-0.248
	12	2125	80.705	-0.023	0.587	0.000	0.000	0.000
		2116	-79.769	0.023	-0.422	0.000	-5.121	-0.161
	13	2125	70.377	-0.017	0.459	0.000	0.000	0.000
		2116	-69.442	0.017	-0.294	0.000	-3.825	-0.248
	14	2125	58.020	-0.023	0.410	0.000	0.000	0.000
		2116	-57.085	0.023	-0.245	0.000	-3.327	-0.162
	15	2125	62.895	-0.017	0.400	0.000	0.000	0.000
		2116	-61.959	0.017	-0.235	0.000	-3.225	-0.248
	16	2125	50.538	-0.023	0.351	0.000	0.000	0.000
		2116	-49.602	0.023	-0.186	0.000	-2.727	-0.162
	Máx	102.784	0.024	0.701	0.000	6.280	0.248	
	Comb.	1	3	1	9	1	13	
	Mín	49.602	-0.023	0.186	0.000	0.000	-0.255	
	Comb.	16	14	16	8	10	4	
2639	1	2127	34.530	-0.017	-0.518	0.000	0.000	0.000
		2123	-33.594	0.017	0.683	0.000	6.100	-0.296
	2	2127	20.058	-0.026	-0.564	0.000	0.000	0.000
		2123	-19.122	0.026	0.729	0.000	6.568	-0.138
	3	2127	40.721	-0.017	-0.459	0.000	0.000	0.000
		2123	-39.785	0.017	0.624	0.000	5.501	-0.296
	4	2127	26.249	-0.026	-0.505	0.000	0.000	0.000
		2123	-25.313	0.026	0.670	0.000	5.968	-0.138
	5	2127	59.057	-0.017	-0.283	0.000	0.000	0.000
		2123	-58.121	0.017	0.448	0.000	3.711	-0.296
	6	2127	44.585	-0.026	-0.329	0.000	0.000	0.000
		2123	-43.649	0.026	0.494	0.000	4.178	-0.138
	7	2127	65.248	-0.017	-0.224	0.000	0.000	0.000
		2123	-64.312	0.017	0.389	0.000	3.111	-0.296
	8	2127	50.776	-0.026	-0.270	0.000	0.000	0.000
		2123	-49.840	0.026	0.435	0.000	3.579	-0.138
	9	2127	31.464	0.026	-0.514	0.000	0.000	0.000
		2123	-30.528	-0.026	0.678	0.000	6.052	0.134
10	2127	16.992	0.016	-0.560	0.000	0.000	0.000	
	2123	-16.056	-0.016	0.725	0.000	6.520	0.292	
11	2127	37.655	0.026	-0.454	0.000	0.000	0.000	
	2123	-36.719	-0.026	0.619	0.000	5.453	0.133	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
	12 2127	23.183	0.016	-0.501	0.000	0.000	0.000
	2123	-22.247	-0.016	0.666	0.000	5.920	0.291
	13 2127	55.991	0.026	-0.278	0.000	0.000	0.000
	2123	-55.055	-0.026	0.443	0.000	3.663	0.134
	14 2127	41.519	0.016	-0.324	0.000	0.000	0.000
	2123	-40.584	-0.016	0.489	0.000	4.130	0.292
	15 2127	62.182	0.026	-0.219	0.000	0.000	0.000
	2123	-61.246	-0.026	0.384	0.000	3.063	0.134
	16 2127	47.710	0.016	-0.265	0.000	0.000	0.000
	2123	-46.775	-0.016	0.430	0.000	3.531	0.292
	Máx	65.248	0.026	-0.219	0.000	0.000	0.296
	Comb.	7	13	15	7	7	3
	Mín	16.056	-0.026	-0.729	0.000	-6.568	-0.292
	Comb.	10	4	2	10	2	14
2640	1 2129	38.581	-0.017	-0.519	0.000	0.000	0.000
	2120	-37.645	0.017	0.684	0.000	6.107	-0.296
	2 2129	17.078	-0.026	-0.567	0.000	0.000	0.000
	2120	-16.142	0.026	0.732	0.000	6.591	-0.138
	3 2129	44.768	-0.017	-0.460	0.000	0.000	0.000
	2120	-43.832	0.017	0.625	0.000	5.507	-0.296
	4 2129	23.265	-0.026	-0.508	0.000	0.000	0.000
	2120	-22.329	0.026	0.673	0.000	5.992	-0.138
	5 2129	63.079	-0.017	-0.284	0.000	0.000	0.000
	2120	-62.143	0.017	0.449	0.000	3.718	-0.296
	6 2129	41.576	-0.026	-0.331	0.000	0.000	0.000
	2120	-40.640	0.026	0.496	0.000	4.202	-0.138
	7 2129	69.265	-0.017	-0.225	0.000	0.000	0.000
	2120	-68.330	0.017	0.390	0.000	3.118	-0.296
	8 2129	47.762	-0.026	-0.272	0.000	0.000	0.000
	2120	-46.827	0.026	0.437	0.000	3.603	-0.138
	9 2129	35.383	0.026	-0.513	0.000	0.000	0.000
	2120	-34.447	-0.026	0.678	0.000	6.043	0.134
	10 2129	13.880	0.016	-0.560	0.000	0.000	0.000
	2120	-12.944	-0.016	0.725	0.000	6.528	0.292
	11 2129	41.570	0.026	-0.454	0.000	0.000	0.000
	2120	-40.634	-0.026	0.619	0.000	5.444	0.133
	12 2129	20.067	0.016	-0.501	0.000	0.000	0.000
	2120	-19.131	-0.016	0.666	0.000	5.929	0.291
	13 2129	59.881	0.026	-0.277	0.000	0.000	0.000
	2120	-58.945	-0.026	0.442	0.000	3.654	0.134
	14 2129	38.378	0.016	-0.325	0.000	0.000	0.000
	2120	-37.442	-0.016	0.490	0.000	4.139	0.292

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

Página:95
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RESULTADOS (Unids: tf, tf*metro)									
BarraComb	Nó	Axial	V2	V3	MT	M2	M3		
2640	15	2129	66.067	0.026	-0.218	0.000	0.000	0.000	
		2120	-65.132	-0.026	0.383	0.000	3.055	0.134	
	16	2129	44.564	0.016	-0.266	0.000	0.000	0.000	
		2120	-43.629	-0.016	0.431	0.000	3.540	0.292	
	Máx		69.265	0.026	-0.218	0.000	0.000	0.296	
	Comb.		7	13	15	9	1	3	
	Mín		12.944	-0.026	-0.732	0.000	-6.591	-0.292	
	Comb.		10	4	2	8	2	14	
	2641	1	2128	36.446	-0.017	-0.519	0.000	0.000	0.000
			2117	-35.510	0.017	0.684	0.000	6.103	-0.296
2		2128	18.890	-0.026	-0.565	0.000	0.000	0.000	
		2117	-17.955	0.026	0.730	0.000	6.580	-0.138	
3		2128	42.635	-0.017	-0.460	0.000	0.000	0.000	
		2117	-41.699	0.017	0.625	0.000	5.504	-0.296	
4		2128	25.079	-0.026	-0.506	0.000	0.000	0.000	
		2117	-24.143	0.026	0.671	0.000	5.980	-0.138	
5		2128	60.958	-0.017	-0.283	0.000	0.000	0.000	
		2117	-60.022	0.017	0.448	0.000	3.714	-0.296	
6		2128	43.403	-0.026	-0.330	0.000	0.000	0.000	
		2117	-42.467	0.026	0.495	0.000	4.190	-0.138	
7		2128	67.147	-0.017	-0.224	0.000	0.000	0.000	
		2117	-66.211	0.017	0.389	0.000	3.115	-0.296	
8		2128	49.592	-0.026	-0.271	0.000	0.000	0.000	
		2117	-48.656	0.026	0.436	0.000	3.591	-0.138	
9		2128	33.314	0.026	-0.513	0.000	0.000	0.000	
		2117	-32.378	-0.026	0.678	0.000	6.048	0.134	
10		2128	15.758	0.016	-0.560	0.000	0.000	0.000	
		2117	-14.823	-0.016	0.725	0.000	6.524	0.292	
11		2128	39.503	0.026	-0.454	0.000	0.000	0.000	
		2117	-38.567	-0.026	0.619	0.000	5.448	0.133	
12		2128	21.947	0.016	-0.501	0.000	0.000	0.000	
		2117	-21.011	-0.016	0.666	0.000	5.924	0.291	
13		2128	57.826	0.026	-0.278	0.000	0.000	0.000	
		2117	-56.891	-0.026	0.443	0.000	3.658	0.134	
14		2128	40.271	0.016	-0.325	0.000	0.000	0.000	
		2117	-39.335	-0.016	0.490	0.000	4.135	0.292	
15		2128	64.015	0.026	-0.219	0.000	0.000	0.000	
		2117	-63.079	-0.026	0.384	0.000	3.059	0.134	
16		2128	46.460	0.016	-0.266	0.000	0.000	0.000	
		2117	-45.524	-0.016	0.431	0.000	3.535	0.292	
Máx		67.147	0.026	-0.219	0.000	0.000	0.296		
Comb.		7	13	15	9	9	3		
Mín		14.823	-0.026	-0.730	0.000	-6.580	-0.292		
Comb.		10	4	2	8	2	14		

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2642	1	2130	10.224	0.024	0.694	0.000	0.000	0.000
		2118	-9.288	-0.024	-0.529	0.000	-6.213	0.163
	2	2130	0.341	0.017	0.645	0.000	0.000	0.000
		2118	0.594	-0.017	-0.480	0.000	-5.709	0.261
	3	2130	12.777	0.024	0.636	0.000	0.000	0.000
		2118	-11.841	-0.024	-0.471	0.000	-5.621	0.163
	4	2130	2.894	0.017	0.586	0.000	0.000	0.000
		2118	-1.958	-0.017	-0.422	0.000	-5.118	0.261
	5	2130	20.100	0.024	0.462	0.000	0.000	0.000
		2118	-19.165	-0.024	-0.297	0.000	-3.853	0.163
	6	2130	10.218	0.017	0.412	0.000	0.000	0.000
		2118	-9.282	-0.017	-0.247	0.000	-3.350	0.261
	7	2130	22.653	0.024	0.404	0.000	0.000	0.000
		2118	-21.717	-0.024	-0.239	0.000	-3.262	0.163
	8	2130	12.770	0.017	0.354	0.000	0.000	0.000
		2118	-11.835	-0.017	-0.189	0.000	-2.758	0.261
	9	2130	9.044	-0.017	0.688	0.000	0.000	0.000
		2118	-8.108	0.017	-0.523	0.000	-6.146	-0.256
	10	2130	-0.838	-0.024	0.638	0.000	0.000	0.000
		2118	1.774	0.024	-0.473	0.000	-5.642	-0.157
	11	2130	11.597	-0.017	0.629	0.000	0.000	0.000
		2118	-10.661	0.017	-0.464	0.000	-5.554	-0.256
	12	2130	1.714	-0.024	0.580	0.000	0.000	0.000
		2118	-0.778	0.024	-0.415	0.000	-5.051	-0.157
	13	2130	18.921	-0.017	0.455	0.000	0.000	0.000
		2118	-17.985	0.017	-0.290	0.000	-3.786	-0.256
	14	2130	9.038	-0.024	0.406	0.000	0.000	0.000
		2118	-8.102	0.024	-0.241	0.000	-3.283	-0.158
	15	2130	21.473	-0.017	0.397	0.000	0.000	0.000
		2118	-20.537	0.017	-0.232	0.000	-3.195	-0.256
	16	2130	11.591	-0.024	0.347	0.000	0.000	0.000
		2118	-10.655	0.024	-0.183	0.000	-2.691	-0.158
	Máx		22.653	0.024	0.694	0.000	6.213	0.256
	Comb.		7	3	1	9	1	13
	Mín		-1.774	-0.024	0.183	0.000	0.000	-0.261
	Comb.		10	14	16	8	2	4
2643	1	2131	43.244	-0.187	0.144	0.000	0.000	0.000
		2034	-42.308	0.187	0.021	0.000	-0.714	-2.060
	2	2131	31.332	-0.203	0.119	0.000	0.000	0.000
		2034	-30.396	0.203	0.046	0.000	-0.272	-1.898
	3	2131	42.575	-0.168	0.144	0.000	0.000	0.000
		2034	-41.639	0.168	0.021	0.000	-0.714	-1.870
	4	2131	30.663	-0.184	0.119	0.000	0.000	0.000
		2034	-29.727	0.184	0.046	0.000	-0.272	-1.708

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2131	40.420	-0.112	0.144	0.000	0.000	0.000
	2034	-39.484	0.112	0.021	0.000	-0.711	-1.301
6	2131	28.508	-0.128	0.118	0.000	0.000	0.000
	2034	-27.572	0.128	0.047	0.000	-0.269	-1.139
7	2131	39.751	-0.093	0.144	0.000	0.000	0.000
	2034	-38.815	0.093	0.021	0.000	-0.711	-1.110
8	2131	27.839	-0.109	0.118	0.000	0.000	0.000
	2034	-26.903	0.109	0.047	0.000	-0.269	-0.948
9	2131	87.346	-0.185	0.018	0.000	0.000	0.000
	2034	-86.410	0.185	0.147	0.000	0.567	-2.037
10	2131	75.434	-0.201	-0.007	0.000	0.000	0.000
	2034	-74.498	0.201	0.172	0.000	1.009	-1.875
11	2131	86.677	-0.166	0.018	0.000	0.000	0.000
	2034	-85.741	0.166	0.147	0.000	0.567	-1.847
12	2131	74.765	-0.182	-0.007	0.000	0.000	0.000
	2034	-73.829	0.182	0.172	0.000	1.009	-1.685
13	2131	84.521	-0.110	0.018	0.000	0.000	0.000
	2034	-83.586	0.110	0.147	0.000	0.570	-1.278
14	2131	72.609	-0.126	-0.008	0.000	0.000	0.000
	2034	-71.674	0.126	0.173	0.000	1.012	-1.116
15	2131	83.852	-0.091	0.018	0.000	0.000	0.000
	2034	-82.917	0.091	0.147	0.000	0.571	-1.087
16	2131	71.940	-0.107	-0.008	0.000	0.000	0.000
	2034	-71.005	0.107	0.173	0.000	1.012	-0.925
Máx Comb.		87.346	-0.091	0.144	0.000	0.714	2.060
	9		15	1	1	1	1
Mín Comb.		26.903	-0.203	-0.173	0.000	-1.012	0.000
	8		2	16	16	16	8
2644	1 2132	8.521	0.024	0.692	0.000	0.000	0.000
	2121	-7.585	-0.024	-0.527	0.000	-6.186	0.163
2	2132	2.356	0.017	0.644	0.000	0.000	0.000
	2121	-1.421	-0.017	-0.479	0.000	-5.703	0.261
3	2132	11.086	0.024	0.633	0.000	0.000	0.000
	2121	-10.150	-0.024	-0.468	0.000	-5.594	0.163
4	2132	4.921	0.017	0.586	0.000	0.000	0.000
	2121	-3.986	-0.017	-0.421	0.000	-5.111	0.261
5	2132	18.442	0.024	0.459	0.000	0.000	0.000
	2121	-17.506	-0.024	-0.294	0.000	-3.826	0.163
6	2132	12.277	0.017	0.412	0.000	0.000	0.000
	2121	-11.342	-0.017	-0.247	0.000	-3.343	0.261
7	2132	21.007	0.024	0.401	0.000	0.000	0.000
	2121	-20.072	-0.024	-0.236	0.000	-3.234	0.163

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2644	8	2132	14.842	0.017	0.353	0.000	0.000	0.000
		2121	-13.907	-0.017	-0.188	0.000	-2.751	0.261
	9	2132	6.389	-0.017	0.687	0.000	0.000	0.000
		2121	-5.453	0.017	-0.522	0.000	-6.133	-0.256
	10	2132	0.224	-0.024	0.639	0.000	0.000	0.000
		2121	0.712	0.024	-0.474	0.000	-5.650	-0.157
	11	2132	8.954	-0.017	0.628	0.000	0.000	0.000
		2121	-8.018	0.017	-0.463	0.000	-5.542	-0.256
	12	2132	2.789	-0.024	0.581	0.000	0.000	0.000
		2121	-1.853	0.024	-0.416	0.000	-5.058	-0.157
	13	2132	16.310	-0.017	0.454	0.000	0.000	0.000
		2121	-15.374	0.017	-0.289	0.000	-3.774	-0.256
	14	2132	10.145	-0.024	0.407	0.000	0.000	0.000
		2121	-9.209	0.024	-0.242	0.000	-3.290	-0.158
	15	2132	18.875	-0.017	0.396	0.000	0.000	0.000
		2121	-17.939	0.017	-0.231	0.000	-3.182	-0.256
	16	2132	12.710	-0.024	0.348	0.000	0.000	0.000
		2121	-11.774	0.024	-0.183	0.000	-2.699	-0.158
	Máx		21.007	0.024	0.692	0.000	6.186	0.256
	Comb.		7	3	1	7	1	13
	Mín		-0.712	-0.024	0.183	0.000	0.000	-0.261
	Comb.		10	14	16	10	8	4
2645	1	2141	99.290	0.023	0.694	0.000	0.000	0.000
		2139	-98.354	-0.023	-0.529	0.000	-6.213	0.161
	2	2141	88.330	0.017	0.646	0.000	0.000	0.000
		2139	-87.394	-0.017	-0.481	0.000	-5.725	0.247
	3	2141	91.812	0.023	0.635	0.000	0.000	0.000
		2139	-90.876	-0.023	-0.470	0.000	-5.613	0.161
	4	2141	80.852	0.017	0.587	0.000	0.000	0.000
		2139	-79.916	-0.017	-0.422	0.000	-5.125	0.248
	5	2141	69.145	0.023	0.459	0.000	0.000	0.000
		2139	-68.210	-0.023	-0.294	0.000	-3.819	0.161
	6	2141	58.186	0.017	0.411	0.000	0.000	0.000
		2139	-57.250	-0.017	-0.246	0.000	-3.331	0.248
	7	2141	61.667	0.023	0.399	0.000	0.000	0.000
		2139	-60.731	-0.023	-0.234	0.000	-3.218	0.162
	8	2141	50.707	0.017	0.351	0.000	0.000	0.000
		2139	-49.771	-0.017	-0.186	0.000	-2.730	0.248
	9	2141	102.006	-0.018	0.700	0.000	0.000	0.000
		2139	-101.070	0.018	-0.535	0.000	-6.266	-0.255
	10	2141	91.046	-0.024	0.652	0.000	0.000	0.000
		2139	-90.110	0.024	-0.487	0.000	-5.778	-0.169
	11	2141	94.528	-0.018	0.640	0.000	0.000	0.000
		2139	-93.592	0.018	-0.475	0.000	-5.666	-0.255

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
	12 2141	83.568	-0.024	0.592	0.000	0.000	0.000
	2139	-82.632	0.024	-0.427	0.000	-5.178	-0.168
	13 2141	71.862	-0.018	0.464	0.000	0.000	0.000
	2139	-70.926	0.018	-0.299	0.000	-3.872	-0.255
	14 2141	60.902	-0.024	0.416	0.000	0.000	0.000
	2139	-59.966	0.024	-0.251	0.000	-3.384	-0.168
	15 2141	64.383	-0.018	0.405	0.000	0.000	0.000
	2139	-63.447	0.018	-0.240	0.000	-3.272	-0.255
	16 2141	53.423	-0.024	0.357	0.000	0.000	0.000
	2139	-52.488	0.024	-0.192	0.000	-2.784	-0.168
	Máx	102.006	0.023	0.700	0.000	6.266	0.255
	Comb.	9	7	9	9	9	9
	Mín	49.771	-0.024	0.186	0.000	0.000	-0.248
	Comb.	8	10	8	8	2	8
2646	1 2143	101.822	0.023	0.696	0.000	0.000	0.000
	2136	-100.886	-0.023	-0.531	0.000	-6.226	0.161
	2 2143	87.704	0.017	0.646	0.000	0.000	0.000
	2136	-86.768	-0.017	-0.481	0.000	-5.717	0.247
	3 2143	94.332	0.023	0.636	0.000	0.000	0.000
	2136	-93.396	-0.023	-0.471	0.000	-5.625	0.161
	4 2143	80.215	0.017	0.586	0.000	0.000	0.000
	2136	-79.279	-0.017	-0.421	0.000	-5.117	0.248
	5 2143	71.633	0.023	0.460	0.000	0.000	0.000
	2136	-70.697	-0.023	-0.295	0.000	-3.832	0.161
	6 2143	57.515	0.017	0.410	0.000	0.000	0.000
	2136	-56.580	-0.017	-0.245	0.000	-3.323	0.248
	7 2143	64.143	0.023	0.401	0.000	0.000	0.000
	2136	-63.208	-0.023	-0.236	0.000	-3.231	0.162
	8 2143	50.026	0.017	0.351	0.000	0.000	0.000
	2136	-49.090	-0.017	-0.186	0.000	-2.723	0.248
	9 2143	103.585	-0.018	0.702	0.000	0.000	0.000
	2136	-102.649	0.018	-0.537	0.000	-6.293	-0.255
	10 2143	89.468	-0.024	0.652	0.000	0.000	0.000
	2136	-88.532	0.024	-0.487	0.000	-5.785	-0.169
	11 2143	96.096	-0.018	0.643	0.000	0.000	0.000
	2136	-95.160	0.018	-0.478	0.000	-5.693	-0.255
	12 2143	81.978	-0.024	0.593	0.000	0.000	0.000
	2136	-81.043	0.024	-0.428	0.000	-5.184	-0.168
	13 2143	73.396	-0.018	0.466	0.000	0.000	0.000
	2136	-72.461	0.018	-0.302	0.000	-3.899	-0.255
	14 2143	59.279	-0.024	0.416	0.000	0.000	0.000
	2136	-58.343	0.024	-0.251	0.000	-3.391	-0.168

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)									
BarraComb	Nó	Axial	V2	V3	MT	M2	M3		
2646	15	2143	65.907	-0.018	0.407	0.000	0.000	0.000	
		2136	-64.971	0.018	-0.242	0.000	-3.299	-0.255	
	16	2143	51.790	-0.024	0.357	0.000	0.000	0.000	
		2136	-50.854	0.024	-0.192	0.000	-2.791	-0.168	
	Máx Comb.		103.585	0.023	0.702	0.000	6.293	0.255	
	Mín Comb.		49.090	-0.024	0.186	0.000	0.000	-0.248	
			9	7	9	9	9	9	
			8	10	8	8	2	8	
	2647	1	2142	100.542	0.023	0.695	0.000	0.000	0.000
			2133	-99.606	-0.023	-0.530	0.000	-6.219	0.161
2		2142	88.187	0.017	0.646	0.000	0.000	0.000	
		2133	-87.251	-0.017	-0.481	0.000	-5.721	0.247	
3		2142	93.058	0.023	0.636	0.000	0.000	0.000	
		2133	-92.122	-0.023	-0.471	0.000	-5.619	0.161	
4		2142	80.703	0.017	0.587	0.000	0.000	0.000	
		2133	-79.767	-0.017	-0.422	0.000	-5.121	0.248	
5		2142	70.375	0.023	0.459	0.000	0.000	0.000	
		2133	-69.439	-0.023	-0.294	0.000	-3.825	0.161	
6		2142	58.020	0.017	0.410	0.000	0.000	0.000	
		2133	-57.085	-0.017	-0.245	0.000	-3.327	0.248	
7		2142	62.891	0.023	0.400	0.000	0.000	0.000	
		2133	-61.956	-0.023	-0.235	0.000	-3.225	0.162	
8		2142	50.536	0.017	0.351	0.000	0.000	0.000	
		2133	-49.601	-0.017	-0.186	0.000	-2.727	0.248	
9		2142	102.782	-0.018	0.701	0.000	0.000	0.000	
		2133	-101.846	0.018	-0.536	0.000	-6.280	-0.255	
10		2142	90.427	-0.024	0.652	0.000	0.000	0.000	
		2133	-89.491	0.024	-0.487	0.000	-5.782	-0.169	
11		2142	95.298	-0.018	0.642	0.000	0.000	0.000	
		2133	-94.362	0.018	-0.477	0.000	-5.679	-0.255	
12		2142	82.943	-0.024	0.593	0.000	0.000	0.000	
		2133	-82.007	0.024	-0.428	0.000	-5.181	-0.168	
13		2142	72.615	-0.018	0.465	0.000	0.000	0.000	
		2133	-71.679	0.018	-0.300	0.000	-3.886	-0.255	
14		2142	60.260	-0.024	0.416	0.000	0.000	0.000	
		2133	-59.324	0.024	-0.251	0.000	-3.388	-0.168	
15		2142	65.131	-0.018	0.406	0.000	0.000	0.000	
		2133	-64.195	0.018	-0.241	0.000	-3.285	-0.255	
16		2142	52.776	-0.024	0.357	0.000	0.000	0.000	
		2133	-51.841	0.024	-0.192	0.000	-2.787	-0.168	
Máx Comb.		102.782	0.023	0.701	0.000	6.280	0.255		
Mín Comb.		49.601	-0.024	0.186	0.000	0.000	-0.248		
		9	7	9	9	9	9		
		8	10	8	8	2	8		

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

Página:101
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2648	1	2144	31.464	-0.016	-0.514	0.000	0.000	0.000
		2140	-30.529	0.016	0.678	0.000	6.052	-0.291
	2	2144	16.992	-0.026	-0.560	0.000	0.000	0.000
		2140	-16.056	0.026	0.725	0.000	6.519	-0.133
	3	2144	37.652	-0.016	-0.454	0.000	0.000	0.000
		2140	-36.717	0.016	0.619	0.000	5.452	-0.291
	4	2144	23.180	-0.026	-0.501	0.000	0.000	0.000
		2140	-22.244	0.026	0.666	0.000	5.920	-0.133
	5	2144	55.991	-0.016	-0.278	0.000	0.000	0.000
		2140	-55.056	0.016	0.443	0.000	3.663	-0.291
	6	2144	41.519	-0.026	-0.324	0.000	0.000	0.000
		2140	-40.584	0.026	0.489	0.000	4.130	-0.133
	7	2144	62.179	-0.016	-0.219	0.000	0.000	0.000
		2140	-61.244	0.016	0.384	0.000	3.063	-0.292
	8	2144	47.707	-0.026	-0.265	0.000	0.000	0.000
		2140	-46.772	0.026	0.430	0.000	3.531	-0.134
	9	2144	34.530	0.026	-0.518	0.000	0.000	0.000
		2140	-33.595	-0.026	0.683	0.000	6.100	0.139
	10	2144	20.058	0.017	-0.564	0.000	0.000	0.000
		2140	-19.122	-0.017	0.729	0.000	6.568	0.297
	11	2144	40.718	0.026	-0.459	0.000	0.000	0.000
		2140	-39.783	-0.026	0.624	0.000	5.501	0.138
	12	2144	26.246	0.017	-0.505	0.000	0.000	0.000
		2140	-25.310	-0.017	0.670	0.000	5.968	0.297
	13	2144	59.058	0.026	-0.283	0.000	0.000	0.000
		2140	-58.122	-0.026	0.448	0.000	3.711	0.138
	14	2144	44.585	0.017	-0.329	0.000	0.000	0.000
		2140	-43.650	-0.017	0.494	0.000	4.178	0.296
	15	2144	65.246	0.026	-0.224	0.000	0.000	0.000
		2140	-64.310	-0.026	0.389	0.000	3.111	0.138
	16	2144	50.773	0.017	-0.270	0.000	0.000	0.000
		2140	-49.838	-0.017	0.435	0.000	3.579	0.296
		Máx	65.246	0.026	-0.219	0.000	0.000	0.292
		Comb.	15	9	7	3	7	7
		Mín	16.056	-0.026	-0.729	0.000	-6.568	-0.297
		Comb.	2	8	10	8	10	10
2649	1	2146	35.380	-0.016	-0.513	0.000	0.000	0.000
		2137	-34.445	0.016	0.678	0.000	6.043	-0.291
	2	2146	13.876	-0.026	-0.560	0.000	0.000	0.000
		2137	-12.940	0.026	0.725	0.000	6.528	-0.133
	3	2146	41.564	-0.016	-0.454	0.000	0.000	0.000
		2137	-40.628	0.016	0.619	0.000	5.444	-0.291
	4	2146	20.059	-0.026	-0.501	0.000	0.000	0.000
		2137	-19.124	0.026	0.666	0.000	5.929	-0.133

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2146	59.878	-0.016	-0.277	0.000	0.000	0.000
	2137	-58.943	0.016	0.442	0.000	3.654	-0.291
6	2146	38.374	-0.026	-0.325	0.000	0.000	0.000
	2137	-37.438	0.026	0.490	0.000	4.139	-0.133
7	2146	66.062	-0.016	-0.218	0.000	0.000	0.000
	2137	-65.126	0.016	0.383	0.000	3.055	-0.292
8	2146	44.557	-0.026	-0.266	0.000	0.000	0.000
	2137	-43.622	0.026	0.431	0.000	3.540	-0.134
9	2146	38.579	0.026	-0.519	0.000	0.000	0.000
	2137	-37.643	-0.026	0.684	0.000	6.107	0.139
10	2146	17.074	0.017	-0.567	0.000	0.000	0.000
	2137	-16.138	-0.017	0.732	0.000	6.591	0.297
11	2146	44.762	0.026	-0.460	0.000	0.000	0.000
	2137	-43.826	-0.026	0.625	0.000	5.507	0.138
12	2146	23.258	0.017	-0.508	0.000	0.000	0.000
	2137	-22.322	-0.017	0.673	0.000	5.992	0.297
13	2146	63.077	0.026	-0.284	0.000	0.000	0.000
	2137	-62.141	-0.026	0.449	0.000	3.718	0.138
14	2146	41.572	0.017	-0.331	0.000	0.000	0.000
	2137	-40.636	-0.017	0.496	0.000	4.202	0.296
15	2146	69.260	0.026	-0.225	0.000	0.000	0.000
	2137	-68.324	-0.026	0.390	0.000	3.118	0.138
16	2146	47.756	0.017	-0.272	0.000	0.000	0.000
	2137	-46.820	-0.017	0.437	0.000	3.603	0.296
	Máx	69.260	0.026	-0.218	0.000	0.000	0.292
	Comb.	15	9	7	3	7	7
	Mín	12.940	-0.026	-0.732	0.000	-6.591	-0.297
	Comb.	2	8	10	8	10	10
2650 1	2145	33.313	-0.016	-0.513	0.000	0.000	0.000
	2134	-32.377	0.016	0.678	0.000	6.047	-0.291
2	2145	15.756	-0.026	-0.560	0.000	0.000	0.000
	2134	-14.820	0.026	0.725	0.000	6.524	-0.133
3	2145	39.498	-0.016	-0.454	0.000	0.000	0.000
	2134	-38.563	0.016	0.619	0.000	5.448	-0.291
4	2145	21.942	-0.026	-0.501	0.000	0.000	0.000
	2134	-21.006	0.026	0.666	0.000	5.924	-0.133
5	2145	57.825	-0.016	-0.278	0.000	0.000	0.000
	2134	-56.889	0.016	0.443	0.000	3.658	-0.291
6	2145	40.269	-0.026	-0.325	0.000	0.000	0.000
	2134	-39.333	0.026	0.490	0.000	4.135	-0.133
7	2145	64.011	-0.016	-0.219	0.000	0.000	0.000
	2134	-63.075	0.016	0.384	0.000	3.059	-0.292

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2650	8	2145	46.455	-0.026	-0.266	0.000	0.000	0.000
		2134	-45.519	0.026	0.431	0.000	3.535	-0.134
	9	2145	36.445	0.026	-0.519	0.000	0.000	0.000
		2134	-35.509	-0.026	0.684	0.000	6.103	0.139
	10	2145	18.888	0.017	-0.565	0.000	0.000	0.000
		2134	-17.953	-0.017	0.730	0.000	6.580	0.297
	11	2145	42.631	0.026	-0.460	0.000	0.000	0.000
		2134	-41.695	-0.026	0.625	0.000	5.504	0.138
	12	2145	25.074	0.017	-0.506	0.000	0.000	0.000
		2134	-24.138	-0.017	0.671	0.000	5.980	0.297
	13	2145	60.957	0.026	-0.283	0.000	0.000	0.000
		2134	-60.022	-0.026	0.448	0.000	3.714	0.138
	14	2145	43.401	0.017	-0.330	0.000	0.000	0.000
		2134	-42.465	-0.017	0.495	0.000	4.190	0.296
	15	2145	67.143	0.026	-0.224	0.000	0.000	0.000
		2134	-66.207	-0.026	0.389	0.000	3.115	0.138
	16	2145	49.587	0.017	-0.271	0.000	0.000	0.000
		2134	-48.651	-0.017	0.436	0.000	3.591	0.296
	Máx	67.143	0.026	-0.219	0.000	0.000	0.292	
	Comb.	15	9	7	3	7	7	
	Mín	14.820	-0.026	-0.730	0.000	-6.580	-0.297	
	Comb.	2	8	10	8	10	10	
2651	1	2147	9.041	0.024	0.688	0.000	0.000	0.000
		2135	-8.106	-0.024	-0.523	0.000	-6.146	0.157
	2	2147	-0.842	0.017	0.638	0.000	0.000	0.000
		2135	1.777	-0.017	-0.473	0.000	-5.642	0.255
	3	2147	11.594	0.024	0.629	0.000	0.000	0.000
		2135	-10.658	-0.024	-0.464	0.000	-5.554	0.157
	4	2147	1.711	0.017	0.580	0.000	0.000	0.000
		2135	-0.775	-0.017	-0.415	0.000	-5.050	0.255
	5	2147	18.918	0.024	0.455	0.000	0.000	0.000
		2135	-17.983	-0.024	-0.290	0.000	-3.786	0.157
	6	2147	9.035	0.017	0.406	0.000	0.000	0.000
		2135	-8.099	-0.017	-0.241	0.000	-3.283	0.256
	7	2147	21.471	0.024	0.397	0.000	0.000	0.000
		2135	-20.535	-0.024	-0.232	0.000	-3.194	0.158
	8	2147	11.588	0.017	0.347	0.000	0.000	0.000
		2135	-10.652	-0.017	-0.183	0.000	-2.691	0.256
	9	2147	10.221	-0.017	0.694	0.000	0.000	0.000
		2135	-9.286	0.017	-0.529	0.000	-6.213	-0.262
	10	2147	0.338	-0.025	0.645	0.000	0.000	0.000
		2135	0.598	0.025	-0.480	0.000	-5.709	-0.163
	11	2147	12.774	-0.017	0.636	0.000	0.000	0.000
		2135	-11.838	0.017	-0.471	0.000	-5.621	-0.261

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

Página:104
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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
	12 2147	2.891	-0.025	0.586	0.000	0.000	0.000
	2135	-1.955	0.025	-0.422	0.000	-5.118	-0.163
	13 2147	20.098	-0.017	0.462	0.000	0.000	0.000
	2135	-19.163	0.017	-0.297	0.000	-3.853	-0.261
	14 2147	10.215	-0.025	0.412	0.000	0.000	0.000
	2135	-9.279	0.025	-0.247	0.000	-3.350	-0.163
	15 2147	22.651	-0.017	0.404	0.000	0.000	0.000
	2135	-21.715	0.017	-0.239	0.000	-3.262	-0.261
	16 2147	12.767	-0.024	0.354	0.000	0.000	0.000
	2135	-11.832	0.024	-0.189	0.000	-2.758	-0.163
Máx Comb. Mín Comb.		22.651	0.024	0.694	0.000	6.213	0.262
	15	7	9	9	9	9	9
		-1.777	-0.025	0.183	0.000	0.000	-0.256
	2	10	8	8	8	2	8
2652	1 2148	87.282	-0.185	0.007	0.000	0.000	0.000
	2036	-86.346	0.185	-0.172	0.000	-1.007	-2.037
	2 2148	75.372	-0.201	-0.018	0.000	0.000	0.000
	2036	-74.436	0.201	-0.147	0.000	-0.565	-1.875
	3 2148	86.657	-0.166	0.007	0.000	0.000	0.000
	2036	-85.722	0.166	-0.172	0.000	-1.009	-1.847
	4 2148	74.747	-0.182	-0.018	0.000	0.000	0.000
	2036	-73.811	0.182	-0.147	0.000	-0.567	-1.684
	5 2148	84.462	-0.110	0.008	0.000	0.000	0.000
	2036	-83.527	0.110	-0.173	0.000	-1.011	-1.278
	6 2148	72.552	-0.126	-0.018	0.000	0.000	0.000
	2036	-71.616	0.126	-0.147	0.000	-0.569	-1.116
	7 2148	83.838	-0.091	0.008	0.000	0.000	0.000
	2036	-82.902	0.091	-0.173	0.000	-1.012	-1.087
	8 2148	71.927	-0.107	-0.018	0.000	0.000	0.000
	2036	-70.992	0.107	-0.147	0.000	-0.570	-0.925
	9 2148	43.180	-0.187	-0.119	0.000	0.000	0.000
	2036	-42.244	0.187	-0.046	0.000	0.274	-2.060
	10 2148	31.270	-0.203	-0.144	0.000	0.000	0.000
	2036	-30.334	0.203	-0.021	0.000	0.716	-1.898
	11 2148	42.555	-0.168	-0.119	0.000	0.000	0.000
	2036	-41.620	0.168	-0.046	0.000	0.272	-1.870
	12 2148	30.645	-0.184	-0.144	0.000	0.000	0.000
	2036	-29.709	0.184	-0.021	0.000	0.714	-1.708
	13 2148	40.361	-0.112	-0.118	0.000	0.000	0.000
	2036	-39.425	0.112	-0.046	0.000	0.270	-1.301
	14 2148	28.450	-0.128	-0.144	0.000	0.000	0.000
	2036	-27.514	0.128	-0.021	0.000	0.712	-1.139

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 1 tabela
Preparado por:

Página:105
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RESULTADOS (Unids: tf, tf*metro)									
BarraComb	Nó	Axial	V2	V3	MT	M2	M3		
2652	15	2148	39.736	-0.093	-0.118	0.000	0.000	0.000	
		2036	-38.800	0.093	-0.047	0.000	0.269	-1.110	
	16	2148	27.825	-0.109	-0.144	0.000	0.000	0.000	
		2036	-26.890	0.109	-0.021	0.000	0.711	-0.948	
	Máx		87.282	-0.091	0.173	0.000	1.012	2.060	
	Comb.		1	7	7	9	7	9	
	Mín		26.890	-0.203	-0.144	0.000	-0.716	0.000	
	Comb.		16	10	10	2	10	8	
	2653	1	2149	6.389	0.024	0.687	0.000	0.000	0.000
			2138	-5.453	-0.024	-0.522	0.000	-6.133	0.157
2		2149	0.224	0.017	0.639	0.000	0.000	0.000	
		2138	0.712	-0.017	-0.474	0.000	-5.650	0.255	
3		2149	8.953	0.024	0.628	0.000	0.000	0.000	
		2138	-8.017	-0.024	-0.463	0.000	-5.541	0.157	
4		2149	2.788	0.017	0.581	0.000	0.000	0.000	
		2138	-1.852	-0.017	-0.416	0.000	-5.058	0.255	
5		2149	16.310	0.024	0.454	0.000	0.000	0.000	
		2138	-15.375	-0.024	-0.289	0.000	-3.774	0.157	
6		2149	10.145	0.017	0.407	0.000	0.000	0.000	
		2138	-9.210	-0.017	-0.242	0.000	-3.290	0.256	
7		2149	18.874	0.024	0.396	0.000	0.000	0.000	
		2138	-17.938	-0.024	-0.231	0.000	-3.182	0.158	
8		2149	12.709	0.017	0.348	0.000	0.000	0.000	
		2138	-11.773	-0.017	-0.183	0.000	-2.698	0.256	
9		2149	8.522	-0.017	0.692	0.000	0.000	0.000	
		2138	-7.586	0.017	-0.527	0.000	-6.186	-0.262	
10		2149	2.357	-0.025	0.644	0.000	0.000	0.000	
		2138	-1.421	0.025	-0.479	0.000	-5.703	-0.163	
11		2149	11.085	-0.017	0.633	0.000	0.000	0.000	
		2138	-10.150	0.017	-0.468	0.000	-5.594	-0.261	
12		2149	4.920	-0.025	0.586	0.000	0.000	0.000	
		2138	-3.984	0.025	-0.421	0.000	-5.111	-0.163	
13		2149	18.443	-0.017	0.459	0.000	0.000	0.000	
		2138	-17.507	0.017	-0.294	0.000	-3.826	-0.261	
14		2149	12.278	-0.025	0.412	0.000	0.000	0.000	
		2138	-11.342	0.025	-0.247	0.000	-3.343	-0.163	
15		2149	21.006	-0.017	0.401	0.000	0.000	0.000	
		2138	-20.071	0.017	-0.236	0.000	-3.234	-0.261	
16		2149	14.841	-0.024	0.353	0.000	0.000	0.000	
		2138	-13.906	0.024	-0.188	0.000	-2.751	-0.163	
Máx			21.006	0.024	0.692	0.000	6.186	0.262	
Comb.			15	7	9	7	9	9	
Mín			-0.712	-0.025	0.183	0.000	0.000	-0.256	
Comb.			2	10	8	10	2	8	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
estaca apoio 1 tabela
Preparado por:

Página:106
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RESULTADOS (Unids: tf, tf*metro)							
<i>BarraComb</i>	<i>Nó</i>	<i>Axial</i>	<i>V2</i>	<i>V3</i>	<i>MT</i>	<i>M2</i>	<i>M3</i>
* Máximo		103.590	0.026	0.702	0.000	6.293	2.060
Barra		2637	2648	2637	2643	2637	2643
Comb.		1	9	1	1	1	1
* Mínimo		-1.777	-0.203	-0.732	0.000	-6.591	-0.297
Barra		2651	2643	2640	2642	2640	2648
Comb.		2	2	2	8	2	10

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:106
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)									
BarraComb	Nó	Axial	V2	V3	MT	M2	M3		
2600	1	2055	93.294	-0.017	0.023	0.000	0.000	0.000	
		2053	-92.359	0.017	-0.023	0.000	-0.714	-0.317	
	2	2055	70.476	-0.027	-0.009	0.000	0.000	0.000	
		2053	-69.541	0.027	0.009	0.000	0.542	-0.117	
	3	2055	87.730	-0.017	0.000	0.000	0.000	0.000	
		2053	-86.794	0.017	0.000	0.000	-0.486	-0.320	
	4	2055	64.912	-0.028	-0.031	0.000	0.000	0.000	
		2053	-63.976	0.028	0.031	0.000	0.769	-0.121	
	5	2055	89.096	-0.017	0.006	0.000	0.000	0.000	
		2053	-88.161	0.017	-0.006	0.000	-0.546	-0.319	
	6	2055	66.278	-0.027	-0.025	0.000	0.000	0.000	
		2053	-65.342	0.027	0.025	0.000	0.709	-0.120	
	7	2055	83.532	-0.018	-0.016	0.000	0.000	0.000	
		2053	-82.596	0.018	0.016	0.000	-0.319	-0.323	
	8	2055	60.714	-0.028	-0.048	0.000	0.000	0.000	
		2053	-59.778	0.028	0.048	0.000	0.937	-0.123	
9	2055	88.893	0.024	0.023	0.000	0.000	0.000		
	2053	-87.957	-0.024	-0.023	0.000	-0.718	0.089		
10	2055	66.075	0.013	-0.008	0.000	0.000	0.000		
	2053	-65.139	-0.013	0.008	0.000	0.537	0.289		
11	2055	83.328	0.023	0.001	0.000	0.000	0.000		
	2053	-82.393	-0.023	-0.001	0.000	-0.491	0.086		
12	2055	60.510	0.013	-0.031	0.000	0.000	0.000		
	2053	-59.575	-0.013	0.031	0.000	0.765	0.285		
13	2055	84.695	0.023	0.007	0.000	0.000	0.000		
	2053	-83.759	-0.023	-0.007	0.000	-0.551	0.087		
14	2055	61.877	0.013	-0.025	0.000	0.000	0.000		
	2053	-60.941	-0.013	0.025	0.000	0.705	0.286		
15	2055	79.130	0.023	-0.016	0.000	0.000	0.000		
	2053	-78.194	-0.023	0.016	0.000	-0.323	0.083		
16	2055	56.312	0.013	-0.048	0.000	0.000	0.000		
	2053	-55.376	-0.013	0.048	0.000	0.932	0.283		
	Máx	93.294	0.024	0.023	0.000	0.718	0.323		
	Comb.	1	9	9	9	9	7		
	Mín	55.376	-0.028	-0.048	0.000	-0.937	-0.289		
	Comb.	16	8	8	8	8	10		
2601	1	2057	117.069	0.025	0.083	0.000	0.000	0.000	
		2050	-116.133	-0.025	0.082	0.000	-0.432	0.106	
	2	2057	89.619	0.015	0.052	0.000	0.000	0.000	
		2050	-88.683	-0.015	0.113	0.000	0.777	0.297	
	3	2057	94.980	0.026	0.101	0.000	0.000	0.000	
		2050	-94.045	-0.026	0.064	0.000	-0.618	0.115	
	4	2057	67.531	0.016	0.070	0.000	0.000	0.000	
		2050	-66.595	-0.016	0.095	0.000	0.592	0.306	

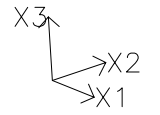
ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:107
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2057	100.442	0.026	0.096	0.000	0.000	0.000
	2050	-99.506	-0.026	0.069	0.000	-0.568	0.112
6	2057	72.992	0.016	0.065	0.000	0.000	0.000
	2050	-72.056	-0.016	0.100	0.000	0.641	0.304
7	2057	78.353	0.027	0.114	0.000	0.000	0.000
	2050	-77.417	-0.027	0.051	0.000	-0.753	0.121
8	2057	50.904	0.017	0.084	0.000	0.000	0.000
	2050	-49.968	-0.017	0.081	0.000	0.456	0.313
9	2057	113.368	-0.013	0.081	0.000	0.000	0.000
	2050	-112.432	0.013	0.084	0.000	-0.420	-0.287
10	2057	85.919	-0.023	0.051	0.000	0.000	0.000
	2050	-84.983	0.023	0.114	0.000	0.789	-0.095
11	2057	91.280	-0.013	0.100	0.000	0.000	0.000
	2050	-90.344	0.013	0.065	0.000	-0.605	-0.278
12	2057	63.830	-0.022	0.069	0.000	0.000	0.000
	2050	-62.895	0.022	0.096	0.000	0.604	-0.086
13	2057	96.741	-0.013	0.095	0.000	0.000	0.000
	2050	-95.805	0.013	0.070	0.000	-0.556	-0.280
14	2057	69.291	-0.023	0.064	0.000	0.000	0.000
	2050	-68.356	0.023	0.101	0.000	0.653	-0.088
15	2057	74.653	-0.012	0.113	0.000	0.000	0.000
	2050	-73.717	0.012	0.052	0.000	-0.741	-0.271
16	2057	47.203	-0.022	0.082	0.000	0.000	0.000
	2050	-46.267	0.022	0.083	0.000	0.468	-0.079
	Máx	117.069	0.027	0.114	0.000	0.753	0.287
	Comb.	1	7	7	1	7	9
	Mín	46.267	-0.023	-0.114	0.000	-0.789	-0.313
	Comb.	16	10	10	16	10	8
2602	1 2056	66.656	0.006	0.148	0.000	0.000	0.000
	2045	-65.721	-0.006	0.017	0.000	-0.860	-0.169
2	2056	50.735	-0.004	0.118	0.000	0.000	0.000
	2045	-49.800	0.004	0.047	0.000	-0.147	0.198
3	2056	60.899	0.000	0.148	0.000	0.000	0.000
	2045	-59.964	0.000	0.016	0.000	-0.865	-0.232
4	2056	44.978	-0.010	0.118	0.000	0.000	0.000
	2045	-44.043	0.010	0.047	0.000	-0.152	0.135
5	2056	62.322	0.001	0.148	0.000	0.000	0.000
	2045	-61.386	-0.001	0.017	0.000	-0.864	-0.215
6	2056	46.401	-0.009	0.118	0.000	0.000	0.000
	2045	-45.465	0.009	0.047	0.000	-0.151	0.151
7	2056	56.565	-0.005	0.149	0.000	0.000	0.000
	2045	-55.629	0.005	0.016	0.000	-0.869	-0.278

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

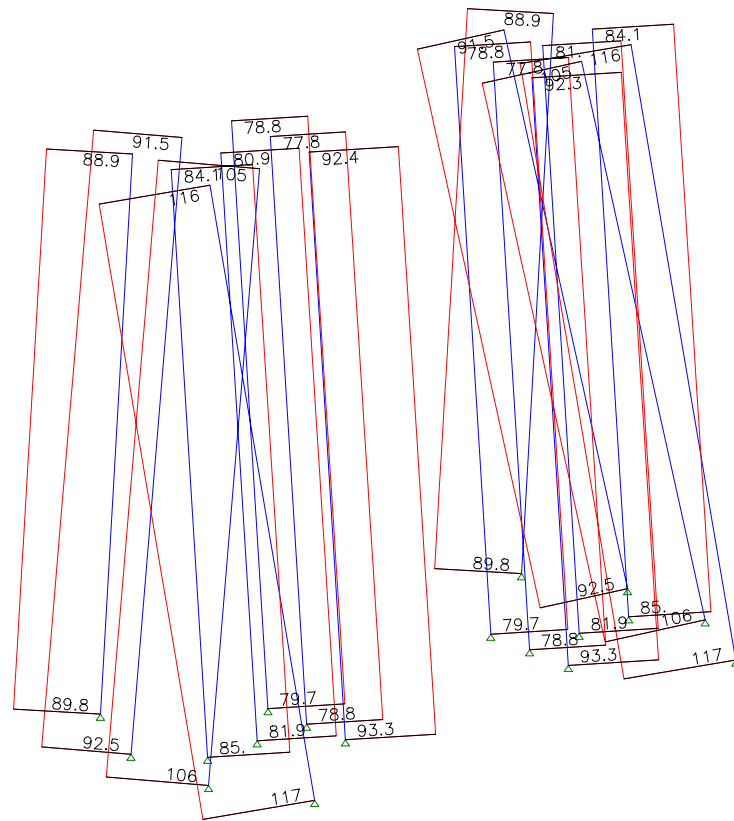
estaca axial apoio 2
VISTA: estaca 2



ESCALA= 1:120

UNIDS: tf

DATA:11/10/11



FORÇA AXIAL

COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:108
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2602	8	2056	40.644	-0.015	0.119	0.000	0.000	0.000
		2045	-39.708	0.015	0.046	0.000	-0.156	0.088
	9	2056	105.899	0.006	0.030	0.000	0.000	0.000
		2045	-104.963	-0.006	0.135	0.000	0.334	-0.165
	10	2056	89.978	-0.004	0.000	0.000	0.000	0.000
		2045	-89.042	0.004	0.165	0.000	1.047	0.201
	11	2056	100.142	0.000	0.031	0.000	0.000	0.000
		2045	-99.206	0.000	0.134	0.000	0.329	-0.228
	12	2056	84.221	-0.010	0.001	0.000	0.000	0.000
		2045	-83.285	0.010	0.164	0.000	1.042	0.138
	13	2056	101.564	0.002	0.031	0.000	0.000	0.000
		2045	-100.629	-0.002	0.134	0.000	0.330	-0.211
	14	2056	85.643	-0.008	0.001	0.000	0.000	0.000
		2045	-84.708	0.008	0.164	0.000	1.043	0.155
	15	2056	95.807	-0.004	0.031	0.000	0.000	0.000
		2045	-94.872	0.004	0.134	0.000	0.325	-0.274
	16	2056	79.886	-0.014	0.001	0.000	0.000	0.000
		2045	-78.951	0.014	0.164	0.000	1.038	0.092
	Máx	105.899	0.006	0.149	0.000	0.869	0.278	
	Comb.	9	9	7	3	7	7	
	Mín	39.708	-0.015	-0.165	0.000	-1.047	-0.201	
	Comb.	8	8	10	16	10	10	
2603	1	2058	69.845	-0.018	0.023	0.000	0.000	0.000
		2054	-68.910	0.018	-0.023	0.000	-0.714	-0.327
	2	2058	47.005	-0.028	-0.009	0.000	0.000	0.000
		2054	-46.069	0.028	0.009	0.000	0.542	-0.127
	3	2058	75.400	-0.018	0.000	0.000	0.000	0.000
		2054	-74.465	0.018	0.000	0.000	-0.486	-0.323
	4	2058	52.560	-0.028	-0.031	0.000	0.000	0.000
		2054	-51.624	0.028	0.031	0.000	0.769	-0.124
	5	2058	74.151	-0.018	0.006	0.000	0.000	0.000
		2054	-73.216	0.018	-0.006	0.000	-0.546	-0.324
	6	2058	51.311	-0.028	-0.025	0.000	0.000	0.000
		2054	-50.375	0.028	0.025	0.000	0.709	-0.125
	7	2058	79.706	-0.017	-0.016	0.000	0.000	0.000
		2054	-78.770	0.017	0.016	0.000	-0.319	-0.321
	8	2058	56.866	-0.028	-0.048	0.000	0.000	0.000
		2054	-55.930	0.028	0.048	0.000	0.937	-0.121
	9	2058	65.406	0.023	0.023	0.000	0.000	0.000
		2054	-64.470	-0.023	-0.023	0.000	-0.718	0.081
10	2058	42.565	0.013	-0.008	0.000	0.000	0.000	
	2054	-41.629	-0.013	0.008	0.000	0.537	0.281	
11	2058	70.960	0.023	0.001	0.000	0.000	0.000	
	2054	-70.025	-0.023	-0.001	0.000	-0.491	0.084	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:109
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
	12	2058	48.120	0.013	-0.031	0.000	0.000	0.000
		2054	-47.184	-0.013	0.031	0.000	0.765	0.284
	13	2058	69.711	0.023	0.007	0.000	0.000	0.000
		2054	-68.776	-0.023	-0.007	0.000	-0.551	0.084
	14	2058	46.871	0.013	-0.025	0.000	0.000	0.000
		2054	-45.935	-0.013	0.025	0.000	0.705	0.283
	15	2058	75.266	0.023	-0.016	0.000	0.000	0.000
		2054	-74.331	-0.023	0.016	0.000	-0.323	0.087
	16	2058	52.426	0.013	-0.048	0.000	0.000	0.000
		2054	-51.490	-0.013	0.048	0.000	0.932	0.286
	Máx		79.706	0.023	0.023	0.000	0.718	0.327
	Comb.		7	15	9	1	9	1
	Mín		41.629	-0.028	-0.048	0.000	-0.937	-0.286
	Comb.		10	2	8	16	8	16
2604	1	2060	51.022	-0.018	0.085	0.000	0.000	0.000
		2051	-50.086	0.018	0.080	0.000	-0.486	-0.324
	2	2060	22.927	-0.028	0.055	0.000	0.000	0.000
		2051	-21.991	0.028	0.110	0.000	0.724	-0.131
	3	2060	73.101	-0.017	0.067	0.000	0.000	0.000
		2051	-72.165	0.017	0.098	0.000	-0.301	-0.315
	4	2060	45.005	-0.027	0.036	0.000	0.000	0.000
		2051	-44.069	0.027	0.129	0.000	0.909	-0.122
	5	2060	67.759	-0.017	0.072	0.000	0.000	0.000
		2051	-66.823	0.017	0.093	0.000	-0.350	-0.317
	6	2060	39.663	-0.027	0.041	0.000	0.000	0.000
		2051	-38.728	0.027	0.124	0.000	0.860	-0.125
	7	2060	89.837	-0.016	0.054	0.000	0.000	0.000
		2051	-88.902	0.016	0.111	0.000	-0.165	-0.308
	8	2060	61.742	-0.026	0.023	0.000	0.000	0.000
		2051	-60.806	0.026	0.142	0.000	1.045	-0.116
	9	2060	46.564	0.021	0.086	0.000	0.000	0.000
		2051	-45.628	-0.021	0.079	0.000	-0.491	0.073
	10	2060	18.468	0.011	0.055	0.000	0.000	0.000
		2051	-17.533	-0.011	0.110	0.000	0.718	0.266
	11	2060	68.643	0.022	0.068	0.000	0.000	0.000
		2051	-67.707	-0.022	0.097	0.000	-0.306	0.082
	12	2060	40.547	0.012	0.037	0.000	0.000	0.000
		2051	-39.611	-0.012	0.128	0.000	0.903	0.274
	13	2060	63.301	0.022	0.072	0.000	0.000	0.000
		2051	-62.365	-0.022	0.093	0.000	-0.355	0.080
	14	2060	35.205	0.012	0.042	0.000	0.000	0.000
		2051	-34.269	-0.012	0.123	0.000	0.854	0.272

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:110
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2604	15	2060	85.379	0.023	0.054	0.000	0.000	0.000
		2051	-84.443	-0.023	0.111	0.000	-0.170	0.089
	16	2060	57.284	0.013	0.024	0.000	0.000	0.000
		2051	-56.348	-0.013	0.141	0.000	1.039	0.281
	Máx		89.837	0.023	0.086	0.000	0.491	0.324
	Comb.		7	15	9	1	9	1
Mín		17.533	-0.028	-0.142	0.000	-1.045	-0.281	
Comb.		10	2	8	2	8	16	
2605	1	2059	42.924	0.006	0.149	0.000	0.000	0.000
		2046	-41.988	-0.006	0.016	0.000	-0.869	-0.169
	2	2059	26.927	-0.004	0.119	0.000	0.000	0.000
		2046	-25.992	0.004	0.046	0.000	-0.155	0.198
	3	2059	48.656	0.000	0.148	0.000	0.000	0.000
		2046	-47.720	0.000	0.017	0.000	-0.864	-0.232
	4	2059	32.659	-0.010	0.118	0.000	0.000	0.000
		2046	-31.723	0.010	0.047	0.000	-0.151	0.135
	5	2059	47.368	0.001	0.148	0.000	0.000	0.000
		2046	-46.432	-0.001	0.017	0.000	-0.865	-0.215
	6	2059	31.371	-0.009	0.118	0.000	0.000	0.000
		2046	-30.435	0.009	0.047	0.000	-0.152	0.151
	7	2059	53.100	-0.005	0.148	0.000	0.000	0.000
		2046	-52.164	0.005	0.017	0.000	-0.860	-0.278
	8	2059	37.103	-0.015	0.118	0.000	0.000	0.000
		2046	-36.167	0.015	0.047	0.000	-0.147	0.088
	9	2059	82.300	0.006	0.031	0.000	0.000	0.000
		2046	-81.364	-0.006	0.134	0.000	0.330	-0.165
	10	2059	66.303	-0.004	0.000	0.000	0.000	0.000
		2046	-65.367	0.004	0.164	0.000	1.044	0.201
	11	2059	88.031	0.000	0.030	0.000	0.000	0.000
		2046	-87.096	0.000	0.135	0.000	0.335	-0.228
	12	2059	72.035	-0.010	0.000	0.000	0.000	0.000
		2046	-71.099	0.010	0.165	0.000	1.049	0.138
	13	2059	86.744	0.002	0.030	0.000	0.000	0.000
		2046	-85.808	-0.002	0.135	0.000	0.334	-0.211
	14	2059	70.747	-0.008	0.000	0.000	0.000	0.000
		2046	-69.811	0.008	0.165	0.000	1.047	0.155
	15	2059	92.475	-0.004	0.030	0.000	0.000	0.000
		2046	-91.540	0.004	0.135	0.000	0.339	-0.274
16	2059	76.478	-0.014	0.000	0.000	0.000	0.000	
	2046	-75.543	0.014	0.165	0.000	1.052	0.092	
Máx		92.475	0.006	0.149	0.000	0.869	0.278	
Comb.		15	9	1	3	1	7	
Mín		25.992	-0.015	-0.165	0.000	-1.052	-0.201	
Comb.		2	8	16	14	16	10	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:111
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2606	1	2061	84.955	-0.018	0.020	0.000	0.000	0.000
		2049	-84.019	0.018	-0.020	0.000	-0.674	-0.322
	2	2061	59.481	-0.028	-0.012	0.000	0.000	0.000
		2049	-58.545	0.028	0.012	0.000	0.562	-0.122
	3	2061	84.950	-0.018	-0.001	0.000	0.000	0.000
		2049	-84.014	0.018	0.001	0.000	-0.467	-0.322
	4	2061	59.476	-0.028	-0.032	0.000	0.000	0.000
		2049	-58.540	0.028	0.032	0.000	0.769	-0.122
	5	2061	85.012	-0.018	0.005	0.000	0.000	0.000
		2049	-84.076	0.018	-0.005	0.000	-0.522	-0.322
	6	2061	59.537	-0.028	-0.027	0.000	0.000	0.000
		2049	-58.602	0.028	0.027	0.000	0.714	-0.122
	7	2061	85.007	-0.018	-0.016	0.000	0.000	0.000
		2049	-84.071	0.018	0.016	0.000	-0.315	-0.322
	8	2061	59.532	-0.028	-0.048	0.000	0.000	0.000
		2049	-58.597	0.028	0.048	0.000	0.921	-0.122
9	2061	80.749	0.023	0.021	0.000	0.000	0.000	
	2049	-79.813	-0.023	-0.021	0.000	-0.684	0.085	
10	2061	55.275	0.013	-0.011	0.000	0.000	0.000	
	2049	-54.339	-0.013	0.011	0.000	0.552	0.285	
11	2061	80.744	0.023	0.000	0.000	0.000	0.000	
	2049	-79.808	-0.023	0.000	0.000	-0.477	0.085	
12	2061	55.270	0.013	-0.031	0.000	0.000	0.000	
	2049	-54.334	-0.013	0.031	0.000	0.759	0.284	
13	2061	80.805	0.023	0.006	0.000	0.000	0.000	
	2049	-79.870	-0.023	-0.006	0.000	-0.531	0.085	
14	2061	55.331	0.013	-0.026	0.000	0.000	0.000	
	2049	-54.395	-0.013	0.026	0.000	0.705	0.285	
15	2061	80.800	0.023	-0.015	0.000	0.000	0.000	
	2049	-79.865	-0.023	0.015	0.000	-0.324	0.085	
16	2061	55.326	0.013	-0.047	0.000	0.000	0.000	
	2049	-54.390	-0.013	0.047	0.000	0.912	0.284	
	Máx	85.012	0.023	0.021	0.000	0.684	0.322	
	Comb.	5	9	9	1	9	7	
	Mín	54.334	-0.028	-0.048	0.000	-0.921	-0.285	
	Comb.	12	8	8	16	8	10	
2607	1	2062	81.827	-0.018	0.022	0.000	0.000	0.000
		2038	-80.891	0.018	-0.022	0.000	-0.694	-0.322
	2	2062	60.595	-0.028	-0.010	0.000	0.000	0.000
		2038	-59.659	0.028	0.010	0.000	0.552	-0.122
3	2062	81.822	-0.018	0.000	0.000	0.000	0.000	
	2038	-80.886	0.018	0.000	0.000	-0.477	-0.322	
4	2062	60.590	-0.028	-0.032	0.000	0.000	0.000	
	2038	-59.654	0.028	0.032	0.000	0.769	-0.122	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2062	81.882	-0.018	0.006	0.000	0.000	0.000
	2038	-80.946	0.018	-0.006	0.000	-0.534	-0.322
6	2062	60.650	-0.028	-0.026	0.000	0.000	0.000
	2038	-59.714	0.028	0.026	0.000	0.712	-0.122
7	2062	81.877	-0.018	-0.016	0.000	0.000	0.000
	2038	-80.941	0.018	0.016	0.000	-0.316	-0.322
8	2062	60.645	-0.028	-0.048	0.000	0.000	0.000
	2038	-59.709	0.028	0.048	0.000	0.929	-0.122
9	2062	77.513	0.023	0.022	0.000	0.000	0.000
	2038	-76.578	-0.023	-0.022	0.000	-0.701	0.085
10	2062	56.281	0.013	-0.009	0.000	0.000	0.000
	2038	-55.346	-0.013	0.009	0.000	0.545	0.285
11	2062	77.508	0.023	0.001	0.000	0.000	0.000
	2038	-76.573	-0.023	-0.001	0.000	-0.484	0.085
12	2062	56.276	0.013	-0.031	0.000	0.000	0.000
	2038	-55.341	-0.013	0.031	0.000	0.762	0.284
13	2062	77.568	0.023	0.006	0.000	0.000	0.000
	2038	-76.633	-0.023	-0.006	0.000	-0.541	0.085
14	2062	56.337	0.013	-0.025	0.000	0.000	0.000
	2038	-55.401	-0.013	0.025	0.000	0.705	0.285
15	2062	77.564	0.023	-0.015	0.000	0.000	0.000
	2038	-76.628	-0.023	0.015	0.000	-0.323	0.085
16	2062	56.332	0.013	-0.047	0.000	0.000	0.000
	2038	-55.396	-0.013	0.047	0.000	0.922	0.284
Máx		81.882	0.023	0.022	0.000	0.701	0.322
Comb.	5		9	9	1	9	7
Mín		55.341	-0.028	-0.048	0.000	-0.929	-0.285
Comb.	12		8	8	16	8	10
2608	1 2063	78.699	-0.018	0.023	0.000	0.000	0.000
	2052	-77.763	0.018	-0.023	0.000	-0.714	-0.322
2	2063	61.667	-0.028	-0.009	0.000	0.000	0.000
	2052	-60.731	0.028	0.009	0.000	0.542	-0.122
3	2063	78.694	-0.018	0.000	0.000	0.000	0.000
	2052	-77.758	0.018	0.000	0.000	-0.486	-0.322
4	2063	61.662	-0.028	-0.031	0.000	0.000	0.000
	2052	-60.726	0.028	0.031	0.000	0.769	-0.122
5	2063	78.753	-0.018	0.006	0.000	0.000	0.000
	2052	-77.817	0.018	-0.006	0.000	-0.546	-0.322
6	2063	61.721	-0.028	-0.025	0.000	0.000	0.000
	2052	-60.785	0.028	0.025	0.000	0.709	-0.122
7	2063	78.748	-0.018	-0.016	0.000	0.000	0.000
	2052	-77.812	0.018	0.016	0.000	-0.319	-0.322

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2608	8	2063	61.716	-0.028	-0.048	0.000	0.000	0.000
		2052	-60.780	0.028	0.048	0.000	0.937	-0.122
	9	2063	74.278	0.023	0.023	0.000	0.000	0.000
		2052	-73.342	-0.023	-0.023	0.000	-0.718	0.085
	10	2063	57.246	0.013	-0.008	0.000	0.000	0.000
		2052	-56.310	-0.013	0.008	0.000	0.537	0.285
	11	2063	74.273	0.023	0.001	0.000	0.000	0.000
		2052	-73.337	-0.023	-0.001	0.000	-0.491	0.085
	12	2063	57.241	0.013	-0.031	0.000	0.000	0.000
		2052	-56.305	-0.013	0.031	0.000	0.765	0.284
	13	2063	74.332	0.023	0.007	0.000	0.000	0.000
		2052	-73.396	-0.023	-0.007	0.000	-0.551	0.085
	14	2063	57.300	0.013	-0.025	0.000	0.000	0.000
		2052	-56.364	-0.013	0.025	0.000	0.705	0.285
	15	2063	74.327	0.023	-0.016	0.000	0.000	0.000
		2052	-73.391	-0.023	0.016	0.000	-0.323	0.085
	16	2063	57.295	0.013	-0.048	0.000	0.000	0.000
		2052	-56.359	-0.013	0.048	0.000	0.932	0.284
	Máx	78.753	0.023	0.023	0.000	0.718	0.322	
	Comb.	5	9	9	1	9	7	
	Mín	56.305	-0.028	-0.048	0.000	-0.937	-0.285	
	Comb.	12	8	8	16	8	10	
2609	1	2072	88.880	-0.013	0.023	0.000	0.000	0.000
		2070	-87.944	0.013	-0.023	0.000	-0.718	-0.289
	2	2072	66.069	-0.024	-0.008	0.000	0.000	0.000
		2070	-65.133	0.024	0.008	0.000	0.536	-0.089
	3	2072	83.314	-0.013	0.001	0.000	0.000	0.000
		2070	-82.379	0.013	-0.001	0.000	-0.490	-0.285
	4	2072	60.504	-0.023	-0.031	0.000	0.000	0.000
		2070	-59.568	0.023	0.031	0.000	0.764	-0.086
	5	2072	84.682	-0.013	0.007	0.000	0.000	0.000
		2070	-83.746	0.013	-0.007	0.000	-0.550	-0.286
	6	2072	61.871	-0.023	-0.025	0.000	0.000	0.000
		2070	-60.936	0.023	0.025	0.000	0.704	-0.087
	7	2072	79.117	-0.013	-0.016	0.000	0.000	0.000
		2070	-78.181	0.013	0.016	0.000	-0.322	-0.283
	8	2072	56.306	-0.023	-0.048	0.000	0.000	0.000
		2070	-55.370	0.023	0.048	0.000	0.931	-0.083
	9	2072	93.279	0.027	0.023	0.000	0.000	0.000
		2070	-92.344	-0.027	-0.023	0.000	-0.713	0.117
	10	2072	70.469	0.017	-0.009	0.000	0.000	0.000
		2070	-69.533	-0.017	0.009	0.000	0.540	0.317
	11	2072	87.714	0.028	0.000	0.000	0.000	0.000
		2070	-86.778	-0.028	0.000	0.000	-0.486	0.121

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
12	2072	64.904	0.017	-0.031	0.000	0.000	0.000
	2070	-63.968	-0.017	0.031	0.000	0.768	0.320
13	2072	89.082	0.027	0.006	0.000	0.000	0.000
	2070	-88.146	-0.027	-0.006	0.000	-0.545	0.120
14	2072	66.271	0.017	-0.025	0.000	0.000	0.000
	2070	-65.336	-0.017	0.025	0.000	0.708	0.319
15	2072	83.517	0.028	-0.017	0.000	0.000	0.000
	2070	-82.581	-0.028	0.017	0.000	-0.318	0.123
16	2072	60.706	0.018	-0.048	0.000	0.000	0.000
	2070	-59.770	-0.018	0.048	0.000	0.936	0.323
Máx Comb.		93.279	0.028	0.023	0.000	0.718	0.289
	9	15	1	1	1	1	1
Mín Comb.		55.370	-0.024	-0.048	0.000	-0.936	-0.323
	8	2	16	16	16	16	16
2610	1 2074	113.380	0.023	0.081	0.000	0.000	0.000
	2067	-112.445	-0.023	0.084	0.000	-0.419	0.095
2	2074	85.926	0.013	0.051	0.000	0.000	0.000
	2067	-84.991	-0.013	0.114	0.000	0.789	0.286
3	2074	91.292	0.022	0.100	0.000	0.000	0.000
	2067	-90.356	-0.022	0.065	0.000	-0.604	0.086
4	2074	63.838	0.013	0.069	0.000	0.000	0.000
	2067	-62.902	-0.013	0.096	0.000	0.603	0.278
5	2074	96.753	0.023	0.095	0.000	0.000	0.000
	2067	-95.817	-0.023	0.070	0.000	-0.555	0.088
6	2074	69.298	0.013	0.064	0.000	0.000	0.000
	2067	-68.363	-0.013	0.101	0.000	0.653	0.280
7	2074	74.664	0.022	0.113	0.000	0.000	0.000
	2067	-73.728	-0.022	0.052	0.000	-0.740	0.079
8	2074	47.210	0.012	0.082	0.000	0.000	0.000
	2067	-46.274	-0.012	0.082	0.000	0.467	0.271
9	2074	117.082	-0.015	0.082	0.000	0.000	0.000
	2067	-116.146	0.015	0.082	0.000	-0.431	-0.298
10	2074	89.627	-0.025	0.052	0.000	0.000	0.000
	2067	-88.692	0.025	0.113	0.000	0.776	-0.106
11	2074	94.993	-0.016	0.101	0.000	0.000	0.000
	2067	-94.057	0.016	0.064	0.000	-0.616	-0.306
12	2074	67.539	-0.026	0.070	0.000	0.000	0.000
	2067	-66.603	0.026	0.095	0.000	0.591	-0.115
13	2074	100.454	-0.016	0.096	0.000	0.000	0.000
	2067	-99.518	0.016	0.069	0.000	-0.567	-0.304
14	2074	73.000	-0.026	0.065	0.000	0.000	0.000
	2067	-72.064	0.026	0.100	0.000	0.640	-0.113

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:115
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)									
BarraComb	Nó	Axial	V2	V3	MT	M2	M3		
2610	15	2074	78.365	-0.017	0.114	0.000	0.000	0.000	
		2067	-77.429	0.017	0.051	0.000	-0.752	-0.313	
	16	2074	50.911	-0.027	0.084	0.000	0.000	0.000	
		2067	-49.975	0.027	0.081	0.000	0.455	-0.121	
	Máx		117.082	0.023	0.114	0.000	0.752	0.313	
	Comb.		9	1	15	1	15	15	
	Mín		46.274	-0.027	-0.114	0.000	-0.789	-0.286	
	Comb.		8	16	2	2	2	2	
	2611	1	2073	105.888	0.006	0.000	0.000	0.000	0.000
			2064	-104.952	-0.006	-0.165	0.000	-1.047	-0.165
2		2073	89.952	-0.004	-0.030	0.000	0.000	0.000	
		2064	-89.017	0.004	-0.135	0.000	-0.334	0.201	
3		2073	100.146	0.000	-0.001	0.000	0.000	0.000	
		2064	-99.210	0.000	-0.164	0.000	-1.042	-0.228	
4		2073	84.210	-0.010	-0.031	0.000	0.000	0.000	
		2064	-83.274	0.010	-0.134	0.000	-0.329	0.138	
5		2073	101.551	0.002	-0.001	0.000	0.000	0.000	
		2064	-100.616	-0.002	-0.164	0.000	-1.043	-0.211	
6		2073	85.616	-0.008	-0.031	0.000	0.000	0.000	
		2064	-84.680	0.008	-0.134	0.000	-0.330	0.155	
7		2073	95.809	-0.005	-0.001	0.000	0.000	0.000	
		2064	-94.873	0.005	-0.164	0.000	-1.038	-0.274	
8		2073	79.873	-0.014	-0.031	0.000	0.000	0.000	
		2064	-78.937	0.014	-0.134	0.000	-0.325	0.092	
9		2073	66.644	0.006	-0.118	0.000	0.000	0.000	
		2064	-65.708	-0.006	-0.047	0.000	0.148	-0.168	
10		2073	50.708	-0.004	-0.148	0.000	0.000	0.000	
		2064	-49.773	0.004	-0.017	0.000	0.861	0.198	
11		2073	60.902	0.000	-0.118	0.000	0.000	0.000	
		2064	-59.966	0.000	-0.047	0.000	0.152	-0.231	
12		2073	44.966	-0.010	-0.148	0.000	0.000	0.000	
		2064	-44.030	0.010	-0.016	0.000	0.865	0.134	
13		2073	62.307	0.001	-0.118	0.000	0.000	0.000	
		2064	-61.372	-0.001	-0.047	0.000	0.152	-0.215	
14		2073	46.372	-0.008	-0.148	0.000	0.000	0.000	
		2064	-45.436	0.008	-0.017	0.000	0.865	0.151	
15		2073	56.565	-0.005	-0.119	0.000	0.000	0.000	
		2064	-55.629	0.005	-0.046	0.000	0.156	-0.278	
16		2073	40.629	-0.015	-0.149	0.000	0.000	0.000	
		2064	-39.694	0.015	-0.016	0.000	0.869	0.088	
Máx			105.888	0.006	0.165	0.000	1.047	0.278	
Comb.			1	1	1	1	1	15	
Mín			39.694	-0.015	-0.149	0.000	-0.869	-0.201	
Comb.			16	16	16	16	16	2	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:116
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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2612	1	2075	65.409	-0.013	0.023	0.000	0.000	0.000
		2071	-64.474	0.013	-0.023	0.000	-0.718	-0.281
	2	2075	42.569	-0.023	-0.008	0.000	0.000	0.000
		2071	-41.633	0.023	0.008	0.000	0.536	-0.081
	3	2075	70.961	-0.013	0.001	0.000	0.000	0.000
		2071	-70.025	0.013	-0.001	0.000	-0.490	-0.284
	4	2075	48.120	-0.023	-0.031	0.000	0.000	0.000
		2071	-47.185	0.023	0.031	0.000	0.764	-0.084
	5	2075	69.714	-0.013	0.007	0.000	0.000	0.000
		2071	-68.779	0.013	-0.007	0.000	-0.550	-0.283
	6	2075	46.874	-0.023	-0.025	0.000	0.000	0.000
		2071	-45.938	0.023	0.025	0.000	0.704	-0.083
	7	2075	75.266	-0.013	-0.016	0.000	0.000	0.000
		2071	-74.330	0.013	0.016	0.000	-0.322	-0.286
	8	2075	52.425	-0.023	-0.048	0.000	0.000	0.000
		2071	-51.490	0.023	0.048	0.000	0.931	-0.087
9	2075	69.851	0.028	0.023	0.000	0.000	0.000	
	2071	-68.915	-0.028	-0.023	0.000	-0.713	0.127	
10	2075	47.010	0.018	-0.009	0.000	0.000	0.000	
	2071	-46.074	-0.018	0.009	0.000	0.540	0.327	
11	2075	75.402	0.028	0.000	0.000	0.000	0.000	
	2071	-74.467	-0.028	0.000	0.000	-0.486	0.124	
12	2075	52.562	0.018	-0.031	0.000	0.000	0.000	
	2071	-51.626	-0.018	0.031	0.000	0.768	0.323	
13	2075	74.156	0.028	0.006	0.000	0.000	0.000	
	2071	-73.220	-0.028	-0.006	0.000	-0.545	0.125	
14	2075	51.315	0.018	-0.025	0.000	0.000	0.000	
	2071	-50.379	-0.018	0.025	0.000	0.708	0.324	
15	2075	79.708	0.028	-0.017	0.000	0.000	0.000	
	2071	-78.772	-0.028	0.017	0.000	-0.318	0.121	
16	2075	56.867	0.017	-0.048	0.000	0.000	0.000	
	2071	-55.931	-0.017	0.048	0.000	0.936	0.321	
	Máx	79.708	0.028	0.023	0.000	0.718	0.286	
	Comb.	15	9	1	1	1	7	
	Mín	41.633	-0.023	-0.048	0.000	-0.936	-0.327	
	Comb.	2	8	16	16	16	10	
2613	1	2077	46.566	-0.011	0.086	0.000	0.000	0.000
		2068	-45.630	0.011	0.079	0.000	-0.491	-0.265
	2	2077	18.475	-0.021	0.055	0.000	0.000	0.000
		2068	-17.539	0.021	0.110	0.000	0.717	-0.073
	3	2077	68.640	-0.012	0.068	0.000	0.000	0.000
		2068	-67.705	0.012	0.097	0.000	-0.305	-0.274
	4	2077	40.549	-0.022	0.037	0.000	0.000	0.000
		2068	-39.614	0.022	0.128	0.000	0.902	-0.082

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2077	63.302	-0.012	0.072	0.000	0.000	0.000
	2068	-62.367	0.012	0.093	0.000	-0.355	-0.272
6	2077	35.211	-0.022	0.042	0.000	0.000	0.000
	2068	-34.276	0.022	0.123	0.000	0.853	-0.080
7	2077	85.377	-0.013	0.054	0.000	0.000	0.000
	2068	-84.441	0.013	0.111	0.000	-0.169	-0.281
8	2077	57.286	-0.023	0.024	0.000	0.000	0.000
	2068	-56.350	0.023	0.141	0.000	1.038	-0.089
9	2077	51.023	0.028	0.085	0.000	0.000	0.000
	2068	-50.088	-0.028	0.080	0.000	-0.485	0.131
10	2077	22.933	0.018	0.055	0.000	0.000	0.000
	2068	-21.997	-0.018	0.110	0.000	0.722	0.324
11	2077	73.098	0.027	0.067	0.000	0.000	0.000
	2068	-72.163	-0.027	0.098	0.000	-0.300	0.122
12	2077	45.007	0.017	0.037	0.000	0.000	0.000
	2068	-44.072	-0.017	0.128	0.000	0.908	0.315
13	2077	67.760	0.027	0.072	0.000	0.000	0.000
	2068	-66.824	-0.027	0.093	0.000	-0.349	0.125
14	2077	39.669	0.017	0.041	0.000	0.000	0.000
	2068	-38.734	-0.017	0.124	0.000	0.858	0.317
15	2077	89.835	0.026	0.054	0.000	0.000	0.000
	2068	-88.899	-0.026	0.111	0.000	-0.164	0.116
16	2077	61.744	0.016	0.023	0.000	0.000	0.000
	2068	-60.808	-0.016	0.142	0.000	1.044	0.308
Máx		89.835	0.028	0.086	0.000	0.491	0.281
Comb.	15	9	1	15	1	7	
Mín		17.539	-0.023	-0.142	0.000	-1.044	-0.324
Comb.	2	8	16	8	16	10	
2614	1 2076	82.298	0.006	-0.001	0.000	0.000	0.000
	2065	-81.362	-0.006	-0.164	0.000	-1.043	-0.165
2	2076	66.302	-0.004	-0.031	0.000	0.000	0.000
	2065	-65.366	0.004	-0.134	0.000	-0.330	0.201
3	2076	88.043	0.000	0.000	0.000	0.000	0.000
	2065	-87.107	0.000	-0.165	0.000	-1.049	-0.228
4	2076	72.047	-0.010	-0.030	0.000	0.000	0.000
	2065	-71.111	0.010	-0.135	0.000	-0.335	0.138
5	2076	86.738	0.002	0.000	0.000	0.000	0.000
	2065	-85.802	-0.002	-0.165	0.000	-1.047	-0.211
6	2076	70.742	-0.008	-0.030	0.000	0.000	0.000
	2065	-69.806	0.008	-0.135	0.000	-0.333	0.155
7	2076	92.483	-0.005	0.000	0.000	0.000	0.000
	2065	-91.547	0.005	-0.165	0.000	-1.052	-0.274

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:118
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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2614	8	2076	76.487	-0.014	-0.030	0.000	0.000	0.000
		2065	-75.551	0.014	-0.135	0.000	-0.339	0.092
	9	2076	42.924	0.006	-0.119	0.000	0.000	0.000
		2065	-41.988	-0.006	-0.046	0.000	0.156	-0.168
	10	2076	26.928	-0.004	-0.149	0.000	0.000	0.000
		2065	-25.992	0.004	-0.016	0.000	0.869	0.198
	11	2076	48.669	0.000	-0.118	0.000	0.000	0.000
		2065	-47.733	0.000	-0.047	0.000	0.150	-0.231
	12	2076	32.673	-0.010	-0.148	0.000	0.000	0.000
		2065	-31.737	0.010	-0.017	0.000	0.864	0.134
	13	2076	47.364	0.001	-0.118	0.000	0.000	0.000
		2065	-46.428	-0.001	-0.047	0.000	0.152	-0.215
	14	2076	31.368	-0.008	-0.148	0.000	0.000	0.000
		2065	-30.432	0.008	-0.017	0.000	0.866	0.151
	15	2076	53.108	-0.005	-0.118	0.000	0.000	0.000
		2065	-52.173	0.005	-0.047	0.000	0.147	-0.278
	16	2076	37.113	-0.015	-0.148	0.000	0.000	0.000
		2065	-36.177	0.015	-0.017	0.000	0.860	0.088
	Máx	92.483	0.006	0.165	0.000	1.052	0.278	
	Comb.	7	1	7	1	7	15	
	Mín	25.992	-0.015	-0.149	0.000	-0.869	-0.201	
	Comb.	10	16	10	10	10	2	
2615	1	2078	80.757	-0.013	0.021	0.000	0.000	0.000
		2066	-79.821	0.013	-0.021	0.000	-0.683	-0.284
	2	2078	55.282	-0.023	-0.011	0.000	0.000	0.000
		2066	-54.346	0.023	0.011	0.000	0.551	-0.085
	3	2078	80.750	-0.013	0.000	0.000	0.000	0.000
		2066	-79.814	0.013	0.000	0.000	-0.476	-0.285
	4	2078	55.275	-0.023	-0.031	0.000	0.000	0.000
		2066	-54.339	0.023	0.031	0.000	0.758	-0.085
	5	2078	80.813	-0.013	0.006	0.000	0.000	0.000
		2066	-79.877	0.013	-0.006	0.000	-0.530	-0.284
	6	2078	55.338	-0.023	-0.026	0.000	0.000	0.000
		2066	-54.402	0.023	0.026	0.000	0.703	-0.085
	7	2078	80.806	-0.013	-0.015	0.000	0.000	0.000
		2066	-79.870	0.013	0.015	0.000	-0.323	-0.284
	8	2078	55.331	-0.023	-0.047	0.000	0.000	0.000
		2066	-54.395	0.023	0.047	0.000	0.911	-0.085
	9	2078	84.963	0.028	0.020	0.000	0.000	0.000
		2066	-84.027	-0.028	-0.020	0.000	-0.674	0.122
10	2078	59.488	0.018	-0.011	0.000	0.000	0.000	
	2066	-58.553	-0.018	0.011	0.000	0.560	0.322	
11	2078	84.956	0.028	-0.001	0.000	0.000	0.000	
	2066	-84.020	-0.028	0.001	0.000	-0.466	0.122	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
12	2078	59.481	0.018	-0.032	0.000	0.000	0.000
	2066	-58.545	-0.018	0.032	0.000	0.767	0.322
13	2078	85.019	0.028	0.005	0.000	0.000	0.000
	2066	-84.084	-0.028	-0.005	0.000	-0.521	0.122
14	2078	59.544	0.018	-0.027	0.000	0.000	0.000
	2066	-58.609	-0.018	0.027	0.000	0.713	0.322
15	2078	85.012	0.028	-0.016	0.000	0.000	0.000
	2066	-84.076	-0.028	0.016	0.000	-0.314	0.122
16	2078	59.537	0.018	-0.047	0.000	0.000	0.000
	2066	-58.601	-0.018	0.047	0.000	0.920	0.322
Máx		85.019	0.028	0.021	0.000	0.683	0.285
Comb.	13		13	1	1	1	3
Mín		54.339	-0.023	-0.047	0.000	-0.920	-0.322
Comb.	4		4	16	16	16	14
2616	1 2079	77.520	-0.013	0.022	0.000	0.000	0.000
	2040	-76.584	0.013	-0.022	0.000	-0.700	-0.284
2	2079	56.287	-0.023	-0.009	0.000	0.000	0.000
	2040	-55.352	0.023	0.009	0.000	0.543	-0.085
3	2079	77.513	-0.013	0.000	0.000	0.000	0.000
	2040	-76.577	0.013	0.000	0.000	-0.483	-0.285
4	2079	56.280	-0.023	-0.031	0.000	0.000	0.000
	2040	-55.345	0.023	0.031	0.000	0.761	-0.085
5	2079	77.575	-0.013	0.006	0.000	0.000	0.000
	2040	-76.639	0.013	-0.006	0.000	-0.540	-0.284
6	2079	56.342	-0.023	-0.025	0.000	0.000	0.000
	2040	-55.407	0.023	0.025	0.000	0.704	-0.085
7	2079	77.568	-0.013	-0.016	0.000	0.000	0.000
	2040	-76.632	0.013	0.016	0.000	-0.323	-0.284
8	2079	56.335	-0.023	-0.047	0.000	0.000	0.000
	2040	-55.400	0.023	0.047	0.000	0.921	-0.085
9	2079	81.833	0.028	0.022	0.000	0.000	0.000
	2040	-80.897	-0.028	-0.022	0.000	-0.693	0.122
10	2079	60.601	0.018	-0.010	0.000	0.000	0.000
	2040	-59.665	-0.018	0.010	0.000	0.550	0.322
11	2079	81.826	0.028	0.000	0.000	0.000	0.000
	2040	-80.890	-0.028	0.000	0.000	-0.476	0.122
12	2079	60.594	0.018	-0.032	0.000	0.000	0.000
	2040	-59.658	-0.018	0.032	0.000	0.768	0.322
13	2079	81.888	0.028	0.006	0.000	0.000	0.000
	2040	-80.952	-0.028	-0.006	0.000	-0.533	0.122
14	2079	60.656	0.018	-0.026	0.000	0.000	0.000
	2040	-59.720	-0.018	0.026	0.000	0.710	0.322

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 2 tabela
Preparado por:

Página:120
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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2616	15	2079	81.881	0.028	-0.016	0.000	0.000	0.000
		2040	-80.945	-0.028	0.016	0.000	-0.316	0.122
	16	2079	60.649	0.018	-0.048	0.000	0.000	0.000
		2040	-59.713	-0.018	0.048	0.000	0.928	0.322
	Máx		81.888	0.028	0.022	0.000	0.700	0.285
	Comb.		13	13	1	1	1	3
Mín		55.345	-0.023	-0.048	0.000	-0.928	-0.322	
Comb.		4	4	16	16	16	14	
2617	1	2080	74.283	-0.013	0.023	0.000	0.000	0.000
		2069	-73.347	0.013	-0.023	0.000	-0.718	-0.284
	2	2080	57.251	-0.023	-0.008	0.000	0.000	0.000
		2069	-56.315	0.023	0.008	0.000	0.536	-0.085
	3	2080	74.276	-0.013	0.001	0.000	0.000	0.000
		2069	-73.340	0.013	-0.001	0.000	-0.490	-0.285
	4	2080	57.244	-0.023	-0.031	0.000	0.000	0.000
		2069	-56.308	0.023	0.031	0.000	0.764	-0.085
	5	2080	74.337	-0.013	0.007	0.000	0.000	0.000
		2069	-73.401	0.013	-0.007	0.000	-0.550	-0.284
	6	2080	57.305	-0.023	-0.025	0.000	0.000	0.000
		2069	-56.369	0.023	0.025	0.000	0.704	-0.085
	7	2080	74.330	-0.013	-0.016	0.000	0.000	0.000
		2069	-73.394	0.013	0.016	0.000	-0.322	-0.284
	8	2080	57.298	-0.023	-0.048	0.000	0.000	0.000
		2069	-56.362	0.023	0.048	0.000	0.931	-0.085
	9	2080	78.703	0.028	0.023	0.000	0.000	0.000
		2069	-77.768	-0.028	-0.023	0.000	-0.713	0.122
	10	2080	61.671	0.018	-0.009	0.000	0.000	0.000
		2069	-60.736	-0.018	0.009	0.000	0.540	0.322
	11	2080	78.697	0.028	0.000	0.000	0.000	0.000
		2069	-77.761	-0.028	0.000	0.000	-0.486	0.122
	12	2080	61.665	0.018	-0.031	0.000	0.000	0.000
		2069	-60.729	-0.018	0.031	0.000	0.768	0.322
13	2080	78.757	0.028	0.006	0.000	0.000	0.000	
	2069	-77.822	-0.028	-0.006	0.000	-0.545	0.122	
14	2080	61.725	0.018	-0.025	0.000	0.000	0.000	
	2069	-60.789	-0.018	0.025	0.000	0.708	0.322	
15	2080	78.750	0.028	-0.017	0.000	0.000	0.000	
	2069	-77.815	-0.028	0.017	0.000	-0.318	0.122	
16	2080	61.718	0.018	-0.048	0.000	0.000	0.000	
	2069	-60.783	-0.018	0.048	0.000	0.936	0.322	
Máx		78.757	0.028	0.023	0.000	0.718	0.285	
Comb.		13	13	1	1	1	3	
Mín		56.308	-0.023	-0.048	0.000	-0.936	-0.322	
Comb.		4	4	16	16	16	14	

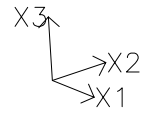
ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
estaca apoio 2 tabela
Preparado por:

Página:121
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)							
<i>BarraComb</i>	<i>Nó</i>	<i>Axial</i>	<i>V2</i>	<i>V3</i>	<i>MT</i>	<i>M2</i>	<i>M3</i>
* Máximo		117.082	0.028	0.165	0.000	1.052	0.327
Barra		2610	2612	2614	2614	2614	2603
Comb.		9	9	7	1	7	1
* Mínimo		17.533	-0.028	-0.165	0.000	-1.052	-0.327
Barra		2604	2603	2605	2604	2605	2612
Comb.		10	2	16	2	16	10

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

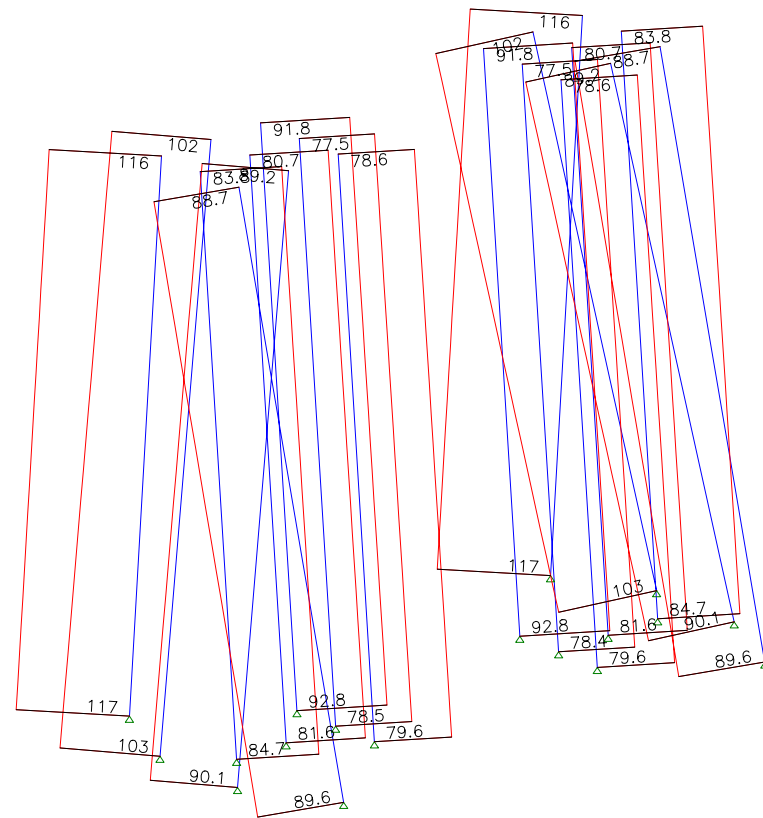
estaca axial apoio 3
VISTA: estaca3



ESCALA= 1:120

UNIDS: tf

DATA:11/10/11



FORÇA AXIAL COMB.: ENVOLTÓRIA

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2618	1	2090	79.574	-0.015	0.048	0.000	0.000	0.000
		2088	-78.638	0.015	-0.048	0.000	-0.935	-0.293
	2	2090	56.708	-0.025	0.017	0.000	0.000	0.000
		2088	-55.772	0.025	-0.017	0.000	0.316	-0.094
	3	2090	74.028	-0.015	0.025	0.000	0.000	0.000
		2088	-73.092	0.015	-0.025	0.000	-0.706	-0.296
	4	2090	51.162	-0.025	-0.006	0.000	0.000	0.000
		2088	-50.226	0.025	0.006	0.000	0.545	-0.098
	5	2090	75.267	-0.015	0.031	0.000	0.000	0.000
		2088	-74.331	0.015	-0.031	0.000	-0.767	-0.295
	6	2090	52.401	-0.025	0.000	0.000	0.000	0.000
		2088	-51.465	0.025	0.000	0.000	0.484	-0.097
	7	2090	69.721	-0.015	0.008	0.000	0.000	0.000
		2088	-68.785	0.015	-0.008	0.000	-0.539	-0.299
	8	2090	46.855	-0.025	-0.023	0.000	0.000	0.000
		2088	-45.919	0.025	0.023	0.000	0.713	-0.100
	9	2090	75.771	0.021	0.049	0.000	0.000	0.000
		2088	-74.835	-0.021	-0.049	0.000	-0.941	0.060
	10	2090	52.905	0.011	0.017	0.000	0.000	0.000
		2088	-51.969	-0.011	-0.017	0.000	0.310	0.258
	11	2090	70.226	0.020	0.026	0.000	0.000	0.000
		2088	-69.290	-0.020	-0.026	0.000	-0.713	0.057
	12	2090	47.360	0.010	-0.006	0.000	0.000	0.000
		2088	-46.424	-0.010	0.006	0.000	0.539	0.255
	13	2090	71.464	0.020	0.032	0.000	0.000	0.000
		2088	-70.528	-0.020	-0.032	0.000	-0.773	0.058
	14	2090	48.598	0.010	0.000	0.000	0.000	0.000
		2088	-47.663	-0.010	0.000	0.000	0.478	0.256
	15	2090	65.919	0.020	0.009	0.000	0.000	0.000
		2088	-64.983	-0.020	-0.009	0.000	-0.545	0.054
	16	2090	43.053	0.010	-0.022	0.000	0.000	0.000
		2088	-42.117	-0.010	0.022	0.000	0.706	0.253
	Máx		79.574	0.021	0.049	0.000	0.941	0.299
	Comb.	1		9	9	7	9	7
	Mín		42.117	-0.025	-0.023	0.000	-0.713	-0.258
	Comb.	16		8	8	10	8	10
2619	1	2092	89.628	0.023	0.054	0.000	0.000	0.000
		2085	-88.692	-0.023	0.111	0.000	-0.169	0.088
	2	2092	61.657	0.014	0.024	0.000	0.000	0.000
		2085	-60.721	-0.014	0.141	0.000	1.037	0.279
	3	2092	67.546	0.024	0.073	0.000	0.000	0.000
		2085	-66.610	-0.024	0.092	0.000	-0.355	0.097
	4	2092	39.574	0.015	0.042	0.000	0.000	0.000
		2085	-38.639	-0.015	0.123	0.000	0.851	0.288

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2092	72.892	0.024	0.068	0.000	0.000	0.000
	2085	-71.956	-0.024	0.097	0.000	-0.305	0.094
6	2092	44.920	0.014	0.037	0.000	0.000	0.000
	2085	-43.985	-0.014	0.128	0.000	0.901	0.286
7	2092	50.809	0.025	0.086	0.000	0.000	0.000
	2085	-49.874	-0.025	0.079	0.000	-0.491	0.103
8	2092	22.838	0.015	0.055	0.000	0.000	0.000
	2085	-21.902	-0.015	0.109	0.000	0.715	0.295
9	2092	86.644	-0.010	0.053	0.000	0.000	0.000
	2085	-85.709	0.010	0.112	0.000	-0.153	-0.252
10	2092	58.673	-0.020	0.022	0.000	0.000	0.000
	2085	-57.737	0.020	0.143	0.000	1.052	-0.061
11	2092	64.562	-0.009	0.071	0.000	0.000	0.000
	2085	-63.626	0.009	0.094	0.000	-0.340	-0.244
12	2092	36.591	-0.019	0.041	0.000	0.000	0.000
	2085	-35.655	0.019	0.124	0.000	0.866	-0.052
13	2092	69.908	-0.010	0.066	0.000	0.000	0.000
	2085	-68.972	0.010	0.099	0.000	-0.289	-0.246
14	2092	41.937	-0.019	0.036	0.000	0.000	0.000
	2085	-41.001	0.019	0.129	0.000	0.916	-0.054
15	2092	47.826	-0.009	0.084	0.000	0.000	0.000
	2085	-46.890	0.009	0.081	0.000	-0.476	-0.237
16	2092	19.854	-0.018	0.054	0.000	0.000	0.000
	2085	-18.919	0.018	0.111	0.000	0.730	-0.045
Máx		89.628	0.025	0.086	0.000	0.491	0.252
Comb.	1		7	7	9	7	9
Mín		18.919	-0.020	-0.143	0.000	-1.052	-0.295
Comb.	16		10	10	10	10	8
2620	1 2091	55.987	0.014	0.140	0.000	0.000	0.000
	2082	-55.052	-0.014	0.025	0.000	-0.776	-0.091
2	2091	39.762	0.005	0.110	0.000	0.000	0.000
	2082	-38.826	-0.005	0.055	0.000	-0.070	0.275
3	2091	50.263	0.008	0.140	0.000	0.000	0.000
	2082	-49.327	-0.008	0.025	0.000	-0.781	-0.154
4	2091	34.037	-0.002	0.110	0.000	0.000	0.000
	2082	-33.101	0.002	0.055	0.000	-0.075	0.212
5	2091	51.544	0.010	0.140	0.000	0.000	0.000
	2082	-50.609	-0.010	0.025	0.000	-0.779	-0.137
6	2091	35.319	0.000	0.110	0.000	0.000	0.000
	2082	-34.383	0.000	0.055	0.000	-0.073	0.228
7	2091	45.820	0.004	0.141	0.000	0.000	0.000
	2082	-44.884	-0.004	0.024	0.000	-0.784	-0.200

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

Página:123
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2620	8	2091	29.594	-0.006	0.111	0.000	0.000	0.000
		2082	-28.658	0.006	0.054	0.000	-0.078	0.165
	9	2091	90.125	0.015	0.038	0.000	0.000	0.000
		2082	-89.190	-0.015	0.127	0.000	0.262	-0.086
	10	2091	73.900	0.005	0.008	0.000	0.000	0.000
		2082	-72.964	-0.005	0.157	0.000	0.968	0.280
	11	2091	84.401	0.009	0.038	0.000	0.000	0.000
		2082	-83.465	-0.009	0.127	0.000	0.257	-0.149
	12	2091	68.175	-0.001	0.008	0.000	0.000	0.000
		2082	-67.239	0.001	0.157	0.000	0.963	0.217
	13	2091	85.682	0.010	0.038	0.000	0.000	0.000
		2082	-84.747	-0.010	0.127	0.000	0.258	-0.132
	14	2091	69.457	0.001	0.008	0.000	0.000	0.000
		2082	-68.521	-0.001	0.157	0.000	0.964	0.234
	15	2091	79.958	0.004	0.038	0.000	0.000	0.000
		2082	-79.022	-0.004	0.127	0.000	0.253	-0.195
	16	2091	63.732	-0.006	0.009	0.000	0.000	0.000
		2082	-62.796	0.006	0.156	0.000	0.959	0.170
		Máx	90.125	0.015	0.141	0.000	0.784	0.200
		Comb.	9	9	7	7	7	7
		Mín	28.658	-0.006	-0.157	0.000	-0.968	-0.280
		Comb.	8	8	10	16	10	10
2621	1	2093	83.035	-0.015	0.048	0.000	0.000	0.000
		2089	-82.100	0.015	-0.048	0.000	-0.935	-0.297
	2	2093	60.329	-0.025	0.017	0.000	0.000	0.000
		2089	-59.393	0.025	-0.017	0.000	0.316	-0.099
	3	2093	88.590	-0.015	0.025	0.000	0.000	0.000
		2089	-87.654	0.015	-0.025	0.000	-0.706	-0.293
	4	2093	65.883	-0.025	-0.006	0.000	0.000	0.000
		2089	-64.948	0.025	0.006	0.000	0.545	-0.095
	5	2093	87.227	-0.015	0.031	0.000	0.000	0.000
		2089	-86.292	0.015	-0.031	0.000	-0.767	-0.294
	6	2093	64.521	-0.025	0.000	0.000	0.000	0.000
		2089	-63.585	0.025	0.000	0.000	0.484	-0.096
	7	2093	92.782	-0.015	0.008	0.000	0.000	0.000
		2089	-91.846	0.015	-0.008	0.000	-0.539	-0.291
	8	2093	70.075	-0.025	-0.023	0.000	0.000	0.000
		2089	-69.140	0.025	0.023	0.000	0.713	-0.093
	9	2093	79.172	0.020	0.049	0.000	0.000	0.000
		2089	-78.236	-0.020	-0.049	0.000	-0.941	0.059
	10	2093	56.466	0.010	0.017	0.000	0.000	0.000
		2089	-55.530	-0.010	-0.017	0.000	0.310	0.256
	11	2093	84.727	0.021	0.026	0.000	0.000	0.000
		2089	-83.791	-0.021	-0.026	0.000	-0.713	0.062

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

Página:124
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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
	12 2093	62.020	0.011	-0.006	0.000	0.000	0.000
	2089	-61.084	-0.011	0.006	0.000	0.539	0.260
	13 2093	83.364	0.021	0.032	0.000	0.000	0.000
	2089	-82.428	-0.021	-0.032	0.000	-0.773	0.061
	14 2093	60.658	0.011	0.000	0.000	0.000	0.000
	2089	-59.722	-0.011	0.000	0.000	0.478	0.259
	15 2093	88.919	0.021	0.009	0.000	0.000	0.000
	2089	-87.983	-0.021	-0.009	0.000	-0.545	0.064
	16 2093	66.212	0.011	-0.022	0.000	0.000	0.000
	2089	-65.276	-0.011	0.022	0.000	0.706	0.262
	Máx	92.782	0.021	0.049	0.000	0.941	0.297
	Comb.	7	15	9	7	9	1
	Mín	55.530	-0.025	-0.023	0.000	-0.713	-0.262
	Comb.	10	2	8	10	8	16
2622	1 2095	77.876	-0.015	0.113	0.000	0.000	0.000
	2086	-76.940	0.015	0.052	0.000	-0.745	-0.289
	2 2095	50.590	-0.024	0.083	0.000	0.000	0.000
	2086	-49.655	0.024	0.082	0.000	0.460	-0.099
	3 2095	99.968	-0.014	0.095	0.000	0.000	0.000
	2086	-99.032	0.014	0.070	0.000	-0.559	-0.280
	4 2095	72.682	-0.024	0.065	0.000	0.000	0.000
	2086	-71.746	0.024	0.100	0.000	0.647	-0.091
	5 2095	94.496	-0.014	0.100	0.000	0.000	0.000
	2086	-93.560	0.014	0.065	0.000	-0.609	-0.282
	6 2095	67.210	-0.024	0.070	0.000	0.000	0.000
	2086	-66.274	0.024	0.095	0.000	0.597	-0.093
	7 2095	116.587	-0.013	0.082	0.000	0.000	0.000
	2086	-115.652	0.013	0.083	0.000	-0.423	-0.274
	8 2095	89.302	-0.023	0.051	0.000	0.000	0.000
	2086	-88.366	0.023	0.114	0.000	0.783	-0.084
	9 2095	73.812	0.019	0.114	0.000	0.000	0.000
	2086	-72.877	-0.019	0.051	0.000	-0.755	0.057
	10 2095	46.527	0.010	0.084	0.000	0.000	0.000
	2086	-45.591	-0.010	0.081	0.000	0.451	0.247
	11 2095	95.904	0.020	0.096	0.000	0.000	0.000
	2086	-94.968	-0.020	0.069	0.000	-0.569	0.066
	12 2095	68.618	0.011	0.066	0.000	0.000	0.000
	2086	-67.683	-0.011	0.099	0.000	0.637	0.256
	13 2095	90.432	0.020	0.101	0.000	0.000	0.000
	2086	-89.496	-0.020	0.064	0.000	-0.619	0.064
	14 2095	63.146	0.010	0.071	0.000	0.000	0.000
	2086	-62.211	-0.010	0.094	0.000	0.587	0.254

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

Página:125
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2622	15	2095	112.524	0.021	0.083	0.000	0.000	0.000
		2086	-111.588	-0.021	0.082	0.000	-0.433	0.073
	16	2095	85.238	0.011	0.052	0.000	0.000	0.000
		2086	-84.302	-0.011	0.113	0.000	0.773	0.263
	Máx		116.587	0.021	0.114	0.000	0.755	0.289
	Comb.		7	15	9	3	9	1
Mín		45.591	-0.024	-0.114	0.000	-0.783	-0.263	
Comb.		10	2	8	14	8	16	
2623	1	2094	58.774	0.014	0.141	0.000	0.000	0.000
		2083	-57.839	-0.014	0.024	0.000	-0.791	-0.091
	2	2094	42.993	0.005	0.111	0.000	0.000	0.000
		2083	-42.058	-0.005	0.053	0.000	-0.086	0.275
	3	2094	64.520	0.008	0.141	0.000	0.000	0.000
		2083	-63.585	-0.008	0.024	0.000	-0.786	-0.154
	4	2094	48.739	-0.002	0.111	0.000	0.000	0.000
		2083	-47.804	0.002	0.054	0.000	-0.080	0.212
	5	2094	63.104	0.010	0.141	0.000	0.000	0.000
		2083	-62.169	-0.010	0.024	0.000	-0.787	-0.137
	6	2094	47.323	0.000	0.111	0.000	0.000	0.000
		2083	-46.388	0.000	0.054	0.000	-0.082	0.228
	7	2094	68.850	0.004	0.140	0.000	0.000	0.000
		2083	-67.915	-0.004	0.025	0.000	-0.782	-0.200
	8	2094	53.069	-0.006	0.111	0.000	0.000	0.000
		2083	-52.134	0.006	0.054	0.000	-0.077	0.165
	9	2094	93.096	0.015	0.038	0.000	0.000	0.000
		2083	-92.161	-0.015	0.126	0.000	0.253	-0.086
10	2094	77.315	0.005	0.009	0.000	0.000	0.000	
	2083	-76.380	-0.005	0.156	0.000	0.959	0.280	
11	2094	98.842	0.009	0.038	0.000	0.000	0.000	
	2083	-97.907	-0.009	0.127	0.000	0.259	-0.149	
12	2094	83.061	-0.001	0.008	0.000	0.000	0.000	
	2083	-82.126	0.001	0.157	0.000	0.964	0.217	
13	2094	97.427	0.010	0.038	0.000	0.000	0.000	
	2083	-96.491	-0.010	0.127	0.000	0.257	-0.132	
14	2094	81.645	0.001	0.008	0.000	0.000	0.000	
	2083	-80.710	-0.001	0.157	0.000	0.963	0.234	
15	2094	103.173	0.004	0.038	0.000	0.000	0.000	
	2083	-102.237	-0.004	0.127	0.000	0.263	-0.195	
16	2094	87.391	-0.006	0.008	0.000	0.000	0.000	
	2083	-86.456	0.006	0.157	0.000	0.968	0.170	
Máx		103.173	0.015	0.141	0.000	0.791	0.200	
Comb.		15	9	1	7	1	7	
Mín		42.058	-0.006	-0.157	0.000	-0.968	-0.280	
Comb.		2	8	16	8	16	10	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

Página:126
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2624	1	2096	84.715	-0.015	0.047	0.000	0.000	0.000
		2084	-83.779	0.015	-0.047	0.000	-0.913	-0.295
	2	2096	59.269	-0.025	0.015	0.000	0.000	0.000
		2084	-58.333	0.025	-0.015	0.000	0.319	-0.097
	3	2096	84.720	-0.015	0.026	0.000	0.000	0.000
		2084	-83.784	0.015	-0.026	0.000	-0.705	-0.294
	4	2096	59.274	-0.025	-0.005	0.000	0.000	0.000
		2084	-58.338	0.025	0.005	0.000	0.527	-0.097
	5	2096	84.655	-0.015	0.032	0.000	0.000	0.000
		2084	-83.719	0.015	-0.032	0.000	-0.760	-0.295
	6	2096	59.209	-0.025	0.000	0.000	0.000	0.000
		2084	-58.273	0.025	0.000	0.000	0.472	-0.097
	7	2096	84.660	-0.015	0.011	0.000	0.000	0.000
		2084	-83.724	0.015	-0.011	0.000	-0.552	-0.294
	8	2096	59.214	-0.025	-0.021	0.000	0.000	0.000
		2084	-58.278	0.025	0.021	0.000	0.680	-0.097
	9	2096	81.082	0.020	0.048	0.000	0.000	0.000
		2084	-80.146	-0.020	-0.048	0.000	-0.926	0.059
	10	2096	55.636	0.010	0.017	0.000	0.000	0.000
		2084	-54.700	-0.010	-0.017	0.000	0.306	0.257
	11	2096	81.087	0.020	0.027	0.000	0.000	0.000
		2084	-80.151	-0.020	-0.027	0.000	-0.718	0.059
	12	2096	55.641	0.010	-0.004	0.000	0.000	0.000
		2084	-54.705	-0.010	0.004	0.000	0.514	0.257
	13	2096	81.022	0.020	0.033	0.000	0.000	0.000
		2084	-80.086	-0.020	-0.033	0.000	-0.774	0.059
	14	2096	55.576	0.010	0.001	0.000	0.000	0.000
		2084	-54.640	-0.010	-0.001	0.000	0.458	0.257
	15	2096	81.026	0.020	0.012	0.000	0.000	0.000
		2084	-80.091	-0.020	-0.012	0.000	-0.566	0.060
	16	2096	55.580	0.010	-0.019	0.000	0.000	0.000
		2084	-54.645	-0.010	0.019	0.000	0.666	0.257
	Máx		84.720	0.020	0.048	0.000	0.926	0.295
	Comb.	3		15	9	7	9	1
	Mín		54.640	-0.025	-0.021	0.000	-0.680	-0.257
	Comb.	14		2	8	10	8	16
2625	1	2097	81.582	-0.015	0.047	0.000	0.000	0.000
		2042	-80.646	0.015	-0.047	0.000	-0.924	-0.295
	2	2097	60.375	-0.025	0.016	0.000	0.000	0.000
		2042	-59.439	0.025	-0.016	0.000	0.318	-0.097
	3	2097	81.586	-0.015	0.026	0.000	0.000	0.000
		2042	-80.651	0.015	-0.026	0.000	-0.706	-0.294
	4	2097	60.380	-0.025	-0.006	0.000	0.000	0.000
		2042	-59.444	0.025	0.006	0.000	0.536	-0.097

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

Página:127
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2097	81.523	-0.015	0.031	0.000	0.000	0.000
	2042	-80.587	0.015	-0.031	0.000	-0.764	-0.295
6	2097	60.316	-0.025	0.000	0.000	0.000	0.000
	2042	-59.381	0.025	0.000	0.000	0.478	-0.097
7	2097	81.527	-0.015	0.010	0.000	0.000	0.000
	2042	-80.592	0.015	-0.010	0.000	-0.545	-0.294
8	2097	60.321	-0.025	-0.022	0.000	0.000	0.000
	2042	-59.385	0.025	0.022	0.000	0.696	-0.097
9	2097	77.849	0.020	0.048	0.000	0.000	0.000
	2042	-76.913	-0.020	-0.048	0.000	-0.934	0.059
10	2097	56.642	0.010	0.017	0.000	0.000	0.000
	2042	-55.706	-0.010	-0.017	0.000	0.308	0.257
11	2097	77.853	0.020	0.027	0.000	0.000	0.000
	2042	-76.918	-0.020	-0.027	0.000	-0.715	0.059
12	2097	56.647	0.010	-0.005	0.000	0.000	0.000
	2042	-55.711	-0.010	0.005	0.000	0.526	0.257
13	2097	77.790	0.020	0.032	0.000	0.000	0.000
	2042	-76.854	-0.020	-0.032	0.000	-0.773	0.059
14	2097	56.583	0.010	0.001	0.000	0.000	0.000
	2042	-55.648	-0.010	-0.001	0.000	0.468	0.257
15	2097	77.794	0.020	0.011	0.000	0.000	0.000
	2042	-76.859	-0.020	-0.011	0.000	-0.555	0.060
16	2097	56.588	0.010	-0.021	0.000	0.000	0.000
	2042	-55.652	-0.010	0.021	0.000	0.686	0.257
Máx Comb.		81.586	0.020	0.048	0.000	0.934	0.295
		3	15	9	7	9	1
Mín Comb.		55.648	-0.025	-0.022	0.000	-0.696	-0.257
		14	2	8	10	8	16
2626	1 2098	78.446	-0.015	0.048	0.000	0.000	0.000
	2087	-77.510	0.015	-0.048	0.000	-0.935	-0.295
2	2098	61.431	-0.025	0.017	0.000	0.000	0.000
	2087	-60.495	0.025	-0.017	0.000	0.316	-0.097
3	2098	78.450	-0.015	0.025	0.000	0.000	0.000
	2087	-77.514	0.015	-0.025	0.000	-0.706	-0.294
4	2098	61.435	-0.025	-0.006	0.000	0.000	0.000
	2087	-60.499	0.025	0.006	0.000	0.545	-0.097
5	2098	78.388	-0.015	0.031	0.000	0.000	0.000
	2087	-77.453	0.015	-0.031	0.000	-0.767	-0.295
6	2098	61.373	-0.025	0.000	0.000	0.000	0.000
	2087	-60.437	0.025	0.000	0.000	0.484	-0.097
7	2098	78.393	-0.015	0.008	0.000	0.000	0.000
	2087	-77.457	0.015	-0.008	0.000	-0.539	-0.294

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2626	8	2098	61.378	-0.025	-0.023	0.000	0.000	0.000
		2087	-60.442	0.025	0.023	0.000	0.713	-0.097
	9	2098	74.613	0.020	0.049	0.000	0.000	0.000
		2087	-73.677	-0.020	-0.049	0.000	-0.941	0.059
	10	2098	57.598	0.010	0.017	0.000	0.000	0.000
		2087	-56.662	-0.010	-0.017	0.000	0.310	0.257
	11	2098	74.617	0.020	0.026	0.000	0.000	0.000
		2087	-73.682	-0.020	-0.026	0.000	-0.713	0.059
	12	2098	57.602	0.010	-0.006	0.000	0.000	0.000
		2087	-56.667	-0.010	0.006	0.000	0.539	0.257
	13	2098	74.555	0.020	0.032	0.000	0.000	0.000
		2087	-73.620	-0.020	-0.032	0.000	-0.773	0.059
	14	2098	57.540	0.010	0.000	0.000	0.000	0.000
		2087	-56.605	-0.010	0.000	0.000	0.478	0.257
	15	2098	74.560	0.020	0.009	0.000	0.000	0.000
		2087	-73.624	-0.020	-0.009	0.000	-0.545	0.060
	16	2098	57.545	0.010	-0.022	0.000	0.000	0.000
		2087	-56.609	-0.010	0.022	0.000	0.706	0.257
	Máx		78.450	0.020	0.049	0.000	0.941	0.295
	Comb.	3	15	9	15	9	1	
	Mín		56.605	-0.025	-0.023	0.000	-0.713	-0.257
	Comb.	14	2	8	2	8	16	
2627	1	2107	75.772	-0.011	0.049	0.000	0.000	0.000
		2105	-74.836	0.011	-0.049	0.000	-0.941	-0.259
	2	2107	52.906	-0.021	0.017	0.000	0.000	0.000
		2105	-51.970	0.021	-0.017	0.000	0.310	-0.060
	3	2107	70.228	-0.010	0.026	0.000	0.000	0.000
		2105	-69.292	0.010	-0.026	0.000	-0.713	-0.255
	4	2107	47.361	-0.020	-0.006	0.000	0.000	0.000
		2105	-46.426	0.020	0.006	0.000	0.539	-0.057
	5	2107	71.465	-0.010	0.032	0.000	0.000	0.000
		2105	-70.529	0.010	-0.032	0.000	-0.773	-0.256
	6	2107	48.599	-0.020	0.000	0.000	0.000	0.000
		2105	-47.663	0.020	0.000	0.000	0.478	-0.058
	7	2107	65.921	-0.010	0.009	0.000	0.000	0.000
		2105	-64.985	0.010	-0.009	0.000	-0.545	-0.253
	8	2107	43.055	-0.020	-0.022	0.000	0.000	0.000
		2105	-42.119	0.020	0.022	0.000	0.706	-0.054
	9	2107	79.575	0.025	0.048	0.000	0.000	0.000
		2105	-78.639	-0.025	-0.048	0.000	-0.935	0.094
	10	2107	56.708	0.015	0.017	0.000	0.000	0.000
		2105	-55.772	-0.015	-0.017	0.000	0.316	0.293
	11	2107	74.030	0.025	0.025	0.000	0.000	0.000
		2105	-73.094	-0.025	-0.025	0.000	-0.707	0.098

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
	12 2107	51.164	0.015	-0.006	0.000	0.000	0.000
	2105	-50.228	-0.015	0.006	0.000	0.545	0.296
	13 2107	75.268	0.025	0.031	0.000	0.000	0.000
	2105	-74.332	-0.025	-0.031	0.000	-0.767	0.097
	14 2107	52.401	0.015	0.000	0.000	0.000	0.000
	2105	-51.466	-0.015	0.000	0.000	0.484	0.295
	15 2107	69.723	0.025	0.008	0.000	0.000	0.000
	2105	-68.788	-0.025	-0.008	0.000	-0.539	0.100
	16 2107	46.857	0.015	-0.023	0.000	0.000	0.000
	2105	-45.921	-0.015	0.023	0.000	0.713	0.299
	Máx	79.575	0.025	0.049	0.000	0.941	0.259
	Comb.	9	15	1	7	1	1
	Mín	42.119	-0.021	-0.023	0.000	-0.713	-0.299
	Comb.	8	2	16	10	16	16
2628	1 2109	86.644	0.020	0.053	0.000	0.000	0.000
	2102	-85.708	-0.020	0.112	0.000	-0.154	0.061
2	2109	58.673	0.010	0.022	0.000	0.000	0.000
	2102	-57.737	-0.010	0.143	0.000	1.052	0.253
3	2109	64.565	0.019	0.071	0.000	0.000	0.000
	2102	-63.629	-0.019	0.094	0.000	-0.340	0.052
4	2109	36.593	0.009	0.041	0.000	0.000	0.000
	2102	-35.658	-0.009	0.124	0.000	0.866	0.244
5	2109	69.908	0.019	0.066	0.000	0.000	0.000
	2102	-68.972	-0.019	0.099	0.000	-0.290	0.054
6	2109	41.936	0.010	0.036	0.000	0.000	0.000
	2102	-41.001	-0.010	0.129	0.000	0.916	0.246
7	2109	47.828	0.018	0.084	0.000	0.000	0.000
	2102	-46.892	-0.018	0.081	0.000	-0.476	0.045
8	2109	19.857	0.009	0.054	0.000	0.000	0.000
	2102	-18.921	-0.009	0.111	0.000	0.730	0.237
9	2109	89.628	-0.014	0.054	0.000	0.000	0.000
	2102	-88.692	0.014	0.111	0.000	-0.169	-0.279
10	2109	61.656	-0.023	0.024	0.000	0.000	0.000
	2102	-60.721	0.023	0.141	0.000	1.037	-0.088
11	2109	67.548	-0.015	0.073	0.000	0.000	0.000
	2102	-66.612	0.015	0.092	0.000	-0.355	-0.288
12	2109	39.577	-0.024	0.042	0.000	0.000	0.000
	2102	-38.641	0.024	0.123	0.000	0.851	-0.097
13	2109	72.891	-0.014	0.068	0.000	0.000	0.000
	2102	-71.955	0.014	0.097	0.000	-0.305	-0.286
14	2109	44.920	-0.024	0.037	0.000	0.000	0.000
	2102	-43.984	0.024	0.128	0.000	0.901	-0.094

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)									
BarraComb	Nó	Axial	V2	V3	MT	M2	M3		
2628	15	2109	50.812	-0.015	0.086	0.000	0.000	0.000	
		2102	-49.876	0.015	0.079	0.000	-0.491	-0.295	
	16	2109	22.840	-0.025	0.055	0.000	0.000	0.000	
		2102	-21.905	0.025	0.109	0.000	0.715	-0.103	
	Máx		89.628	0.020	0.086	0.000	0.491	0.295	
	Comb.		9	1	15	1	15	15	
	Mín		18.921	-0.025	-0.143	0.000	-1.052	-0.253	
	Comb.		8	16	2	2	2	2	
	2629	1	2108	90.149	0.015	-0.008	0.000	0.000	0.000
			2099	-89.213	-0.015	-0.157	0.000	-0.968	-0.086
2		2108	73.917	0.005	-0.038	0.000	0.000	0.000	
		2099	-72.981	-0.005	-0.127	0.000	-0.263	0.280	
3		2108	84.412	0.009	-0.008	0.000	0.000	0.000	
		2099	-83.477	-0.009	-0.157	0.000	-0.963	-0.149	
4		2108	68.181	-0.001	-0.038	0.000	0.000	0.000	
		2099	-67.245	0.001	-0.127	0.000	-0.257	0.217	
5		2108	85.705	0.010	-0.008	0.000	0.000	0.000	
		2099	-84.769	-0.010	-0.157	0.000	-0.965	-0.132	
6		2108	69.474	0.001	-0.038	0.000	0.000	0.000	
		2099	-68.538	-0.001	-0.127	0.000	-0.259	0.233	
7		2108	79.969	0.004	-0.009	0.000	0.000	0.000	
		2099	-79.033	-0.004	-0.156	0.000	-0.959	-0.195	
8		2108	63.737	-0.006	-0.038	0.000	0.000	0.000	
		2099	-62.802	0.006	-0.127	0.000	-0.254	0.170	
9		2108	56.011	0.014	-0.110	0.000	0.000	0.000	
		2099	-55.075	-0.014	-0.055	0.000	0.069	-0.091	
10		2108	39.779	0.005	-0.140	0.000	0.000	0.000	
		2099	-38.843	-0.005	-0.025	0.000	0.775	0.275	
11		2108	50.274	0.008	-0.110	0.000	0.000	0.000	
		2099	-49.339	-0.008	-0.055	0.000	0.075	-0.154	
12		2108	34.043	-0.002	-0.140	0.000	0.000	0.000	
		2099	-33.107	0.002	-0.025	0.000	0.781	0.211	
13		2108	51.567	0.010	-0.110	0.000	0.000	0.000	
		2099	-50.631	-0.010	-0.055	0.000	0.073	-0.137	
14		2108	35.335	0.000	-0.140	0.000	0.000	0.000	
		2099	-34.400	0.000	-0.025	0.000	0.779	0.228	
15		2108	45.831	0.004	-0.111	0.000	0.000	0.000	
		2099	-44.895	-0.004	-0.054	0.000	0.078	-0.200	
16		2108	29.599	-0.006	-0.141	0.000	0.000	0.000	
		2099	-28.663	0.006	-0.024	0.000	0.784	0.165	
Máx			90.149	0.015	0.157	0.000	0.968	0.200	
Comb.			1	1	1	15	1	15	
Mín			28.663	-0.006	-0.141	0.000	-0.784	-0.280	
Comb.			16	16	16	8	16	2	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2630	1	2110	79.173	-0.010	0.049	0.000	0.000	0.000
		2106	-78.237	0.010	-0.049	0.000	-0.941	-0.257
	2	2110	56.466	-0.020	0.017	0.000	0.000	0.000
		2106	-55.530	0.020	-0.017	0.000	0.310	-0.059
	3	2110	84.729	-0.011	0.026	0.000	0.000	0.000
		2106	-83.793	0.011	-0.026	0.000	-0.713	-0.260
	4	2110	62.022	-0.021	-0.006	0.000	0.000	0.000
		2106	-61.086	0.021	0.006	0.000	0.539	-0.062
	5	2110	83.365	-0.011	0.032	0.000	0.000	0.000
		2106	-82.429	0.011	-0.032	0.000	-0.773	-0.259
	6	2110	60.658	-0.021	0.000	0.000	0.000	0.000
		2106	-59.723	0.021	0.000	0.000	0.478	-0.061
	7	2110	88.921	-0.011	0.009	0.000	0.000	0.000
		2106	-87.985	0.011	-0.009	0.000	-0.545	-0.262
	8	2110	66.214	-0.021	-0.022	0.000	0.000	0.000
		2106	-65.278	0.021	0.022	0.000	0.706	-0.064
9	2110	83.036	0.025	0.048	0.000	0.000	0.000	
	2106	-82.100	-0.025	-0.048	0.000	-0.935	0.099	
10	2110	60.329	0.015	0.017	0.000	0.000	0.000	
	2106	-59.394	-0.015	-0.017	0.000	0.316	0.296	
11	2110	88.592	0.025	0.025	0.000	0.000	0.000	
	2106	-87.656	-0.025	-0.025	0.000	-0.707	0.095	
12	2110	65.885	0.015	-0.006	0.000	0.000	0.000	
	2106	-64.949	-0.015	0.006	0.000	0.545	0.293	
13	2110	87.228	0.025	0.031	0.000	0.000	0.000	
	2106	-86.293	-0.025	-0.031	0.000	-0.767	0.096	
14	2110	64.521	0.015	0.000	0.000	0.000	0.000	
	2106	-63.586	-0.015	0.000	0.000	0.484	0.294	
15	2110	92.784	0.025	0.008	0.000	0.000	0.000	
	2106	-91.848	-0.025	-0.008	0.000	-0.539	0.093	
16	2110	70.077	0.015	-0.023	0.000	0.000	0.000	
	2106	-69.141	-0.015	0.023	0.000	0.713	0.291	
	Máx	92.784	0.025	0.049	0.000	0.941	0.262	
	Comb.	15	9	1	15	1	7	
	Mín	55.530	-0.021	-0.023	0.000	-0.713	-0.296	
	Comb.	2	8	16	2	16	10	
2631	1	2112	73.814	-0.010	0.114	0.000	0.000	0.000
		2103	-72.878	0.010	0.051	0.000	-0.755	-0.247
	2	2112	46.526	-0.019	0.084	0.000	0.000	0.000
		2103	-45.590	0.019	0.081	0.000	0.451	-0.057
	3	2112	95.905	-0.011	0.096	0.000	0.000	0.000
		2103	-94.969	0.011	0.069	0.000	-0.569	-0.256
	4	2112	68.617	-0.020	0.066	0.000	0.000	0.000
		2103	-67.681	0.020	0.099	0.000	0.637	-0.066

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
5	2112	90.434	-0.010	0.101	0.000	0.000	0.000
	2103	-89.498	0.010	0.064	0.000	-0.619	-0.254
6	2112	63.146	-0.020	0.071	0.000	0.000	0.000
	2103	-62.210	0.020	0.094	0.000	0.587	-0.064
7	2112	112.525	-0.011	0.083	0.000	0.000	0.000
	2103	-111.589	0.011	0.082	0.000	-0.433	-0.263
8	2112	85.237	-0.021	0.052	0.000	0.000	0.000
	2103	-84.301	0.021	0.113	0.000	0.773	-0.073
9	2112	77.878	0.024	0.113	0.000	0.000	0.000
	2103	-76.942	-0.024	0.052	0.000	-0.745	0.099
10	2112	50.590	0.015	0.083	0.000	0.000	0.000
	2103	-49.654	-0.015	0.082	0.000	0.461	0.289
11	2112	99.968	0.024	0.095	0.000	0.000	0.000
	2103	-99.033	-0.024	0.070	0.000	-0.559	0.090
12	2112	72.681	0.014	0.065	0.000	0.000	0.000
	2103	-71.745	-0.014	0.100	0.000	0.647	0.280
13	2112	94.498	0.024	0.100	0.000	0.000	0.000
	2103	-93.562	-0.024	0.065	0.000	-0.609	0.093
14	2112	67.210	0.014	0.070	0.000	0.000	0.000
	2103	-66.274	-0.014	0.095	0.000	0.597	0.282
15	2112	116.588	0.023	0.082	0.000	0.000	0.000
	2103	-115.653	-0.023	0.083	0.000	-0.423	0.084
16	2112	89.300	0.013	0.051	0.000	0.000	0.000
	2103	-88.365	-0.013	0.114	0.000	0.783	0.273
Máx		116.588	0.024	0.114	0.000	0.755	0.263
Comb.	15		9	1	7	1	7
Mín		45.590	-0.021	-0.114	0.000	-0.783	-0.289
Comb.	2		8	16	10	16	10
2632	1 2111	93.119	0.015	-0.009	0.000	0.000	0.000
	2100	-92.183	-0.015	-0.156	0.000	-0.959	-0.086
2	2111	77.332	0.005	-0.038	0.000	0.000	0.000
	2100	-76.396	-0.005	-0.127	0.000	-0.254	0.280
3	2111	98.854	0.009	-0.008	0.000	0.000	0.000
	2100	-97.918	-0.009	-0.157	0.000	-0.964	-0.149
4	2111	83.067	-0.001	-0.038	0.000	0.000	0.000
	2100	-82.131	0.001	-0.127	0.000	-0.259	0.217
5	2111	97.449	0.010	-0.008	0.000	0.000	0.000
	2100	-96.513	-0.010	-0.157	0.000	-0.963	-0.132
6	2111	81.661	0.001	-0.038	0.000	0.000	0.000
	2100	-80.726	-0.001	-0.127	0.000	-0.258	0.233
7	2111	103.184	0.004	-0.008	0.000	0.000	0.000
	2100	-102.248	-0.004	-0.157	0.000	-0.968	-0.195

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

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RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2632	8	2111	87.396	-0.006	-0.038	0.000	0.000	0.000
		2100	-86.461	0.006	-0.127	0.000	-0.263	0.170
	9	2111	58.797	0.014	-0.111	0.000	0.000	0.000
		2100	-57.861	-0.014	-0.054	0.000	0.085	-0.091
	10	2111	43.010	0.005	-0.141	0.000	0.000	0.000
		2100	-42.074	-0.005	-0.024	0.000	0.791	0.275
	11	2111	64.532	0.008	-0.111	0.000	0.000	0.000
		2100	-63.596	-0.008	-0.054	0.000	0.080	-0.154
	12	2111	48.745	-0.002	-0.141	0.000	0.000	0.000
		2100	-47.809	0.002	-0.024	0.000	0.786	0.211
	13	2111	63.127	0.010	-0.111	0.000	0.000	0.000
		2100	-62.191	-0.010	-0.054	0.000	0.081	-0.137
	14	2111	47.339	0.000	-0.141	0.000	0.000	0.000
		2100	-46.404	0.000	-0.024	0.000	0.787	0.228
	15	2111	68.861	0.004	-0.111	0.000	0.000	0.000
		2100	-67.926	-0.004	-0.054	0.000	0.076	-0.200
	16	2111	53.074	-0.006	-0.140	0.000	0.000	0.000
		2100	-52.138	0.006	-0.025	0.000	0.782	0.165
	Máx		103.184	0.015	0.157	0.000	0.968	0.200
	Comb.		7	1	7	15	7	15
	Mín		42.074	-0.006	-0.141	0.000	-0.791	-0.280
	Comb.		10	16	10	4	10	2
2633	1	2113	81.081	-0.010	0.048	0.000	0.000	0.000
		2101	-80.145	0.010	-0.048	0.000	-0.926	-0.257
	2	2113	55.634	-0.020	0.017	0.000	0.000	0.000
		2101	-54.699	0.020	-0.017	0.000	0.306	-0.060
	3	2113	81.086	-0.010	0.027	0.000	0.000	0.000
		2101	-80.151	0.010	-0.027	0.000	-0.718	-0.257
	4	2113	55.640	-0.020	-0.004	0.000	0.000	0.000
		2101	-54.704	0.020	0.004	0.000	0.514	-0.060
	5	2113	81.020	-0.010	0.033	0.000	0.000	0.000
		2101	-80.085	0.010	-0.033	0.000	-0.774	-0.257
	6	2113	55.574	-0.020	0.001	0.000	0.000	0.000
		2101	-54.638	0.020	-0.001	0.000	0.458	-0.060
	7	2113	81.026	-0.010	0.012	0.000	0.000	0.000
		2101	-80.091	0.010	-0.012	0.000	-0.566	-0.257
	8	2113	55.580	-0.020	-0.019	0.000	0.000	0.000
		2101	-54.644	0.020	0.019	0.000	0.666	-0.060
	9	2113	84.714	0.025	0.047	0.000	0.000	0.000
		2101	-83.778	-0.025	-0.047	0.000	-0.913	0.097
	10	2113	59.267	0.015	0.015	0.000	0.000	0.000
		2101	-58.332	-0.015	-0.015	0.000	0.319	0.294
	11	2113	84.720	0.025	0.026	0.000	0.000	0.000
		2101	-83.784	-0.025	-0.026	0.000	-0.705	0.097

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

Página:134
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)							
BarraComb	Nó	Axial	V2	V3	MT	M2	M3
12	2113	59.273	0.015	-0.005	0.000	0.000	0.000
	2101	-58.338	-0.015	0.005	0.000	0.527	0.294
13	2113	84.654	0.025	0.032	0.000	0.000	0.000
	2101	-83.718	-0.025	-0.032	0.000	-0.760	0.096
14	2113	59.207	0.015	0.000	0.000	0.000	0.000
	2101	-58.272	-0.015	0.000	0.000	0.472	0.294
15	2113	84.659	0.025	0.011	0.000	0.000	0.000
	2101	-83.724	-0.025	-0.011	0.000	-0.552	0.097
16	2113	59.213	0.015	-0.021	0.000	0.000	0.000
	2101	-58.277	-0.015	0.021	0.000	0.680	0.294
Máx Comb. Mín Comb.		84.720	0.025	0.048	0.000	0.926	0.257
	11	11	11	1	1	1	5
	6	6	6	16	16	16	12
2634	1 2114	77.847	-0.010	0.048	0.000	0.000	0.000
	2044	-76.911	0.010	-0.048	0.000	-0.934	-0.257
2	2114	56.640	-0.020	0.017	0.000	0.000	0.000
	2044	-55.705	0.020	-0.017	0.000	0.308	-0.060
3	2114	77.853	-0.010	0.027	0.000	0.000	0.000
	2044	-76.917	0.010	-0.027	0.000	-0.715	-0.257
4	2114	56.646	-0.020	-0.005	0.000	0.000	0.000
	2044	-55.710	0.020	0.005	0.000	0.526	-0.060
5	2114	77.788	-0.010	0.032	0.000	0.000	0.000
	2044	-76.853	0.010	-0.032	0.000	-0.773	-0.257
6	2114	56.582	-0.020	0.001	0.000	0.000	0.000
	2044	-55.646	0.020	-0.001	0.000	0.468	-0.060
7	2114	77.794	-0.010	0.011	0.000	0.000	0.000
	2044	-76.858	0.010	-0.011	0.000	-0.555	-0.257
8	2114	56.587	-0.020	-0.021	0.000	0.000	0.000
	2044	-55.652	0.020	0.021	0.000	0.686	-0.060
9	2114	81.580	0.025	0.047	0.000	0.000	0.000
	2044	-80.644	-0.025	-0.047	0.000	-0.924	0.097
10	2114	60.373	0.015	0.016	0.000	0.000	0.000
	2044	-59.438	-0.015	-0.016	0.000	0.318	0.294
11	2114	81.586	0.025	0.026	0.000	0.000	0.000
	2044	-80.650	-0.025	-0.026	0.000	-0.706	0.097
12	2114	60.379	0.015	-0.006	0.000	0.000	0.000
	2044	-59.443	-0.015	0.006	0.000	0.536	0.294
13	2114	81.521	0.025	0.031	0.000	0.000	0.000
	2044	-80.586	-0.025	-0.031	0.000	-0.764	0.096
14	2114	60.315	0.015	0.000	0.000	0.000	0.000
	2044	-59.379	-0.015	0.000	0.000	0.478	0.294

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 estaca apoio 3 tabela
Preparado por:

Página:135
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2634	15	2114	81.527	0.025	0.010	0.000	0.000	0.000
		2044	-80.591	-0.025	-0.010	0.000	-0.545	0.097
	16	2114	60.320	0.015	-0.022	0.000	0.000	0.000
		2044	-59.385	-0.015	0.022	0.000	0.696	0.294
	Máx		81.586	0.025	0.048	0.000	0.934	0.257
	Comb.		11	11	1	15	1	5
Mín		55.646	-0.020	-0.022	0.000	-0.696	-0.294	
Comb.		6	6	16	2	16	12	
2635	1	2115	74.611	-0.010	0.049	0.000	0.000	0.000
		2104	-73.676	0.010	-0.049	0.000	-0.941	-0.257
	2	2115	57.596	-0.020	0.017	0.000	0.000	0.000
		2104	-56.660	0.020	-0.017	0.000	0.310	-0.060
	3	2115	74.617	-0.010	0.026	0.000	0.000	0.000
		2104	-73.681	0.010	-0.026	0.000	-0.713	-0.257
	4	2115	57.602	-0.020	-0.006	0.000	0.000	0.000
		2104	-56.666	0.020	0.006	0.000	0.539	-0.060
	5	2115	74.554	-0.010	0.032	0.000	0.000	0.000
		2104	-73.618	0.010	-0.032	0.000	-0.773	-0.257
	6	2115	57.539	-0.020	0.000	0.000	0.000	0.000
		2104	-56.603	0.020	0.000	0.000	0.478	-0.060
	7	2115	74.560	-0.010	0.009	0.000	0.000	0.000
		2104	-73.624	0.010	-0.009	0.000	-0.545	-0.257
	8	2115	57.544	-0.020	-0.022	0.000	0.000	0.000
		2104	-56.608	0.020	0.022	0.000	0.706	-0.060
	9	2115	78.444	0.025	0.048	0.000	0.000	0.000
		2104	-77.508	-0.025	-0.048	0.000	-0.935	0.097
	10	2115	61.429	0.015	0.017	0.000	0.000	0.000
		2104	-60.493	-0.015	-0.017	0.000	0.316	0.294
	11	2115	78.450	0.025	0.025	0.000	0.000	0.000
		2104	-77.514	-0.025	-0.025	0.000	-0.707	0.097
	12	2115	61.434	0.015	-0.006	0.000	0.000	0.000
		2104	-60.499	-0.015	0.006	0.000	0.545	0.294
13	2115	78.387	0.025	0.031	0.000	0.000	0.000	
	2104	-77.451	-0.025	-0.031	0.000	-0.767	0.096	
14	2115	61.371	0.015	0.000	0.000	0.000	0.000	
	2104	-60.436	-0.015	0.000	0.000	0.484	0.294	
15	2115	78.392	0.025	0.008	0.000	0.000	0.000	
	2104	-77.457	-0.025	-0.008	0.000	-0.539	0.097	
16	2115	61.377	0.015	-0.023	0.000	0.000	0.000	
	2104	-60.441	-0.015	0.023	0.000	0.713	0.294	
Máx		78.450	0.025	0.049	0.000	0.941	0.257	
Comb.		11	11	1	7	1	5	
Mín		56.603	-0.020	-0.023	0.000	-0.713	-0.294	
Comb.		6	6	16	10	16	12	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
estaca apoio 3 tabela
Preparado por:

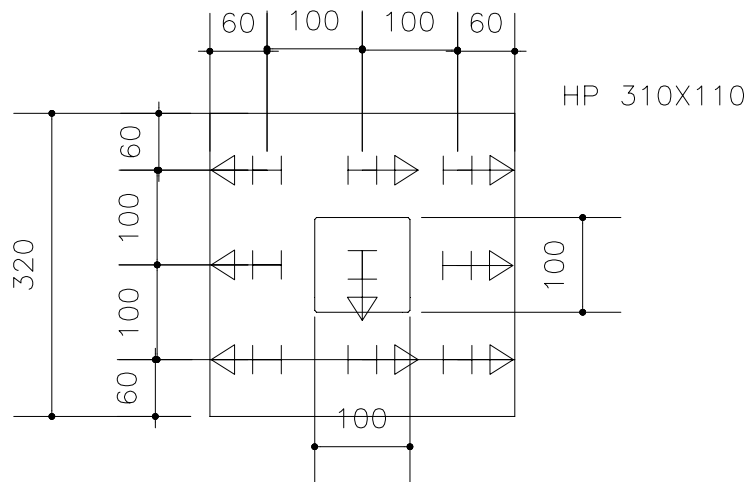
Página:136
Data:11/10/11

RESULTADOS (Unids: tf, tf*metro)							
<i>BarraComb</i>	<i>Nó</i>	<i>Axial</i>	<i>V2</i>	<i>V3</i>	<i>MT</i>	<i>M2</i>	<i>M3</i>
* Máximo		116.588	0.025	0.157	0.000	0.968	0.299
Barra		2631	2627	2632	2622	2629	2618
Comb.		15	15	7	3	1	7
* Mínimo		18.919	-0.025	-0.157	0.000	-1.052	-0.299
Barra		2619	2618	2623	2632	2628	2627
Comb.		16	8	16	4	2	16

B L O C O - Armação Transversal

OBRA: VIADUTO NA PE-060

APOIO 1



Número de estaca long/transv até ao eixo do pilar

$$n_L := 1$$

$$n_T := 1$$

Número de estacas long/transv além da seção AA

$$n_{LA} := 1$$

$$n_{TA} := 1$$

Base do pilar (m)

$$B_{\text{pilar}} := 1.00$$

Largura do pilar (m)

$$L_{\text{pilar}} := 1.00$$

Área da seção transversal da estaca (cm²)

$$A_{\text{estaca}} := 141$$

Tensão máxima adotada (tf/cm²)

$$\sigma_{\text{máx}} := 2.1$$

Altura útil do bloco (m)

$$h_d := 1.10$$

Esforço normal máximo em serviço (tf)

$$NL_i := 104$$

$$NT_j := 104$$

Distâncias long/trans das estaca aos eixos do pilar (m)

$$dL_i := 1.00$$

$$dT_j := 1.00$$

Armação longitudinal

$$BL := \left| \begin{array}{l} \text{for } i \in 1..n_L \\ A_i \leftarrow \left| \begin{array}{l} dL_i - 0.30 \cdot B_{\text{pilar}} \text{ if } i \leq n_{LA} \\ \max \left[0, dL_i - \frac{0.30 \cdot B_{\text{pilar}}}{n_L - n_{LA}} \cdot (n_L - i + 0.5) \right] \text{ if } i > n_{LA} \wedge n_L - n_{LA} \neq 0 \\ 0 \text{ otherwise} \end{array} \right. \\ A \end{array} \right.$$

Verificação 1

$$As1 := \sum_{k=1}^{n_L} \frac{NL_k \cdot BL_k}{h_d \cdot \sigma_{\text{máx}}} \quad As1 = 31.515 \quad (\text{cm}^2) \quad BL = (0.7)$$

Verificação 2

$$As2 := \sum_{k=1}^{n_L} \frac{1.4 \cdot 0.9 \cdot A_{\text{estaca}} \cdot BL_k}{4.35 \cdot h_d} \quad As2 = 25.99 \quad (\text{cm}^2)$$

Armação transversal

$$BT := \left| \begin{array}{l} \text{for } i \in 1..n_T \\ A_i \leftarrow \left| \begin{array}{l} dT_i - 0.30 \cdot L_{\text{pilar}} \text{ if } i \leq n_{TA} \\ \max \left[0, dT_i - \frac{0.30 \cdot L_{\text{pilar}}}{n_T - n_{TA}} \cdot (n_T - i + 0.5) \right] \text{ if } i > n_{TA} \wedge n_T - n_{TA} \neq 0 \\ 0 \text{ otherwise} \end{array} \right. \\ A \end{array} \right.$$

Verificação 1

$$As1 := \sum_{k=1}^{n_T} \frac{NT_k \cdot BT_k}{h_d \cdot \sigma_{\text{máx}}} \quad As1 = 31.515 \quad (\text{cm}^2) \quad BT = (0.7)$$

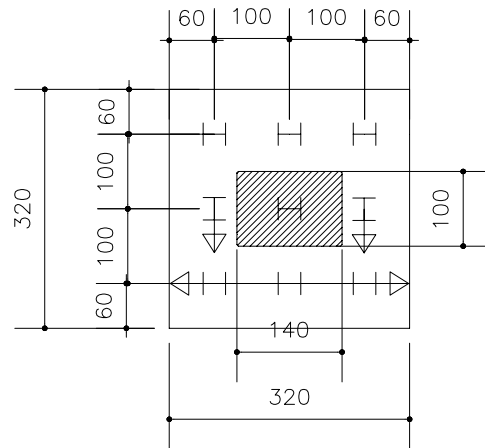
Verificação 2

$$As2 := \sum_{k=1}^{n_T} \frac{1.4 \cdot 0.9 \cdot A_{\text{estaca}} \cdot BT_k}{4.35 \cdot h_d} \quad As2 = 25.99 \quad (\text{cm}^2)$$

B L O C O - Armação Transversal

OBRA: VIADUTO NA PE-060

APOIO 2 = APOIO 3



Número de estaca long/transv até ao eixo do pilar

$$n_L := 1$$

$$n_T := 1$$

Número de estacas long/transv além da seção AA

$$n_{LA} := 1$$

$$n_{TA} := 1$$

Base do pilar (m)

$$B_{\text{pilar}} := 1.40$$

Largura do pilar (m)

$$L_{\text{pilar}} := 1.00$$

Área da seção transversal da estaca (cm²)

$$A_{\text{estaca}} := 141$$

Tensão máxima adotada (tf/cm²)

$$\sigma_{\text{máx}} := 2.1$$

Altura útil do bloco (m)

$$h_d := 1.10$$

Esforço normal máximo em serviço (tf)

$$NL_i := 117$$

$$NT_j := 117$$

Distâncias long/trans das estaca aos eixos do pilar (m)

$$dL_i := 1.00$$

$$dT_j := 1.00$$

Armação longitudinal

$$BL := \left| \begin{array}{l} \text{for } i \in 1..n_L \\ A_i \leftarrow \left| \begin{array}{l} dL_i - 0.30 \cdot B_{\text{pilar}} \text{ if } i \leq n_{LA} \\ \max \left[0, dL_i - \frac{0.30 \cdot B_{\text{pilar}}}{n_L - n_{LA}} \cdot (n_L - i + 0.5) \right] \text{ if } i > n_{LA} \wedge n_L - n_{LA} \neq 0 \\ 0 \text{ otherwise} \end{array} \right. \\ A \end{array} \right.$$

Verificação 1

$$As1 := \sum_{k=1}^{n_L} \frac{NL_k \cdot BL_k}{h_d \cdot \sigma_{\text{máx}}} \quad As1 = 29.377 \quad (\text{cm}^2) \quad BL = (0.58)$$

Verificação 2

$$As2 := \sum_{k=1}^{n_L} \frac{1.4 \cdot 0.9 \cdot A_{\text{estaca}} \cdot BL_k}{4.35 \cdot h_d} \quad As2 = 21.535 \quad (\text{cm}^2)$$

Armação transversal

$$BT := \left| \begin{array}{l} \text{for } i \in 1..n_T \\ A_i \leftarrow \left| \begin{array}{l} dT_i - 0.30 \cdot L_{\text{pilar}} \text{ if } i \leq n_{TA} \\ \max \left[0, dT_i - \frac{0.30 \cdot L_{\text{pilar}}}{n_T - n_{TA}} \cdot (n_T - i + 0.5) \right] \text{ if } i > n_{TA} \wedge n_T - n_{TA} \neq 0 \\ 0 \text{ otherwise} \end{array} \right. \\ A \end{array} \right.$$

Verificação 1

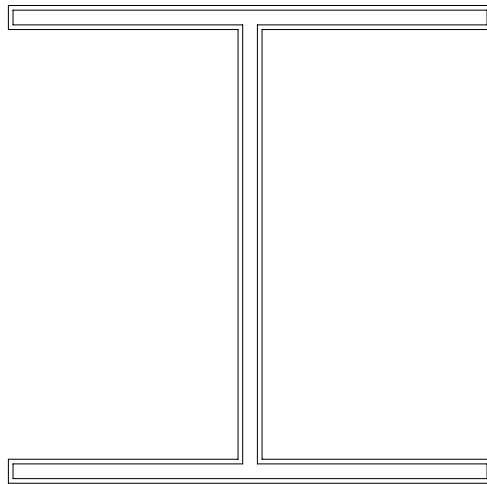
$$As1 := \sum_{k=1}^{n_T} \frac{NT_k \cdot BT_k}{h_d \cdot \sigma_{\text{máx}}} \quad As1 = 35.455 \quad (\text{cm}^2) \quad BT = (0.7)$$

Verificação 2

$$As2 := \sum_{k=1}^{n_T} \frac{1.4 \cdot 0.9 \cdot A_{\text{estaca}} \cdot BT_k}{4.35 \cdot h_d} \quad As2 = 25.99 \quad (\text{cm}^2)$$

ESTACA METALICA

ESTACA HP 310x125



De acordo com o item 8.6.7 e Tabela 5 da NBR 6122-2010 (Projeto e Execução de Fundações) a espessura de compensação de corrosão é de 3mm para solos com turfa.

Ared := 102 cm²

ESFORÇO MÁXIMO

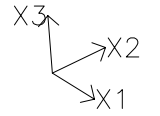
N := 117000 kg

$$\sigma_1 := \frac{N}{A_{red}} \quad \sigma_1 = 1147 \quad \text{kg/cm}^2$$

5.2.2.4 NEOPRENE

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)

meoprene nó-barra



ESCALA= 1:4.0

DATA:15/10/11

1560
2082
1559

1558
2081
1557

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
neoprene lista de combinações
Preparado por:

Página:14
Data:15/10/11

TABELA de COMBINAÇÕES	
Comb.	
g1+g2	1 1 * 1.00 + 2 * 1.00
mov #1	2 10 * 1.00
mov #2	3 11 * 1.00
emp	4 3 * 1.00
fren	5 5 * 1.00
vent	6 7 * 1.00
temp	7 9 * 1.00

GRUPOS DEFINIDOS	
Grupo	
mov	10/ 11
fren	5/ 6
emp	3/ 4
vent	7/ 8

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
neoprene lista de combinações
Preparado por:

Página:14
Data:15/10/11

TABELA de COMBINAÇÕES	
Comb.	
g1+g2	1 1 * 1.00 + 2 * 1.00
mov #1	2 10 * 1.00
mov #2	3 11 * 1.00
emp	4 3 * 1.00
fren	5 5 * 1.00
vent	6 7 * 1.00
temp	7 9 * 1.00

GRUPOS DEFINIDOS	
Grupo	
mov	10/ 11
fren	5/ 6
emp	3/ 4
vent	7/ 8

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 neoprene esforços
Preparado por:

Página:12
Data:15/10/11

RESULTADOS (Unids: tf, tf*metro)								
BarraComb	Nó	Axial	V2	V3	MT	M2	M3	
2081	1	1557	88.285	-0.008	-1.770	0.000	0.000	0.000
		1558	-88.253	0.008	1.770	0.000	0.106	0.000
	2	1557	47.208	0.078	0.214	0.000	0.000	0.000
		1558	-47.208	-0.078	-0.214	0.000	0.000	-0.002
	3	1557	-6.915	-0.072	-0.869	0.000	0.000	0.000
		1558	6.915	0.072	0.869	0.000	0.045	0.003
	4	1557	-0.822	0.000	0.584	0.000	0.000	0.000
		1558	0.822	0.000	-0.584	0.000	-0.035	0.000
	5	1557	-1.068	0.000	0.784	0.000	0.000	0.000
		1558	1.068	0.000	-0.784	0.000	-0.047	0.000
	6	1557	-0.285	-1.409	-0.028	0.000	0.000	0.000
		1558	0.285	1.409	0.028	0.000	0.002	-0.085
	7	1557	-1.483	-0.638	1.011	0.000	0.000	0.000
		1558	1.483	0.638	-1.011	0.000	-0.061	-0.038
Máx		88.285	0.078	1.011	0.000	0.061	0.085	
Comb.		1	2	7	2	7	6	
Mín		-6.915	-1.409	-1.770	0.000	-0.106	-0.003	
Comb.		3	6	1	3	1	3	
2082	1	1559	76.569	-0.007	1.500	0.000	0.000	0.000
		1560	-76.537	0.007	-1.500	0.000	-0.090	0.000
	2	1559	46.448	0.064	0.805	0.000	0.000	0.000
		1560	-46.448	-0.064	-0.805	0.000	-0.042	-0.002
	3	1559	-7.038	-0.055	-0.152	0.000	0.000	0.000
		1560	7.038	0.055	0.152	0.000	0.000	0.003
	4	1559	0.630	0.000	0.589	0.000	0.000	0.000
		1560	-0.630	0.000	-0.589	0.000	-0.035	0.000
	5	1559	1.078	0.001	0.783	0.000	0.000	0.000
		1560	-1.078	-0.001	-0.783	0.000	-0.047	0.000
	6	1559	-0.380	-1.415	-0.022	0.000	0.000	0.000
		1560	0.380	1.415	0.022	0.000	0.001	-0.085
	7	1559	1.522	-0.636	1.177	0.000	0.000	0.000
		1560	-1.522	0.636	-1.177	0.000	-0.071	-0.038
Máx		76.569	0.064	1.500	0.000	0.090	0.085	
Comb.		1	2	1	2	1	6	
Mín		-7.038	-1.415	-0.152	0.000	-0.001	-0.003	
Comb.		3	6	3	3	6	3	
* Máximo		88.285	0.078	1.500	0.000	0.090	0.085	
Barra		2081	2081	2082	2082	2082	2082	
Comb.		1	2	1	2	1	6	
* Mínimo		-7.038	-1.415	-1.770	0.000	-0.106	-0.003	
Barra		2082	2082	2081	2082	2081	2081	
Comb.		3	6	1	3	1	3	

ENTR PE 060 (11) INFRA vãos 33 -37-33 (novo)
 neoprene deslocamentos
Preparado por:

Página:12
Data:15/10/11

DESLOCAMENTOS (Unids: cm)							
Nó	Comb.	X1	X2	X3	X4	X5	X6
1557	1	0.06534	-0.00724	-0.37343	0.0001012	0.0002623	0.0000010
	2	0.15647	0.08180	0.04474	0.0002395	0.0006380	0.0000456
	3	-0.14824	-0.08468	-0.15222	-0.0001832	-0.0006151	-0.0000459
	4	0.30004	0.00001	-0.01185	-0.0000001	0.0002033	-0.0000006
	5	0.39802	-0.00028	-0.01596	0.0000000	0.0002657	-0.0000007
	6	-0.00581	0.58644	-0.00565	-0.0000081	-0.0000004	-0.0000123
	7	0.55620	0.00028	-0.02230	-0.0000041	0.0003715	-0.0000012
Nó máx		0.55620	0.58644	-0.37343	0.0002395	0.0006380	-0.0000459
1557 Comb.		7	6	1	2	2	3
1558	1	-0.62170	-0.00374	-0.48635	-0.0000246	0.0045548	-0.0000015
	2	0.10519	0.11562	0.04651	0.0002858	0.0020086	0.0000114
	3	-0.34991	-0.11545	-0.21046	-0.0002451	-0.0001519	-0.0000113
	4	0.53581	0.00015	-0.01080	0.0000007	0.0000020	-0.0000001
	5	0.71432	-0.00035	-0.01459	0.0000006	-0.0000025	0.0000003
	6	-0.01695	1.15498	-0.00528	0.0000019	0.0000044	-0.0000305
	7	0.96419	0.25753	-0.02040	-0.0000060	0.0000133	0.0000008
Nó máx		0.96419	1.15498	-0.48635	0.0002858	0.0045548	-0.0000305
1558 Comb.		7	6	1	2	1	6
1559	1	0.06534	-0.00736	-0.34195	0.0001012	0.0002623	0.0000010
	2	0.15647	0.08302	0.04627	0.0002395	0.0006380	0.0000456
	3	-0.14824	-0.08567	-0.15056	-0.0001832	-0.0006151	-0.0000459
	4	0.30004	0.00008	0.01255	-0.0000001	0.0002033	-0.0000006
	5	0.39802	-0.00019	0.01593	0.0000000	0.0002657	-0.0000007
	6	-0.00581	0.58792	-0.00570	-0.0000081	-0.0000004	-0.0000123
	7	0.55620	0.00042	0.02229	-0.0000041	0.0003715	-0.0000012
Nó máx		0.55620	0.58792	-0.34195	0.0002395	0.0006380	-0.0000459
1559 Comb.		7	6	1	2	2	3
1560	1	0.65126	-0.00452	-0.43988	-0.0000310	-0.0032570	0.0000017
	2	0.31866	0.10882	0.04792	0.0002799	0.0001524	0.0000464
	3	-0.08089	-0.10838	-0.20734	-0.0002389	-0.0016432	-0.0000463
	4	0.53777	0.00000	0.01174	-0.0000004	-0.0000038	0.0000003
	5	0.71383	-0.00057	0.01455	-0.0000007	0.0000003	0.0000003
	6	-0.01475	1.15881	-0.00521	0.0000016	-0.0000021	-0.0000353
	7	1.03127	0.25724	0.02034	-0.0000077	-0.0000066	-0.0000007
Nó máx		1.03127	1.15881	-0.43988	0.0002799	-0.0032570	0.0000464
1560 Comb.		7	6	1	2	1	2
Máx.		1.03127	1.15881	-0.48635	0.0002858	0.0045548	0.0000464
Comb		7	6	1	2	1	2
Nó		mb1560	1560	1558	1558	1558	1560

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 37 m
viga prot t=30000 dias rotação no apoio
Preparado por:

Página:278
Data:15/10/11

DESLOCAMENTOS: carregamento 20 (Unids: cm)						
%PTEN% Prestress load at time = 30000.						
<i>Nó</i>	<i>X1</i>	<i>X2</i>	<i>X3</i>	<i>X4</i>	<i>X5</i>	<i>X6</i>
48	0.60896	0.00012	-0.00004	0.0000002	-0.0071525	-0.0000015
49	0.54902	0.00009	1.29860	-0.0000001	-0.0070088	0.0000002
MAX.	0.60896	0.00012	1.29860	0.0000002	-0.0071525	-0.0000015
NÓ	48	48	49	48	48	48

VIADUTO NA RODOVIA PE-060 (prot) 12 cordoalhas 33.20 m
viga 33.2 m t=30000 dias rotação no apoio

Preparado por:

Página:257

Data:16/10/11

DESLOCAMENTOS: carregamento 19 (Unids: cm)						
%PTEN% Prestress load at time = 30000.						
<i>Nó</i>	<i>X1</i>	<i>X2</i>	<i>X3</i>	<i>X4</i>	<i>X5</i>	<i>X6</i>
67	-0.38043	-0.00011	0.84228	-0.0000001	0.0050895	0.0000008
68	-0.42216	0.00007	-0.00005	0.0000002	0.0051759	0.0000020
MAX.	-0.42216	-0.00011	0.84228	0.0000002	0.0051759	0.0000020
NÓ	68	67	67	68	68	68

ESFORÇOS NOS NEOPRENES

OBRA : VIADUTO NA PE-060

TRECHO 37 m

APOIO barra 2081		neoprene
unidade (t, tm,rad,cm)		a := 0.35 b := 0.50 h := 0.06
		$K := 100 \cdot \frac{a \cdot b}{h}$ K = 292
Rg1 := 88.285	$\alpha_{g1} := 0.0045548$	para levar em conta defeitos de posicionamento, segundo recomendação SETRA tomar $\alpha_o := 0.0100$ para estruturas pre-moldadas
Rg2 := 0	$\alpha_{g2} := -0.0$	
Rcm1 := 47.208	$\alpha_{cm1} := 0.0020086$	
Rcm2 := -6.915	$\alpha_{cm2} := -0.0001519$	
	$\alpha_{prot} := -0.0071525$	
Rtemp := 0	$\alpha_{temp} := -0$	gradiente termico
Por neoprene	H1 := 0.584 + 1.011	H1 = 1.595 empuxo +temperatura (axial)
	H2 := 0.784	H2 = 0.784 frenagem
	H3 := 1.409	H3 = 1.409 vento
	$\delta_1 := \frac{H1}{K}$	$\delta_1 = 0.00547$
	$\delta_2 := \frac{H2}{K}$	$\delta_2 = 0.00269$
Carga permanente.....	N1 := Rg1 + Rg2 + max(Rtemp, 0)	N1 = 88.285 t
Carga acidental.....	N2 := Rcm1	N2 = 47.208 t
	N3 := Rcm2	N3 = -6.915 t
Rotação long permanente..	$\alpha_1 := \alpha_{g1} + \alpha_{g2} + \alpha_{prot} + \alpha_o + \max(\alpha_{temp}, 0)$	$\alpha_1 = 0.012598$
Rotação long dinamica.....	$\alpha_2 := \alpha_{cm1}$	$\alpha_2 = 0.00201$
Esforço long. permanente.....	H _A := H1	H _A = 1.595 t
Esforço long. dinamico.....	T _A := H2	T _A = 0.784 t
Deslocamento long. permanente.	$\delta_P := \delta_1 \cdot 1000$	$\delta_P = 5.47$ mm

Rotina para Verificação de Aparelhos de Apoio de NEOPRENE Fretados

OBRA : VIADUTO NA PE-060

TRECHO 37m

1. Dados de Entrada

1.1 Geometria

Dimensão nom. dir. longitudinal	<mm>	$a_n := 350$
Dimensão nom. dir. transversal	<mm>	$b_n := 500$
Espessura da camada de proteção	<mm>	$t_p := 3$
Espessura de cada camada	<mm>	$h_1 := 12$
Numero de camadas		$n := 5$

1.2 Carregamentos

Esforço normal estático	<tf>	$N_e := 88.285$
Esforço normal dinâmico máximo	<tf>	$N_{max} := 47.208$
Esforço normal dinâmico mínimo	<tf>	$N_{min} := -6.915$
Esforço longitudinal dinâmico	<tf>	$H_L := 0.784$
Esforço longitudinal dinâmico concomitante com N_{min}	<tf>	$H_{L1} := 0$
Esforço transversal dinâmico	<tf>	$H_T := 1.409$

1.3 Deformações Impostas

Deslocamento longitudinal estático	<mm>	$\delta_e := 5.47$
Rotação estática	<rad>	$\alpha_e := 0.012589$
Rotação dinâmica	<rad>	$\alpha_d := 0.002010$

2. Cálculos

		$G := 1$	Mpa
	$a_0 := a_n - 2 \cdot t_p$	$b_0 := b_n - 2 \cdot t_p$	
dimen. p/calc.	$a_0 = 344$	$b_0 = 494$	mm
Área nao deformada:	$A_0 := a_0 \cdot b_0$	$A_0 = 169936$	mm ²
fator de forma	$k_f := \frac{a_0 \cdot b_0}{2 \cdot h_1 \cdot (a_0 + b_0)}$	$k_f = 8.449$	
altura total:	$h := n \cdot h_1$	$h = 60$	mm
deslocamento longitudinal total:			
	$\delta_t := \delta_e + \frac{H_L \cdot 10^4}{2 \cdot G \cdot A_0} \cdot h$	$\delta_t = 6.854$	mm

áreas de cálculo:

estático	$A_e := (a_0 - \delta_e) \cdot b_0$	$A_e = 167234$	mm^2
dinâmico	$A_d := (a_0 - \delta_t) \cdot b_0$	$A_d = 166550$	mm^2

2.1 Limite na tensão normal média

2.1.1 Tensão normal máxima

$$\sigma_{me} := \frac{N_e \cdot 10^4}{A_e} \quad \sigma_{me} = 5.279 \quad \text{MPa}$$

$$\sigma_{md} := \frac{(N_e + N_{\max}) \cdot 10^4}{A_d} \quad \sigma_{md} = 8.135 \quad \text{MPa}$$

NOTA: ambos os valores devem ser inferiores a 15 MPa

2.1.2 Tensão normal mínima

$$\sigma_{\min} := \min \left[\sigma_{me}, \frac{(N_e + N_{\min}) \cdot 10^4}{A_d} \right] \quad \sigma_{\min} = 4.886 \quad \text{MPa}$$

NOTA: recomenda-se valor mínimo não inferior a 2 MPa

2.2 Abaixamento da Articulação

$$\delta h(\sigma) := n \cdot \frac{\sigma \cdot h_1}{4 \cdot G \cdot k_f^2 + 3 \cdot \sigma}$$

estático	$\delta h_e := \delta h(\sigma_{me})$	$\delta h_e = 1.051$	mm
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dinâmico	$\delta h_d := \delta h(\sigma_{md})$	$\delta h_d = 1.575$	mm
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NOTA: ambos os valores devem ficar abaixo de 15% de h	$0.15 \cdot h = 9$	mm
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2.3 Limite para a Distorção

$$\text{tg} \alpha := \frac{\delta_t}{h} \quad \text{tg} \alpha = 0.114 \quad (\text{deve ser não superior a } 0.70)$$

2.4 Limitação das Tensões de Cisalhamento

2.4.1 Estático

$$\tau_{Ne} := \frac{1.5 \cdot N_e \cdot 10^4}{k_f \cdot A_0} \quad \tau_{Ne} = 0.922 \quad \text{MPa}$$

$$H_e := G \cdot A_0 \cdot \frac{\delta_e}{h} \cdot 10^{-4} \quad H_e = 1.549 \quad \text{tf}$$

$$\tau_{He} := \frac{H_e \cdot 10^4}{A_0} \quad \tau_{He} = 0.091 \quad \text{MPa}$$

$$\tau_{\alpha e} := \frac{G \cdot a_0^2}{2 \cdot h_1^2} \cdot \frac{|\alpha_e|}{n} \quad \tau_{\alpha e} = 1.035 \quad \text{MPa}$$

$$\tau_{te} := \tau_{Ne} + \tau_{He} + \tau_{\alpha e} \quad \tau_{te} = 2.048 \quad \text{(n\~{a}o sup. a 5MPa)}$$

2.4.2 Din\~{a}mico

$$\tau_{Nd} := \frac{1.5 \cdot 10^4 \cdot (N_e + 1.5 \cdot N_{max})}{k_f \cdot A_0} \quad \tau_{Nd} = 1.662 \quad \text{MPa}$$

$$\tau_{Hd} := \frac{\left[(H_e + H_L)^2 + H_T^2 \right]^{0.5} \cdot 10^4}{A_0} \quad \tau_{Hd} = 0.16 \quad \text{MPa}$$

$$\tau_{\alpha d} := \frac{G \cdot a_0^2}{2 \cdot h_1^2} \cdot \frac{|\alpha_e + \alpha_d|}{n} \quad \tau_{\alpha d} = 1.2 \quad \text{MPa}$$

$$\tau_{td} := \tau_{Nd} + \tau_{Hd} + \tau_{\alpha d} \quad \tau_{td} = 3.022 \quad \text{(n\~{a}o sup. a 5MPa)}$$

2.5 Seguran\~{c}a ao deslizamento

coeficiente de atrito: $\mu(\sigma) := 0.10 + \frac{0.6}{\sigma}$

2.5.1 Est\~{a}tico $\mu_e := \mu(\sigma_{me}) \quad \mu_e = 0.214$

esfor\~{c}o resistente: $R_e := \mu_e \cdot N_e$

esfor\~{c}o sollicitante: $S_e := \left(H_e^2 + H_T^2 \right)^{0.5}$

$$R_e = 18.863 \quad \text{tf} \geq S_e = 2.094 \quad \text{tf}$$

2.5.2 Din\~{a}mico com rea\~{c}\~{a}o m\~{i}nima $\mu_m := \mu(\sigma_{min}) \quad \mu_m = 0.223$

esfor\~{c}o resistente: $R_m := \mu_m \cdot (N_e + N_{min})$

esfor\~{c}o sollicitante: $S_m := \left[(H_e + H_{L1})^2 + H_T^2 \right]^{0.5}$

$$R_m = 18.13 \quad \text{tf} \geq S_m = 2.094 \quad \text{tf}$$

2.5.3 Din\~{a}mico com rea\~{c}\~{a}o m\~{a}xima $\mu_d := \mu(\sigma_{md}) \quad \mu_d = 0.174$

esfor\~{c}o resistente: $R_d := \mu_d \cdot (N_e + N_{max})$

esforço solicitante: $S_d := \left[(H_e + H_L)^2 + H_T^2 \right]^{0.5}$

$$R_d = 23.542 \quad \text{tf} \quad \geq \quad S_d = 2.726 \quad \text{tf}$$

2.6 Segurança ao Levantamento da Borda Menos Comprimida

2.6.1 Estático $\alpha_e = 0.01259 \quad \leq \quad \frac{6 \cdot \delta h_e}{a_0} = 0.018$

2.6.2 Dinâmico $\alpha_e + \alpha_d = 0.0146 \quad \leq \quad \frac{6 \cdot \delta h_d}{a_0} = 0.027$

2.7 Segurança a Flambagem

tensão admissível: $\sigma_{ad} := \text{if} \left(h \leq \frac{a_0}{5}, 15, \frac{2 \cdot a_0}{3 \cdot h} \cdot k_f \cdot G \right)$

$$\sigma_{ad} = 15 \quad \text{MPa}$$

$$\sigma_{md} = 8.135 \quad \text{MPa} \quad \leq \quad \sigma_{ad} = 15 \quad \text{MPa}$$

2.8 Espessura da chapa interna

espessura $\geq \quad \frac{a_0}{k_f} \cdot \frac{\sigma_{md}}{150} = 2.208 \quad \text{mm}$

ESFORÇOS NOS NEOPRENES

OBRA : VIADUTO NA PE-060

TRECHO 33.2m

APOIO barra 2082	unidade (t, tm,rad,cm)	neoprene
		a := 0.35 b := 0.50 h := 0.06
		$K := 100 \cdot \frac{a \cdot b}{h}$ K = 292
Rg1 := 76.659	$\alpha_{g1} := 0.0032570$	para levar em conta defeitos de posicionamento, segundo recomendação SETRA tomar
Rg2 := 0	$\alpha_{g2} := -0.0$	
Rcm1 := 46.448	$\alpha_{cm1} := 0.0016432$	$\alpha_o := 0.0100$
Rcm2 := -7.038	$\alpha_{cm2} := -0.0001524$	para estruturas pre-moldadas
	$\alpha_{prot} := -0.0050895$	
Rtemp := 0	$\alpha_{temp} := -0$	gradiente termico
Por neoprene	H1 := 0.589 + 1.177	H1 = 1.766 empuxo +temperatura (axial)
	H2 := 0.783	H2 = 0.783 frenagem
	H3 := 1.415	H3 = 1.415 vento
	$\delta_1 := \frac{H1}{K}$	$\delta_1 = 0.00605$
	$\delta_2 := \frac{H2}{K}$	$\delta_2 = 0.00268$
Carga permanente.....	N1 := Rg1 + Rg2 + max(Rtemp, 0)	N1 = 76.659 t
Carga acidental.....	N2 := Rcm1	N2 = 46.448 t
	N3 := Rcm2	N3 = -7.038 t
Rotação long permanente..	$\alpha_1 := \alpha_{g1} + \alpha_{g2} + \alpha_{prot} + \alpha_o + \max(\alpha_{temp}, 0)$	$\alpha_1 = 0.011833$
Rotação long dinamica.....	$\alpha_2 := \alpha_{cm1}$	$\alpha_2 = 0.00164$
Esforço long. permanente.....	H _A := H1	H _A = 1.766 t
Esforço long. dinamico.....	T _A := H2	T _A = 0.783 t
Deslocamento long. permanente.	$\delta_P := \delta_1 \cdot 1000$	$\delta_P = 6.05$ mm

Rotina para Verificação de Aparelhos de Apoio de NEOPRENE Fretados

OBRA : VIADUTO NA PE-060

TRECHO 33.2m

1. Dados de Entrada

1.1 Geometria

Dimensão nom. dir. longitudinal	<mm>	$a_n := 350$
Dimensão nom. dir. transversal	<mm>	$b_n := 500$
Espessura da camada de proteção	<mm>	$t_p := 3$
Espessura de cada camada	<mm>	$h_1 := 12$
Numero de camadas		$n := 5$

1.2 Carregamentos

Esforço normal estático	<tf>	$N_e := 76.659$
Esforço normal dinâmico máximo	<tf>	$N_{max} := 46.448$
Esforço normal dinâmico mínimo	<tf>	$N_{min} := -7.038$
Esforço longitudinal dinâmico	<tf>	$H_L := 0.783$
Esforço longitudinal dinâmico concomitante com N_{min}	<tf>	$H_{L1} := 0$
Esforço transversal dinâmico	<tf>	$H_T := 1.415$

1.3 Deformações Impostas

Deslocamento longitudinal estático	<mm>	$\delta_e := 6.05$
Rotação estática	<rad>	$\alpha_e := 0.011833$
Rotação dinâmica	<rad>	$\alpha_d := 0.00164$

2. Cálculos

		$G := 1$	Mpa
	$a_0 := a_n - 2 \cdot t_p$	$b_0 := b_n - 2 \cdot t_p$	
dimen. p/calc.	$a_0 = 344$	$b_0 = 494$	mm
Área nao deformada:	$A_0 := a_0 \cdot b_0$	$A_0 = 169936$	mm ²
fator de forma	$k_f := \frac{a_0 \cdot b_0}{2 \cdot h_1 \cdot (a_0 + b_0)}$	$k_f = 8.449$	
altura total:	$h := n \cdot h_1$	$h = 60$	mm
deslocamento longitudinal total:			
	$\delta_t := \delta_e + \frac{H_L \cdot 10^4}{2 \cdot G \cdot A_0} \cdot h$	$\delta_t = 7.432$	mm

áreas de cálculo:

estático	$A_e := (a_0 - \delta_e) \cdot b_0$	$A_e = 166947$	mm^2
dinâmico	$A_d := (a_0 - \delta_t) \cdot b_0$	$A_d = 166264$	mm^2

2.1 Limite na tensão normal média

2.1.1 Tensão normal máxima

$$\sigma_{me} := \frac{N_e \cdot 10^4}{A_e} \quad \sigma_{me} = 4.592 \quad \text{MPa}$$

$$\sigma_{md} := \frac{(N_e + N_{\max}) \cdot 10^4}{A_d} \quad \sigma_{md} = 7.404 \quad \text{MPa}$$

NOTA: ambos os valores devem ser inferiores a 15 MPa

2.1.2 Tensão normal mínima

$$\sigma_{\min} := \min \left[\sigma_{me}, \frac{(N_e + N_{\min}) \cdot 10^4}{A_d} \right] \quad \sigma_{\min} = 4.187 \quad \text{MPa}$$

NOTA: recomenda-se valor mínimo não inferior a 2 MPa

2.2 Abaixamento da Articulação

$$\delta h(\sigma) := n \cdot \frac{\sigma \cdot h_1}{4 \cdot G \cdot k_f^2 + 3 \cdot \sigma}$$

estático	$\delta h_e := \delta h(\sigma_{me})$	$\delta h_e = 0.92$	mm
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dinâmico	$\delta h_d := \delta h(\sigma_{md})$	$\delta h_d = 1.443$	mm
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NOTA: ambos os valores devem ficar abaixo de 15% de h	$0.15 \cdot h = 9$	mm
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2.3 Limite para a Distorção

$$\text{tg} \alpha := \frac{\delta_t}{h} \quad \text{tg} \alpha = 0.124 \quad (\text{deve ser não superior a } 0.70)$$

2.4 Limitação das Tensões de Cisalhamento

2.4.1 Estático

$$\tau_{Ne} := \frac{1.5 \cdot N_e \cdot 10^4}{k_f \cdot A_0} \quad \tau_{Ne} = 0.801 \quad \text{MPa}$$

$$H_e := G \cdot A_0 \cdot \frac{\delta_e}{h} \cdot 10^{-4} \quad H_e = 1.714 \quad \text{tf}$$

$$\tau_{He} := \frac{H_e \cdot 10^4}{A_0} \quad \tau_{He} = 0.101 \quad \text{MPa}$$

$$\tau_{\alpha e} := \frac{G \cdot a_0^2}{2 \cdot h_1^2} \cdot \frac{|\alpha_e|}{n} \quad \tau_{\alpha e} = 0.972 \quad \text{MPa}$$

$$\tau_{te} := \tau_{Ne} + \tau_{He} + \tau_{\alpha e} \quad \tau_{te} = 1.874 \quad \text{(n\~{a}o sup. a 5MPa)}$$

2.4.2 Din\~{a}mico

$$\tau_{Nd} := \frac{1.5 \cdot 10^4 \cdot (N_e + 1.5 \cdot N_{max})}{k_f \cdot A_0} \quad \tau_{Nd} = 1.529 \quad \text{MPa}$$

$$\tau_{Hd} := \frac{\left[(H_e + H_L)^2 + H_T^2 \right]^{0.5} \cdot 10^4}{A_0} \quad \tau_{Hd} = 0.169 \quad \text{MPa}$$

$$\tau_{\alpha d} := \frac{G \cdot a_0^2}{2 \cdot h_1^2} \cdot \frac{|\alpha_e + \alpha_d|}{n} \quad \tau_{\alpha d} = 1.107 \quad \text{MPa}$$

$$\tau_{td} := \tau_{Nd} + \tau_{Hd} + \tau_{\alpha d} \quad \tau_{td} = 2.805 \quad \text{(n\~{a}o sup. a 5MPa)}$$

2.5 Seguran\~{c}a ao deslizamento

coeficiente de atrito: $\mu(\sigma) := 0.10 + \frac{0.6}{\sigma}$

2.5.1 Est\~{a}tico $\mu_e := \mu(\sigma_{me}) \quad \mu_e = 0.231$

esfor\~{c}o resistente: $R_e := \mu_e \cdot N_e$

esfor\~{c}o sollicitante: $S_e := \left(H_e^2 + H_T^2 \right)^{0.5}$

$$R_e = 17.683 \quad \text{tf} \geq S_e = 2.222 \quad \text{tf}$$

2.5.2 Din\~{a}mico com rea\~{c}o\~{e} m\~{i}nima $\mu_m := \mu(\sigma_{min}) \quad \mu_m = 0.243$

esfor\~{c}o resistente: $R_m := \mu_m \cdot (N_e + N_{min})$

esfor\~{c}o sollicitante: $S_m := \left[(H_e + H_{L1})^2 + H_T^2 \right]^{0.5}$

$$R_m = 16.938 \quad \text{tf} \geq S_m = 2.222 \quad \text{tf}$$

2.5.3 Din\~{a}mico com rea\~{c}o\~{e} m\~{a}xima $\mu_d := \mu(\sigma_{md}) \quad \mu_d = 0.181$

esfor\~{c}o resistente: $R_d := \mu_d \cdot (N_e + N_{max})$

esforço solicitante: $S_d := \left[(H_e + H_L)^2 + H_T^2 \right]^{0.5}$

$$R_d = 22.287 \quad \text{tf} \quad \geq \quad S_d = 2.87 \quad \text{tf}$$

2.6 Segurança ao Levantamento da Borda Menos Comprimida

2.6.1 Estático $\alpha_e = 0.01183 \quad \leq \quad \frac{6 \cdot \delta h_e}{a_0} = 0.016$

2.6.2 Dinâmico $\alpha_e + \alpha_d = 0.01347 \quad \leq \quad \frac{6 \cdot \delta h_d}{a_0} = 0.025$

2.7 Segurança a Flambagem

tensão admissível: $\sigma_{ad} := \text{if} \left(h \leq \frac{a_0}{5}, 15, \frac{2 \cdot a_0}{3 \cdot h} \cdot k_f \cdot G \right)$

$$\sigma_{ad} = 15 \quad \text{MPa}$$

$$\sigma_{md} = 7.404 \quad \text{MPa} \quad \leq \quad \sigma_{ad} = 15 \quad \text{MPa}$$

2.8 Espessura da chapa interna

espessura $\geq \quad \frac{a_0}{k_f} \cdot \frac{\sigma_{md}}{150} = 2.01 \quad \text{mm}$