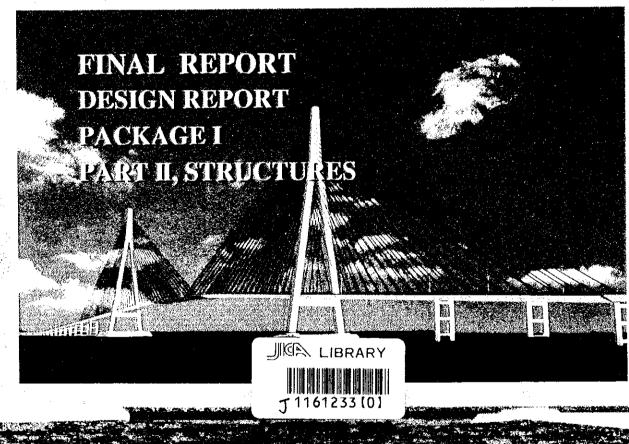
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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) MINISTRY OF TRANSPORT SOCIALIST REPUBLIC OF VIET NAM

THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM



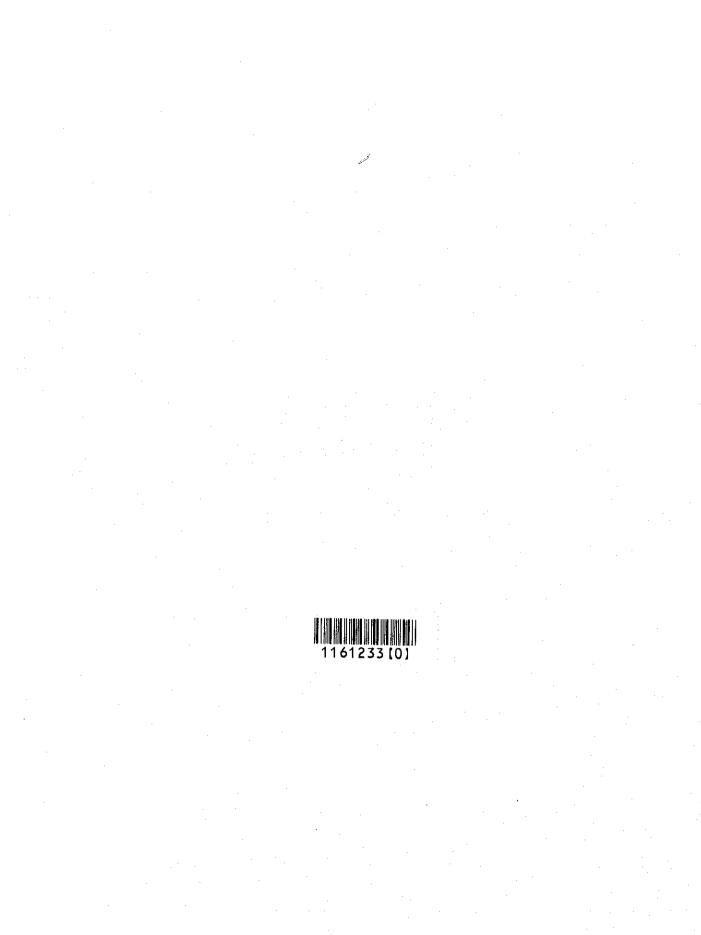
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THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM

FINAL REPORT DESIGN REPORT PACKAGE I PART II, STRUCTURES

OCTOBER 2000

NIPPON KOEI CO., LTD.



DESIGN REPORT II STRUCTURES, PACKAGE-1

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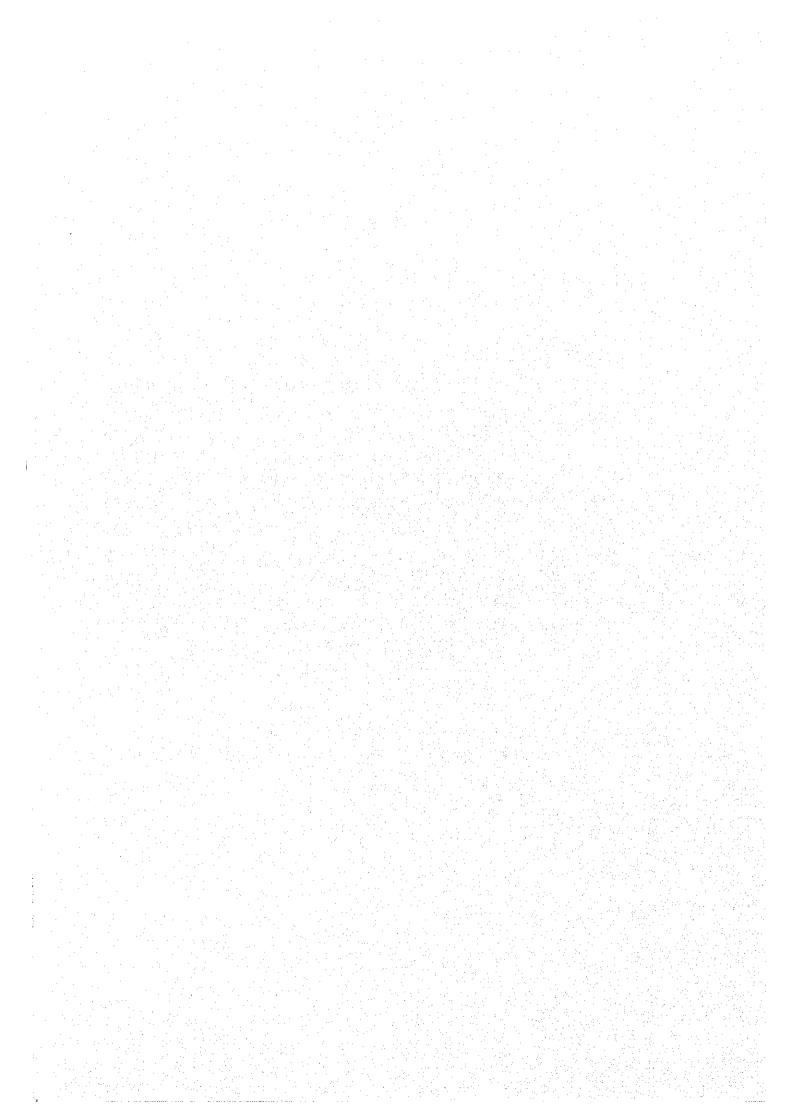
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DESIGN REPORT II

STRUCTURES, PACKAGE-1

CHAPTER 1 GENERAL

1.1 Summary of Categorization

1.1.1 General

The structures of Package -1 and 3 were categorized into the following summary tables with considering the design conditions and dimensions of the structures, and the design analysis was studied for the most severe design condition.

The categorized structures are summarized as follows:

| Structure | Number of Categorized | Remarks | |
|----------------------|--------------------------|------------------------------------|---------|
| | Structures | | |
| 1) Bridges | · · · | | |
| 1-1) Superstructures | 15 types | PC Box: | 2types |
| | | PRC Hollow Slab: | 2types |
| | · · · · | PC Composite I beam (Connected): | 8types |
| | | PC Composite I beam (Simple Span): | 3types |
| 1-2) Abutments | 11 types | Reversed T type | |
| 1-3) Piers | 16 types | 3 column type: | 8 types |
| | | Solid single column type: | 2 types |
| | | Wall type: | 6 types |
| 2) Culvert Box | | | |
| 2-1) Culvert Box | 14 types | 1 cell type: | 10types |
| | | 2 cells type: | 4types |
| 2-2) Wing Wall | 3 types | | |

Table 1.1 Summary of Categorized Structures

1.1.2 Bridges

(1) Superstructures

| Type for De | esign | Span Arrangement | | Name of Bridges | |
|-----------------|--------|----------------------------|---|-------------------------------|--|
| PC Box Girder | Case 1 | 42 + 75 + 42 | - | Cai Rang Bridge (Package -3) | |
| | Case 2 | 36.5+57+36.5 | - | Tra On Bridge (Package - 1) | |
| PRC Hollow Slab | Case 1 | 4 @ 25 | - | NH. 91B, Over Bridge | |
| | | | | (Package-3) | |
| | Case 2 | 2 @ 24.5 + 34.5 + 2 @ 24.5 | - | NH. 54, Over Bridge | |
| | | | | (Pacakge-1) | |
| PC Composite | Case 1 | 31 (H=1.85) + 31 (H=1.85) | - | Cai Rang Bridge (Package - 3) | |
| I beam | Case 2 | 37 (H=1.85) + 31 (H=1.65) | - | Cai Rang Bridge (Package - 3) | |
| (Connected or | Case 3 | 25(H=1.45) + 37(H=1.85) + | - | Small Tra Va Bridge (Package | |
| Simple Spans) | | 25(H=1.45) | | - 1) | |
| | Case 4 | 28(H=1.65) + 37(H=1.85) + | - | Cai Da Bridge (Package-3) | |
| · · · · | | 28(H=1.65) | - | Cai Nai Bridge (Package-3) | |
| | Case 6 | 28(H=1.65) + 25(H=1.65) + | - | Ap My Bridge (Package-3) | |
| · · · · | | 37(H=1.85) + 2@25(H=1.65) | | | |
| | Case 7 | 5 @ 37(H=1.85) | - | Large Tra Va Bridge | |
| | | | | (Package-1) | |
| | | | - | Tra On Bridge (Package-1) | |
| · · · · | | | - | Cai Tac 1 Bridge (Package-3) | |
| · . | Case 8 | 28(H=1.65) + 37(H=1.85) + | - | NH No.91, Rampway Bridge | |
| | | 28(H=1.65), *W=6.5 | | (Package-3) | |
| PC Composite | Case 1 | 25(H=1.45) | - | Ba Mang Bridge (Package-3) | |
| I beam | Case 2 | 31(H=1.85) | - | Cai Rang Bridge (Package-3) | |
| (Simple Span) | Case 3 | 37(H=1.85) | - | Cai Rang Bridge (Package-3) | |
| | | | - | Cai Tac 2 Bridge (Package-3) | |

| Table 1.2 | Summary | of Superstructure | for Design |
|-----------|---------|-------------------|------------|
|-----------|---------|-------------------|------------|

Remarks: (H=1.65) indicates the height of PC I beam.

*W=6.5 indicates the Carriageway width of the Bridge Case 8.

Abutments (2)

| Type for Design | Height of abutment | Type & Diameter of Piles |
|--------------------|-----------------------------------|---|
| A1 | 9.2m | Cast in Place Concrete Pile 1.5m |
| A2 | 9.2m | Cast in Place Concrete Pile 1,5m |
| A3 | 8.2m | Cast in Place Concrete Pile 1.5m |
| A4 | 8.8m | Cast in Place Concrete Pile 1.5m |
| A5 | 8.0m | Cast in Place Concrete Pile 1.5m |
| A6 | 7.52, 7.6, 7.8m | Cast in Place Concrete Pile 1.5m |
| A8 | 8.0m | Cast in Place Concrete Pile 1.5m |
| A2-DP | 9.2m | Driving Square Pile 0.45m x 0.45m |
| A3-DP | 8.2m | Driving Square Pile 0.45m x 0.45m |
| A7-DP | 7.6m | Driving Square Pile 0.45m x 0.45m |
| A9-DP | 7.8m | Driving Square Pile $0.45 \mathrm{m} \ge 0.45 \mathrm{m}$ |
| Notes: | In the Design of "Type Adstudied. | 0.45m x 0.45m 6", the highest Abutment (7.8 |

Table 1.3 Summary of Abutments for Design

| (3) | Piers |
|-----|-------|
| | |

| Type for | Height of Piers | Type & Diameter of Piles | Type of Pier |
|----------|-----------------|--|--------------------------|
| Design | | | |
| P2 | 8.6m, 9.1m | Cast in Place Concrete Pile 1.5m | Solid Single Column Type |
| P4 | 12.6m, | Cast in Place Concrete Pile $1.5 \mathrm{m}$ | Wall Type |
| | 13.6m,14.4m | | |
| P5 | 11.2m | Cast in Place Concrete Pile 1.5m | Wall Type |
| P6 | 9.5m | Cast in Place Concrete Pile 1.5m | 3 Column Type |
| P7 | 7.4m | Cast in Place Concrete Pile 1.5m | 3 Column Type |
| P8 | 8.0m, 8.7m, | Cast in Place Concrete Pile 1.5m | 3 Column Type |
| | 9.0m | | |
| P9 | 9.1m, 10.8m | Cast in Place Concrete Pile 1.5m | 3 Column Type |
| P11 | 8.4m, 9.0m | Cast in Place Concrete Pile 1.5m | 3 Column Type |
| P13 | 8.1m | Cast in Place Concrete Pile 1.5m | Wall Type |
| P14 | 8.5m | Cast in Place Concrete Pile 1.5m | Wall Type |
| P15 | 9.0m | Cast in Place Concrete Pile 1.5m | Wall Type |
| P16 | 9.1m | Cast in Place Concrete Pile 1.5m | Wall Type |
| P3-DP | 9.2m | Driving Square Pile $0.45m \ge 0.45m$ | Solid Single Column Type |
| P6-DP | 8.7m | Driving Square Pile $0.45m \ge 0.45m$ | 3 Column Type |
| P9-DP | 11.5m | Driving Square Pile $0.45m \ge 0.45m$ | 3 Column Type |
| P12-DP | 7.7m | Driving Square Pile $0.45m \ge 0.45m$ | 3 Column Type |

Table 1.4 Summary of Piers for Design

Notes:

In the Design, the highest Pier was studied for the types of piers with some heights.

1.1.3 Culverts

| (1) Culverts |
|--------------|
|--------------|

| | | 0 |
|----------|-------------------------|---------------------------------------|
| Type for | Size & Number of Cell | Facilities in the Cell |
| Design | Width x Height x Number | · · · · · · · · · · · · · · · · · · · |
| B1 | 2.5m x 1.5m x 1 | Waterway |
| B2 | 2.5m x 2.0m x 1 | Waterway |
| B3 | 3.0m x 3.2m x 1 | Waterway |
| B4 | 3.0m x 3.5m x 1 | Waterway |
| B5 | 3.0m x 3.8m x 1 | Waterway |
| B6 | 5.0m x 3.8m x 1 | Waterway & Foot Path |
| B7 | 5.0m x 4.0m x 1 | Waterway & Foot Path |
| B8 | 5.0m x 4.0m x 1 | Waterway |
| B9 | 5.0m x 4.5m x 1 | Waterway & Foot Path |
| B10 | 6.5m x 4.5m x 1 | Waterway & Foot Path |
| B11 | 2.5m x 1.5m x 2 | Waterway |
| B12 | 2.5m x 2.0m x 2 | Waterway |
| B13 | 2.5m x 2.0m x 2 | Waterway |
| B14 | 5.0m x 4.5m x 2 | Waterway |

| Table 1.5 Summary of Culverts for | r Design |
|-----------------------------------|----------|
|-----------------------------------|----------|

(2) Wing Wall

| | Table 1.0 Summary of Wing Wanton Debign |
|----------|---|
| Type for | Dimension |
| Design | Length of Footing x Width of Footing x Maximum Height |
| W1 | 8.7m x 4.1m x 5.9m |
| W2 | 7.2m x 3.5m x 5.1m |
| W3 | 3.5m x 1.9m x 3.0m |
| | |

Table 1.6 Summary of Wing Wall for Design

1.1.4 Types of Structures in Package-1

| Tabl | e 1.7 Summ | ary or 1 ype | es of Structures | пгаск | age-1 | | |
|------------------------|--------------------|---------------------------------------|------------------|-------------|----------|------------|----------------------|
| <1> Bridges | | | | | | | |
| Supers | structures | · · · · · · · · · · · · · · · · · · · | | Substr | uctures | 3 | |
| Large Tra Va (STA: 0+5 | 78.55 ~ 0+860. | 15) | | | | | • |
| - PC Composite I beam | n (Connected): | : Case 7 | Abutments: | A1: Typ | e A1 | A2: | Type A1 |
| | | | Piers: | P1: Type | | | Туре Рб |
| | | | | РЗ: Туре | | | Type P6 |
| | | | | Р5: Туре | | P6: | Туре Рб |
| | | | | Р7: Тур | e P6 | | |
| Small Tra Va (STA: 1+8 | | | | | | | · · |
| - PC Composite I bear | n (Connected) | : Case 3 | Abutments: | А1: Тур | | | Type A3 |
| | | | Piers: | P1: Typ | e P7 | P2: | Type P7 |
| Tra On (STA: 3+582.00 | ~ 3+842.00) | | | | . | | |
| - PC Box Girder: | | Case 2 | Abutments: | A1: Typ | | | Type A1 |
| - PC Composite I bear | m (Connected) | : Case 7 | Piers: | P1: Typ | | | Type P2 |
| | | | | РЗ: Тур | | 1.1 | Type P4 |
| | | | | Р5: Тур | e PZ | 10: | Type P2 |
| NH No.54 Interchange | Over Bridge (| | | A 1. 11 | | ۸ ۵ | Tuno A4 |
| - PRC Hollow Slab: | | Case 2 | Abutments: | A1: Typ | | | : Type A4 |
| | | | Piers: | P1: Typ | | | Type P13 Type P14 |
| | · · · · · | | | РЗ: Тур | e115 | 1 4 | Type114 |
| <2> Culverts | Tring of | | STA | · · · · · · | Туре | of | Type of |
| STA | Type of Culvert | Type of | | | Culve | | Wing Wall |
| | | Wing Wall | (INTERCHAN | GE 2) | Cuirc | , | This Tun |
| (MAIN ROUTE) | - | Type W1 | Ramp "A" - Kn | • | Type | B1 | Type W1 |
| Km 0+51.8 | Type B3 | Type W2 | - | | Type | · • | Type W1 |
| Km 0+183.7 | • • | Type W2 | Ramp "B" - Kn | | Туре | | Type W1 |
| Km 0+369.5 | Type B3 | | Ramp "C" - Kn | | Туре | | Type W1 |
| Km 1+063.2 (Path) | Туре В9 | Type W3 | Ramp "D" - Kr | n 0+300 | Type | DI | Type wi |
| Km 1+300 | Type B11 | Type W1 | | | | | |
| Km 1+560 | Туре В4 | Type W2 | | | | | |
| Km 2+150 | Type B12 | Type W1 | | | | | |
| Km 2+620 (Path) | Туре Вб | Type W2 | | | | | |
| Km 2+835 | Type B12 | Type W1 | | | | | |
| Km 3+170 | Type B11 | Type W1 | · · | · · · · · | | | |
| Km 4+125 | Type B11 | Type W1 | | | | | |
| NIL 4T IZJ | | T | | | | | |

Table 1.7 Summary of Types of Structures in Package-1

II - 1- 7

Type B14

Type B10

Km 4+318

Km 4+640 (Path)

Type W3

Type W3

1.1.5 Types of Structures in Package-3

| | uctures in Packa | | <u>_</u> |
|---|------------------|-----------------|----------------|
| <1> Bridges | | Cultoturatura | |
| Superstructures | | Substructures | <u> </u> |
| Cai Tac 1 (STA: 8+456.85 ~ 8+642.75) | | · · · · · · · · | |
| - PC Composite I beam (Connected): Case 7 | Abutments: | A1: Type A6 | A2: Type A1 |
| | Piers: | P1: Type P11 | P2: Type P8 |
| • | | РЗ: Туре Р8 | P4: Type P11 |
| Cai Tac 2 (STA: 9+431.45 ~ 9+468.55) | | | |
| - PC Composite I beam (Simple Span):Case 3 | Abutments: | A1: Type A8 | A2: Type A5 |
| Cai Da (STA: 10+416.25 ~ 10+509.75) | | | |
| - PC Composite I beam (Connected): Case 4 | Abutments: | A1: Type A6 | A2: Type A6 |
| | Piers: | P1: Type P9 | P2: Type P9 |
| Ba Mang (STA: 11+202.45 ~ 11+227.55) | | | |
| - PC Composite I beam (Simple Span):Case 1 | Abutments: | A1: Type A9-DP | |
| | | A2: Type A9-DP | |
| Cai Nai (STA: 12+336.25 ~ 12+429.75) | · · · · | | |
| - PC Composite I beam (Connected): Case 4 | Abutments: | A1: Type A3-DP | |
| | | A2: Type A3-DP | |
| | Piers: | P1: Type P9-DP | |
| | | P2: Type P9-DP | |
| Ap My (STA: 13+109.55 ~ 13+250.45) | | | |
| - PC Composite I beam (Connected): Case 6 | Abutments: | A1: Type A2-DP | |
| | | A2: Type A2-DP | |
| | Piers: | P1: Type P12-DF | , |
| | | P2: Type P9-DP | |
| | | P3: Type P9-DP | |
| | | P4: Type P12-DF | > |
| Cai Rang (STA: 13+806.40 ~ 14+064.90) | | | |
| - PC Box Girder: Case 1 | Abutments: | A1: Type A2-DP | • |
| - PC Composite I beam (Connected): Case 1 | | A2: Type A2-DP | |
| - PC Composite I beam (Connected): Case 2 | Piers: | P1: Type P2 | P2: Type P5 |
| - PC Composite I beam (Simple Span): Case 2 | | P3: Type P5 | P4: Type P2 |
| - PC Composite I beam (Simple Span): Case 3 | | P5: Type P6-DP | |
| NH No.91B Interchange Over Bridge (STA: 10- | +000.00) | | |
| - PRC Hollow Slab: Case 1 | Abutments: | A1: Type A2 | A2: Type A2 |
| | Piers: | P1: Type P15 | P2: Type P16 |
| | | P3: Type P15 | |
| NH No.91B Interchange Ramp Way Bridge | | | |
| - PC Composite I beam (Connected): Case 8 | Abutments: | A1: Type A7-DP | A2: Type A7-DP |
| | Piers: | P1: Type P3-DP | P2: Type P3-DP |
| · · · · · · · · · · · · · · · · · · · | | | |

Table 1.8 Types of Structures in Package-3 (1/2)

| <2> Culverts | | | · | | |
|---------------------|----------|-----------|--------------------------|----------|-----------|
| STA | Type of | Type of | STA | Type of | Type of |
| · | Culvert | Wing Wall | | Culvert | Wing Wall |
| (MAIN ROUTE) | | | (MAIN ROUTE) | | |
| Km 7+820 | Type B5 | Type W2 | Km 13+600 | Type B11 | Type W1 |
| Km 7+950 | Type B12 | Type W1 | Km 14+247 | Туре В7 | Type W3 |
| Km 8+820 | Type B12 | Type W1 | Km 14+450 | Type B11 | Type W1 |
| Km 9+326 | Type B12 | Type W1 | Km 14+625 | Type B11 | Type W1 |
| Km 9+760 | Type B11 | Type W1 | Km 14+890 | Type B11 | Type W1 |
| Km 10+310 | Type B12 | Type W1 | (INTERCHANGE 3) | | |
| Km 10+690 | Type B11 | Type W1 | Ramp "A" - Km 0+154 | Type B11 | Type W1 |
| Km 10+950 | Type B11 | Type W1 | Ramp "B" - Km 0+286.5 | Type B11 | Type W1 |
| Km 11+451 | Type B11 | Type W1 | Ramp "C" - Km 0+300 | Туре В8 | Type W3 |
| Km 11+690 | Type B12 | Type W1 | Ramp "D" - Km 0+300 | Type B2 | Type W1 |
| Km 11+976.50 (Path) | Type B7 | Type W3 | Ramp "F" - Km 0+300 | Type B8 | Type W3 |
| Km 12+180 | Type B13 | Type W1 | | | |
| Km 12+592.50 (Path) | Type B7 | Type W3 | (INTERSECTION 4) | | |
| Km 12+756 | Type B5 | Type W2 | Ramp "B" - Km0+223 | Type B11 | Type W1 |

Table 1.8 Types of Structures in Package-3 (2/2)

1.2 Design Condition

1.2.1 General

Generally, the design method, the design theory, and the design philosophies were based on the "Design Criteria on the Detailed Design of the Can Tho Bridge Construction in Socialist Republic of Viet Nam", September , 1999.

- 1.2.2 References and Software
 - (1) References
 - Design Criteria on the Detailed Design of the Can Tho Bridge Construction in Socialist Republic of Viet Nam, September, 1999
 - The AASHTO LRFD 1998 Bridge Design Specification shall be applied for design excepting the live loads.
 - The Standard Specifications for Highway Bridges (Japanese Road Association - 1996)
 - The Design Specifications for Highway Bridges and Culverts (22TCN18-79)

(2) Software

- UC Dos Japanese Software, applied for Substructure and Foundation Design
- UC Bridge Japanese Software, applied for the Superstructure Design of PRC Hollow Slab
- APPLLO Grid Japanese Software, applied for the frame analysis of PC Composite I beam
 - SAP 2000 U.S. Software, applied for the Frame Analysis of Superstructures & Substructures
 - LEAP-5 British Software, applied for the Superstructure Design of PC Box Girder, and the Frame Analysis of Culvert Box & Multicolumn or Rigid Frame Piers

MicrosoftApplied for the Sectional Analysis of RC ConcreteExcelSections

1.2.3 Load and Load Combinations

Generally, Loads and Load Combinations were based on the "Design Criteria". Addition were described as follows:

| | Table 1.9 Addition of Loads |
|---------------------------------------|---|
| Live Load | Refer to "Design Criteria" |
| | Japanese Live Load B for Bridges |
| | Vietnamese HK-80 Load for Culvert Box |
| Creep & Shrinkage | (PC Box Girder & PRC Hollow Slab) |
| | - "CEP-PIF" was applied to define the Creep & Shrinkage. |
| | (PC Composite I beam) |
| | Creep Coefficient t = infinity 2.2 |
| | - Creep Coefficient of slab at t = 1.2 |
| | - Different Shrinkage between Girder & Slab at t = 140days: |
| | 0.00004 |
| Settlement of Piers | (PC Box Girder) |
| (Displacement) | - 15mm in the vertical direction |
| | (PRC Hollow Slab & PC Composite I beam) |
| | - 10mm in the vertical direction |
| Vessel Collision Force | Loading Elevation: Water level with 5% frequency |
| | Force: The formula defined in Clause 3.14, AASHTO |
| | LRFD was applied. In this formula, vessel impact |
| | velocity was defined as the velocity of water flow, |
| · · · · · · · · · · · · · · · · · · · | and Dead weight tonnage of vessel was defined |
| | based on the Vietnamese Classification of Streams. |

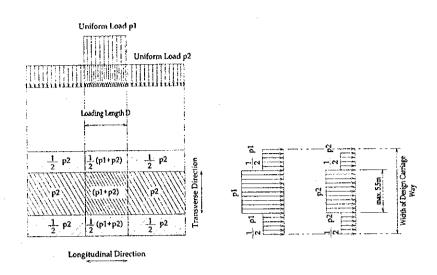
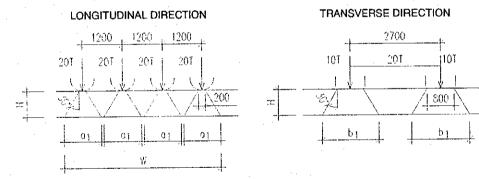
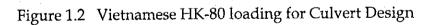


Figure 1.1 Japanese Live Load B (L Load) for Bridge Design

| | | | | | | L: Span Length (m) |
|-----------------|------------------------|-----------|-------|--|----------------|------------------------|
| | Sub-Loading | | | | | |
| p] | Main load l-Loading | | | p2-Loading | | - |
| Loading | Weight | kgf/m^2 | V | Veight (kgf/m | ²) | |
| length D (m) | For M | For V | L<=80 | 80 <l<=130< td=""><td>L>130</td><td></td></l<=130<> | L>130 | |
| 10 | 1 000 | 1 200 | 350 | 430 - L | 300 | 50% of main loading |

| Table 1.10 | Japanese Live Load B (| [L Load] : | for Bridges |
|------------|------------------------|------------|-------------|
|------------|------------------------|------------|-------------|





Combination of Loads for individual structures are summarized in the following:

| (1) Superstructures | |
|---|---|
| Check of tensile stress | SERVICE-III |
| - Check of resistance | STRENGTH-I, STRENGTH-III & |
| | STRENGTH IV |
| (2) Substructures & Foundations | |
| - Abutments | STRENGTH I-1, STRENGTH I-2, STRENGTH I- |
| | 3, EXTREME EVENT I-1, and EXTREME EVENT |
| | I-2 |
| - Piers | STRENGTH I-1, STRENGTH I-2, STRENGTH III, |
| | EXTREME EVENT I-1, EXTREME EVENT I-2, |
| | and SERVICE I |
| (3) Culvert Box | |
| - Culvert Box | STRENGTH I, STRENGTH IV, and |
| | SERVICE I |
| - Wing Wall | STRENGTH I & STRENGTH II |

| Table 1.11 | Combination | of Loac | ls f | for Structures |
|------------|-------------|---------|------|----------------|
|------------|-------------|---------|------|----------------|

1.2.4 Soil Properties for Design

| STA | | B.P. ~ 4+500 (Package-1) | 4+500 ~ 7+600 | 7+600 ~ 11+0 (Package-3) | |
|-----------|------------|---|---------------|---|------------------------|
| Bridge | | Large Tra Va Small Tra Va Tra On Interchange No.54 Over bridge | | Cai Tac 1 Cai Tac 2 Cai Da Interchang No.91B C bridge Rampway Bridge Interchang | of |
| No. of Be | owling | D-1 ~ D-9 | | No.91B D-18 ~ D-2 | 1 D-22 ~ D-28 |
| Point | | | | | |
| | Ν | 1 | 1 | 1 | 1 |
| | ф | 5 | 5 | 4 | 4 |
| Layer | Ŷ | 16 | 16 | 16 | 16 7 |
| C1 | γ ' | 7 | 7 | 7 | |
| CI | Ċ | 10 | 10 | 10 | 10 |
| | E0 | 2000 | 2000 | 2000 | 2000 |
| · · · | qu | 30 | 30 | 35 | 20 |
| | N | 8 | 12 | 18 | 20 |
| | φ | 14 | 14 | 14 | 14 |
| Louor | γ | 19 | 19 | 19 | 19 |
| Layer | γ' | 10 | 10 | 10 | 10 |
| C2 | Ċ | 20 | 20 | 50 | 50 |
| | E0 | 5000 | 8000 | 12000 | 3500 |
| | qu | 60 | 150 | 220 | 150 |
| | N | | 20 | - | - |
| | φ | - | . 10 | - | - |
| τ | Ϋ́Υ | - | 18 | - | - |
| Layer | γ' | - | . 9 | - | · · · - |
| S/St | Ċ | - | 10 | - | - |
| | E0 | - | 13000 | • | - |
| | qu | - | 300 | | |
| * Notes: | N: | N value (Blows/300 | mm) | C: Cohesion (| |
| | ф: | Friction Angle of So | il (Degree) | E0: Modulus o | of Deformation (kN/m2) |
| | γ. | Unit Weight of Soil | • | 4 · | d Compression Strength |
| · . | γ': | Dry Unit Weight of | Soil (kN/m3) | (kN/m2) | |
| | * Frici | ion of C1 Layer was i | gnored. | | |

Table 1.12 Summary of Soil Properties for Design (1/2)

| | | Table 1.12 Summ | ary of Soll Proj | perne | es for Design (2/2 |) |
|--------------------|-------------------------------|--|---|-------------|--|--|
| STA | | B.P. ~ 4+500 | 4+500 ~ 7+600 | | 7+600 ~ 11+000 | 11+000 ~ E.P |
| Bridge | | (Package-1) - Large Tra Va - Small Tra Va - Tra On - Interchange No.54 Over bridge | (Package-?) | - - - | (Package-3) Cai Tac 1 Cai Tac 2 Cai Da Interchange No.91B Over bridge Rampway Bridge of Interchange No.91B | (Package-3) - Ba Mang - Cai Nai - Ap My - Cai Rang |
| No. of Bo Point | owling | D-1 ~ D-9 | | | D-18 ~ D-21 | D-22 ~ D-28 |
| Layer St/C1 | Ν φ γ Υ' C | 28 15 19.5 10 170 | 25 15 19.5 10 170 | | 29 15 19.5 10 170 | 28 15 19.5 10 170 |
| | E0 qu | 19000 450 | 17500 450 | | 20000 450 | 19000 450 |
| Layer S1 | Ν φ γ' C E0 qu | 60 40 21 12 50 27000 1000 | 60 40 21 12 50 27000 1000 | • | 60 40 21 12 50 27000 1000 | 60 40 21 12 50 27000 1000 |
| * Notes: | N: ¢: | N value (Blows/300) Friction Angle of Soi | nm) I (Degree) | C: E0: | | ormation (kN/m2) |
| | γ: γ': * Frict | Unit Weight of Soil (Dry Unit Weight of S tion of C1 Layer was i | Soil (kN/m3) | qu: | Unconfined Con (kN/m2) | npression Strength |

Table 1.12 Summary of Soil Properties for Design (2/2)

1.2.5 Design of the Connecting Portion of Pile Top and Footing

The following analyses were studied for the connecting portion of pile top and footing, based on the "Japanese Manual for the Design of Pile Foundation":

(1) Checking of Push out Force

1) Vertical Bearing Pressure of the Pile Cap caused by the Pile

The following formula should be applied for the checking:

$$\sigma_{cv} = P / (\pi D^2/4) \leq \sigma_{ca}$$

where,

P: Axial Force of Pile

D: Diameter of Pile

- σ_{cv} : Vertical Bearing Pressure of Pile Cap
- σ_{ca} : Allowable Vertical Bearing Pressure of Pile Cap (0.5 x σ_{ck} = 0.5 x 240 kgf/cm² = 120 kgf/cm² = 11.8 Mpa)
- 2) Vertical Punching Shear of the Pile Cap caused by the Pile

 $\tau_c = P / \{\pi \times (D + h) \times h\} \leq = \tau_a$

P:

where,

- D: Diameter of Pile
- h: depth from the pile head to the upper surface of Pile cap
- τ_c : Punching Shear of Pile Cap

Axial Force of Pile

 τ_a : Allowable Punching Shear of Pile Cap

 $(9.0 \text{ kgf/cm}^2 = 0.88 \text{ Mpa})$

- (2) Checking of Horizontal Force
 - Horizontal Bearing Pressure of the Pile Cap caused by the Pile

 $\sigma_{ch} = H / (Dl) \le \sigma_{ca}$

where,

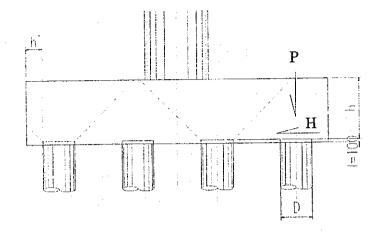
- H: Horizontal Force at the top of Pile D: Diameter of Pile
 - 1: 100mm (Embedded length of Pile into Pile cap)
 - σ_{ch} : Horizontal Bearing Pressure of Pile Cap
 - σ_{ca} : Allowable Horizontal Bearing Pressure of Pile Cap
 - $(0.3 \times \sigma_{ck} = 0.3 \times 240 \text{ kgf/cm}^2 = 72 \text{ kgf/cm}^2 = 7.0 \text{ Mpa})$
- 2) Horizontal Punching Shear of the Pile Cap caused by the Pile

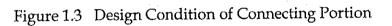
 $\tau_{c} = H / \{h' \times (2l + D + 2h')\} \le \tau_{a}$

where, H: Horizontal Force at the top of Pile

- D: Diameter of Pile
- h': Nearest Length from the side surface of Pile to the side
 - surface of Pile cap
- I: 100mm (Embedded length of Pile into Pile cap)

- τ_c : Horizontal Punching Shear of Pile Cap
- τ_a : Allowable Horizontal Punching Shear of Pile Cap (9.0 kgf/cm² = 0.88 Mpa)





1.2.6 Materials

(1) Concrete

| | Tab. | e 1.13 Concrete for Design (1/2) |
|--------|-------------|---|
| Grade | fc' | Typical use |
| В | 40 Mpa | PC box girder, PC I-Girder |
| C | 35 Mpa | Hollow Slab |
| D | 30 Mpa | In situ concrete : Bored pile, Deck Slab |
| Е | 24 Mpa | In situ concrete : Pier, Abut, Pile cap, Wing wall, retaining wall, Culverts |
| F | 20 Mpa | In situ concrete : Base concrete, Apron |
| G | 15 Mpa | In situ concrete : Lean Concrete, Plain Concrete |
| * fc': | Compressive | strength of concrete at 28 days |

Table 1.13 Concrete for Design (2/2)

| Grade | fc' | Ec (Mpa) | E | XP | |
|-------|--------------|-------------------------------|----------------------|--|--|
| В | 40Mpa | 33 990 | | | |
| D | 30Mpa | 29 440 | 10.8 x 1.0E-6 (/°C) | | |
| Ē | 24Mpa | 26 330 | | | |
| * Ec: | Young's M | lodulus (AASHT | TO LRFD, 5.4.2.4) | $Ec = 0.043\gamma_c^{1.5} \times \sqrt{fc'}$ | |
| γ.: | Density of (| concrete (kg/m ³) | | | |
| EXP: | Coefficient | of thermal expans | sion and contraction | | |

<Allowable Stress of Concrete>

 For checking of tensile stress in Serviceability limit state (SERVICE-III): 0.25 x √f'c

~ for PC Box Girder & PC Composite I beam For checking of tensile stress in stages during construction,

and serviceability limit state: $0.50 \times \sqrt{f'c}$

~ for PRC Hollow slab

Stress at interface between pre-casting segments: No tension allowed.

(2) Reinforcement Steel

•••

| - Specified Yield Strength: | Plain Round: | 240Mpa |
|-----------------------------|----------------------|--------|
| • | High Yield deformed: | 390MPa |

Es =

- Modulus of elasticity of reinforcement steel:

200,000 Mpa

| Dia. (mm) | Area (mm2) | Mass kg/m | Dia. (mm) | Area (mm2) | Mass kg/m |
|-----------|------------|-----------|-----------|------------|-----------|
| 10 | 78.5 | 0.617 | 20 | 314.2 | 2.466 |
| 12 | 113.1 | 0.888 | 22 | 380.1 | 2.984 |
| 14 | 153.9 | 1.208 | 24 | 490.9 | 3.85 |
| 16 | 201.1 | 1.578 | 28 | 615.8 | 4.83 |
| 18 | 254.5 | 1.998 | 32 | 804.2 | 6.31 |

Table 1.14 Summary of Reinforcement Steel

| Strength | Diameter | | Hook (mm) | | ap Splice (mm | • |
|----------|-------------|--------|-----------|---------|---------------|---------|
| of | (mm) | (kg/m) | | Grade A | Grade B | Grade C |
| Concrete | | | | | | |
| 24Mpa | Plain Round | | 440 | 0.00 | 200 | |
| | 6 | 0.222 | 129 | 300 | 300 | 300 |
| | 8 | 0.395 | 151 | 300 | 300 | 318 |
| | 10 | 0.617 | 173 | 300 | 304 | 398 |
| | Deformed | | | | | |
| | 10 | 0.617 | 175 | 300 | 304 | 398 |
| | 12 | 0.888 | 210 | 300 | 365 | 477 |
| | 14 | 1.208 | 245 | 328 | 426 | 557 |
| | 16 | 1.578 | 280 | 374 | 487 | 636 |
| | 18 | 1.998 | 315 | 421 | 548 | 716 |
| | 20 | 2.466 | 350 | 500 | 650 | 850 |
| | 22 | 2.984 | 385 | 605 | 787 | 1029 |
| | 25 | 3.853 | 437 | 782 | 1016 | 1329 |
| | 28 | 4.834 | 534 | 980 | 1274 | 1667 |
| | 32 | 6.313 | 610 | 1280 | 1665 | 2177 |
| 30Mpa | Plain Round | _ | | | | |
| | 6 | 0.222 | 129 | 300 | 300 | 300 |
| | 8 | 0.395 | 151 | .300 | 300 | 318 |
| | 10 | 0.617 | 173 | 300 | 304 | 398 |
| | Deformed | • | | • | • • | |
| | 10 | 0.617 | 175 | 300 | 304 | 398 |
| | 12 | 0.888 | 210 | 300 | 365 | 477 |
| | 14 | 1.208 | 245 | 328 | 426 | 557 |
| | 16 | 1.578 | 280 | 374 | 487 | 636 |
| | 18 | 1.998 | 315 | 421 | 548 | 716 |
| | 20 | 2.466 | 350 | 468 | 608 | 796 |
| | 22 | 2.984 | 385 | 541 | 704 | 920 |
| | 25 | 3.853 | 437 | 699 | 909 | 1188 |
| | 28 | 4.834 | 534 | 877 | 1140 | 1491 |
| | 32 | 6.313 | 610 | 1145 | 1489 | 1947 |
| 35Mpa | Plain Round | | | | | |
| | 6 | 0.222 | 129 | 300 | 300 | 300 |
| | 8 | 0.395 | 151 | 300 | 300 | 318 |
| | 10 | 0.617 | 173 | 300 | 304 | 398 |
| | Deformed | | | | | |
| | 10 | 0.617 | 175 | 300 | 304 | 398 |
| | 12 | 0.888 | 210 | 300 | 365 | 477 |
| | 14 | 1.208 | 245 | 328 | 426 | 557 |
| • | 16 | 1.578 | 280 | 374 | 487 | 636 |
| | 18 | 1.998 | 315 | 421 | 548 | 716 |
| | 20 | 2.466 | 350 | 468 | 608 | 796 |
| | 22 | 2.984 | 385 | 515 | 669. | 875 |
| | 25 | 3.853 | 437 | 647 | 841 | 1100 |
| | 28 | 4.834 | 534 | 812 | 1055 | 1380 |
| | 32 | 6.313 | 610 | 1060 | 1378 | 1803 |

Table 1.15 Summary of Development of Reinforcement Steel (1/2)

| | 10010 0/00 | | 1 | | · · · | <i>'</i> |
|----------|-------------|-------------|-----------|---------|----------------|----------|
| Strength | Diameter | Unit weight | Hook (mm) |] | Lap Splice (mm | ı) |
| of | (mm) | (kg/m) | | Grade A | Grade B | Grade C |
| Concrete | | | | | | |
| 40Mpa | Plain Round | | | | | |
| | 6 | 0.222 | 129 | 300 | 300 | 300 |
| | 8 | 0.395 | 151 | 300 | 300 | 318 |
| | 10 | 0.617 | 173 | 300 | 304 | 398 |
| | Deformed | | · | | | |
| | 10 | 0.617 | 175 | 300 | 304 | 398 |
| | 12 | 0.888 | 210 | 300 | 365 | 477 |
| | 14 | 1.208 | 245 | 328 | 426 | 557 |
| | 16 | 1.578 | 280 | 374 | 487 | 636 |
| | 18 | 1.998 | 315 | 421 | 548 | 716 |
| | 20 | 2.466 | 350 | 468 | 608 | 796 |
| | 22 | 2,984 | 385 | 515 | 669 | 875 |
| | 25 | 3.853 | 437 | 605 | 787 | 1029 |
| | 28 | 4.834 | 534 | 759 | 987 | 1291 |
| | 32 | 6.313 | 610 | 992 | 1289 | 1686 |

Table 1.15 Summary of Development of Reinforcement Steel (2/2)

Reference: AASHTO 98 - Article 5.11.2 - Page 5-138

Hook and Bends (For Standard Hooks)

<Longitudinal Reinforcement>

- 180°-bend, plus a 4.0 d_b extension, but not less than 65mm at the free end of the bar, or
- 90°-bend, plus a 12.0 d_b extension at the free end of the bar <Transverse Reinforcement>
 - No.16 bar (Dia. 15.9mm) and smaller -90° -bend, plus a 6.0 d_b extension at the free end of the bar,
 - No.19, No.22 and No.25 bar (Dia. 19.1mm, 22.2mm, and 25.4mm, respectively) 90°-bend, plus a 12.0 d_b extension at the free end of the bar, and
 - No.25 bar (Dia. 25.4mm) and smaller 135°-bend, plus a 6.0 d_b extension at the free end of the bar.

where,

-

- d_b: nominal diameter of reinforcing bar (mm)
- Reference: AASHTO 98 Article 5.10.2.1 Page 5-90

Minimum Bend Diameters (For Standard Hooks)

| Bar Size and Use | Minimum Diameter |
|---|---------------------|
| No.10 (Dia. 9.5mm) through No.16 (Dia. 15.9mm) | 6.0d _h |
| – Genera | 1 |
| No.10 (Dia. 9.5mm) through No.16 (Dia. 15.9mm) | 4.0d _b |
| - Stirrups and Ties | 8 |
| No.19 (Dia. 19.1mm) through No.25 (Dia. 25.4mm) | 6.0d _b |
| – Genera | 1 |
| No.29 (Dia. 28.7mm), No.32 (Dia. 32.3mm), | 8.0d _b |
| and No.36 (Dia. 35.8mm) | |
| No.43 (Dia. 43.0mm) and No.57 (Dia. 57.3mm) | 10.0d _b |
| Reference: AASHTO 98 - Article 5.10 |).2.3 - Page 5- |

(3) PC Strand

| Table 1.16 | Summary | of PC Strands |
|------------|---------|---------------|
| | | |

| | Internal | External | Transverse |
|--------------------------------|----------|----------|----------------|
| Type of PC Steel | 12S12.7 | 12S15.2 | 3S12.7 |
| Sectional Area (mm2) | 1,184.5 | 1,664.5 | 296.1 |
| Nominal Strength (N/mm2) | 1,860 | 1,860 | 1,860 . |
| Yield Strength (N/mm2) | 1,395 | 1,395 | 1,395 |
| Young's Modules (MPa) | 196,000 | 196,000 | 196,000 |
| Friction Loss Coefficient (/m) | 0.004 | 0.004 | 0.004 |
| Angle Coefficient (/Deg.) | 0.25 | 0.25 | 0.25 |
| Set Losses (mm) | | | |
| One side Tensioning | 5 | 5 | 5 |
| Both side Tensioning | 10 | 10 | 10 |

- 1.2.7 Span Length Arrangement and Foundation Pile for the Minor Bridges in the Approach Roads
 - (1) General

After the discussion about the Draft Final Report on 7 August 2000, the Vietnamese side requested the review of the types of the minor bridges in the approach roads, namely, Package-1 and Package-3. The item number in the "Minutes of Meeting on the Draft Final Report" is "3.2".

Accordingly, the Study Team reviewed the minor bridges, and some of them were revised as shown in the following.

(2) Summary of Revision

The following table shows the summary of modifications for the bridges in the approach roads (Package-1 & 3).

| Bridge | Modification | |
|----------------|------------------------------------|--|
| - Large Tra Va | Span Length Arrangement | |
| U | (Original) | |
| | PC I beam: 4@31 = 124m | |
| | PC Box Girder: 56+80+56 = 192m | |
| | Total Length: 316m | |
| | (Modified) | |
| | PC I beam: 4@35+4@35 = 280m | |
| - Tra On | Span Length Arrangement | |
| | (Original) | |
| | PC I beam: 1@31 = 31m | |
| | PC Box Girder: 56+80+56= 192m | |
| | PC I beam: 1@31 = 31m | |
| | Total Length: 254m | |
| | (Modified) | |
| | PC I beam: 2@36=72m | |
| | PC Box Girder: 36.5+57.0+36.5=130m | |
| | PC I beam: 2@29=58m | |
| | Total Length: 260m | |

1) Package-1 (Approach Road on Vinh Long side)

2) Package-3 (Approach Road on Can Tho side)

| | Bridge | Modification |
|---|---|--|
| | Ba Mang | Pile Foundation The types of piles are changed from bore-hole |
| | | pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, |
| | | and changed to the simple spans. |
| - | Cai Nai | Pile Foundation The types of piles are changed from bore-hole pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans. |
| _ | Ар Му | Pile Foundation The types of piles are changed from bore-hole pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans. |
| - | Cai Rang | Pile Foundation The types of piles of the substructures supporting PC I beams (A1, A2, P5) are changed from bore- hole pile to driven pile, and the penetration depth were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans. |
| | NH No.91B Interchange Ramp Way Bridge | Pile Foundation The types of piles are changed from bore-hole pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans. |

- (3) Policy of Revision
 - 1) Span Length Arrangement for the Approach Roads

The navigational clearances were reviewed, and the span lengths for two bridges were reduced with considering the requirement. The comparison tables for these bridges are shown in Figure 1.4 and Figure 1.5, respectively.

2) Foundation Pile for the Approach Span and Approach Road Bridges

The geotechnical conditions were reviewed. The summary of soil properties is shown in Table 1.12.

In the Draft Final Report, the Layer and the Layers, "St/C1" or "S1" were regarded as the bearing stratum, and in the revision, the Clay Layer "C2" was regarded as the bearing stratum for some types of Minor Bridges at some locations.

The types of pile foundations were selected with considering the following items:

Location & Soil Properties of C2 Layer

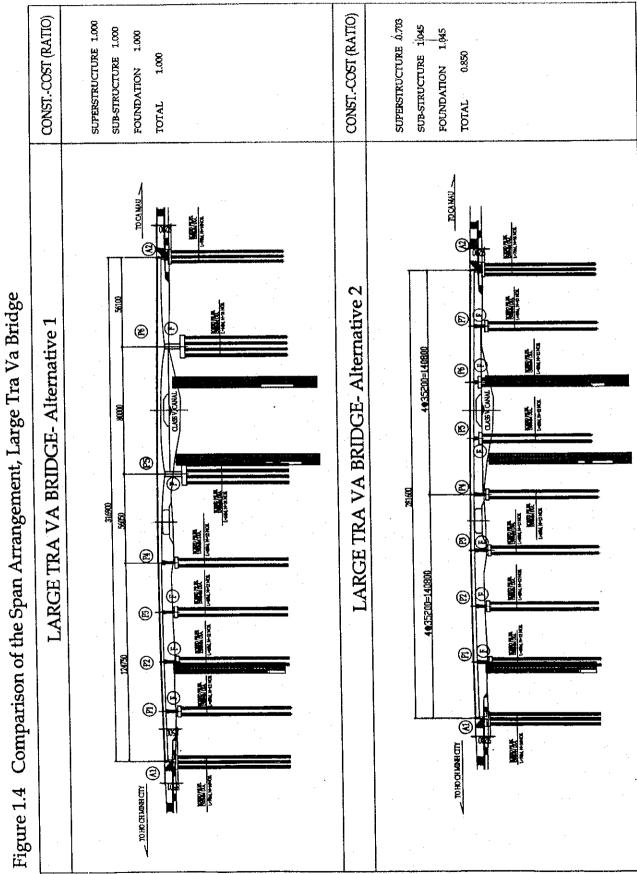
At the each location of minor bridge, the depth and soil properties of C2 Layer were reviewed. With considering the available construction depth of driven pile (40m), the bridges with the following design conditions were reviewed;

- The depth of the C2 Layer is less than 35m from the existing ground level.
- The design N value of C2 Layer is more than "20".
 (Based on the Standard Specification of Highway Bridge, Japan Road Association)
- Type of Superstructure

The driven piles were only applied for the substructures supporting the simple span portions of PC I beam.

In case that the C2 Layer is regarded as the bearing stratum, the differential settlements of substructures will be happened. To prevent the effects caused by these settlements for the superstructures, the continuous spans of superstructures will not be adopted.

The PC I beam can be the simple span, however the PC Box Girder and PRC Hollow Slab can not be the simple span because of their design and construction features.



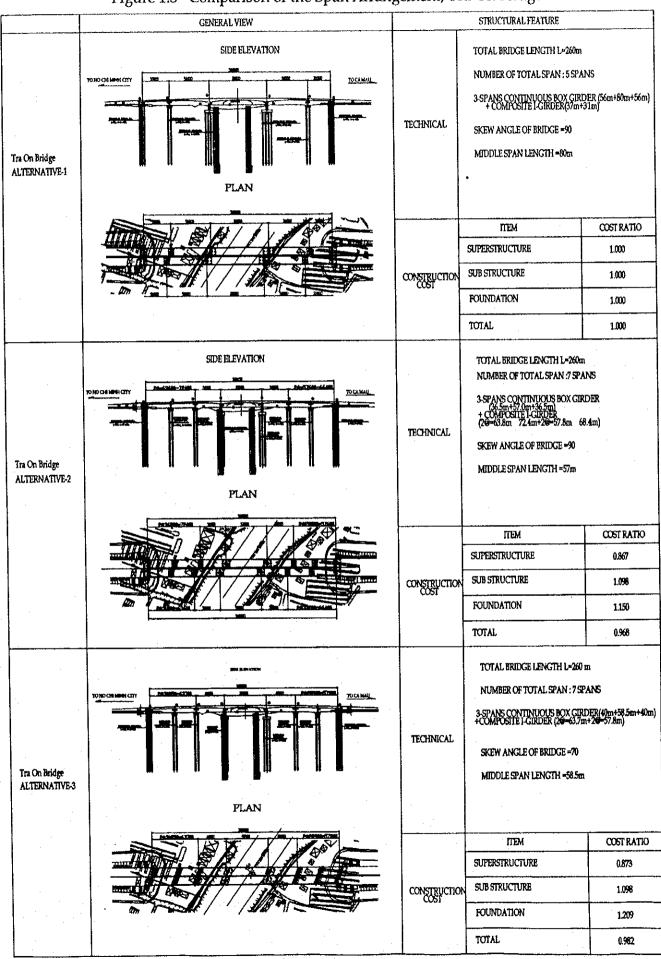
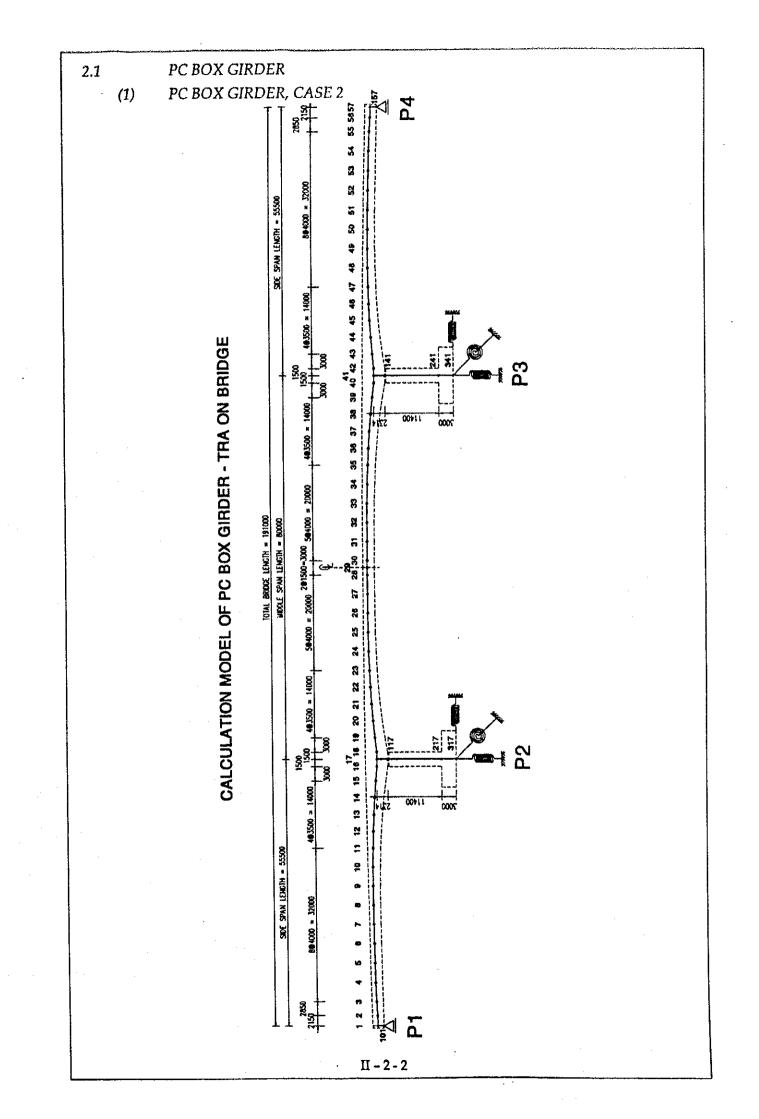


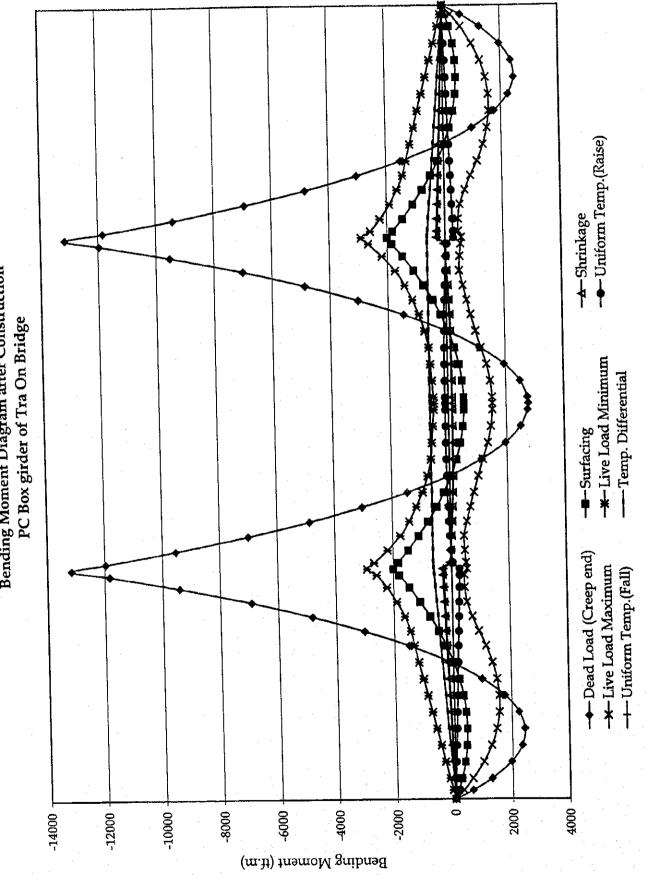
Figure 1.5 Comparison of the Span Arrangement, Tra On Bridge

Chapter 2

DESIGN SUMMARY OF SUPERSTRUCTURES

| 2.1 | | PC BOX GIRDER | II - 2 - 2 |
|-------|-----|--|-------------|
| | (1) | PC BOX GIRDER, CASE 2 | II - 2 - 2 |
| 2.2 | | PRC HOLLOW SLAB | II - 2 - 6 |
| | (1) | PRC HOLLOW SLAB, CASE 2 | II - 2 - 6 |
| 2.3 | | PC COMPOSITE I BEAM (CONNECTED) | II - 2 - 10 |
| · · · | (1) | PC COMPOSITE I BEAM (CONNECTED), CASE 3 | lI - 2 - 10 |
| | (2) | PC COMPOSITE I BEAM (CONNECTED), CASE 7 | II - 2 - 27 |





Bending Moment Diagram after Construction

II – 2 – 3

Summary of Bending Stress at Service Load Design - PC Box girder of Tra On Bridge

| | | | P1~P2 [Section 6] | ection 6] | P2 [Section 17] | ion 17] | P2~P3 [Section 29] | tion 29] | P3 [Section 41] | on 41] | P3~P4 [Section 52] | ction 52] |
|------------|--|-----------|-------------------|-------------|-----------------|--------------|--------------------|----------|-----------------|---------|--------------------|-----------|
| | | . | - uct | Bottom | Top | Bottom | Top | Bottom | Top | Bottom | Top | Bottom |
| | | | r de L | Slah | Slab | Slab | Slab | Slab | Slab | Slab | Slab | Slab |
| | | | | 200 00 | 20 012 | 690.75 | 431.26 | 11.069- | -712.29 | 690.75 | 371.48 | -623.99 |
| <u>(</u>) | Self Weight of Girder (Include Creep) DC | p) DC | 3/1.40 | 44.070- | 23.24.74.7- | | | VC COF | 111 08 | 104 35 | 64 43 | -111.84 |
| <u>1-</u> | Dead I and of Surface Load | DW | 64.43 | -111.84 | -111.08 | 104.35 | 10.87 | +1.22.24 | 00.111- | DO-FOT | | |
| | | HS | -13.99 | 24.23 | -17.44 | 16.38 | 3.71 | -48.82 | -17.44 | 16.38 | -13.99 | 24.23 |
| i | Shrinkage | | 1015 | 1163.01 | 1975 26 | -352.65 | 176.18 | 1042.49 | 1375.26 | -352.65 | -48.15 | 1163.91 |
| | Pre-stress | 2 | C1.04 | T2-00TT | | | | | | | | |
| <u> </u> | Live Load with Impact Factor | | | () | i c T | 3 | 137 59 | 370 40 | 37.10 | -21.64 | 215.13 | -372.68 |
| | Maximum | LL_MAX | 215.13 | -372.68 | 37.10 | +0.12- | 00707 | 21-7 /C- | ST. | | 01 OF | 157.20 |
| | Minimum | ILL_MIN | -87.95 | 152.20 | -166.10 | 146.81 | -79.65 | 114.92 | -166.10 | 140.01 | 06.10- | |
| : | Thermal Rice and Fall | | | | | • | | = | | | ļ | đ |
| | $\frac{1}{1} \sum_{i=1}^{n} \frac{1}{i} \sum_{i=1}^{n} \frac{1}$ | TIR | 12.27 | -21.26 | 15.30 | -14.37 | -3.23 | 42.25 | 15.30 | -14.37 | 12.27 | -21.26 |
| | In case of Misurg (Truck) | TITE - | 12.77 | 21 76 | -15.30 | 14.37 | 3.23 | -42.25 | -15.30 | 14.37 | -12.27 | 21.26 |
| | In Case of Falling (-20Deg) | JUL | | | | | | 150 00 | 17 A 7 A | 37.64 | -27.87 | 48.2 |
| : | Differential Temperature (5Deg) | TG | -27.87 | 48.27 | -34./4 | 32.64 | 07.04- | 00.001 | | | | ***** |
| <u></u> | Wind load on Structure | | | | 1 | i t | (; | 3 | 22.00 | 18.20 | 11 09 | -19 23 |
| 10 | Maximum | WL_MAX | 11.10 | -19.22 | C/.4I | 00.01- | 24·11 | 12.01- | 00-07 7 | | 2052 | 9010 |
| สิบา | Minimum | ML-MIN | -22.56 | 39.11 | 5.92 | -5.56 | -25.36 | 40.42 | c0.4 | 00.0- | 00.77- | |
| ipuə | Support Setlement | | | | | | | | 00 80 | 20.00 | 27 M | 46.82 |
| <u> </u> | Maximum | SE MAX | 27.02 | 46.81 | 33.69 | -31.65 | 01-11 | -10.07 | 04-00 | 2 | | |
| | Minimum | SE_MIN | -17.55 | 30.39 | -21.87 | 20.55 | -11.46 | 16.87 | -23.60 | 20.97 | -17.54 | 30.40 |
| ╉ | Combination SERVICE III | | | | | | | | _ | | | 1 |
| (zu | COMPARATION CONTRACTOR | | 545.88 | 154.17 | 564.13 | 441.53 | 875.22 | -135.67 | 564.13 | 441.53 | 545.88 | 154.17 |
| | | | 303.41 | 574.07 | 401.57 | 576.29 | 625.44 | 254.26 | 401.57 | 576.29 | 303.41 | 2/4.U/ |
| | | | 574 57 | 104.48 | | 406.26 | 841.77 | -35.92 | 601.45 | 408.03 | 574.56 | 104.47 |
| | SEKVICE III-3 | | 550.03 | 146.99 | | 435.00 | 848.23 | -120.42 | 570.86 | 436.77 | 550.01 | 146.98 |
| iqu | SERVICE III-4 | | | 210.02 | 270 40 | | 558.01 | 404.95 | 377.11 | 597.62 | 277.45 | 619.09 |
| | SERVICE III-5 | | TT-//7 | | | | | 200 AE | 346 51 | 62636 | 252.90 | 661.60 |
| | SERVICE III-6 | | 252.89 | 661.59 | 348.81 | 99.079 | 004.47 | 1 | TCOLO | | | |
| əę | | | | СK СK | | QK | 0 | Š | ر | ž | , | 4 |

Notes: Load Factors of Combinations:

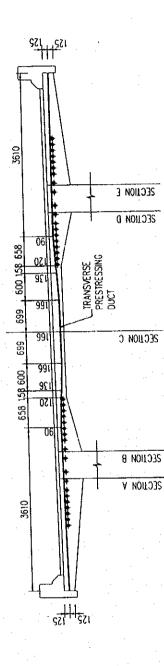
| 123. LUQU I HULVIN VI COTT | | | | | | | | 6 | | | | | |
|----------------------------|------|--------|-----|--|--------|-----------------|------|--|---|----------|------|--------|-----|
| | | | | | | ŝ | | 9 | | | | | |
| | | | | | | | | | (f | WAY NAY! | | SF NAX | |
| COMBINATION | | ΜC | SH | ۲ ۲ | LL MAX | LL MAX LL MIN | | IUF | - 1 | | | | |
| | | | | 1.00 | | | | | | | | | * |
| | 5 | 8 | 8.1 | 1.00 | 0.80 | | | | | | | | |
| | 2017 | | | | | | | | | | | | - |
| | S. | e F | 8 | 1.0 | | 0.80 | | | | | | | |
| SERVICE III-2 | 3.1 | A.1 | 001 | | | | | ********************** | | 000 | | 5 | |
| | | | 5 | S | 0.80 | | 1001 | | 000 | 2.0 | | | |
| | | n T | A.1 | 3 | 2 | | | Press Press of the state of the | | | | | |
| DENVICE HER | | | | and a second sec | | | | Ę | 050 | 0.30 | | 3.1 | |
| | S | 2 | 8 | | 0.80 | | | 3 | 22.5 | | | | |
| | | N'T | | | | | | | | | 0.30 | | 2 |
| | | Ş | S | Ş | | | 1.00 | | 0.00 | | 3 | | |
| SERVICE III-5 | N.T | N'T | 3.1 | ×.4 | | | | | second a state of the second se | | | | 5 |
| | | | | Ş | | | | 8 | 0.50 | | 25.2 | | N.1 |
| | 100 | 871 | NT. | 1 .W | | 0,00 | - | | | | | | |
| | | | | | | | | | | | | | |

II - 2 - 4

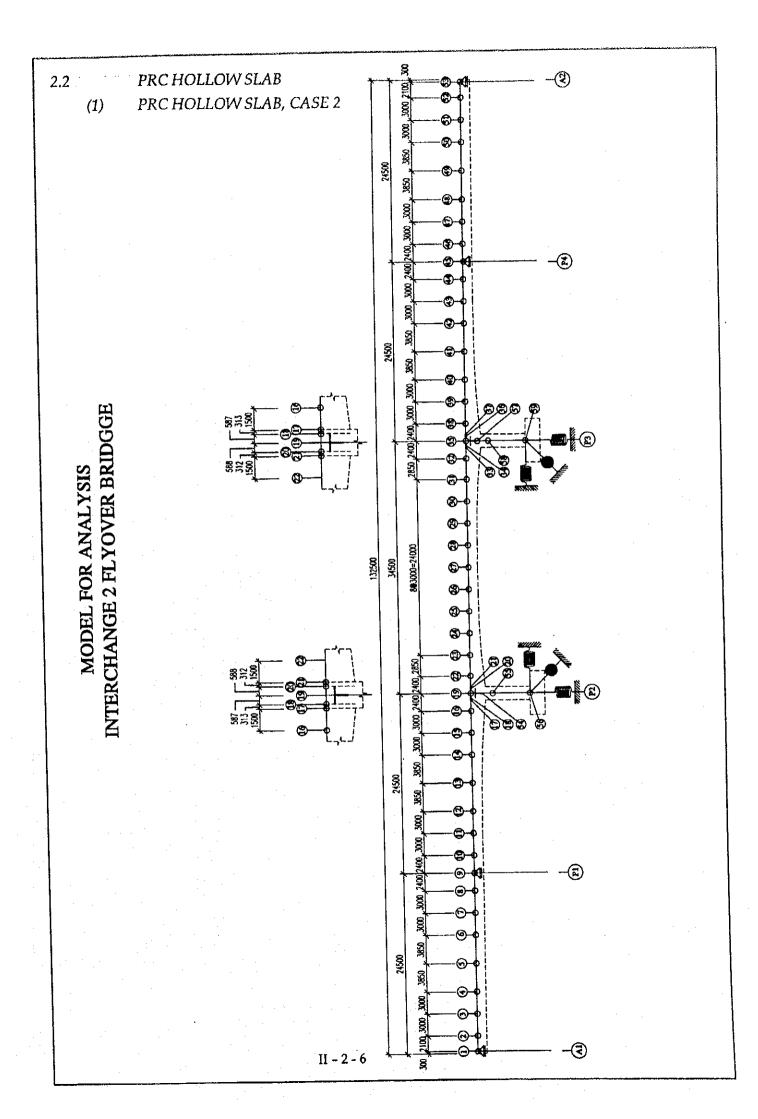
Unit: ff/m^2 Summary of Bending Stress for Slab in Transverse Direction - PC Box Girder of Tra On bridge

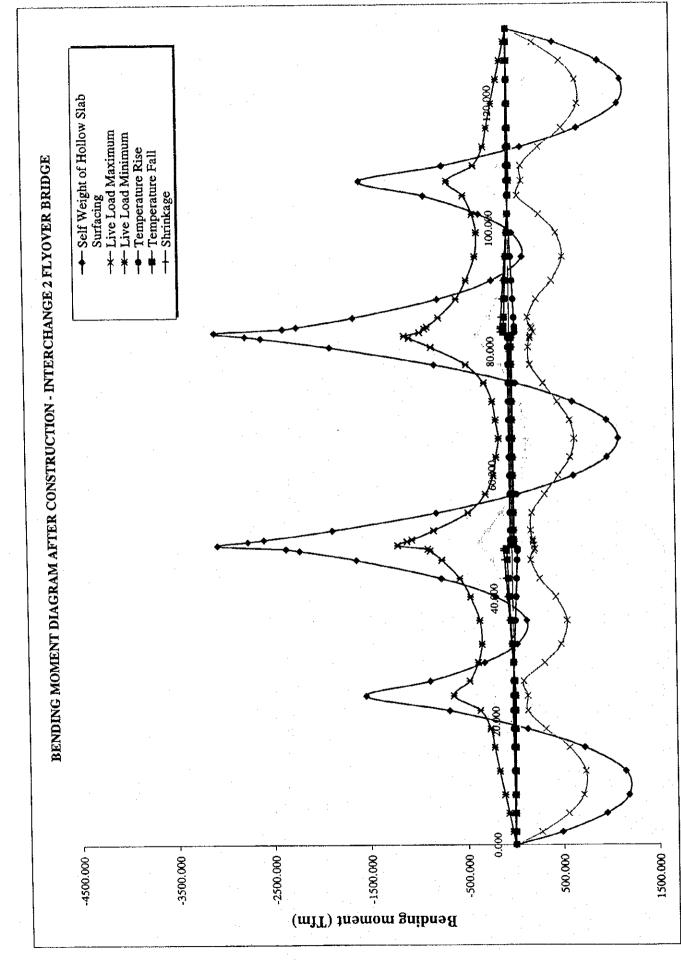
| | | | | - | | | |
|-------------------|-----------|-----------|--------------------|---------|---------------------|-------------|-------------|
| | | After nre | After prestressing | SERVICE | ICEI | SEKVICE III | |
| • | - | | > | - | | | |
| - | | Ton | Bottom | Top | Bottom | Top | Bottom |
| | | Fiber | Fiher | Fiber | Fiber | Fiber | Fiber |
| | | 1371.1 | | | 10101 | 17 73 | 17618 |
| C | Cortion-A | 110.23 | 3.72 | -40.38 | 40-401 | C7.77- | 0T-07T |
| Cantlever Jiau | | 107.45 | 00 E2 | -47 03 | 160.95 | -12.73 | 126.65 |
| | Section-b | 017-0CT | 22.44 | | | | |
| 5 | | 18.61 | 207.31 | 562.09 | -306.17 | 461.35 | z#.cnz- |
| Continuous Slab | Section | 10.04 | | | | C4 C F | 106 65 |
| | Section-D | 136.45 | -22.53 | 47.03 | 160.Y2 | C/777- | 77.077 |
| | | 00 0 4 4 | 2 77 | 40.38 | 154.34 | -12.23 | 126.18 |
| [Cantilever Slab | Section-E | C7.011 | 1.1 | 2007 | | | 1 000 |
| California cana | | 2447 > 0 | 7447 > 66 > -374 | 1631.0 | $1631.6 > \sigma c$ | ς Υ | ac > -322.5 |
| Allowable Stress | | 2 . /EE7 | | | | | OK OK |
| 5 | | | Ň | 5 | CF CF | | 4 |
| Cneck | | | | | | | |

<u>Notes:</u> * SERVICE I : Checking compressive stress * SERVICE III : Checking tensile stress



II – 2 – 5





II - 2 - 7

11 - J

SUMMARY OF FLEXURAL STRESS AT SERVICE LIMIT STATE - INTERCHANGE 2 FLYOVER BRIDGE

| n 19] | Bottom | fiber | 4.086 | 0.532 | -0.045 | -1.737 | -0.311 | 1 584 | 107-1 | 0.029 | -0.029 | -0.215 | 0.411 | 2.588 | 4.104 | 2.402 | 2.343 | 4.544 | 4.485 | | | | SE_Min | | | | | 1.000 | 1.000 |
|----------------------|-------------|---------------|--------|----------------------------|----------------------------|-----------|------------------------------|-----------------------------------|-----------------------------------|-----------------------|---|--------------------|---------|-------------------------|---------------|---------------|---------------|---------------|--------------------------------|--------|-------------------------------|--------------|-------------------------|---------------|----------------|---------------|-------|-------|---------------|
| P2 [Section 19] | Top | fiber | -3.683 | -0.479 | 0.020 | 3.911 | 275.0 | | -1.422 | -0.013 | 0.013 | 0.188 | -0.381 | -0.012 | -1.369 | 0.163 | 0.189 | -1.763 | -1.737 | OK | | | SE_Max | | | 1.000 | | | |
| ction 12] | Bottom | fiber | -0.138 | -0.001 | 0.068 | 7.249 | 366 1 | 1 1 20 | 1.109 | -0.044 | 0.044 | -0.324 | 0.290 | 5.759 | 8.113 | 5.390 | 5.479 | 8.359 | 8.448 | K | | | TUF | | | | 1.000 | | 1.000 |
| P1 ~ P2 [Section 12] | Top | fiber | 0.124 | 0.001 | -0.061 | -0.442 | 100 | C4C.1 | -1.050 | 0.040 | -0.040 | 0.291 | -0.261 | 0.897 | -1.219 | 1.228 | 1.149 | -1.439 | -1.519 | OK | | | TUR | | | 1.000 | | 1.000 | |
| tion 91 | Bottom | fiber | 4.967 | 0.682 | -0.059 | -2.482 | | -0.401 | 2.045 | 0.039 | -0.039 | -1.250 | . 0.518 | 822 6 | 4.743 | 1.527 | 1.449 | 5.300 | 5.222 | оК | | tors | LL_Min | | 0.800 | | | 0.800 | 0.800 |
| P1 [Section 9] | Top | fiber | -4.548 | -0.624 | 0.054 | 6.444 | | 0.422 | -1.873 | -0.036 | 0.036 | 1.144 | 1 | 1 663 | -0.173 | | | | | 0 | | Load Factors | LL_Max | 0.800 | | 0.800 | 0.800 | | |
| ection 61 | Bottom | fiher | -2.835 | -0.435 | 0.047 | 10.695 | | -2.228 | 0.824 | 0.031 | -0.031 | -0 986 | 0.409 | 5 E07 | 8 M38 | 4.642 | | | | OK | | | PS | 1.000 | 1.000 | 1:000 | 1.000 | 1.000 | 1.000 |
| A1 PI [Section 6] | | t vp Fiher | 2.456 | 0376 | 0.041 | -2.289 | | 1.930 | -0.713 | 2000- | 0.027 | 1 2 2 V | -0.354 | | 071.7 | 2.955 | 3 008 | -0.367 | -0.314 | | | | HS | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | - | | | Nuc. | 100 | LIC PS | | LL_Max | LL_Min | on me | TUF | CE Mar | SE_Min | | - | | | | · | -2.950 | | | MC | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | • • • | | | | | | | g Moment | Moment | | | | | | - | | | | | ∧ 30 ∧ | | | DC | 1.000 | 1.000 | 1.000 | 1 000 | 1 000 | 1.000 |
| | | - | 1 | Sell Weight of Hollow Stau | Dead Load due to Surfacing | Shrinkage | Live Load with Impact Factor | In case of Maximum Bending Moment | In case of Minimum Bending Moment | Thermal Rise and Fall | In case of Rasing (+10 Deg) In case of Falling (-10 Deg) | Support Settlement | Maximum | Combination Service III | SERVICE III-1 | SERVICE III-2 | SEKVICE III-3 | SERVICE III-4 | SERVICE III-5 SEDVICE III-6 | | T and Bactors of Combinations | | Combination Service III | CERVICE III-1 | SED VICE III-2 | SERVICE III-2 | | | SERVICE III-6 |
| | | (8 | | | | | -1 | | | | ÷., | ribn9. | | | | (eqi | W) | ssə. | nS | mo) | | | | <u> </u> | -13 | <u> </u> | - 1 * | -1 | |

II - 2 - 8

SUMMARY OF FLEXURAL STRESS AT SERVICE LIMIT STATE - INTERCHANGE 2 FLYOVER BRIDGE

-0.746 3.308 660.9 2.586 2.539 0.023 0.309 6.431 6.384 -0.666 -0.035 -2.865 0.623 0.023 -4.490 10.791 SE_Min P4 ~ A2 [Section 49] Bottom fiber g 1.259 1.299 0.540 -0.020 0.020 0.646 0.268 3.963 L.546 4.589 4.629 -2.518 2.482 3.889 0.577 0.031 SE_Max 1.000 1.000 fiber Top 0.039 2.738 4.743 .449 5.300 5.222 -0.059 -1.250 0.518 0.682 2.045 0.039 1.527 0.461 4.967 -2.482 1.000 Bottom TUF fiber P4 [Section 45] Ş 1.145 0.683 -4.548 0.054 0.422 -0.036 0.036 0.474 1.663 0.173 2.772 2.844 -0.611 -0.624 6.444 1.000 TUR fiber Top 5.759 8.113 5.479 8.448 -1.775 0.044 0.324 0.290 5.390 8.359 -0.138 -0.001 0.068 7.249 1.169 0.044 LL_Min P3 ~ P4 [Section 42] Bottom 0.800 fiber Load Factors QK -1.519 1.595 -1.050 0.040 0.040 1.219 1.228 1.149 1.439 0.124 0.291 -0.2610.897 LL Max -0.442 0.001 -0.061 0.800 0.800 0.800 Top fiber -0.341 0.630 3.903 2.589 4.604 4.086 0.447 0.109 -1.737 1.247 -0.071 2.632 2.446 4.461 Bottom 80.1 1.000 000.1 1.000 fiber PS P3 [Section 35] <u>S</u> 0.079 0.104 0.052 -1.186 -1.680 -1.837 -0.402 -0.120 0.302 0.131 0.027 -3.683 3.911 1.000 1.000 000 1.000 fiber Top HS -0.042 3.476 1.109 0.943 3.848 -4.304 -0.612 -0.127 8.152 -2.550 0.459 0.083 0.289 1.068 3.682 P2 ~ P3 [Section 27] 1.000 1.000 1.000 Bottom 1.000 DW fiber <u> N</u> 0.039 4.319 4.320 1.396 .853 929 3.806 0.058 2.269 -0.038 0.038 0.270 0.542 -1.903 -0.428 2.161 1.000 1.000 1.000 1.000 fiber В Top in case of Maximum Bending Moment LL_Max SE_Max n case of Minimum Bending Moment LL_Min SE_Min -2.950 TUF MO Ы E S Combination Service III ۸ g ٨ Load Factors of Combinations ive Load with Impact Factor In case of Rasing (+10 Deg) Dead Load due to Surfacing Self Weight of Hollow Slab n case of Falling (-10 Deg) 14.000 **Combination Service III** Chermal Rise and Fal Support Settlement SERVICE III-3 **SERVICE III-2** SERVICE III-3 SERVICE III-4 SERVICE III-2 **SERVICE III-4** SERVICE III-5 SERVICE III-1 SERVICE III-6 SERVICE III-1 PC Tendon Maximum Checking Shrinkage Minimum (sqM) seeus <u>Notes</u> Bending Suess due to Each Loading (Mpa) Sombination of Bending

80.00

1.000

1.000

0.800

1.00

1.000

1.000

1.000

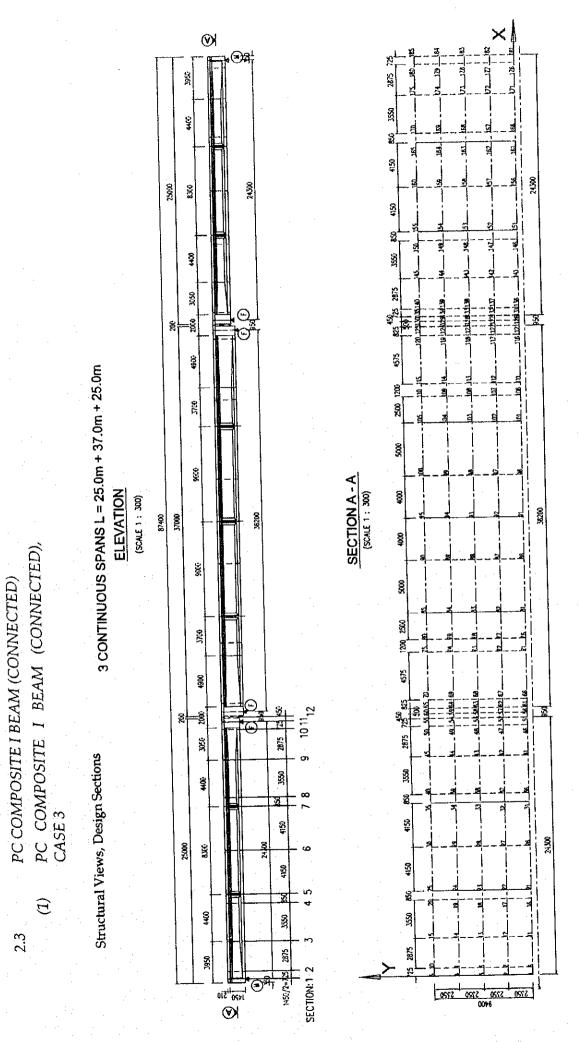
SERVICE III-5 SERVICE III-6

1.000

1.000

1.000

II - 2 - 9



ll - 2 - 1Ò

Summary of Sectional Forces:

| Section | S.' | W of girde | r | S.W of Dec | k Slab+Di | aphragms | S.V | V of Surfac | |
|---------|--------|------------|----------|------------|-----------|----------|--------|---------------|----------|
| | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) | N (tf) | <u>V (tt)</u> | M (tf.m) |
| SEC-1 | 0.00 | 20.76 | 0.00 | 0.00 | 14.99 | 0.00 | 0.00 | 9,33 | -1.41 |
| SEC-2 | 0.00 | 19.08 | 14.44 | 0.00 | 14.10 | 10.54 | 0.00 | 8.21 | 4.95 |
| SEC-3 | 0.00 | 14.53 | 62.75 | 0.00 | 10,55 | 45.97 | 0.00 | 3.74 | 22.13 |
| SEC-4 | 0.00 | 7.74 | 102.27 | 0.00 | 6.17 | 75.64 | 0.00 | -1.06 | 27.86 |
| SEC-5 | 0.00 | 6.39 | 108.28 | 0.00 | 5.12 | 80.44 | 0.00 | -2.38 | 26.39 |
| SEC-6 | 0.00 | 0.00 | | | 0.00 | 91.07 | 0.00 | -2.73 | 28.34 |
| SEC-7 | 0.00 | -6.39 | | 0.00 | -5.12 | 80.44 | 0.00 | -8.89 | 4.86 |
| SEC-8 | 0.00 | -7.74 | 102.27 | | -6.17 | 75.64 | 0.00 | -4.89 | 1.41 |
| SEC-9 | 0.00 | | | 1 1 | -10.55 | 45.97 | 0.00 | -10.40 | -25.74 |
| SEC-10 | 0.00 | -19.08 | | | -14.10 | 10.54 | 0.00 | -14.75 | -61.47 |
| SEC-11 | 0.00 | -20.76 | 0.00 | 0.00 | -14.99 | 0.00 | 0.00 | -15.88 | -72.57 |
| | | | | | | | | | <u> </u> |

| Section | | Prestress | | Liv | veLoad ma | ıx | Li | veLoad mi | |
|------------------|--------|-----------|------------|--------|-----------|----------|--------|---------------|----------|
| | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) | N (tf) | <u>V (tf)</u> | M (tf.m) |
| SEC-1 | 376.83 | -34.64 | 0.00 | 0.00 | 8.41 | 1.96 | 0.00 | -1.04 | -1.90 |
| SEC-2 | 376.83 | -32.49 | -53.02 | 0.00 | 7.99 | 4.70 | 0.00 | -1.04 | -0.67 |
| SEC-3 | 383.09 | -26.09 | -139.56 | 0.00 | 6.40 | 21.22 | 0.00 | -1.19 | -3.10 |
| SEC-4 | 389.95 | -18.93 | -217.17 | 0.00 | 5.12 | 35.47 | 0.00 | -2.74 | -6.79 |
| SEC-5 | 395.20 | -11.66 | -230.19 | 0.00 | 4.71 | 37.73 | 0,00 | -3.16 | -7.72 |
| SEC-6 | 397.67 | 0.04 | | 0.00 | 2.24 | 36.61 | 0.00 | -4.67 | -11.03 |
| SEC-0 | 395.20 | 11.69 | | 0.00 | 1.04 | 26.05 | 0.00 | -6.69 | -14.54 |
| SEC-8 | 389.95 | 18.91 | | | 2.02 | | 0.00 | -8.29 | -15.18 |
| SEC-8 | 383.09 | 26.01 | | 0.00 | 1.25 | 9.29 | 0.00 | -9.97 | -21.38 |
| SEC-10 | 376.83 | 32.37 | 1 | | 1.24 | 8.99 | 0.00 | -11.12 | -39.77 |
| SEC-10 SEC-11 | 376.83 | | I 1 | | 1.24 | i . • | 0.00 | -11.37 | -46.18 |
| SEC-11 | 570.05 | 51.01 | 0.00 | 0.00 | | | | | |

| Section | Diffe | erential Cr | eep | Differe | ential Shrir | ikage | Differen | itial Tempe | |
|---------|---------|-------------|----------|---------|--------------|----------|----------|-------------|-----------------|
| | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | <u>M (tf.m)</u> |
| SEC-1 | 77.20 | 0.00 | 9.17 | 5.70 | 0.00 | 0.55 | 7.69 | 0.00 | 0.75 |
| SEC-2 | 55.21 | 0.00 | 6.77 | 5.53 | 0.00 | 0.54 | 7.47 | 0.00 | 0.72 |
| SEC-3 | -26.02 | 0.00 | -2.07 | 4.83 | 0.00 | 0.46 | 6.53 | 0.00 | 0.63 |
| SEC-4 | -83.82 | 0.00 | -8.57 | 4.87 | 0.00 | 0.47 | 6.57 | 0.00 | 0.63 |
| SEC-5 | -80.53 | 0.00 | | 5.75 | 0.00 | 0.56 | 7.76 | 0.00 | 0.76 |
| SEC-6 | -113.44 | 0.00 | | 4.90 | 0.00 | 0.47 | 6.62 | 0.00 | 0.64 |
| SEC-7 | -80.53 | 0.00 | | 5.75 | 0.00 | 0.56 | 7.76 | 0.00 | 0.76 |
| SEC-8 | -83.82 | 0.00 | | 4.87 | 0.00 | 0.47 | 6.57 | 0.00 | 0.63 |
| SEC-9 | -26.02 | 0.00 | -2.07 | 4.83 | 0.00 | 0.46 | 6.53 | 0.00 | 0.63 |
| SEC-10 | 55.21 | 0.00 | • | 5.53 | 0.00 | 0.54 | 7.47 | 0.00 | 0.72 |
| SEC-11 | 77.20 | 0.00 | | 5.70 | 0.00 | 0.55 | 7.69 | 0.00 | 0.75 |
| ULS AL | | | | | | 1. | | | |

| Section | Secondary | force due | to Creep | lo | npact max | | I | npact min | <u> </u> |
|---------|-----------|-----------|----------|--------|-----------|----------|--------|-----------|----------|
| | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tř) 🛛 | M (tf.m) |
| SEC-1 | 0.00 | 1.58 | 0.00 | 0.00 | 2.77 | 0.65 | 0.00 | -0.34 | -0.63 |
| SEC-2 | 0.00 | 1.58 | 1.14 | 0.00 | 2.64 | 1.55 | 0.00 | -0.34 | -0.2 |
| SEC-3 | 0.00 | 1.58 | 5.68 | 0.00 | 2.11 | 7.00 | 0.00 | -0.39 | -1.0 |
| SEC-4 | 0.00 | 1.58 | 11.28 | 0.00 | 1.69 | 11.71 | 0.00 | -0.91 | -2.2 |
| SEC-5 | 0.00 | 1.58 | 12.61 | 0.00 | 1.55 | 12.45 | 0.00 | -1.04 | -2.5 |
| SEC-6 | 0.00 | 1.45 | | 0.00 | 0.74 | 12.08 | 0.00 | -1.54 | -3.6 |
| SEC-7 | 0.00 | 1.33 | 1 | 0.00 | 0.34 | 8.60 | 0.00 | -2.21 | -4.8 |
| SEC-8 | 0.00 | 1.33 | I . I | 0.00 | 0.67 | 7.31 | 0.00 | -2.74 | -5.0 |
| SEC-9 | 0.00 | 2.15 | 1 1 | 0.00 | 0.41 | 3.07 | 0.00 | -3.29 | -7.0 |
| SEC-10 | 0.00 | 1.49 | | 0.00 | 0.41 | 2.97 | 0.00 | -3.67 | -13.1 |
| SEC-11 | 0.00 | 1.41 | 1 | 0.00 | 0.41 | 3.20 | 0.00 | -3.75 | -15.2 |
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| | ASHTO LRFD 5.7.3.2.2) - 1 |
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| Unit Section 1 Section 2 Section 3 | - | Unit | Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | Section 6 | Section 7 |
|--|-------|----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|
| Sectional Properties | | | | | | | | | |
| Depth of Girder | н | mm | 1,450 | 1,450 | 1,450 | 1,450 | 1,450 | 1,450 | 1,450 |
| Width of Deck Slap | pq | um | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| Depth of Deck Slap | hd | mm | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| Total width of Webs | hwd | um | 650 | 576 | 200 | 200 | 200 | 200 | |
| Width of Siffit Slap | psq | mm | 650 | 650 | 650 | 650 | 650 | 650 | 650 |
| Depth of Soffit Slap | hs | um | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| | | | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 |
| Distance from extreme compressive fibre to centroid of | | | - | | | | | | |
| Tensile Reinforcement | dp | шш | 778.0 | 843.0 | 1,07 | 1,261.0 | 1,29 | 1,360.0 | 1,291.0 |
| Area of Tensile Reinforcement | Ast | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Distance from extreme compressive fibre to centroid of | | | | | | | | | |
| Tensile Reinforcement | dst | mm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Area of Compressive Reinforcement | Asc | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Distance from extreme compressive fibre of | | | | | | | | | |
| Compressive Reinforcement | dsc | шш | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Calculation of Mr | | | - | | | | | | - |
| Stress block factor | β1 | | 0.76 | 0.76 | 0.76 | 0.76 | 0 | 0.76 | 0.76 |
| Distance from extreme compressive fibre Neutral Axis | J | un mu | 343 | 385 | 954 | 992 | | 1,008 | 266 |
| Depth of equivalent stress block | B | ШШ | 262 | 294 | 729 | 758 | 762 | 2/1/0 | 762 |
| Average stress in Prestress stell at nominal bending | | | | | | | | | |
| resistance | sdj - | Mpa | 1,630 | ! | [| 1,450 | | | 1,458 |
| Nominal Resistance | Mn | N.mm | 3.74E+09 | 4.02E+09 | 4.06E+09 | 5.14E+09 | 5.32E+09 | 5.72E+09 | 5.32E+09 |
| Flexural Resistance factor | e | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Factored Resistance | Mr | N.mm | 3.74E+09 | 4.02E+09 | 4.062,154, | 5.14E+09 | 5.32E+09 | 5.72E+09 | 5.32E+09 |
| Checking | | | - | | | | | | |
| Factored Bending Moment due to External Loads | Mu | N.mm | 0.00E+00 | 3.75E+08 | 1.63E+09 | 2.67E+09 | 2.83E+09 | 3.18E+09 | 2.83E+09 |

| (1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) -2/2 | ruction S | itage (AA | SHTO LI | RFD 5.7.3 | .2.2) -2/2 | | |
|--|-----------|-----------|-----------|------------------|---------------------------------|------------|---|
| | | Unit | Section 8 | Section 9 | Section 9 Section 10 Section 11 | Section 11 | |
| Sectional Properties | | | - | | | | |
| Depth of Girder | H | mm | 1,450 | 1,450 | 1,450 | 1,450 | |
| Width of Deck Slap | þq | mm | 600 | 600 | 009 | 600 | |
| Depth of Deck Slap | hd | шш | 210 | 210 | 210 | 210 | |
| Total width of Webs | bw | шш | 200 | 200 | 576 | 650 | |
| Width of Siffit Slap | bs | mm | 650 | . 650 | 650 | 650 | |
| Depth of Soffit Slap | hs | шш | 250 | 250 | 250 | 250 | |
| | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 | |
| Distance from extreme compressive fibre to centroid of | | - | | | | | |
| Tensile Reinforcement | dp | mm | 1,261.0 | 1,070.0 | 84 | 778.0 | |
| Area of Tensile Reinforcement | Ast | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Distance from extreme compressive fibre to centroid of | | | | | - | - | |
| Tensile Reinforcement | dst | uuu | 0.0 | 0.0 | 0.0 | 0.0 | |
| Area of Compressive Reinforcement | Asc | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Distance from extreme compressive fibre of | | · | | | | | |
| Compressive Reinforcement | dsc | um | 0.0 | 0.0 | 0.0 | 0.0 | |
| Calculation of Mr | | | | | | | الموادي |
| Stress block factor | β1 | | 0.76 | 0.76 | 0.76 | 0.76 | |
| Distance from extreme compressive fibre Neutral Axis | C | uuu | 992 | 954 | 385 | 343 | |
| Depth of equivalent stress block | a | uuu | 758 | 729 | 294 | 262 | |
| Average stress in Prestress stell at nominal bending | | | | | | | |
| resistance | fps | Mpa | 1,450 | 1,395 | - | 1,630 | |
| Nominal Resistance | Mn | N.mm | 5.14E+09 | 4.06E+09 | 4.02E+09 | 3.74E+09 | |
| Flexural Resistance factor | 9 | | 1.0 | 1.0 | 1.0 | 1.0 | |
| Factored Resistance | Mr | N.mm | 5.14E+09 | 4.06E+09 | 4.02E+09 | 3.74E+09 | |
| Checking | - | | | | | | |
| Factored Bending Moment due to External Loads | Mu | N.mm | 2.67E+09 | 1.63E+09 | 3.75E+08 | 0.00E+00 | |
| | | | | | | | |

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| | | Unit | Unit Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | Section 6 | Section / |
|--|--------|-------------|----------------|-------------|-------------|-----------|-----------|-----------|--------------------|
| Sectional Properties | | | | | | | 017 5 | | |
| Depth of Girder | I | mm | 1,450 | 1,450 | 1, | 1,450 | 1,450 | 1,45U | 1,45U |
| Width of Deck Slan | pq | mm | 600 | 0 09 | 600 | 600 | 600 | 600 | 60 |
| Douth of Dock Slan | hd | шш | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| Total width of Webe | bw | um | 650 | 576 | 200 | 200 | 200 | 200 | 200 |
| | şq | mm | 650 | 650 | 650 | 650 | 650 | 650 | 650 |
| VVIGUI UI SOULI SIAP | hs | a u u | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| | | | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 3,554 | 3,554 | 3,554 | 3,554 | 3,554 | 3,554 | 3,554 |
| Distance from extreme compressive fibre to centroid of | | | | | | | 1 | | |
| Prestressing Cables | db | шш | 778 | 84 | 1,U/ | 97/T | 1,241 | 0£/T | 67(T |
| Area of Tensile Reinforcement | Ast | mm2 | 0 | 0 | | | | | > |
| Distance from extreme compressive fibre to centroid of | | | | | | | | | |
| Tensile Reinforcement | dst | | 0 | | | | | | |
| Area of Comressive Reinforcement | Asc | mm2 | 0 | 0 | 0 | | | | |
| Distance from extreme compressive fibre to centroid of | | | | | | | | | |
| Compressive Reinforcement | dsc | mm | 0 | 0 | | 0 | | | |
| 3 | | • | | | | | | | |
| Effective shear Depth | dv | шш | 1,044 | 1, | 1 | 1, | | 1 | 1, |
| Effective web width | þv | шш | 650 | | | | | | |
| Spacing of stirrups | S | mm2 | 150 | 150 | 150 | 300 | 300 | 300 | 300 |
| Angle of inclination of transverse reinforcement to | | | | | | . (| ~ | 2 | 2 |
| longitudinal axis of girder | ಶ | degree | 8 | 8 | 8 | 8 | 06 | 3 | 3 |
| Factor indicating ability of diagonally cracked concrete | | | | | , | 1 | t | | |
| to transmit tension | β | | 6.3 | 6.2 | 5.4 | 5.1 | 5.1 | 4.4 | 4.0 |
| Area of shear reinf. within a distances | Av | mm2 | 616 | | | ÷ | <u> </u> | | |
| Strain in the tensile reinforcement | εx | | -0.000162 | ð Ý | ō. Ç | o o | -0.000024 | -0.00006 | -0.000069 |
| Inclination angle of diagonal compressive stress | θ | degree | 27.00 | 27.00 | 23.40 | 27.00 | 27.00 | 00./Z | 00 [.] /2 |
| Component of effective pretressed force in the direction | | , | | | | | 1 175 105 | | 1 17E 10E |
| of the applied shear | Vp | z | -3.46E+U5 | 1 | 1 | 1 | | | 1 |
| Nominal Resistance of Concrete | Vc | z | 2.25E+06 | 1.96E+06 | | - 1 | | | <u> </u> |
| Nominal Resistance of Reinforcement | Vs | Z | 3.28E+06 | 3.28E+06 | | | <u> </u> | | + |
| Nominal Resistance | Vn | z | 5.19E+06 | 4.92E+06 | 1 | <u>.</u> | | | - |
| Resistance factor for shear | 9 | | 0.9 | 0.9 | | | | | ! |
| Factored Resistance | Vr | z | 4.67E+06 | 4.42E+06 | 5 1.64E+06 | 1.07E+06 | 1.13E+06 | 1.22E+06 | 1.38E+06 |
| Checking | | | | | | | | <u>!</u> | |
| Factored Moment due to External Loads | Mu | N.mm | 0.00E+00 | <u> </u> | 1, | | 2.85E+U9 | 0.18E+09 | |
| Factored Axial Force due to External Loads | л Z | z | 0.00E+00 | | | | | | |
| Factored Shear Force due to External Loads | Vu | Z | 5.36E+05 | 1 4.98E+05 | 51 3.76E+05 | | | | |

| | Virt Section 8 | Unit | Section 8 | Section 9 | Section 10 | Section 11 | |
|--|----------------|--------|-----------|-------------|------------|------------|---|
| Sectional Properties | | | | | | | |
| Depth of Girder | H | шш | 1,450 | 1, | 1,450 | Ι, | |
| Width of Deck Slap | pq | шш | 600 | 009 | 600 | | |
| Depth of Deck Slap | pų | шш | 210 | 210 | 210 | | |
| Total width of Webs | рw | шш | 200 | 200 | 576 | | |
| Width of Soffit Slap | bs | шш | 650 | 650 | 650 | | |
| Depth of Soffit Slap | hs | um | 250 | 250 | 250 | 250 | |
| | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 3,554 | 3,554 | 3,554 | 3,554 | - |
| Distance from extreme compressive fibre to centroid of | | | | | | | <u> </u> |
| Prestressing Cables | dр | шш | 1,261 | 1,070 | 8 | 17 | |
| Area of Tensile Reinforcement | Ast | mm2 | 0 | 0 | 0 | 0 | |
| Distance from extreme compressive fibre to centroid of | | | , | | (| | |
| Tensile Reinforcement | dst | | 0 | | 0 | | |
| Area of Comressive Reinforcement | Asc | mm2 | 0 | 0 | 0 | 0 | |
| Distance from extreme compressive fibre to centroid of | | | | | | | <u> </u> |
| Compressive Reinforcement | dsc | шш | 0 | 0 | Ð | 5 | |
| Calculation of Mr | | - | | | | | |
| Effective shear Depth | dv | шш | 1,044 | 1 | 1,044 | 1 | |
| Effective web width | ρΛ | mm | 200 | 200 | 576 | | |
| Spacing of stirrups | s | mm2 | 300 | 150 | 150 | 150 | |
| Angle of inclination of transverse reinforcement to | | | | | : | | |
| longitudinal axis of girder | ჾ | degree | 8 | 60 | 6 | 66 | |
| Factor indicating ability of diagonally cracked concrete | I | | 1 | 0 | Ţ | ľ | |
| to transmit tension | β | | 5.5 | 6. 8 | 0.I | /.0 | |
| Area of shear reinf. within a distances | Av | mm2 | 308 | 616 | 919 | i | |
| Strain in the tensile reinforcement | X3 | | -0.000088 | -0.000208 | -0.000148 | -0.000107 | |
| Inclination angle of diagonal compressive stress | θ | degree | 27.00 | 27.00 | 27.00 | 27.00 | |
| Component of effective pretressed force in the direction | | | | - | - | | |
| of the applied shear | γp | z | 1.89E+05 | 2.60E+05 | 3.24E+05 | | |
| Nominal Resistance of Concrete | Vc | Z | 6.07E+05 | 7.43E+05 | 1.94E+06 | | |
| Nominal Resistance of Reinforcement | Vs | Z | 8.20E+05 | 3.28E+06 | 3.28E+06 | | |
| Nominal Resistance | Λn | Z | 1.62E+06 | 2.35E+06 | 5.54E+06 | പ് | and the second se |
| Resistance factor for shear | э | | 0.9 | 0.9 | 0.9 | | |
| Factored Resistance | Vr | Z | 1.45E+06 | 2.11E+06 | 4.99E+06 | 5.09E+06 | |
| Checking | | | | ļ | 1 | <u> </u> | |
| Factored Moment due to External Loads | Mu | uuur N | 2.67E+09 | | | 1 | |
| Factored Axial Force due to External Loads | Nu | z | 0.00E+00 | . 1 | | | |
| T CLAL TANK A. T. C. | | 11 | | 201020 C | | | |

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|-------|--|----------|---|-----------|-----------|-----------|-----------|------------|-----------|----------|
| ۰. | | •, | Unit | Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | | Cernon / |
| 1 | Sectional Properties | | | | | | | 077 4 | 1 220 | 1 460 |
| - + | The of Cardon | H | unu | 1,660 | 1,660 | 1,660 | 1,000 | 1,000 | Λ00'Τ | 7,000 |
| i | | pq | шш | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 |
| | Width of Deck Slap | - P4 | mm | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| | Depth of Deck Slab | | | 650 | 576 | 200 | 200 | 200 | 200 | 200 |
| | Total width of Webs | Ma | זוחוו | | | 250 | 6ED | ARO | 650 | 650 |
| | Width of Soffit Slab | ps | uuu | nca | 000 | 0.00 | 000 | | | |
| • | Denth of Soffit Slab | hs | um | 250 | 250 | 250 | nc7 | NC7 | NC7 | 22 |
| | | | - | | | | | | | |
| • | Total Area of Prestressing Cables | Ap | mm2 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 | 3,553.6 |
| • | Distance from extreme compressive fibre to centroid of | - Т | | 088.0 | 1 053 0 | 1 280.0 | 1.471.0 | 1,501.0 | 1,570.0 | 1,501.0 |
| | Prestressing Cables | Act | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| I | Area of lensule Keinforcement | 1 201 | | | | | | | | |
| I-2-1 | Distance from extreme compressive fibre to centroid of Tonsila Reinforcement | dst | mm | 0.0 | 0.0 | 0.0 | | | | 0.0 |
| 5 | Area of Compressive Reinforcement | Asc | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Distance from extreme compressive fibre to centroid of | <u> </u> | | | | Ċ | | 00 | | 0.0 |
| | Compressive Reinforcement | dsc | H H H H H H H H H H H H H H H H H H H | U.U | 0.0 | | | | | |
| | Calculation of Mr | | | | Ì | | 74.0 | 74.0 | 72.0 | 0.76 |
| | Stress block factor | β1 | | 0.76 | 0.76 | 0./0 | 00 | 0/.0 | 0/.0 | 222 |
| • | Distance from extreme compressive fibre to the Neutral | | | 357 | 305 | 995 | 1.024 | 1.028 | 1,037 | |
| | Axis | U | | 400 | | | | | | 786 |
| | Depth of equivalent stress block | a | ä | 697 | 202 | | | | | |
| | Average stress in Prestress stell at nominal bending | | | 1 674 | 1 665 | 1 455 | 1 497 | 1,503 | | 1,503 |
| | resistance | sdr | INIPA | ¥/0/T | L | 5 | 0 61 | 28.8 | 0 74 F+09 | a a |
| | Nominal Resistance | uW | N.mm | 9.30E+09 | TU/.c | | | | | |
| | Flexural Resistance factor | ð | | I:0 | 1 | 1 | <u> </u> | | | 000 |
| | Factored Resistance | Mr | N.mm | 5.30E+09 | 5.70E+09 | 7.41E+09 | 8.61E+U9 | 9 8.8UE+U9 | | - بايند |
| | Checking | | | | | | | | | |
| | The second s | Ňu | N | 1730F+07 | | | | | | |

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| H mun 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 2.035 2.036 2.010 2.010 2.010 2.010 2.010 2.010 2.010 2.010 2.010 | | IInit Section 8 Section | Unit | Section 8 | Section 9 | Section 10 | Section 11 | |
|---|--|-----------------------------|------|-----------|-----------|------------|------------|---|
| Iab IA mm $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ 210 </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> | | | | | | | | |
| and bd/mm 2003 <t< td=""><td>Sectional rioperues</td><td>I</td><td>mm</td><td>1.660</td><td>1.660</td><td></td><td>1.660</td><td></td></t<> | Sectional rioperues | I | mm | 1.660 | 1.660 | | 1.660 | |
| National State National Matrix National M | | , P4 | u u | 2,025 | 2 035 | | 2.035 | |
| Data Data <thdata< th=""> Data Data <th< td=""><td></td><td>7 P 4</td><td></td><td>210</td><td>210</td><td>210</td><td>210</td><td>· • • · • · · · · · · · · · · · · · · ·</td></th<></thdata<> | | 7 P 4 | | 210 | 210 | 210 | 210 | · • • · • · · · · · · · · · · · · · · · |
| Webs Wurd ω_{00} ω | Depth of Deck Slap | | | | | E76 | | |
| Image: Slab bs mm 550 650 | Total width of Webs | MQ | um | 7007 | | 0/0 | 0.00 | |
| Slab nm 250 <td>Width of Soffit Slab</td> <td>bs</td> <td>mm</td> <td>650</td> <td>650</td> <td></td> <td>650</td> <td></td> | Width of Soffit Slab | bs | mm | 650 | 650 | | 650 | |
| Trestressing Cables Ap mm2 $3,553.6$ $3,557.6$ $3,557.6$ | Depth of Soffit Slab | hs | unu | 250 | 250 | | 250 | |
| Trestnessing Cables Ap mm2 $3,553.6$ $3,557.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ | | | | | | | | |
| extreme compressive fibre to centroid of ablesdpmm $1.471.0$ $1.280.0$ 607.0 ablesReinforcementAstmm2 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of treementdstmm 0.0 0.0 0.0 0.0 rementAscmm2 0.0 0.0 0.0 0.0 0.0 rement 0.0 0.0 0.0 0.0 0.0 0.0 rement 0.0 0.0 0.0 0.0 0.0 rement 0.0 0.0 0.0 0.0 0.0 ressive Reinforcement 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of dect 0.0 0.0 0.0 extreme compressive fibre to the Neutral ctor 0.0 </td <td>Total Area of Prestressing Cables</td> <td>Ap</td> <td>mm2</td> <td>3,553.6</td> <td></td> <td>3,553.6</td> <td>3,553.6</td> <td></td> | Total Area of Prestressing Cables | Ap | mm2 | 3,553.6 | | 3,553.6 | 3,553.6 | |
| ables dp mm $1,471.0$ $1,280.0$ 607.0 e Ktreme compressive fibre to centroid of extreme compressive fibre to centroid of ressive Reinforcement Ast mm2 0.0 0.0 0.0 0.0 rement Asc mm2 0.0 0.0 0.0 0.0 recement Asc mm2 0.0 0.0 0.0 0.0 ressive Reinforcement Asc mm2 0.0 0.0 0.0 extreme compressive fibre to centroid of deinforcement 0.0 0.0 0.0 0.0 extreme compressive fibre to the Neutral 0.76 0.76 0.76 0.76 0.76 ctor 0.0 0.0 0.0 0.0 0.0 0.0 dent stress block m $1,024$ 995 367 367 ralent stress block m $1,024$ 995 367 $1,455$ $1,545$ $1,545$ in Prestress stell at nominal bending fps Min $N.mn$ | Distance from extreme compressive fibre to centroid of | | | | | | | |
| Reinforcement Ast mm2 0.0 | Prestressing Cables | dp | mm | 1,471.0 | | 607.0 | 672.0 | |
| extreme compressive fibre to centroid of recementdstmm 0.0 0.0 0.0 0.0 ressive ReinforcementAscmm2 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of extreme compressive fibre to the Neutral $\beta 1$ 0.76 0.76 0.76 extreme compressive fibre to the Neutral $\beta 1$ 0.76 0.76 0.76 0.76 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm 783 760 280 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 ralent stress block a mm $1,024$ 995 367 rance factor ϕ Mm $N.mm$ $8.61E+09$ $2.57E+09$ rance factor ϕ Mm $N.mm$ 2.610 1.0 rance factor ϕ Mm $N.mm$ $2.61E+09$ $2.57E+09$ rance Mr $N.mm$ $2.61E+09$ $2.67E+09$ 3.0 | Area of Tensile Reinforcement | Ast | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | |
| rcementdstmm 0.0 0.0 0.0 0.0 ressive ReinforcementAscmm2 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of deinforcementdscmm 0.0 0.0 0.0 0.0 Reinforcement $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\gamma 1$ $\gamma 2$ $\gamma 2$ $\gamma 2$ extreme compressive fibre to the Neutral c mm $1,024$ 995 367 extreme compressive fibre to the Neutral c mm 783 760 280 extreme compressive fibre to the Neutral c mm 783 760 280 in Prestress stell at nominal bendingfpsMpa $1,497$ $1,455$ $1,545$ in Prestress stell at nominal bendingfpsMm $8.61E+09$ $2.71E+09$ $2.57E+09$ in Rece Min $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.000 ince factor ϕ Min $N.mm$ $2.661+09$ $2.67E+09$ 3.000 | Distance from extreme compressive fibre to centroid of | | | | | | | |
| ressive ReinforcementAscmm20.00.00.00.00.0extreme compressive fibre to centroid of deterementdscmm0.00.00.00.01Reinforcement α mm0.0 α α 0.00.00.01Reinforcement β β β β α α 0.00.00.01Reinforcement β β β α α α 0.76 α 0.760.761extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral e α < | Tensile Reinforcement | dst | mm | 0.0 | 0.0 | 0.0 | 1,660.0 | |
| extreme compressive fibre to centroid of deinforcementmm 0.0 0.0 0.0 1.0 Reinforcement 0.0 0.0 0.0 0.0 0.0 1.0 Reinforcement $\beta 1$ 0.76 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 0.76 extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral ctor α mm 1.024 995 367 alent stress block α mm 783 760 280 280 alent stress block α mm 783 760 280 alent stress block α mm 783 760 280 alent stress stell at nominal bending fps fps Mpa 1.497 1.455 1.545 tance mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 tance mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 tance mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 | Area of Compressive Reinforcement | Asc | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Reinforcement dsc mm 0.0 0.0 0.0 0.0 1 ctor $\beta 1$ $\beta 1$ 0.76 </td <td>Distance from extreme compressive fibre to centroid of</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> | Distance from extreme compressive fibre to centroid of | | | | | | - | |
| ctor $\beta 1$ 0.76 | Compressive Reinforcement | dsc | unu | 0.0 | 0.0 | 0.0 | 1,660.0 | |
| block factor $\beta 1$ 0.76 <th< td=""><td>Calculation of Mr</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<> | Calculation of Mr | | | | | | | |
| cc from extreme compressive fibre to the Neutralcmm1,024995367of equivalent stress blockamm783760280ge stress in Prestress stell at nominal bendingfpsMpa1,4971,4551,545incemm8.61E+097.41E+092.57E+093.05al Resistancemm8.61E+097.41E+092.57E+093.05ed Resistancemm8.61E+097.41E+092.57E+093.05ed Resistancemm8.61E+097.41E+092.57E+093.05in Resistancemmmm8.61E+097.067.01 <tr< td=""><td>Stress block factor</td><td>β1</td><td></td><td>0.76</td><td>0.76</td><td>0.76</td><td>0.76</td><td></td></tr<> | Stress block factor | β1 | | 0.76 | 0.76 | 0.76 | 0.76 | |
| c mm $1,024$ 995 367 of equivalent stress block a mm 783 760 280 ge stress in Prestress stell at nominal bending fps Mpa $1,497$ $1,455$ $1,545$ $1,545$ nce Min N.mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 al Resistance factor mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 ed Resistance Min N.mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 $1, 1, 2, 1, 2, 1, 2, 2, 3, 1, 2, 4, 2, 4, 3, 3, 1$ | Distance from extreme compressive fibre to the Neutral | | | | | | | |
| of equivalent stress block a mm 783 760 280 ge stress in Prestress stell at nominal bending fps Mpa 1,497 1,455 1,545 ince fps Mpa 1,497 1,455 1,545 3.05 and Resistance Min N.mm 8.61E+09 2.57E+09 3.05 al Resistance factor φ 1.0 1.0 1.0 1.0 ed Resistance Mir N.mm 8.61E+09 2.57E+09 3.05 | Axis | U | mm | 1,024 | | | 336 | |
| ge stress in Prestress stell at nominal bending ncefpsMpa $1,497$ $1,455$ $1,545$ ncence Mn $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09 al Resistance ϕ mn $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09 al Resistance factor ϕ Mn $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09 ed Resistance mn $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09 | Depth of equivalent stress block | а | mm | 783 | 760 | | 257 | |
| Ince fps Mpa 1,497 1,455 1,545 nal Resistance Mn N.mm 8.61E+09 7.41E+09 2.57E+09 3.05 al Resistance factor φ 1.0 1.0 1.0 1.0 ed Resistance Mr N.mm 8.61E+09 7.41E+09 2.57E+09 3.05 | Average stress in Prestress stell at nominal bending | | | | | | | |
| nal Resistance Min N.mm 8.61E+09 2.57E+09 al Resistance factor φ 1.0 1.0 1.0 ed Resistance Mir N.mm 8.61E+09 2.57E+09 d Resistance Mir N.mm 2.61E+09 2.57E+09 | resistance | fps | Mpa | 1,497 | | | | |
| al Resistance factor ϕ 1.0 1.0 1.0 1.0 ed Resistance $M_{\rm T}$ N.mm 8.61E+09 7.41E+09 2.57E+09 ed Resistance N.m. 2.55E+09 7.41E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+08 2.57E+08 2.57E+08 2.57E+08 2.57E+08 2.58E+08 2.58 | Nominal Resistance | Mn | N.mm | 8.61E+09 | 7.41E+09 | 2.57E+09 | 3.09E+09 | |
| ed Resistance Mr N.mm 8.61E+09 7.41E+09 2.57E+09 | Flexural Resistance factor | æ | | 1.0 | 1.0 | 1.0 | 1.0 | |
| J 7 3: 3: 3: 40 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 | Factored Resistance | Mr | N.mm | 8.61E+09 | 7.41E+09 | 2.57E+09 | 3.09E+09 | |
| N N 2 855+00 1 405+00 8 785+08 | Checking | | | | | | | |
| MIN DETERMINE TO THE TOTAL OF THE DETERMINE DETERMINE DETERMINE | Factored Bending Moment due to External Loads | Mu | N.mm | 2.85E+09 | 1.40E+09 | 8.78E+08 | 1.31E+09 | |

| (4) Checking Nominal Shear Strength of Section at Service Stage - 1/2 | rvice Sta | ge - 1/2 Unit | Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | Section 6 | Section 7 |
|---|-----------|------------------|-----------|-----------|-----------|-----------|-----------|------------|-----------|
| Sectional Properties | | | | | | | | | |
| Denth of Girder | H | шш | 1,660 | 1,660 | 1,660 | 1,660 | | | 1,660 |
| Width of Derk Slan | pq | mm | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 |
| Douth of Dork Clan | hd | mm | 210 | 210 | 210 | 210 | | | 210 |
| Total width of Wohe | bw | mm | 650 | 576 | 200 | 200 | 200 | 200 | 200 |
| I Otal Widut of Tcos | psq | mm | 650 | 650 | 650 | 650 | 650 | | 650 |
| Denth of Soffit Slap | sy | uuu | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| | | | | | | | | | |
| Total Area of Prestnessing Cables | Ap | mm2 | 3,554 | 3,554 | 3,554 | 3,554 | 3,554 | 3,554 | 3,554 |
| Distance from extreme compressive fibre to centroid of | | | - | | | | | | |
| Prestressing Cables | dp | mm | 988 | 1,05 | 1,280 | 1,47 | 1,50 | 7,2/1 | IUC,I |
| Area of Tensile Reinforcement | Ast | mm2 | 0 | 0 | 0 | 0 | | | 0 |
| Distance from extreme compressive fibre to centroid of | | | | | G | c | | | C |
| Tensile Reinforcement | dst | | | | | | | | |
| Area of Comressive Reinforcement | Asc | mm2 | 0 | 0 | 0 | | | | |
| Distance from extreme compressive fibre to centroid of | | | | | | | | | ¢ |
| Compressive Reinforcement | dsc | mm | 0 | 0 | | 0 | 2 | 2 | ₽ |
| Calculation of Mr | | | | | | | | | |
| Effective shear Depth | dv | шш | 1,195 | 1,195 | 1' | 1, | | F, | 1, |
| 6 Effective web width | hv | шщ | 650 | 576 | | | | | |
| Spacine of stirrups | s | mm2 | 150 | 150 | 150 | 300 | 300 | 300 | 300 |
| Angle of inclination of transverse reinforcement to | | | | | | | | : | ć |
| longitudinal axis of girder | ø | degree | 8 | 8 | 8 | 6 | 06 | 8 | 6 |
| Factor indicating ability of diagonally cracked concrete | | | | | | | 1 | 1 | |
| to transmit tension | β | | 6.1 | 6.1 | 5.9 | 5.4 | 5.4 | 5.0 | 9.6 |
| Area of shear reinf. within a distances | Av | mm2 | 616 | | | 308 | , | <u> </u> | 305 |
| Strain in the tensile reinforcement | X3 | | -0.000143 | -0.000139 | -0.000140 | -0.000069 | <u>8</u> | õ o | -0.000102 |
| Inclination angle of diagonal compressive stress | θ | degree | 27.00 | 27.00 | 25.11 | 27.00 | 27.00 | 27.00 | 27.00 |
| Component of effective pretressed force in the direction | | | | | | | | | |
| of the applied shear | Vp | Z | -3.46E+05 | 1 | | | | | |
| Nominal Resistance of Concrete | Vc | Z | 2.49E+06 | | | | | | 7.09E+05 |
| Nominal Resistance of Reinforcement | Vs | z | 3.76E+06 | | | | <u> </u> | 1 | |
| Nominal Resistance | Vn | z | 5.89E+06 | 5.62E+06 | , | ÷, | -i | <u> </u> | |
| Resistance factor for shear | ф | | 0.9 | | | 1 | | j | ! |
| Factored Resistance | Vr | z | 5.31E+06 | 5.06E+06 | 1.92E+06 | 1.28E+06 | 1.35E+06 | 1.44E+06 | 1.59E+06 |
| Checking | | | | | | .) | | | |
| Factored Moment due to External Loads | Mu | N.mm | 7.30E+07 | . ! | | | | ļ | |
| Factored Axial Force due to External Loads | Nu | z | 4.14E+05 | | | 1 | | 1 | 0.00E+00 |
| Factored Shear Force due to External Loads | Λu | z | 7.90E+05 | 7.32E+05 | 5.27E+05 | 2.85E+05 | 5.26E+05 | 5 1.19E+05 | |

| | Unit | Unit | Section 8 | Section 9 | Section 10 | Section 11 | |
|--|------|--------|-----------|-----------|------------|------------|---------------------------------------|
| Sectional Properties | | | | | | | |
| Depth of Girder | Ξ | mm | 1,660 | | 1,660 | | |
| Width of Deck Slap | pq | шш | 2,035 | 2,035 | 2,035 | 2 | |
| Denth of Deck Slap | hd | mm | 210 | 210 | 210 | | |
| Total width of Webs | bw | mm | 200 | 200 | 576 | | |
| Width of Soffit Slap | bs | uu | 650 | 650 | 650 | | |
| Depth of Soffit Slap | hs | uuu | 250 | 250 | 250 | 250 | |
| | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 3,554 | 3,554 | 3,554 | 3,554 | |
| Distance from extreme compressive fibre to centroid of | | | | | | | |
| Prestressing Cables | dþ | шш | 1,471 | 1,280 | 60 | 67 | · · · · · · · · · · · · · · · · · · · |
| Area of Tensile Reinforcement | Ast | mm2 | 0 | 0 | 0 | 0 | |
| Distance from extreme compressive fibre to centroid of | | | | | | | |
| Tensile Reinforcement | dst | - | 0 | 0 | 1,660 | 1,66 | |
| Area of Comressive Reinforcement | Asc | mm2 | 0 | 0 | 0 | 0 | |
| Distance from extreme compressive fibre to centroid of | | | | - | | | |
| Compressive Reinforcement | dsc | uuu | 0 | 0 | 1,660 | 1,660 | |
| Calculation of Mr | | | | | | | |
| Effective shear Depth | dv | mm | 1,195 | 1 | 1 | 1, | |
| Effective web width | pv | шш | 200 | 200 | 576 | | |
| Spacing of stirrups | s | mm2 | 300 | 150 | 150 | 150 | |
| Angle of inclination of transverse reinforcement to | | | | | | | |
| longitudinal axis of girder | ø | degree | 8 | 60 | 8 | 66 | |
| Factor indicating ability of diagonally cracked concrete | | | | . (| 1 | | |
| to transmit tension | đ | | 5.8 | 6.8 | 5.5 | 5.4 4.0 | |
| Area of shear reinf. within a distances | Av | mm2 | 308 | _ | 616 | | |
| Strain in the tensile reinforcement | ХЗ | | -0.000116 | -0.000211 | -0.000085 | -0.000066 | |
| Inclination angle of diagonal compressive stress | θ | degree | 27.00 | 27.00 | 27.00 | 27.00 | |
| Component of effective pretressed force in the direction | | · | | | | | |
| of the applied shear | ۷p | z | 1.89E+05 | 2.60E+05 | 3.24E+05 | | |
| Nominal Resistance of Concrete | Vc | Z | 7.28E+05 | 8.51E+05 | 1.99E+06 | | |
| Nominal Resistance of Reinforcement | Vs | N | 9.39E+05 | 3.76E+06 | 3.76E+06 | | |
| Nominal Resistance | νn | Z | 1.86E+06 | 2.65E+06 | 6.07E+06 | 6 | |
| Resistance factor for shear | 9 | | 0.9 | 0.9 | 0.9 | | |
| Factored Resistance | Vr | z | 1.67E+06 | 2.39E+06 | 5.47E+06 | 5.66E+06 | |
| Checking | | | | | · · · | | |
| Factored Moment due to External Loads | Mu | N.mm | 2.85E+09 | 1.40E+09 | 8.78E+08 | 1 | |
| Factored Axial Force due to External Loads | Nu | N | 0.00E+00 | | 0.00E+00 | | |
| Eactored Chear Earce due to External Loads | 1.11 | z | 3.43E+05 | 5.32E+05 | 7.19E+05 | 7 746+05 | |

Stress checking during construction stage (AASHTO 5.9.4.2

| | | COMBIN/ | COMBINATION 14 | |
|---------|-------------------|----------|-------------------------------|----------|
| Section | $\sigma_t(T/m^2)$ | Checking | $\sigma_{\rm b}({\rm T/m}^2)$ | Checking |
| | | | | |
| SEC-1 | 414.39 | OK | 414.39 | OK |
| SEC-2 | 321.53 | OK | 579.01 | - |
| SEC-3 | 507.15 | ОK | 816.68 | |
| SEC-4 | 480.25 | УÓ | 865.21 | - |
| SEC-5 | 258.55 | OK | 615.65 | |
| SEC-6 | 454.42 | - | 915.97 | |
| SEC-7 | 260.03 | OK | 614.13 | ОĶ |
| SEC-8 | 482.08 | | 863.40 | |
| SEC-9 | 508.70 | | 815.14 | |
| SEC-10 | 321.64 | OK | 578.88 | |
| SEC-11 | 414.39 | ОK | 414.39 | А М |

| uring | | | | | | | | | | | | | | | | ~ | | ~ | | <u> </u> | | |
|--|------------|-----------|---------------------|------------------------|---|---|---|------------|-------------|--------------|---------|------------|--------|--------|-------------|--------|--------|--------|--------|----------|--------|--------|
| n Stress di | 14 | Factor | 1.00 | 1.00 | • | · | | · . · . | · | 1.00 | M(T.m) | 0.00 | -28.03 | -30.84 | -39.26 | -11.17 | -47.87 | -41.12 | -38.88 | -30.54 | -28.01 | 0.00 |
| constructic r Checking | OMBINATION | ype | ght G_DC | veight S_D | | • | · | | · · | | V(T) | 1.12 | 0.68 | -1.01 | -5.02 | -0.14 | F0.0 | 0.18 | 5.00 | 0.93 | -0.80 | -1.12 |
| lecking Stress during construction Load Combinations for Checking Stress during | COMI | Load type | Girder Selfweight G | Slab+Dia. Selfweight S | | | | ۰. | · · · | Prestress PS | N(T) | 376.83 | 376.83 | 383.09 | 389.95 | 395.20 | 397.67 | 395.20 | 389.95 | 383.09 | 376.83 | 376.83 |
| Checking Stress during construction Load Combinations for Checking S | | <u> </u> | <u> </u> | <u> </u> | | | | | | | Section | SEC-1 | SEC-2 | SEC-3 | SEC-4 | SEC-5 | SEC-6 | SEC-7 | SEC-8 | SEC-9 | SEC-10 | SEC-11 |

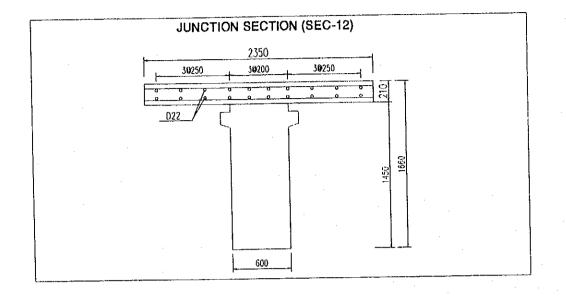
Checking Stress at service stage Load Combinations for Checking Stress at service stage

| | COM | COMBINATION | 11 | COM | TOM THAN TO THE TOTAL | 1 | | | |
|---------|--------------------------|------------------|--------|---------------------------|-----------------------|--------|--------------------------|--------------|---------------|
| | I nad type | tvne | Factor | Load type | type | Factor | Load type | type | Factor |
| | Cindor Salfwaight G DC | | 1.00 | Girder Selfweight G_DC | ight G_DC | 1.00 | Girder Selfweight G_DC | ight G_DC | 1.00 |
| | Onder Jenwerg | colfinaiobt S DC | 1.00 | Slab+Dia. Selfweight S_DC | weight S_DC | 1.00 | Slab+Dia. Selfweight S_D | weight S_D | 1.00 |
| | | verbruche | 1.00 | Surface + Railings DW | ings DW | 1.00 | Surface + Railings DW | ings DW | 1.00 |
| | Surface - Naum | Tood I MAX | 0.80 | Max. Live Load LL_MAX | d LL_MAX | 0.00 | Max. Live Load LL_MAX | A LL_MAX | 0.00 |
| | Max. Live Load 11 MIN | | 0.00 | Min. Live Load LL_MIN | d LL_MIN | 0.80 | Min. Live Load LL_MIN | NIM_11 P | 0.00 |
| | Max Impact IM MAX | M MAX | 0.80 | Max. Impact IM_MAX | M_MAX | 0.00 | Max. Impact IM_MAX | IM_MAX | 0.00 |
| | Min Impact IM MIN | MIN N | 0.00 | Min. Impact IM_MIN | M_MIN | 0.80 | Min. Impact IM_MIN | M_MIN | 0.00 |
| | Creep Diff. CR D | | 1.00 | Creep Diff. CR_D | ζD | 1.00 | Creep Diff. CR_D | D D | 1.00 |
| | Shrinkage Diff. | Diff. SH_D | 1.00 | Shrinkage Diff. SH_D | f. sH_D | 1.00 | Shrinkage Diff. SH_D | ii. SH_D | 1.00 |
| | Temperature Diff. TG | Diff. TG | 0.50 | Temperature Diff. TG | Diff. TG | 0.50 | Temperature Ditt. TG | Diff. TG | - 1.00 - 1 |
| | Creep CR Prestress PS | | 1.00 | Creep CR Prestress PS | | 1.00 | Creep UK Prestress PS | | 1.00 |
| | | | | | | | | | |
| Section | N(T) | V(T) | M(T.m) | (E)N | (T)V | M(T.m) | N(T) | (1) | M(1.m) |
| | | | | | | | | | |
| SEC-1 | 463.56 | 20.97 | 10.77 | 1 63.56 | 10.92 | 6.66 | 117.791 | 12.03 | 9.06 |
| SEC.7 | 111.30 | 18.97 | -9.28 | 11 1.30 | 9.36 | -14.99 | H12.01 | 10.47 | -13.92 |
| 5EC-2 | | 11.12 | 18.24 | 365.17 | 3.05 | -7.63 | 368.43 | 4.31 | -4.02 |
| CEC.4 | 314 29 | 0.95 | 29.83 | 314.29 | -7.42 | -15.13 | 317.58 | 1 .50 | -7.59 |
| SEC.5 | | | 30.21 | 324.29 | 1 .31 | -18.15 | 328.17 | -0.95 | -9.56 |
| SEC-6 | 292.44 | | 27.48 | 292.44 | -6.20 | -23.21 | 295.75 | -1.23 | -11.16 |
| SEC-7 | 324.29 | | 8.67 | 324.29 | -14.49 | -34.51 | 328.17 | -7.38 | -18.67 |
| SEC-8 | 314.29 | | 4.15 | 314.29 | -7.39 | -35.58 | 317.58 | 1.44 | -19.11 |
| SEC-0 | 365.17 | | -15.67 | 365.17 | 1 6.71- | -18.31 | 368.43 | -7.32 | -25.25 |
| SEC-10 | H1.30 | | -35.01 | 1130 | -25.91 | -86.88 | 115.01 | -14.07 | -4.21 |
| CEC-11 | 463.56 | .t | -13.83 | 463.56 | -27.68 | -73.30 | (1+'29F | -15.58 | -23.79 |

| | | | | | COMBINATION 12 | TION 12 | | | COMBIN. | COMBINATION 13 | |
|------------------|---------------------------|-------------------------|----------|--------------------------------------|------------------|----------------------|-----------|-----------------------|----------|-----------------------|--------------|
| | COMBI | COMBINATION II | | 1 | | (m) | | π (T/m ²) | Charling | סי(T/m ²) | Checking |
| Section | $\alpha.(T/m^2)$ Checking | $\alpha_{\rm b}(T/m^2)$ | Checking | σ _t (T/m [*]) C | Checking 0h(1/m) | α ^p (1/m) | Lhecking | 0414/471 | 9 | | |
| | | | | | | | - | | | | |
| | | | - | | | | 5 | 360.18 | - | 326.12 | 0K |
| (| | 318 80 | ХĊ | 354.51 | y X | 27472 | 40 | AT AND | | | |
| SEC-1 | NO 67.600 | | | | کر کر | 387 68 | ХĊ | 334.54 | - | 387.7 1 | č |
| SEC-2 | 336.91 OK | 372.38 | | 00.000 | 5 | | | 267 17 | | 377.93 | ОĶ |
| | | 309.65 | | 355.23 | ŏ | C7.C85 | | | | | 10 |
| vec-3 | - | | | CC 70C | УK | 355.86 | | 308.04 | | 337.40 | Ś |
| SEC-4 | | 70.022 | | 77.127 | 5 | | | 72152 | | 269.64 | oK |
| ((| | 166.27 | | 221.78 | N N | CT-987 | | | | | |
| 2012 | - | | | 73 676 | NC OK | 356.63 | | 282.84 | | 325.60 | Š |
| SEC-6 | _ | 212.54 | | 00.07 | 2 | | | 00100 | | 292.66 | Х ХО |
| 1 () (| | 220.68 | | 203.01 | ok | 3.29.79 | | 10.121 | | | , , ; , , |
| SEC-1 | | | | 37 270 | NK OK | 111 59 | | 296.50 | | 370.56 | č |
| SEC-8 | 316.53 OK | 300.47 | ź | C/-0/7 | | | JC JC | 3.10.68 | ОĶ | 139.91 | о К |
| | | 108.72 | | 314.14 | č | 10.400 | | 0.0¥0 | | | 10 |
| 261-2 | • | | | 217 01 | УÇ | 580.14 | | 299.81 | | 10.01 | ž |
| SEC-10 | Ť | /7.144 | | 1/1/17 | | | | 277 01 | | ++~[L+ | о Хо |
| SEC-11 | 330.70 OK | 382.69 | OK | 261.59 | X O | Q1./5C | | 10.770 | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Stress checking at Service stage (AASHTO 5.9.4.2)

Stress Check at Junction of the Girders



| Horizontal Shear per unit length of girder V _h due to Vertical Shear V _u Distance from the centroid of tensile steel to the midthickness of the deck | ength of gire of tensile ste | ler V _h due to sel to the mi | v Vertical Sh dthickness c | lear V _u of the deck | Υ ^ν Υ ^ν | V _h = V _u /d _e d _e А _и | | | | | |
|---|--|---|-------------------------------|------------------------------------|----------------------------------|---|--------------------------------|-----------------|----------------------|------------|--------------------|
| Required area of remuced and $A_{a'} >= \max \{0.35 b_v / f_y; (V_h - c b_v - \mu^F W)$ Width of the interface between the girder and Vield strength of reinforcement | b _v / f _y ; (V _h - o reen the gird nent | s b _v - μ P _c) / μ f _y } ter and the deck: | ty) leck: | · | ار به ا الم بح ر | H 1 | 600 пли 390 МРа 0.17 МРа | m Pa Pa | | | |
| Cohesion factor Friction factor | . * | - | | | ייי ש א בי ע | n H | 0.7 58750 N | | | | |
| Permanent net compressive force normal to the shear plan | e force norn | al to the sh | ear pian | | | | | | - | 01 000 | SEC.11 |
| | SEC-1 | SEC-2 | SEC-3 | SEC-4 | SEC-5 | SEC-6 | SEC-7 | SEC-8 | SEL-Y | | |
| Section | 000 | 816 | 1175 | 1366 | 1396 | 1465 | 1396 | 1366 | 1175 | 948 | 883 |
| d _* (mm) | 000 | | | | | | | | 111120 | 187087 | -203618 |
| Interface Shear(N): Cirdor Solfweight G DC | 203618 | 187087 | 142459 | 75906 | 62712 | 00 | -62712 | -75906 | -142 1 16 | -138230 | -147002 |
| Slab+Dia. Selfweight S_D | 147002 | 138230 | 103446 | 60495 | 21212 | 0 | -87157 | -47978 | -102031 | -144687 | -155726 |
| Surface + Railings DW | 91529 | 80490 | 36715 | 50241 | 46187 | 21980 | 10205 | 19789 | 1224 | 12161 | 12135 |
| Max. Live Load LL_MAX | 52475 | -10237 | -11626 | -26899 | +7905- | F6231- | -65601 | -81339 | 97808 | -107070 | -111005 |
| Min. Live Load LL_MUN Max Timpact IM MAX | 27207 | 25850 | 20727 | 16580 | , 15242 | 7254 | 3368 | -26842 | -32277 | -36002 | -36795 |
| Min. Impact IM_MIN | -3361 | · · · | -3837 | -8877 | -789696 | -1112450 | -789696 | -821957 | -255193 | 541424 | 757067 |
| Creep Diff. CR_D | 757067 | | CATCC7- | 12227 | 56355 | 48061 | 56355 | 17754 | 60 F /F | 54255 | 10200 |
| Shrinkage Diff. SH_D | 75351 | CC2FC | 64002 | 64468 | 76079 | 64882 | 76079 | 64168 | 64002 | 11598 | 13855 |
| Temperature Dift. 16 | 15166 | | 15467 | 15464 | 15464 | 14266 | 13077 | 130/9 | 210/0 | 069042 | 111965 |
| Creep CK T1 Max | 1455583 | 119 | 237841 | -501449 | -490789 | -982786 | -830694 | 7174-080 | -400724 | 68418 | 247530 |
| I Otal Min | 1332387 | 107 | 138843 | -604045 | -593-114 | 0767/01- | 1965 | 3472 | 2049 | 069 | 1358 |
| Avr required (mm2) | 5181 | 1 224 | 720 | 7907 | 17777 | | | | | | |
| | | | 3205 | FC6 | 924 | 6 24 | 924 | 1 26 | 3695 | 3695 | 3695 |
| Area of Stirrups (nun^2) | 3695 | | 2022 | 1008@FLQ) | (D14@300) | (D14@300) | (D143-300) | (D146300) | (D146 | (D146.150) | (0518F1(1)) |
| | (D140150) | (0519410) | | 3770 | i | 3770 | 3770 | 3770 | | 37/0 | 5770 (D2018-0) |
| Area of Dowel bars (mm) | (D20@150) | D20 | (D20@150) | (D20-6:150) | (D20@150) | (D203-150) | (D20@150) | (D20) | (UC12012(1) | 1912 | 1-9 1 2 |
| Total Connector Area (mm ²) | 1 91-2 | | 191-2 | F69F | 1691 | 1 69 1 | +69t | +40+ | | | |
| | | | | | OK | OK | oK | OK | oK | ОK | ok |
| Checking | OK | ok | OK. | 40 | | | | | | | |
| | | | ÷ | | | | | | | | |

Design of connectors at the interface between girder and deck slab (AASHTO 5.8.4):

Design of Deck Slab

ł

Sumary of Bending Moment:

Bending Moment due to Live Load:

| | 1.700 m 10.000 T 33% A=0.8*(1+IM) A=-(1+IM)*(0 |)*(0.12S+0.0 | | T.m/m T.m/m | |
|---|--|---------------------------|---------------------------------------|----------------|-------------|
| (2) Cantilever Slab 1) Effective Span Length 2) Load 3) Impact Factor IM 4) Negative Moment | 0.100 n 10.000 T 33% | | - | T.m/m | |
| Bending Moment due to Self-z Section Bending Moment (T.m) | veight of Slat A -0.152 | b: B 0.152 | C -0.150 | | |
| <i>Bending Moment due to Asph</i> Section Bending Moment (T.m) | <i>alt Concrete:</i> A -0.050 | B 0.050 | C -0.030 | | |
| Bending Moment due to Para Section Bending Moment (T.m) | pet & Railing A 0.000 | g <i>s:</i> B 0.000 | C -0.424 | · · · · | |
| | | 11750 | | · · · · | |
| 500 | · · · · · · · · · · · · · · · · · · · | 10750 | | · · · · | 500 |
| 350 650 1700 | - | | | | |
| | | | | | |
| | | | | | |
| 1175 | 4 | @ 2350 = 940 | 30 | | 1175 |
| | | 11750 | · · · · · · · · · · · · · · · · · · · | | |

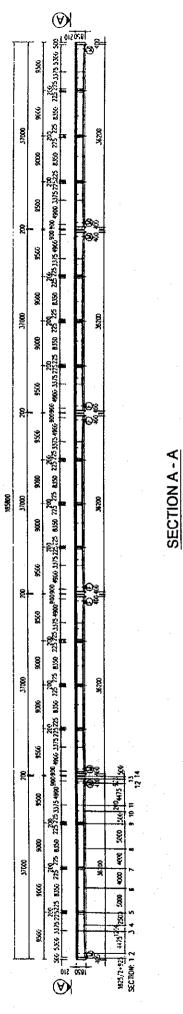
Checking Nominal Flexural Strength of Deck Slab (Article 5.7.3.2.2 AASHTO)

PC COMPOSITE I BEAM (CONNECTED), CASE 7

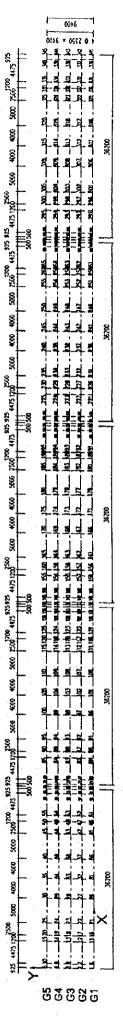
 $\overline{\mathfrak{O}}$

Structural Views, Design Sections

5 CONTINUOUS SPANS 5@37.0m, W = 11.75m ELEVATION (SAUL: 11500)







| Section | S.1 | N of girde | r | S.W of Dec | k Slab+Dia | aphragms | S.W | of Surfac | |
|------------------|--------|------------|----------|------------|------------|----------|--------|-----------|-----------------|
| | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) | N (tf) | V (II) | <u>M (tf.m)</u> |
| SEC-1 | 0.00 | 35.61 | 0.00 | 0.00 | 22.33 | 0.00 | 0.00 | 13,80 | -(),99 |
| SEC-2 | 0.00 | 32.72 | 31.60 | 0.00 | 21.19 | 20.13 | 0.00 | 12.36 | 11.11 |
| SEC-3 | 0.00 | 24.40 | | l | 15.67 | 102.60 | 0.00 | 5.41 | 50.89 |
| SEC-4 | 0.00 | 21.48 | | 0.00 | 14.19 | 120.51 | 0.00 | 4.06 | 56.77 |
| SEC-5 | 0.00 | 16.84 | | | 11.10 | 152.13 | 0.00 | 0.18 | |
| SEC-6 | 0.00 | 7.54 | | | 4.94 | 192.23 | 0.00 | -0.54 | 78.71 |
| SEC-0 | 0.00 | 0.00 | | | 0.00 | 202.10 | 0.00 | -6.61 | 64.70 |
| SEC-7 SEC-8 | 0.00 | -7.54 | · · · · | | -4.94 | 192.23 | 0.00 | -5.23 | 56.20 |
| SEC-0 SEC-9 | 0.00 | -16.84 | | 1 | | 152.13 | 0.00 | -12.84 | 11.42 |
| SEC-10 | 0.00 | -21.48 | | • • • • | | | 0.00 | -10.64 | -10.27 |
| SEC-10 | 0.00 | -24.40 | - | | | 102.60 | 0.00 | -12.51 | -24.16 |
| SEC-11 | 0.00 | -32.72 | | | | | 0.00 | -19.15 | -94.18 |
| SEC-12 SEC-13 | 0.00 | | | | | 0.00 | 0.00 | -20.59 | -112.50 |

| Section | | Prestress | | Liv | eLoad ma | x | Liv | eLoad mir | <u>۱</u> |
|---------|--------|-----------|----------|--------|----------|----------|--------|-----------|----------|
| Jection | N (tf) | V (tf) | M (tf.m) | N (tf) | V(tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) |
| SEC-1 | 633.99 | -54.23 | 0.00 | 0.00 | 9.82 | 2.72 | 0.00 | -0.80¦ | -2.68 |
| SEC-2 | 633.99 | ~50.56 | -92.20 | 0.00 | 9.44 | 7.07 | 0.00 | -0.80 | -0.63 |
| SEC-3 | 644.24 | -42.51 | -300.75 | 0.00 | 7.63 | 37.61 | 0.00 | -1.52 | -3.51 |
| SEC-4 | 653.03 | -35.26 | -346.23 | 0.00 | 8.12 | 44.51 | 0.00 | -2.37 | -4.47 |
| SEC-5 | 661.26 | -24.57 | -426.84 | 0.00 | 7.14 | 57.39 | 0.00 | -3.33 | -6.80 |
| SEC-6 | 661.23 | -7.94 | 1 | 0.00 | 4.26 | 66.24 | 0.00 | -3.90 | -9.91 |
| SEC-7 | 656.44 | 0.00 | 1 . 1 | 0.00 | 3.17 | 65.61 | 0.00 | -5.36 | -12.61 |
| SEC-8 | 661.23 | 7.94 | i I | 0.00 | 2.18 | 53.10 | 0.00 | -7.62 | -14.37 |
| SEC-9 | 661.26 | 24.57 | | | 1.11 | 32.07 | 0.00 | -9.10 | -17.88 |
| SEC-10 | 653.03 | 35.26 | 1 | 0.00 | 2.09 | 21.01 | 0.00 | -11.33 | |
| SEC-11 | 644.24 | 42.51 | | 0.00 | 1.87 | 17.76 | 0.00 | -11.68 | -27.09 |
| SEC-12 | 633.99 | 50.56 | · · | 0.00 | 1.37 | 17.03 | 0.00 | -12.41 | -63.68 |
| SEC-12 | 633.99 | 54.23 | | | 1.36 | 17.99 | 0.00 | -12.61 | -72.7 |

| Section | Diffe | rential Cr | Pen | Differe | ntial Shrin | kage | Different | ial Tempe | rature |
|------------------|---------|------------|----------|---------|-------------|----------|-----------|-----------|----------|
| Section | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tt) | M (tf.m) |
| SEC-1 | 120.24 | 0.00 | 13.76 | 7.10 | 0.00j | 0.71 | 9.59 | 0.00 | 0.96 |
| SEC-2 | 89.11 | 0.00 | 10.39 | 6.89 | 0.00 | 0.69 | 9.31 | 0.00 | 0.93 |
| SEC-3 | -56.20 | 0.00 | -5.24 | 5.70 | 0.00 | 0.57 | 7.70 | 0.00 | 0.77 |
| SEC-4 | -82.52 | 0.00 | | 5.71 | 0.00 | 0.57 | 7.70 | 0.00; | 0.77 |
| SEC-5 | -128.48 | 0.00 | -13.22 | 5.71 | 0.00 | 0.57 | 7.72 | 0.00 | 0.77 |
| SEC-6 | -181.95 | 0.00 | | 5.73 | 0.00 | 0.57 | 7.74 | 0.00 | 0.77 |
| SEC-7 | -190.57 | 0.00 | | 5.73 | 0.00 | 0.57 | 7.74 | 0.00 | 0.77 |
| SEC-8 | -181.95 | 0.00 | | 5.73 | 0.00 | 0.57 | 7.74 | 0.00 | 0.77 |
| SEC-9 | -128.48 | 0.00 | i I | 5.71 | 0.00 | 0.57 | 7.72 | 0.00 | 0.77 |
| SEC-10 | -82.52 | 0.00 | 1 1 | 5.71 | 0.00 | i1 | 7.70 | 0.00 | 0.77 |
| SEC-10 SEC-11 | -56.20 | 0.00 | L I | 5.70 | 0.00 | | 7.70 | 0.00 | 0.77 |
| SEC-12 | 89.11 | 0.00 | | 6.89 | 0.00 | | 9.31 | 1.00 | 0.93 |
| SEC-12 | 120.24 | 0.00 | 1. 1 | | 0.00 | | 9.59 | 2.00 | 0.9 |

| Section | Secondary | force due | to Creep | In | npact max | | In | pact min | |
|---------|-----------|-----------|----------|--------|-----------|----------|--------|----------|----------|
| Section | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) | N (tf) | V (tf) | M (tf.m) |
| SEC-1 | 0.00 | 0.71 | 0.00 | 0.00 | 3.24 | 0.90 | 0.00 | -0.26 | -0,89 |
| SEC-2 | 0.00 | 0.82 | 0.76 | 0.00 | 3.11 | 2.33 | 0.00 | -0.27 | -0.21 |
| SEC-3 | 0.00 | 0.82 | 4.42 | 0.00 | 2.52 | 12.41 | 0.00 | -0.50 | -1.16 |
| SEC-4 | 0.00 | 0.82 | 5.41 | 0.00 | 2.68 | 14.69 | 0.00 | -0.78 | -1.47 |
| SEC-5 | 0.00 | 0.82 | 7.45 | 0.00 | 2.36 | 18.94 | 0.00 | -1.10 | -2.2- |
| SEC-6 | 0.00 | 0.82 | | 0.00 | 1.41 | 21.86 | 0.00 | -1.29 | -3.27 |
| SEC-7 | 0.00 | 0.94 | 14.83 | 0.00 | 1.05 | 21.65 | 0.00 | -1.77 | -4.10 |
| SEC-8 | 0.00 | 1.05 | 19.05 | 0.00 | 0.72 | 17.52 | 0.00 | -2.51 | -4.7 |
| SEC-9 | 0.00 | 0.98 | | 0.00 | 0.37 | 10.58 | 0.00 | -3.00 | -5.9 |
| SEC-10 | 0.00 | 0.93 | 26.58 | 0.00 | 0.69 | 6.93 | 0.00 | -3.74 | -7.5 |
| SEC-11 | 0.00 | 1.38 | | 0.00 | 0.62 | 5.86 | 0.00 | -3.85 | -8,9 |
| SEC-12 | 0.00 | -0.45 | | 0.00 | 0.45 | 5.62 | 0.00 | -4.09 | -21.0 |
| SEC-13 | 0.00 | -0.34 | | 0.00 | 0.45 | 5.94 | 0.00 | -4.16 | -24.0 |

| Cirder during Construction | uction St | age (AA | ruction Stage (AASHTO LRFD 5.7.3.2.2) - 1/2 | (FD 5.7.3. | 2.2) - 1/2 | | | | |
|--|-----------------|------------|---|------------|-------------------|-----------|-----------|-----------|-----------|
| (1) Nominal Flexural Sutengui of Suren and Sur | | Unit | Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | Section 6 | Section 7 |
| | | | | | | | | | |
| Sectional Properties | | | 1 850 | 1 850 | 1.850 | 1.850 | 1,850 | 1,850 | 1,850 |
| Depth of Girder | Ľ, | | 1,000 | 4,000 | 650 | 650 | 650 | 650 | 650 |
| TARIATE of Dork Slan | bd | um | 8 | 2 | | | 010 | 010 | 210 |
| Wildlich Dece and | hđ | mm | 210 | 210 | 210 | 210 | 210 | | 017 |
| Depth of Deck Stap | hw | um um | 650 | 580 | 200 | 200 | 200 | 200 | 200 |
| Total width of Webs | 2 4 | um | 650 | 650 | 650 | 650 | 650 | 650 | 650 |
| Width of Siffit Slap | s r | uuu | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Depth of Softit Slap | | | | | | | | | |
| | ٩٣ | 2 mm | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 |
| Total Area of Prestressing Cables | | | | | | | | | |
| Distance from extreme compressive fibre to centroid of | սր | unu | 971.0 | 1,050.0 | 1,370.0 | 1,437.0 | 1,552.0 | 1,677.0 | 1,688.0 |
| Tensile Reinforcement | A of | Cmm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Area of Tensile Reinforcement | 191 | | } | | | | | | |
| Distance from extreme compressive fibre to centroid of | | • | , , | | 00 | 0 | 00 | 0.0 | 0.0 |
| Toncila Reinforrement | dst | mm | 0.0 | 0.0 | 0.0 | | | | |
| A of Commercive Reinforcement | Asc | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Distance from extreme compressive fibre of | | - | | Ċ | Ċ | | | 00 | 0.0 |
| Commessive Reinforcement | dsc | m | 0.0 | 0.0 | 0.0 | 2.0 | | | |
| Colorion of Mr | | - - | | | | | | | 20.0 |
| | 81 | | 0.76 | 0.76 | 0.76 | 0.76 | 0.76 | | |
| Stress block factor | | mm | 549 | 612 | 1,479 | 1,500 | | | |
| Darth of equivalent stress block | a b | uuu | 420 | 467 | 1,130 | 1,147 | 1,172 | 1,197 | 1,199 |
| Average stress in Prestress stell at nominal bending | | | 1 | | | | 1 346 | 1 374 | 1 376 |
| | fps | Mpa | 1,566 | | 1 | 5 | | | 10 |
| Iteliautic | чW | N.mm | 7.06E+09 | 7.57E+09 | 7.32E | 7.89E+09 | 8.88E | 9.995 | 01+310.1 |
| NULLIAI NEUCONALICE | θ | | 1.0 | 1.0 | 1.0 | 1.0 | | | 0.1 |
| Flexural Icesistance | Mr | N.mm | 7.06E+09 | 7.57E+09 | 7.32E+09 | 7.89E+09 | 8.88E+09 | 9.99E+09 | 1.01E+10 |
| ractoreu Nesustative | | | | | | | | | |
| Checking | N ¹¹ | Nmm | 0.00E+00 | | 7.76E+08 3.93E+09 | 4.61E+09 | 5.80E+09 | 7.32E+09 | 7.70E+09 |
| Factored Bending Moment due to External Loaus | 7777 | | | | | | | | |

| 11) Non | (1) Nominal Flexural Strength of Girder during Constr | truction Stage | | AASHTO LKFU 5.7.3.2.2) -2/2 | XFD 5.7.3 | 7.7- (7.7: | | | | |
|----------|---|----------------|------|-----------------------------|------------------|------------|------------|------------|-------------|--|
| | | 2 | Unit | Section 8 | Section 9 | Section 10 | Section 11 | Section 12 | Section 13 | |
| Sectiona | Certional Promerties | | | - | | | | | | |
| Certavia | Douth of Circlor | T | mm | 1,850 | 1,850 | 1,850 | 1,850 | 1,850 | 1,850 | |
| Tri-Pic | Deput of Dock Slam | pq | unu | 650 | 650 | 650 | 650 | 650 | 650 | |
| | It of Dack Star | hd | mm | 210 | 210 | 210 | 210 | 210 | 210 | |
| | Deput of Deck Stap | bw | um | 200 | 200 | 200 | 200 | 580 | 650 | |
| | 10tat Width of Siffit Slan | ps | uuu | 650 | 650 | 650 | 650 | 650 | 650 | |
| | Widuit of Soffit Slap | su | mm | 250 | 250 | 250 | 250 | 250 | 250 | |
| | | | | | | | | | | |
| Total | Total Area of Prestressing Cables | Ap | mm2 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | |
| Dista | Distance from extreme compressive fibre to centroid of | dp | unu | 1,677.0 | 1,552.0 | 1,437.0 | 1,370.0 | 1,050.0 | 970.0 | |
| Area | Area of Tensile Reinforcement | Ast | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | Distance from extreme compressive fibre to centroid of | det. | | 00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 2-30 | I ensile Keintorcement | Asc | mm2 | 0.0 | | | 0.0 | 0.0 | 0.0 | |
| | Area of Compressive Achicorcentum Dictance from extreme compressive fibre of | | | | | | | | | |
| Com | Compressive Reinforcement | dsc | uuu | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Calculat | Calculation of Mr | | | | | | | | | |
| Stree | Stress block factor | β1 | | 0.76 | 0.76 | 0.76 | | 5 | 0.76 | |
| Dist | Distance from extreme compressive fibre Neutral Axis | c | unu | 1,566 | | | | | 549 | |
| Dept | Depth of equivalent stress block | а | uuu | 1,197 | 1,172 | 1,147 | 1,130 | 467 | 420 | |
| Aver | Average stress in Prestress stell at nominal bending | | | | | | | | v V H | |
| resis | resistance | fps | Mpa | 1,374 | | | | | - 000.1 | |
| Non | Nominal Resistance | Мп | N.mm | 9.99E+09 | 8.88E+09 | 7.89E | 7.32E | 7.57E | 7.06E+09 | |
| Flex | Flexural Resistance factor | 9 | - | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | |
| Facto | Factored Resistance | Mr | N.mm | 9.99E+09 | 8.88E+09 | 7.89E+09 | 7.32E+09 | 7.57E+09 | 7.06E+09 | |
| Checking | Ŕ | | | | | | | | 00.100.0 | |
| Fact | Factored Bending Moment due to External Loads | Mu | N.mm | 7.32E+09 | 5.80E+09 | 4.61E+09 | 3.93E+09 | 7.765+08 | 0.00±+00 | |
| | | | | | | | | | | |

44 (A ASHTO I RFD 5.7.3.2.2) -2/2 -tion Sta Č • . ۲

| (2) Construction Strength of Section during Construction Stage - 1/2 | ig Consti | uction St | tage - 1/2 | · | | | | | |
|---|-----------|-----------|------------|-----------|-----------|-----------|-----------|------------|-----------------|
| (2) Checking indulated differ on the second of the second | | Unit | Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | Section 6 | Section 7 |
| Sectional Properties | | | 010 | 1 050 | 1 850 | 1 850 | 1.850 | 1.850 | 1,850 |
| Depth of Girder | E | mm | 1,850 | 1,000 | 1,000 | CED. | 650 | 650 | 650 |
| Width of Deck Slap | pq | шш | 650 | 000 | 000 | 0.00 | 0.00 | 010 | 210 |
| Denth of Derk Slap | рч | шш | 210 | 210 | 710 | 012 | 017 | | 017 |
| Depart of Debe | hw | mm | 650 | 580 | 200 | 200 | 200 | 500 | 2007 |
| 10tal Widul 01 Webs | å | um | 650 | 650 | 650 | 650 | 650 | 650 | 650 |
| Width of Sound Stap | hs | mm | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Ueptin of Sofiti Stap | | | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 |
| Distance from extreme compressive fibre to centroid of | ap | шш | 1//6 | 1,050 | 1,370 | 1,437 | 1,552 | 1,677 | 1,688 |
| Prestressing Caples | Ast | mm2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Distance from extreme compressive fibre to centroid of | 407 | | c | C | 0 | 0 | 0 | 0 | 0 |
| Tensile Reinforcement | Asr | mm2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2 | | | | | | | | |
| Distance from extreme compressive fibre to centrold of | dsc | mm | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | |
| Calculation of MIT | dv | mm | 1,332 | 1,332 | 1,332 | 1,332 | 1,332 | 1,332 | 1,332 |
| Lifective snear Depui | , îr | mm | 650 | 580 | 200 | 200 | 200 | 200 | 200 |
| Effective web width | 3 | | 150 | 150 | 150 | 300 | 300 | 300 | 300 |
| Spacing of stirrups | s | ZUIUI | PCT | | 224 | | | | |
| Angle of inclination of transverse reinforcement to | . 2 | degree | 6 | 06 | 06 | 6 | 6 | 6 | 90 |
| Iongitudinal axis of grder Eactor indicating ability of diagonally cracked concrete | 5 | | | | | | | L 1 | L |
| to transmit tension | æ | | 6.8 | 6.8 | 6.1 | 6.6 | 6.3 | 5.5 | 5.4 |
| Area of shear reinf. within a distances | Av | mm2 | 616 | _ | 616 | 308 | | 80£ | 308 |
| Strain in the tensile reinforcement | ХЗ | - | -0.000254 | -0.000248 | -0.000245 | -0.000219 | -0.000163 | -0.000055 | -0.000.0- |
| Inclination angle of diagonal compressive stress | θ | degree | 27.00 | 27.00 | 23.14 | 25.06 | 2/.00 | M./7 | 007/7 |
| Component of effective pretressed force in the direction | | 2 | E ADELOE | E DEVEADE | 1 255+05 | -3 53E+05 | -2 46E+05 | -7.94E+04 | 0.00E+00 |
| of the applied shear | ۲P | z | -0.42ETUJ | <u> </u> | _ | | | 7.69E+05 | 7.55E+05 |
| Nominal Resistance of Concrete | ζ | z | 0.00ETU0 | | | _1_ | <u> </u> | 1 055+06 | 1 05E+06 |
| Nominal Resistance of Reinforcement | Vs | z | 4.195+06 | 4.19E+U0 | 4.9915100 | | | 1 74F+06 | 1 80E+06 |
| Nominal Resistance | ۳۷ | z | 6.72E+06 | 6.43E+U6 | | | | 0.0.17 | 60 |
| Resistance factor for shear | \$ | | 0.9 | 0.9 | | - | F | 1 565406 | <u>1 62E+06</u> |
| Factored Resistance | Vr | z | 6.05E+06 | 9./9E+U0 | 2.025+00 | | | 20. 701 | |
| Checking | | | | | 00 T | 4 21ET00 | E ROETOO | 7 375+00 | 7 70E+09 |
| Factored Moment due to External Loads | Мu | Mm.N | 0.0012+00 | | | | 1 | 0.00E+00 | 0.00E+00 |
| Factored Axial Force due to External Loads | Nn N | z | 0.0010+00 | | | 1 | 1 | 1 876+05 | 0.000 |
| Factored Shear Force due to External Loads | Λu | z | 8.69E+UD | 8.09E+UO | | | | ~~ ~ /or T | 200 |

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| Sectional Properties H mm 1.850 200 | | | | Section 8 | Section 9 | Section 10 | Section 11 | Section 12 | | |
|--|--|------------|----------|-----------|---------------|------------|------------|------------|------------|---|
| Hmm1.8501.850laphdmm 650 650 laphdmm 650 650 laphm 210 210 lebsbymm 650 650 laphn 210 210 laphn 250 250 laphm 2592 5923 sertessing CablesApmm 250 sertessing CablesApmm 250 sertessing CablesAs 0 0 wreme compressive fibre to centroid of $4p$ mm 1.677 blesmm 1.677 1.532 blesmm2 0 0 compressive fibre to centroid of $4st$ mm 0 wreme compressive fibre to centroid of $4st$ mm 200 sive Reinforcement $4sr$ mm 230 1.332 blip 0 0 0 0 0 sive Reinforcement by mm 2.300 1.332 blip 0 0 0 0 0 sive Reinforcement by mm 2.300 1.332 blip 0 0 0 0 0 sive Reinforcement by mm 2.300 1.300 sinforcement by by mm 0 sinforcement by by mm 0 sinforcement by by mm 0 sinforcement by <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<> | | | | | | | | | | |
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| Supplehidmm 210 210 Stapbwmm 200 200 Websbsmm 550 5923 Slapmm 250 5923 Slapmm 1.677 1.552 Slapmm2 $5,923$ $5,923$ Sizemm2 $5,923$ $5,923$ Streme compressive fibre to centroid ofdpmm 1.677 1.552 wetterne compressive fibre to centroid ofdstmm2 0.0 0 wetterne compressive fibre to centroid ofdstmm2 0.0 0 Sive ReinforcementAscmm2 0.0 0 extreme compressive fibre to centroid ofdstmm2 0.0 0 sive ReinforcementAscmm2 0.0 0 0 sive Reinforcement 0 0 0 0 | | pq | un mu | 650 | 650 | 650 | 650 | 650 | | |
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| f shear reinf. within a distancesAvmm2 500 010 in the tensile reinforcementex -0.000083 -0.000163 -0.000163 -0.000163 tion angle of diagonal compressive stress θ degree 27.00 27.00 27.00 onent of effective pretressed force in the direction V_p N $7.94E+04$ $2.46E+05$ applied shear V_p N $7.09E+06$ $8.86E+05$ all Resistance of Concrete V_c N $1.05E+06$ $4.19E+06$ all Resistance V_n N $1.05E+06$ 0.9 and Resistance V_n N $1.05E+06$ $2.91E+06$ and Resistance V_n N $1.71E+06$ $2.91E+06$ and Resistance V_n N $1.71E+06$ $2.62E+06$ and Resistance V_n N_n $7.32E+09$ $5.80E+09$ | | 8 | | C.C | 2.0 | 0.0 | | | | |
| in the tensile reinforcementex-0.000083-0.000163- | within a distances | Av | mm2 | 305 | | | | | 0000- | |
| tion angle of diagonal compressive stress θ degree 27.00 27.00 onent of effective pretressed force in the direction V_P N $7.94E+04$ $2.46E+05$ applied shear V_C N $7.69E+05$ $8.86E+05$ all Resistance of Concrete V_C N $7.69E+06$ $4.19E+06$ all Resistance V_N N $1.05E+06$ $4.19E+06$ all Resistance V_N N 0.9 0.9 all Resistance V_N N $1.769E+06$ $2.91E+06$ all Resistance V_N N $1.71E+06$ $2.91E+06$ ed Resistance V_1 N $1.71E+06$ $2.62E+06$ ed Resistance V_1 N N 0.9 0.9 | reinforcement | £X | | -0.000083 | -0.000165 | C77000'0- | 107000 | - | | |
| onent of effective pretressed force in the direction V_p N $7.94E+04$ $2.46E+05$ applied shear V_c V N $7.69E+05$ $8.86E+05$ all Resistance of Concrete V_c N $1.05E+06$ $4.19E+06$ all Resistance of Reinforcement V_n N $1.05E+06$ $2.91E+06$ all Resistance V_n N $1.05E+06$ $2.91E+06$ and Resistance V_n N 0.9 0.9 ance factor for shear V_r N $1.71E+06$ $2.62E+06$ ed Resistance W_n $N.mm$ $7.32E+09$ $5.80E+09$ | diagonal compressive stress | θ | degree | 27.00 | 00./Z | 00.72 | NN: 77 | | - | |
| applied shear Vp N $7.94E+104$ $2.46E+104$ rail Resistance of Concrete Vc N $7.69E+05$ $8.86E+05$ rail Resistance of Reinforcement Vs N $1.05E+06$ $4.19E+06$ rail Resistance Vn N $1.05E+06$ $4.19E+06$ rail Resistance Vn N $1.05E+06$ $2.91E+06$ rail Resistance Vn N $1.05E+06$ $2.91E+06$ ance factor for shear vr N 0.9 0.9 ed Resistance Vr N $1.71E+06$ $2.62E+06$ ance factor for shear Vn $Nnnn$ $7.32E+09$ $5.80E+09$ | tive pretressed force in the direction | | | | | | A DEELOS | 5 06E+05 | 5 47E+05 | |
| ail Resistance of ConcreteVcN $7.69E+05$ $8.86E+00$ all Resistance of ReinforcementVsN $1.05E+06$ $4.19E+06$ all ResistanceVnN $1.89E+06$ $2.91E+06$ ance factor for shear ϕ N 0.9 0.9 ed ResistanceVrN $1.71E+06$ $2.62E+06$ ance factor for shear ψ N $1.71E+06$ $2.62E+06$ ed ResistanceMuNmm $7.32E+09$ $5.80E+09$ | | νp | z | 7.94E+04 | 2.465+00 | 0.005700 | | | | |
| al Resistance of ReinforcementVsN1.05E+064.19E+06al ResistanceVnN1.89E+062.91E+06ance factor for shear φ 0.90.9ed ResistanceVrN1.71E+062.62E+06ance factor for shear ψ Nn7.32E+095.80E+09 | of Concrete | Vc | z | C0+369.7 | CN+398.8 | 9.40ETU3 | | | 4 | |
| nal Resistance Vn N1.89E+062.91E+06ance factor for shear φ 0.90.9ed Resistance Vr N1.71E+062.62E+06ed Resistance Mu Nmm7.32E+095.80E+09 | of Reinforcement | Vs | Z | 1.05E+06 | 4.19E+06 | 4.19E+06 | | | | |
| ance factor for shear φ 0.9 0.9 ance factor for shear ψ N 1.71E+06 2.62E+06 ed Resistance Nu N.mm 7.32E+09 5.80E+09 | | μŊ | z | 1.89E+06 | 2.91E+06 | 3.02E+06 | m | | 2 | |
| ed Resistance Vr N 1.71E+06 2.62E+06 Mu N.mm 7.32E+09 5.80E+09 | r shear | ə | | 0.9 | 0.9 | 0.9 | | | 1 | |
| au Nummer die die Gebernal Frankeiten Mu N.mm 7.32E+09 5.80E+09 | | Vr | z | 1.71E+06 | 2.62E+06 | 2.71E+06 | 2.78E+06 | 5 6.70E+06 | 6 7.U3E+U6 | |
| 1 Mu N.mm 7.32E+09 5.80E+09 | | | | | | | 1 | | | |
| | in to External (aads | Mu | N.mm | 7.32E+05 | | 4.61E+09 | | | 1 | |
| ds Nu N. 0.00E+00 0.00E+00 | o due to External Loads | nZ | z | 0.00E+0C | | <u> </u> | | | | |
| V. N 1 87F+05 4.19E+05 | | | Z | 1 87F+0F | | 5.35E+05 | 6.01E+05 | 5 8.09E+05 | 5 8.69E+05 | |

time Nominal Shear Strength of Section during Construction Stage.

| (2) Nominal Flevitral Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -1/2 | ge (AAS) | HTO LR | FD 5.7.3.2 | 2) -1/2 | | | | - | |
|--|------------|--------|------------------|-----------|-----------|--------------|-------------|----------------------------------|-------------|
| | | Unit | Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | Section 6 | Section 7 |
| Sectional Properties | | | | | | | | | |
| Douth of Cirder | H | mm | 2,060 | 2,060 | 2,060 | 2,060 | 2,060 | 7,060 | 2,060 |
| | pq | шш | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 |
| | hd | um | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| | Mq | unu | . 650 | 580 | 200 | 200 | 200 | 200 | 200 |
| I otal width of vveus | - <u>s</u> | mm | 650 | 650 | 650 | 650 | 650 | 650 | 650 |
| Width of Sofiit Slab | 2 4 | | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Depth of Soffit Slab | SIL | ITTT | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 |
| Distance from extreme compressive fibre to centroid of | ар | шш | 1,181.0 | 1,260.0 | 1,580.0 | 1,647.0 | 1,762.0 | 1,887.0 | 1,898.0 |
| Prestressing Captes | Ast | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Distance from extreme compressive fibre to centroid of | · | | | | | | | (| |
| Tensile Reinforcement | dst | mm | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 |
| Area of Compressive Reinforcement | Asc | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Distance from extreme compressive fibre to centroid of | | | | ĊĊ | | 00 | 00 | 00 | 00 |
| Compressive Reinforcement | dsc | шш | 0.0 | 0.0 | | ^ '^ | | | |
| Calculation of Mr | | | 14.0 | L C | 74.0 | 74.0 | 0 76 | 0.76 | 0.76 |
| Stress block factor | β1 | | 0.76 | 0.70 | 0/.0 | 0/.0 | 0/'0 | 0.70 | 07.0 |
| Distance from extreme compressive fibre to the Neutral | | | 1 1 | | | 1 660 | 1 506 | 1 621 | רא 1 1 א |
| Axis | Ų | mm | C9C | 679 | | | | | - 20 F |
| Depth of equivalent stress block | IJ | uuu | 432 | 481 | 1,178 | 1,191 | 1,212 | 1,232 | 1,234 |
| Average stress in Prestress stell at nominal bending | | | ד ד ע ד | | | 1 3 <i>L</i> | | 1 415 | 7121 |
| resistance | fps | Mpa | 1/9/I | T,bUU | 1 | 1 | | | L L |
| Nominal Resistance | Mn | N.mm | 1.00E+10 | 1.07E+10 | 1.28E | 1.34E | 1.455+10 | . 3 2 C . 1 | 01+346.1 |
| Flexural Resistance factor | 9- 1 | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | I.U |
| Factored Resistance | Mr | N.mm | 1.00E+10 | 1.07E+10 | 1.28E+10 | 1.34E+10 | 1.45E+10 | 1.58E+10 | 1.59±+10 |
| Checking | | | | | | | · · · · · · | | |
| Factored Bending Moment due to External Loads | Mu | N.mm | 1.25E+08 | 1.04E+09 | 4.95E+09 | 5.77±+09 | 7.14E+09 | 8.834+04 | 8.4312+09 |
| | | • | | • | | | | | |

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| Unit Section 8 Section 9 Section 10 Section 11 Section 12 Section 12 Section 13 Section 14 Section 14 <th></th> <th>(3) Nominal Flexural Strength of Girder at Service Sta</th> <th>ge (AASI</th> <th>HTO LR</th> <th>ge (AASHTO LRFD 5.7.3.2.2) -2/2</th> <th></th> <th></th> <th>· · ·</th> <th></th> <th></th> <th></th> | | (3) Nominal Flexural Strength of Girder at Service Sta | ge (AASI | HTO LR | ge (AASHTO LRFD 5.7.3.2.2) -2/2 | | | · · · | | | |
|--|---------|--|-------------|--------|---------------------------------|----------|------------|------------|------------|------------|-------------|
| Sectional Properties H mm 2060 | -1 | | | Unit | Section 8 | 9 | Section 10 | Section 11 | Section 12 | Section 13 | Section 14 |
| Width of Sofiit Slab H mm 2060 2060 2060 2060 2060 2060 2060 2060 2035 | | inctional Properties | | | - | | | | | | 0100 |
| Verter Number 2005 | - 1 | | H | mm | 2,060 | 2,060 | 2,060 | 2,060 | 2,060 | | 7,000 |
| | , I | | P4 | mm | 2,035 | 2,035 | 2,035 | 2,035 | 2,035 | | 2,035 |
| Depth of Deck Slab Dw mm 200 200 500 580 650 Total vidih of Kels bw mm 200 200 200 580 650 Width of Kels bw mm 250 < | | Width of Deck Slap | 7 2 2 | - | 010 | 210 | 210 | 210 | 210 | | 210 |
| Total width of Webs pw mm $\frac{50}{50}$ \frac | i | Depth of Deck Slab | ри Г | 111111 | 000 | | | 200 | 580 | | 650 |
| Width of Soffit Slab bs mm 550 550 250 | | Total width of Webs | MQ | | 007 | 200 | 2007 | | 222 | | 650 |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | | Width of Soffit Slab | şq | шш | 650 | 650 | 069 | 000 | 000 | | |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | • | Denth of Soffit Slab | hs | шш | 250 | 250 | 250 | 250 | 250 | | 007 |
| Total Area of Prestressing Cables Ap mm2 5,922.6 5,922 | • | | | | | | | | ļ | | |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | | Total Area of Prestressing Cables | Ap | mm2 | 5,922.6 | 5,922.6 | 5,922.6 | 5,922.6 | | | 0.0 |
| Prestressing Cables dp mm 1.8870 $1.762.0$ $1.647.0$ $1.00.0$ 00.0 | | Distance from extreme compressive fibre to centroid of | | | | | | | • | | 2 060 0 |
| Area of Tensile Reinforcement Ast mm2 0.0 0 | | Prestressing Cables | dp | шш | 1,887.0 | | | | | | 0.00/1 |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | . 1 | Arra of Toneilo Reinforcement | Ast | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | | | V.6U0// |
| Tensile Reinforcement Tensile Reinforcement Option Extense compressive fibre to centroid of Asc mm 0.0 |] | ALEA OF LEIDING ANGLAUTICATION FILME TO CONTROL OF | | | | | | | | | |
| Tensile kendorcement Tensile kendorcement Asc nun2 0.0 | []-2 | Distance from extreme compressive more to certain of | det | uuu | 0.0 | | | 0.0 | | | 1,955.0 |
| Area of Compressive ReinforcementAscmm20.0 <td>2-3</td> <td>Tensile Reinforcement</td> <td>nen</td> <td>177777</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>00</td> | 2-3 | Tensile Reinforcement | nen | 177777 | | | | | | | 00 |
| ce from extreme compressive fibre to centroid of essive Reinforcement dsc mm 0.0 0.0 0.0 2,060. | 34 | Area of Compressive Reinforcement | Asc | mm2 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| ressive Reinforcementdscmm0.00.00.00.00.0 $2,0000$ $2,0000$ n of Mrn of Mrn of Mrn of Mr0.760.760.760.760.760.76block factorpn1,5111,5811,5311,541582540ce from extreme compressive fibre to the Neutralcmm1,6121,5861,5581,541582540of equivalent stress blockamm1,2321,2121,1911,178445413ge stress in Prestress stell at nominal bendingfpsMpa1,4151,3911,3671,3521,4811,540ncencenm1,6121,3911,3671,3521,4811,540al Resistancemn1,6101,01,01,01,01,01,0al Resistance factor ψ N.mm1.58E+101.34E+101.28E+101,01,01,0al Resistance1,01,01,01,01,01,01,01,0al ResistanceMrN.mm1.58E+101.34E+101.28E+101,01,01,0al ResistanceMrN.mm1.58E+101.45E+101.28E+101,01,01,0al ResistanceMrN.mm1.58E+101.45E+101.28E+101,01,01,0al ResistanceMrN.mm1.58E+101.45E+101.28E+101,01,01,0al Res | | Distance from extreme compressive fibre to centroid of | - | | | | | | | | 0 040 0 |
| n of Mr n of Mr 0.76 0.7 | | Compressive Reinforcement | dsc | mm | 0.0 | | | 0.0 | | | |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | | Calculation of Mr | | | | | ì | | | | 94.0 |
| ce from extreme compressive fibre to the Neutralcmm $1,612$ $1,586$ $1,558$ $1,541$ 582 540 of equivalent stress blockamm $1,232$ $1,212$ $1,191$ $1,178$ 445 413 ge stress in Prestress stell at nominal bendingfpsMpa $1,415$ $1,391$ $1,367$ $1,352$ $1,481$ $1,540$ ncefpsMinN.mm $1.58E+10$ $1.45E+10$ $1.34E+10$ 1.352 $1,481$ $1,540$ al Resistanceal Resistancemin $1.616+10$ $1.34E+10$ $1.34E+10$ 1.0 1.0 al Resistancemin $1.58E+10$ $1.45E+10$ $1.34E+10$ $1.28E+10$ $6.14E+09$ al Resistancemin $1.58E+10$ $1.45E+10$ $1.24E+10$ 1.0 1.0 ed Resistancemin $N.mm$ $1.58E+10$ $1.45E+10$ $1.28E+10$ $6.14E+09$ ed ResistanceMin $N.mm$ $1.58E+10$ $1.24E+10$ $1.26E+10$ $6.14E+09$ ed ResistanceMin $N.mm$ $8.22E+09$ $6.02E+09$ $4.54E+09$ $2.0E+09$ $2.30E+09$ | | Stress block factor | β1 | | 0.76 | 0.76 | 0.76 | 0.70 | | | 0/.0 |
| cmun1,6121,5361,5381,541 0.02 | • | Distance from extreme compressive fibre to the Neutral | | | | | | | | | 176 |
| of equivalent stress blockamm1,2321,2121,1911,1/8443443ge stress in Prestress stell at nominal bendingfpsMpa1,4151,3911,3671,3521,4811,540nceMnN.mm1.58E+101.4151,3911,3671,3521,4811,540nceMnN.mm1.58E+101.4151,34E+101.28E+105.11E+096.14E+09al Resistancem1.01.01.01.01.01.0al Resistancem1.58E+101.45E+101.24E+101.01.0al Resistancem1.01.01.01.01.0al Resistancem1.58E+101.45E+101.24E+105.11E+096.14E+09ed ResistanceMuN.mm8.22E+096.02E+093.67E+092.50E+092.30E+09 | | Axis | υ | um | 1,612 | | | | | | |
| ge stress in Prestress stell at nominal bending fpsfpsMpa $1,415$ $1,367$ $1,352$ $1,481$ $1,540$ ncemcmn 1.58 ± 10 1.34 ± 10 1.352 $1,481$ $1,540$ ncemn $N.mm$ 1.58 ± 10 1.45 ± 10 1.28 ± 10 5.11 ± 0 6.14 ± 00 nal Resistance ϕ 1.0 1.0 1.0 1.0 1.0 1.0 al Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 5.11 ± 0 6.14 ± 00 ed Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 $5.11E+09$ $6.14E+09$ ed Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 $5.11E+09$ $6.14E+09$ ed Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 $5.11E+09$ $2.10E+09$ ed Resistance mn $N.mm$ 8.22 ± 0 $4.54E+09$ $3.67E+09$ $1.50E+09$ $2.30E+09$ | • • | Depth of equivalent stress block | ъ | uuu | 1,232 | | | | | | ROT |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | - | Average stress in Prestress stell at nominal bending | | | 1 | | | | | | 1.816 |
| nal Resistance Mn N.mm $1.58E+10$ $1.34E+10$ $1.28E+10$ $2.11E+09$ $0.14E+09$ al Resistance φ 1.0 < | | resistance | fps | Mpa | cIF/I | | | 10 | | r v | U U U |
| al Resistance factor p 1.0 1.0 1.0 1.0 1.0 ed Resistance Mr N.mm 1.58E+10 1.45E+10 1.28E+10 5.11E+09 6.14E+09 ed Resistance Mu N.mm 8.22E+09 6.02E+09 4.54E+09 3.67E+09 2.30E+09 | | Nominal Resistance | Mn | N.mm | 1.58E+10 | | | <u>⊣ </u> | <u> </u> | - 1 | a 0 |
| ed Resistance Mr. N.mm 1.58E+10 1.45E+10 1.34E+10 1.28E+10 5.11E+09 0.14E+09 0.14E+0 | | Flexural Resistance factor | φ | | 1.0 | | | | | <u></u> | 00-400-1 |
| ed Rending Moment due to External Loads Mu N.mm 8.22E+09 6.02E+09 4.54E+09 3.67E+09 2.30E+09 | | Factored Resistance | Mr | N.mm | 1.58E+10 | _ | _ | | _ | | 4.205-07 |
| ad Rending Moment due to External Loads Mu N.mm 8.22E+09 6.02E+09 4.54E+09 3.67E+09 1.50E+09 2.50E+09 | - | Checking | | | | | | | | | |
| | | Factored Bending Moment due to External Loads | Mu | N.mm | 8.22E+09 | 6.02E+09 | 4.54E+09 | 3.67E+09 | | | |

| (4) Checking Nominal Shear Strength of Section at Se | Service Stage - 1/2 | ge - 1/2 Unit | Section 1 | Section 2 | Section 3 | Section 4 | Section 5 | Section 6 | Section 7 |
|--|---------------------|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Sectional Properties | | | | 0,000 | 070 0 | 070 C | 2 060 | 090 0 | 2 060 |
| Depth of Girder | H | mm | 2,060 | 2,060 | 7,000 | 2,000 | 2,000 | | 2000 C |
| Width of Deck Slap | pq | um | 2,035 | 2,035 | 2,035 | 2,005 | C\$U,2 | | 010 |
| Denth of Deck Slap | Ъđ | шш | 210 | 210 | 210 | 210 | 017 | 017 | 017 |
| Total width of Webs | hw | шш | 650 | 580 | 200 | 200 | 200 | | 500 |
| 10tal Widdl of 1100 | bs | mm | 650 | 650 | 650 | 650 | 650 | | 650 |
| Pouth of Soffit Slan | hs | mm | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Deput of court one | | | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 |
| Distance from extreme compressive fibre to centroid of | | | | | 1 100 | 1 617 | 692 1 | 1 887 | 1 808 |
| Prestressing Cables | dp | шш | 1,181 | 1,26U | | 1,04/ | 70 / T | | |
| Area of Tensile Reinforcement | Ast | mm2 | 0 | 0 | | | 0 | | |
| Distance from extreme compressive fibre to centroid of | t T | | C | C | 0 | 0 | 0 | | 0 |
| Tensile Reinforcement | 4 cr | | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 164 | | | | | | | | |
| Distance from extreme compressive fibre to centroid of | dsc | шш | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Compressive Activity Compressive | | | | | | | | | |
| Calculation of Mr | | | 1 483 | 1 483 | 1 483 | 1.483 | 1,483 | 1,483 | 1,483 |
| Effective shear Depth | n | 111111 | 7,100 | | 200 | 200 | 200 | 200 | 200 |
| Effective web width | λά | unu | 000 | | | 000 | | | 300 |
| Spacing of stirrups | S | mm2 | 150 | 120 | ncı | nne | 200 | | 222 |
| Angle of inclination of transverse reinforcement to | | | Ş | ç | 2 | U | 8 | 5 | 6 |
| longitudinal axis of girder | ಶ | degree | ß | Ŗ | 20 | R | 2 | | |
| Factor indicating ability of diagonally cracked concrete | 8 | | 6.8 | 6.7 | 4.7 | 6.0 | 5.7 | 5.1 | 5.1 |
| to transmit tension | A1/ | Cmm | 616 | 616 | 616 | 308 | 308 | 308 | 308 |
| Area of shear reint, within a distances | 2 2 | | -000000 | -0.000196 | -0.000178 | -0.000155 | -0.000107 | -0.000033 | -0.000029 |
| Strain in the tensile reinforcement | 5 9 | Jaman | 27.00 | 27.00 | 22.17 | 24.07 | 27.00 | 27.00 | 27.00 |
| | 2 | Action | | | | | | | |
| Component of effective preficesed force in the unrection | νn | Z | -5.42E+05 | -5.06E+05 | -4.25E+05 | -3.53E+05 | | • | 0.00E+00 |
| of the applied shear | ν. - Γ | z | 3 43E+06 | 3.04E+06 | 7.31E+05 | 9.30E+05 | 8.88E+05 | 7.98E+05 | 7.94E+05 |
| Nominal Kesistance of Concrete | Ve | z | 4 66F+06 | 4.66E+06 | 5.83E+06 | 1.33E+06 | 1.17E+06 | 1.17E+06 | 1.17E+06 |
| Nominal Kesistance of Keinforcement | 51 | 14 | 7555-06 | 7101+06 | 2 54F+06 | 1 91 E+06 | 1.81E+06 | 1.88E+06 | 1.96E+06 |
| Nominal Resistance | ц, | 2 | 0.00 | 00 | 00 | 00 | 60 | | |
| Resistance factor for shear | ¢ | | 0.3 | 2'n | 2.00 C | 10.10 | 1 100100 | - | 9UT372 L |
| Factored Resistance | Vr | z | 6.79E+06 | 6.47±+06 | 2.295+00 | 1./2E+00 | 1.035700 | | 00.10.11 |
| Checking | | | | 1 | | | | _ | O OEL TOO |
| Factored Moment due to External Loads | Mu | N.mm | 1.25E+08 | | | 5.77E+U9 | | 8.80E+U9 | 0.001109 |
| Factored Axial Force due to External Loads | Nu | z | 6.37E+05 | | | 0.001:400 | | | |
| Factored Shear Force due to External Loads | νu | z | 1.17E+06 | 1.09E+06 | 8.02E+05 | 7.0/E+05 | c0+362.c | c0+3cc.2 | |
| | | | · | | | | | | |

| | / | Unit | Section 8 | Section 9 | Section 10 | Section 11 | Section 12 | Section 13 |
|---|------------|-------------|------------|-----------|------------|------------|-------------|------------|
| Certional Properties | | | | | | | | |
| Douth of Girder | H | E E E | 2,060 | 2;060 | 2,060 | | 2,060 | 2,060 |
| Width of Deck Slan | pq | шш | 2,035 | 2,035 | 2,035 | 2 | 650 | 650 |
| Thush of Dork Clan | Pq | mm | 210 | 210 | 210 | 210 | 210 | 2,035 |
| Lepul VI Dech Jidy Tatal width of Wohe | hw | mm | 200 | 200 | 200 | 200 | 580 | 650 |
| 10tal widul 01 Webs Width of Soffit Slan | şq | шш | 650 | 650 | . 650 | 650 | 650 | 650 |
| Depth of Soffit Slap | hs | mm | 250 | 250 | 250 | 250 | 250 | 250 |
| | | | | | | | | |
| Total Area of Prestressing Cables | Ap | mm2 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 | 5,923 |
| Distance from extreme compressive fibre to centroid of | 1 | | 1 887 | 1 762 | 1 647 | 1.580 | 800 | 879 |
| Prestressing Cables | d d | | 0 /00/T | | | | C | |
| Area of Tensile Reinforcement | Ast | 7mm | | . | | | | |
| Distance from extreme compressive fibre to centroid of Tensile Reinforcement | dst | | 0 | 0 | 0 | 0 | 2,060 | 2,060 |
| A rea of Comressive Reinforcement | Asc | mm2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Distance from extreme compressive fibre to centroid of | | | | | | | | |
| Commessive Reinforcement | dsc | шш | 0 | 0 | 0 | 0 | 2,060 | 2,060 |
| Calculation of Mr | | | | | | | | |
| Effective shear Denth | dv | um | 1,483 | 1,483 | 1,483 | Ľ, | 1, | 1 |
| Effective web width | hv | шш | 200 | 200 | | 200 | 580 | |
| Smarino of stirruns | s | mm2 | 300 | 150 | 150 | 150 | 150 | 150 |
| Angle of inclination of transverse reinforcement to | | | | | , | Ş | ç | 2 |
| longitudinal axis of girder | ø | degree | 6 | 90 | 96 | ₽ | 3 | 3 |
| Factor indicating ability of diagonally cracked concrete | c | | Ж | 2 | x Y | 84 | 60 | 5.7 |
| to transmit tension | ۹. | | 1.0 | 20.0 | 2 | | 516 | |
| Area of shear reinf. within a distances | Av | Zuuu | 308 | 010 | - 1 | | 010 | 0000 |
| Strain in the tensile reinforcement | X3 | | -0.000063 | -0.000163 | -0.000233 | 997/0///- | -0.00100 | |
| Inclination angle of diagonal compressive stress | θ | degree | 27.00 | 27.00 | 27.00 | 00.72 | M. /2 | M. /2 |
| Component of effective pretressed force in the direction | | | | | | | | 2072702 |
| of the applied shear | ٩V | z | 7.94E+04 | Z.46E+U3 | 1 | | 0.001-000.0 | |
| Nominal Resistance of Concrete | Vc | z | 8.33E+05 | 9.85E+U5 | | | 2./1E+U0 | |
| Nominal Resistance of Reinforcement | ۲s | z | 1.17E+06 | 4.66E+06 | 1 | | <u> </u> | |
| Nominal Resistance | νn | z | 2.08E+06 | 3.21E+06 | ς Μ | ത് | ~ | <u>~</u> |
| Resistance factor for shear | Ð | | 0.9 | 0.9 | | 1 | | <u> </u> |
| Factored Resistance | ٧r | Z | 1.87E+06 | 2.89E+06 | 2.99E+06 | 3.05E+06 | 7.08E+06 | 7.28E+U6 |
| hecking | | | | | | | | 1 |
| Factored Moment due to External Loads | Мu | N.mm | 8.22E+09 | | | | | |
| Factored Axial Force due to External Loads | nN | z | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | | | | | | | 1 | 1 |

Checking Stress during construction Load Combinations for Checking Stress during

| 114 Factor | 1.00 | 1.00 | | | | 1.00 | M(T.m) | | 0.00 to 17 | -38.74 | -38.79 | -39.88 | -22.73 | 1.87 | -22.73 | -39.88 | -38.79 | -38.74 | -40.47 | 0.00 |
|---|---------------------|------------------------|--|---|------|--------------|---------|---|------------------|--------|--------|--------|--------|--------|-------------|--------|--------|--------|--------|--------|
| در المحمد ال المحمد المحمد | eight G_DC | fweight 5_D | | ÷ | | | V(T) | | 3.7U | -2.44 | 0.41 | 3.37 | 4.54 | 0.00 | 1 51 | -3.37 | 11.0- | 2.44 | -3.35 | -3.70 |
| CON | Girder Selfweight G | Slab+Dia. Selfweight S | | | | Prostress PS | N(T) | | 77.550 623.00 | 644.24 | 653.03 | 661.26 | 661.23 | 656.44 | 661.23 | 661.26 | 653.03 | 641.24 | 633.99 | 633.99 |
| | | | | | | | Section | (| | SEC-3 | SEC-4 | SEC-5 | SEC-6 | SEC-7 | SEC-8 | SEC-9 | SEC-10 | SEC-11 | SEC-12 | SEC-13 |

Stress checking during construction stage (AASHTO 5.9.4.2)

| Section | | COMBINATION 14 | TION 14 | |
|---------|-------------------|-----------------------|-----------------------|----------|
| - | $\sigma_t(T/m^2)$ | Checking | σ _h (T/m²) | Checking |
| | | | | |
| SEC-1 | 512.28 | OK | 512.28 | оK |
| SEC-2 | 448.35 | oK | 91-1-99 | оK |
| SEC-3 | 816.99 | OK NO | 1062.95 | Хo |
| SEC-4 | 829.94 | OK | 1075.49 | ЮК |
| SEC-5 | 839.05 | OK | 1090.00 | ОК |
| SEC-6 | 893.84 | оĶ | 1035.68 | ОK |
| SEC-7 | 973.71 | УÓ | 943.32 | 0K |
| SEC-8 | 893.84 | ОĶ | 1035.68 | бĶ |
| SEC-9 | 839.05 | ЮК | 1090.00 | Х Х |
| SEC-10 | 829.94 | Хŏ | 1075.49 | ОK |
| SEC-11 | 816.99 | о Хо | 1062.95 | оқ |
| SEC-12 | 448.35 | ð | 91-1-99 | ОĶ |
| SEC-13 | 512.28 | ð | 512.28 | 0K |

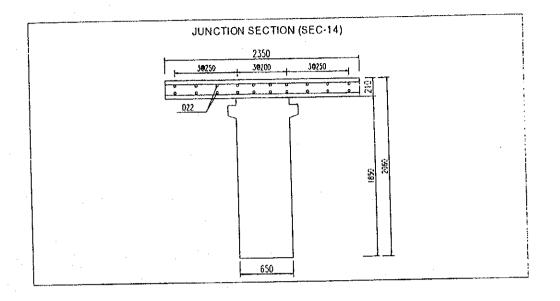
Checking Stress at service stage Load Combinations for Checking Stress at service stage

| | | COMBINATION 11 | 111 | CON | COMBINATION 12 | 112 | COM | COMBINATION 13 | 113 |
|---------|--------------------------|----------------|--------|--------------------------|----------------|---------|--------------------------|----------------|--------|
| | Load type | type | Factor | Load type | type | Factor | Load type | type | Factor |
| - | Girder Selfweight G_DC | ight C_DC | 1.00 | Girder Selfweight G_DC | ight C_DC | 1.00 | Girder Selfweight G_DC | ight G_DC | 1.00 |
| | Slab+Dia. Selfweight S_D | weight S_D | 1.00 | Slah+Dia. Selfweight S_D | weight S_D | 1.00 | Slab+Dia. Selfweight S_D | weight S_D | 1.00 |
| | Surface + Railings DW | ings DW | 1.00 | Surface + Railings DW | ings DW | 1.00 | Surface + Railings DW | ings DW | 1.00 |
| ÷., | Max. Live Load LL MAX | d LL MAX | 0.80 | Max. Live Load LL_MAX | Id LL_MAX | 0.00 | Max. Live Load LL_MAX | Id LL_MAX | 0.00 |
| • | Min. Live Load LL_MIN | | 0.00 | Min. Live Load LL_MIN | d LL_MIN | 0.80 | Min. Live Load LL_MIN | d LL_MIN | 0.00 |
| | Max. Impact IM_MAX | M_MAX | 0.80 | Max. Impact IM_MAX | M_MAX | 0.00 | Max. Impact IM_MAX | M_MAX | 0.00 |
| | Min. Impact IM_MIN | MIN | 0.00 | Min. Impact IM_MIN | MIN | 0.80 | Min. Impact IM_MIN | MIM_M | 0.00 |
| | Creep Diff. CR_D | R D | 1.00 | Creep Diff. CR_D | 20. | 1.00 | Creep Diff. CR_D | 27 | 1.00 |
| | Shrinkage Diff. SH_D | r sh_D | 1.00 | Shrinkage Diff. SH_D | f. SH_D | 1.00 | Shrinkage Diff. SH_D | f. SH_D | 1.00 |
| | Temperature Diff. TG | Diff. TG | 0.50 | Temperature Diff. TG | Diff. TG | 0.50 | Temperature Diff. TG | Diff. TG | 1.00 |
| | Creen CR | | 1.00 | Creep CR | | 1.00 | Creep CR | | 1.00 |
| | Prestress PS | | 1.00 | Prestress PS | | 1.00 | Prestress PS | | 1.00 |
| Saction | LUN | | M(T.m) | (T)N | V(T) | M(T.m) | N(T) | V(T) | M(T.m) |
| | | | | | | | | | |
| SEC-1 | 766.13 | 28.67 | 16.87 | 766.13 | 17.37 | 11.11 | 770.93 | 18.22 | 11.45 |
| SEC-2 | 19.167 | 26.57 | 1-2-6- | 131.64 | 15.68 | -17.72 | 739.30 | 16.53 | -16.59 |
| SEC-3 | 597.59 | 11.91 | 52.29 | 597.59 | 2.18 | 8.54 | FF 109 | 3.79 | 12.66 |
| SEC-4 | 580.08 | 13.93 | 63.55 | 580.08 | 2.77 | 11.44 | 583.93 | 5.29 | 16.57 |
| SEC-5 | 542.35 | 11.97 | 78.42 | 542.35 | 0.83 | 10.13 | 546.21 | 1.36 | f2'21 |
| SEC-6 | 188.87 | 9.35 | 119.82 | 188.87 | 0.66 | 38.79 | 192.74 | 4.81 | t9.73 |
| SEC-7 | 475.48 | -2.29 | 135.06 | 475.48 | -11.37 | 51.84 | HE-674 | -5.67 | 65.64 |
| SEC-8 | 188.87 | -6.41 | 90.83 | 188.87 | -16.83 | 19.04 | 192.71 | -8.73 | 34.71 |
| SEC-9 | 542.35 | -14.05 | 17.62 | 542.35 | -24.91 | -35.54 | 546.21 | -15.23 | -16.12 |
| SEC-10 | 580.08 | -7.90 | -7.32 | 580.08 | -22.18 | -53,91 | 583.93 | -10.12 | -29.29 |
| SEC-11 | 597.59 | -6.70 | -20.29 | 597.59 | -21.11 | -68.01 | 601.44 | -8.69 | -38.80 |
| SEC-12 | 734.64 | -21.00 | 96°t2- | 19'167 | -35.65 | -160.84 | 739.30 | -21.95 | -92.62 |
| SEC-13 | 766.13 | -22.18 | -18.81 | 766.13 | +0°26- | -145.37 | 270.93 | -22.63 | -67.46 |
| | _ | | | | | | | | |

| (AASHTO 5.9.4.2) |
|----------------------------------|
| Stress checking at service stage |

| | | COMBIN | COMBINATION 8 | | | COMBIN | COMBINATION 9 | | | COMBIN, | </th <th></th> | |
|----------|-------------------|----------|-------------------------|----------|------------------------------------|----------|-------------------------|----------|-----------------------|----------|-----------------------|----------|
| Section | $\sigma_1(T/m^2)$ | Checking | $\sigma_{\rm b}(T/m^2)$ | Checking | σ _ι (T/m ²) | Checking | $\sigma_{\rm h}(T/m^2)$ | Checking | σ _ι (T/m²) | Checking | $\sigma_{b}(T/m^{2})$ | Checking |
| | | | | | | | | | | | | |
| SEC-1 | 175.37 | | 431.87 | 0 K | 470.17 | | 11.51 | ХÖ | 476.07 | - | 438.80 | У0 ХО |
| SEC-2 | 129.04 | - | 184.25 | 0K | 451.65 | | 81-861 | QK | 455.63 | - | 74.9017 | У ХО |
| SEC.3 | 580.51 | | 429.90 | Ŋ | 544.29 | | 519.70 | OK | 551.16 | - | 514.70 | 0K |
| SEC-4 | 574.05 | , XO | 391.35 | Ŏ | 530.93 | ОĶ | 498.05 | OK | 538.64 | QK | 491.00 | 0 X |
| SEC-5 | 552.27 | - | 327.75 | о К | 495.91 | | 466.92 | OK | 505.67 | _ | 454.86 | OK |
| SEC-6 | 538.01 | | 196.74 | 9 K | 471.38 | | 360.89 | OK | 483.85 | | 342.22 | 0K |
| SEC-7 | 1085.36 | - | 700.89 | УO | 679.98 | - | 532.40 | У К | 750.66 | - | 563.81 | 0 X |
| SFC.8 | 51.17 | - | 255.49 | ÖK | 455.13 | | 400.92 | OK | 471.50 | _ | 372.65 | о ЖО |
| CHC P | 502.10 | - | 451.65 | Š | 458.23 | | 559.97 | ОĶ | 477.72 | _ | 523.88 | 0K |
| SEC-10 | 515 11 | - | 536.46 | УÓ | 476.86 | - | 631.84 | ОК | 500.69 | - | 584.90 | 0K |
| SEC.11 | 520.41 | - | 578.86 | ОK | 480.88 | | 676.79 | QK | 508.54 | Ξ. | 620.31 | ОK |
| SEC-12 | 399.92 | - | 598.04 | УÓ | 322.31 | o¥0 | 14.747 | OK | 386.93 | ð | 631.71 | о Х |
| SEC-13 | 416.04 | - | 541.92 | УÓ | 328.81 | ХÓ | 703.73 | Х Х | 402.07 | • | 576.06 | 0K |
| | | | | | | | | | | | | |

Stress Check at Junction of the Girders



| Moment due to Service Loa | ad M= | 145.4 tf.m | |
|---------------------------|-----------|-------------------------|---------------|
| Tensile Reinforcement As= | =2xD22(No | os=2x10=20) | 1005 E 1 /7 |
| Stress of Concrete | fcj= | $159.4 \text{ t/m}^2 <$ | 1835.5 t/m2 |
| Stress of Tensile Reinf. | fs= | -816.5 t/m2 > | -17896.1 t/m2 |

| Horizontal Shear per unit length of girder V _h due to Vertical Shear Distance from the centroid of tensile steel to the midthickness of th | length of gi d of tensile s | rder V _h due tecl to the n | to Vertical nidthicknes | Shear V. s of the deck | · -, | $V_{h} = V_{u}/d_{e}$ d_{e} | | | | | | | |
|---|---|---|-------------------------|---------------------------|--------------------|----------------------------------|-------------------------------|----------------------|---------------------|---------------|--------------------|--------------|-------------|
| Kequired area of reinforcement: $A_{a'} >= \max \{0.35 b_v / t_y; (V_h - c b_v - \mu P_c) / \mu t_y\}$ Width of the interface between the girder and the deck: Yield strength of reinforcement | emenu. 35 bv / fy; (V _h - ween the gu ement | - с b _v - µ P _c) / rder and the | μty) edeck: | | | ه الم مرکب الم | 600 mm 390 MPa 0.17 MPa | nm ViPa ViPa | | | | | |
| Cohesion factor Friction factor Permanent net compressive force normal to the shear plan | ve force norr | nal to the sl | iear plan | | - | 1 11 11 2 | 0.7 58750 N | 7 | | | | | |
| Section | SEC-1 | SEC-2 | SEC-3 | SEC-4 | SEC-5 | SEC-6 | SEC-7 | SEC-8 | SEC-9 | SEC-10 | SEC-11 | SEC-12 | SEC-13 |
| գ. (տու) | 1076 | 1155 | 1475 | 1542 | 1657 | 1782 | 1793 | 1782 | 1657 | 1542 | 1475 | 1155 | 1076 |
| Interface Shcar(N): | 1017 | 310012 | 030010 | T29016 | 145110 | 73982 | 0 | -73982 | -165110 | -210674 | -239289 | -320848 | -3-49173 |
| Girder Selfweight G_UC | | | 153657 | 139138 | | 48396 | 0 | -18396 | -108891- | -139138 | -153657 | -207799 | -218990 |
| State + Dia. Seriver Build - D | | | 53097 | 39796 | | -5341 | -64779 | -51323 | -125929 | -104385 | -122656 | -187797 | -201881 |
| Max. Live Load LL_MAX | | 92551 | 74826 | 79660 | 70061 | 41824 | 31107 | 21337 | 10855 | 20465 | 18301 | 13409 | 133// |
| Min. Live Load LL_MIN | | -7885 | -14884 | -23194 | | -38268 | -52533 | -74715 | -89260 | 111124 | 60241 I- | 12125 | 710C71- |
| Max. Impact IM_MAX | 31792 | 30542 | 24692 | 26288 | | 128021 | 50701 | 1HU/ | 2000 | -36671 | -37788 | 10154 | F620F- |
| Min. Impact IM_MIN | -2582 | -2602 | -1912 55108.1 | 1-C01-01 | 10/01- | -1784325 | -1868829 | -1784325 | -1259938 | -809192 | -551084 | 873859 | 1179148 |
| | 66677 | 67595 | 55911 | 22672 | 56043 | 56195 | 56210 | 56195 | 56043 | 21655 | 55911 | 67595 | 69672 |
| | 9,0058 | 91253 | 75480 | 75529 | | 75863 | 75884 | 75863 | 75659 | 75529 | 75480 | 91 253 | 94058 |
| | 7009 | | 8030 | 8034 | 8036 | 8035 | 9181 | 10279 | 9654 | 9162 | 13526 | 914- | -3326 |
| Total | 2181500 | 1813719 | 133897 | -174125 | -751287 | -1471570 | -1750961 | -1787311 | -1504075 | -1095532 | -897429 | 329681 | 587298 |
| | 2042961 | 1680139 | 14584 | -310920 | -887840 | -1578093 | -1862203 | -1915060 | -1637228 | -1270545 | -10/4066 | 150015 | 94050F |
| Avf required (111112) | 01-87 | 649 | 339 | 988 | 3101 | 5630 | 6670 | 6864 | 5846 | 1503 | 3783 | 1001 | 7000 |
| A of Climical (mm ²) | 3695 | 3695 | 3695 | 924 | 924 | 924 | 924 | 924 | 924 | 924 | | | 3695 |
| | (051-9-11(1) | ria) | (D14@120) | (006% HICI) | (0053FICI) | (I)(11 a/3()() | (0059 FICI) | (00£9HCI) | (00E@FICI) | (00£@±1Cl) | (Ditatio) | (D]4#150) (1 | (D14=150) |
| Area of Dowel bars (mm^2) | 6371 | 6371 | | 6371 | 6371 | 6371 | 6371 | 6.5/1 | 6.5/1 | 1700 | | | 174.0 |
| 5 | (1)24a:150) 10066 | (1)24 6(150) 10066 | (051a150) 10066 | (1)24 6 150) 7295 | (1)24@150) 7295 | (1)24@15(1) 7295 | (1)24 6 150) | (1)24 6(150) 7295 | (1)248(150) 7295 | (1)24/a/15(1) | (024#150) 10066 | 10066 | (n<1'a+7(1) |
| | | | ì | :0 | Č | ý | Ż | Š. | ž | ÖK | ý | У ХО | 0K |
| Checking | ok | OK | ň | ž | 40 | 40 | | 20 | | | | | |

Design of connetor at the interface between girder and deck slab (AASHTO 5.8.4):

Design of Deck Slab

Sumary of Bending Moment:

Bending Moment due to Live Load:

| (a) Continuous Slab 1) Effective Span Length 2) Load 3) Impact Factor IM 4) Positive Moment 5) Negative Moment | 1.700 m 10.000 T 33% M=0.8*(1+1M) M=-(1+1M)*(0. | - | | ſ.m/m ſ.m/m |
|---|---|-------------------------|---------------------------------------|----------------|
| (2) Cantilever Slab 1) Effective Span Length 2) Load 3) Impact Factor IM 4) Negative Moment | 0.100 m 10.000 T 33% | < 0.5m> ig M= | | T.m/m |
| <i>Bending Moment due to Self</i> Section Bending Moment (T.m) | <i>weight of Slat</i> A -0.152 | в 0.152 | C -0.150 | |
| Bending Moment due to Asp Section Bending Moment (T.m) | A | B 0.050 | C -0.030 | |
| <i>Bending Moment due to Par</i> Section Bending Moment (T.m) | apet & Railing A 0.000 | s: B 0.000 | C -0.424 | |
| 500 | | 11750 | · · · · · · · · · · · · · · · · · · · | 500 |
| | | 10750 | <u>.</u> | Ĵ. |
| | | | | |
| 1175 | 4 @ | 2350 = 9400 11750 | | 1175 |

II-2-42

| (OTHSA. |
|-------------------|
| cle 5.7.3.2.2 A |
| c Slab (Arti |
| gth of Decl |
| xural Stren |
| Jominal Fle |
| Checking N |

| | | | Section A | Section B | Section C |
|----------------------|---|-----------------|----------------------|-----------------------|----------------------|
| Sectional Properties | S | | | | |
| | Depth of Slab | н | 210 mm | 210 mm | 210 mm |
| | Width of Slab | ds | 1000 mm | 1000 mm | 1000 mm |
| | | | | | |
| | Area of Tensile Reinforcement | A _{st} | 1885 mm ² | 1885 mm ² | 1885 mm ² |
| | Distance from extreme compressive fibre to centroid of Tensile Reinforcement | d" | 162 mm | 162 mm | 162 mm |
| · | Area of Compressive Reinforcement | Asc | 0 mm ² | 0 mm^2 | $0 \mathrm{mm}^2$ |
| | Distance from extreme compressive fibre | | | | |
| | to centroid of Compressive Reinforcement d_{sc} | d _{st} | 48 mm | 48 mm | 48 mm |
| Calculation of Mr | Stress block factor | ß, | 0.76 | 0.76 | 0.76 |
| | Distance from extreme compressive fibre | | | | |
| | to the Neutral Axis | υ | 28 mm | 28 mm | 28 mm |
| | Depth of equivalent stress block | a | 22 mm | 22 mm | 22 mm |
| | Nominal Resistance | Mn | 111,144,141 N.mm | 111,144,141 N.mm | 111,144,141 N.mm |
| | Flexural Resistance factor | q | 0.9 | 0.9 | 0.9 |
| | Factored Resistance | Mr | 100,029,726 N.mm | 100,029,726 N.unu | 100,029,726 N.mm |
| Checking | Factored Bending Moment due to | | | | |
| 9 | External Loads | Mu | 91,089,350 N.mm | 53,663,150 N.mm OK | 7,617,528 N.mm OK |