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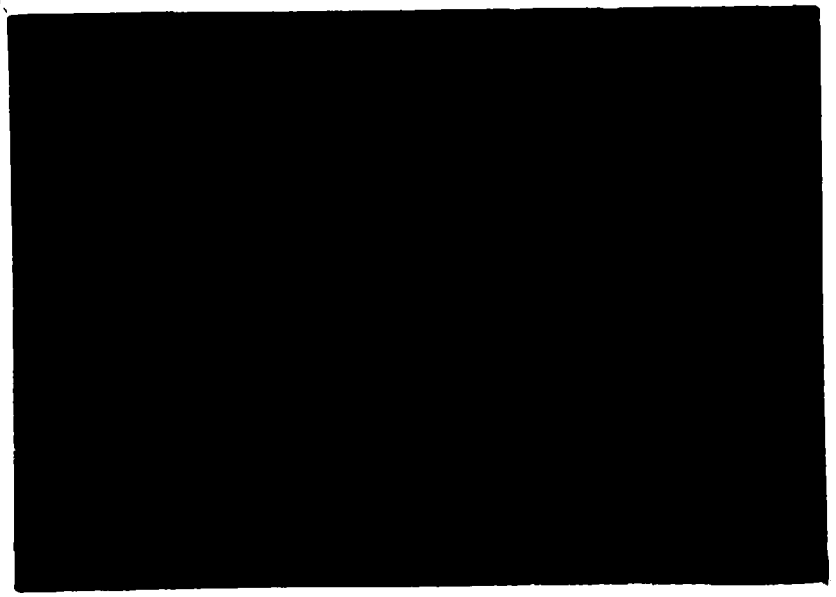

GUIDEWAY STRUCTURAL DESIGN AND POWER/PROPULSION/BRAKING IN RELATION TO GUIDEWAYS

APPENDIX A

FINAL REPORT

JANUARY 1993

GUIDEWAY STRUCTURAL DESIGN AND POWER/PROPULSION/BRAKING IN RELATION TO GUIDEWAYS

FINAL REPORT

APPENDIX A

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APPENDIX A

FINAL REPORT

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Appendix A-1

Supporting Equations for Section 1.4 Levitation System Design

Induced voltage in m^{th} track loop using constant-flux magnets:

$$e_m(x) = -v_x I_f \frac{d M_{mf}}{dx} - L_{ff} \frac{v_x}{dx} \left(\sum_j M_{jf} i_j\right)$$

$$- v_x L_{ff} \left(\Sigma\, i_j \frac{M_{mf}}{dx} \frac{dM_{jf}}{dx}\right)$$

$$- v_x L_{ff} \left(\Sigma\, M_{jf} \frac{M_{mf}}{dx} \frac{d\, i_j}{dx}\right)$$

$$L \overset{o}{i} + Ri = e_o + \overset{o}{M} M^T i + M \overset{o}{(M)}^T i + M M^T \overset{o}{i}$$

$$[L - M M^T] \overset{o}{i} + [R - \overset{o}{M} M^T - M\overset{o}{(M)}^T] i = e_o$$

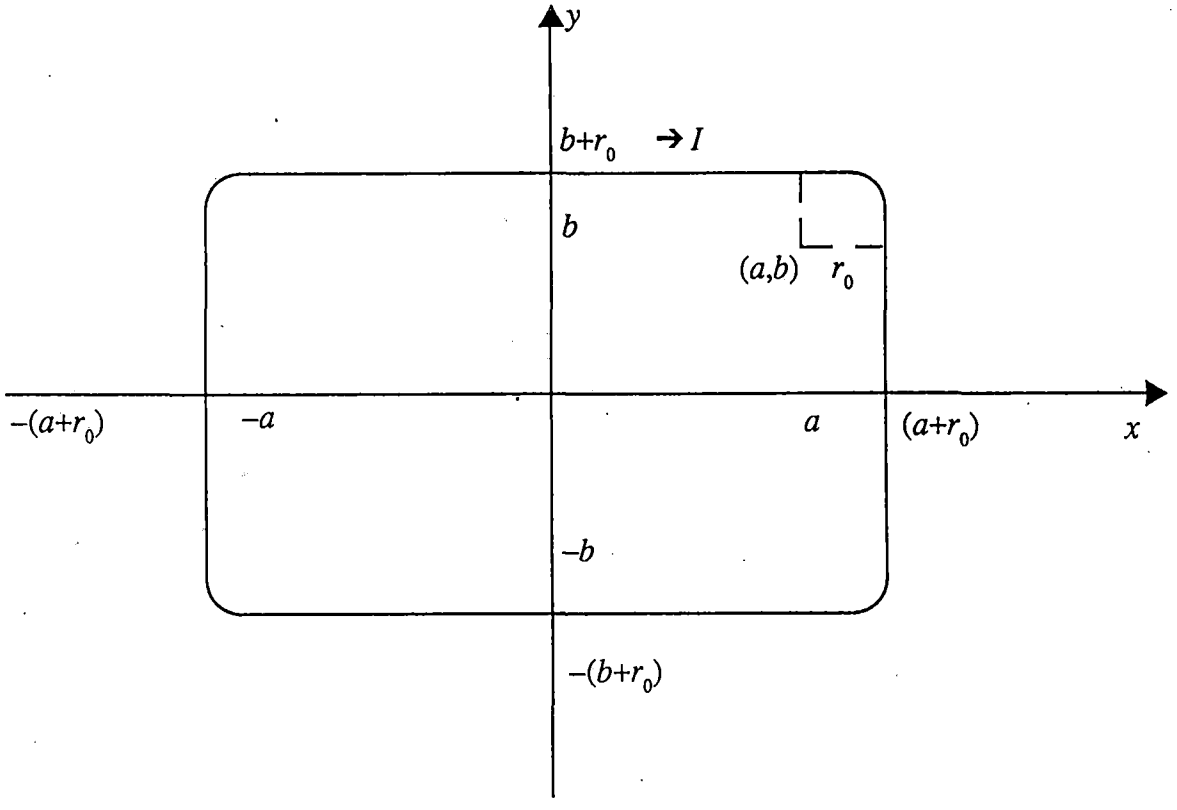
$$\overset{o}{i} = -[L - M M^T]^{-1} [R - \overset{o}{M} M^T - M\overset{o}{(M)}^T] i + [L - M M^T]^{-1} e_o$$

where

$$M = \sqrt{\frac{v_x}{L_{ff}}} \begin{bmatrix} L_{1f} \\ L_{2f} \\ \vdots \\ L_{nf} \end{bmatrix}$$

$$\overset{o}{M} = \sqrt{\frac{v_x}{L_{ff}}} \times \frac{d}{dx} \begin{bmatrix} L_{1f} \\ L_{2f} \\ \vdots \\ L_{nf} \end{bmatrix}$$

L_{nf} = mutual inductance of the n^{th} ladder loop and vehicle magnet

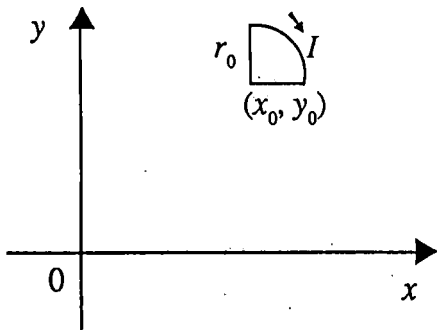


Racetrack coil (definiton)
Figure 2-1

$$\vec{B} = \frac{\mu_0 I}{4\pi}\int_l \frac{d\vec{s}\times\vec{R}}{R^3}$$

$$\xi = x_0 + r_0\cos\theta$$
$$\eta = y_0 + r\sin\theta$$
$$d\xi = -r_0\sin\theta d\theta$$
$$d\eta = T_0 + \cos\theta d\theta$$

$0 \le \theta \le 90°$



$$\vec{r} = x\vec{x} + y\vec{y} + z\vec{z}$$
$$\vec{r}_1 = \xi\vec{x} + \eta\vec{y}$$
$$\vec{R} = \vec{r} - \vec{r}_1$$
$$d\vec{s} = d\xi\vec{x} + d\eta\vec{y} \qquad d\vec{s}\times\vec{R} = zd\eta\vec{x} - zd\xi\vec{y} + \left[(yd\xi - xd\eta) + (\xi d\eta - \eta d\xi)\right]\vec{z}$$

$$B_x = -\frac{\mu_0 Iz}{4\pi}\int_0^{\pi/2} \frac{r_0\cos\theta d\theta}{\left\{\left[(x-x_0) - r_0\cos\theta\right]^2 + \left[(y-y_0) - r_0\sin\theta\right]^2 + z^2\right\}^{3/2}}$$

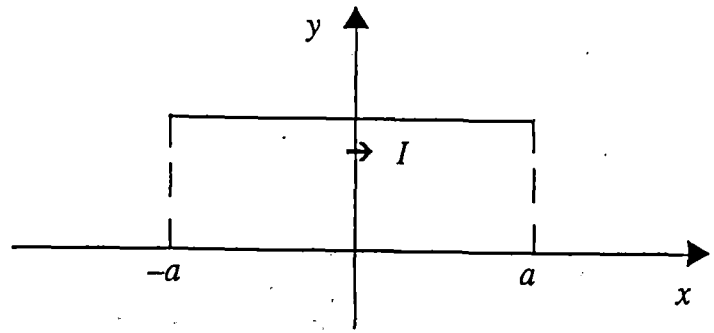
$$B_y = -\frac{\mu_0 Iz}{4\pi}\int_0^{\pi/2} \frac{r_0\sin\theta d\theta}{\left\{\left[(x-x_0) - r_0\cos\theta\right]^2 + \left[(y-y_0) - r_0\sin\theta\right]^2 + z^2\right\}^{3/2}}$$

$$B_z = -\frac{\mu_0 r_0}{4\pi}\int_0^{\pi/2} \frac{(x-x_0)\cos\theta d\theta + (y-y_0)\sin\theta d\theta + r_0 d\theta}{\left\{\left[(x-x_0) - r_0\cos\theta\right]^2 + \left[(y-y_0) - r_0\sin\theta\right]^2 + z^2\right\}^{3/2}}$$

Formulae for magnetic field calculations for racetrack coil defined on Figure 2-1

Figure 2-2

$$\vec{B} = \frac{\mu_0 I}{4\pi} \int_l \frac{d\vec{s} \times \vec{R}}{R^3}$$



$$\vec{r}_s = t\vec{x} + b\vec{y}$$

$$\vec{r} = x\vec{x} + y\vec{y} + z\vec{z}$$

$$\vec{R} = \vec{r} - \vec{r}_s = (x-t)\vec{x} + (y-b)\vec{y} + z\vec{z}$$

$$R = \left[(x-t)^2 + (y-b)^2 + z^2\right]^{\frac{1}{2}}$$

$$d\vec{s} = dt\vec{x}, \quad d\vec{s} \times \vec{R} = -z\,dt\vec{y} + (y-b)\,dt\vec{z}$$

$$\therefore \qquad B_x = 0, \quad B_y = \frac{\mu_0 I z}{4\pi} \int_{-a}^{a} \frac{dt}{R^3}, \quad B_z = \frac{\mu_0 I (y-b)}{4\pi} \int_{-a}^{a} \frac{dt}{R^3}$$

$$B_x = 0$$

$$B_y = \frac{\mu_0 I z}{4\pi} \left(\frac{a-x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} + \frac{a+x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} \right) \qquad A^2 = (y-b)^2 + z^2$$

$$B_z = \frac{\mu_0 I (y-b)}{4\pi} \left(\frac{a-x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} + \frac{a+x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} \right)$$

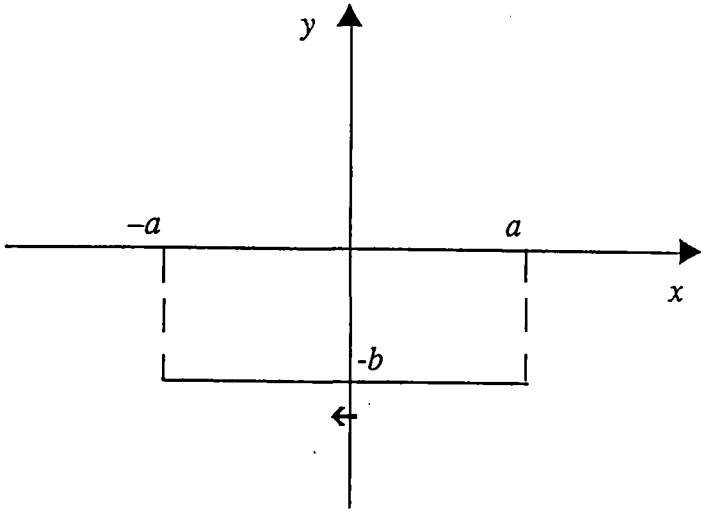
Formulae for magnetic field calculations for racetrack coil defined on Figure 2-1

Figure 2-3

$$B_x = 0$$

$$B_y = \frac{\mu_0 I z}{4\pi} \int_{-a}^{a} \frac{dt}{\left[(x-t)^2 + (y+b)^2 + z^2\right]^{3/2}}$$

$$B_z = \frac{\mu_0 I (y+b)}{4\pi} \int_{-a}^{a} \frac{dt}{\left[(x-t)^2 + (y+b)^2 + z^2\right]^{3/2}}$$



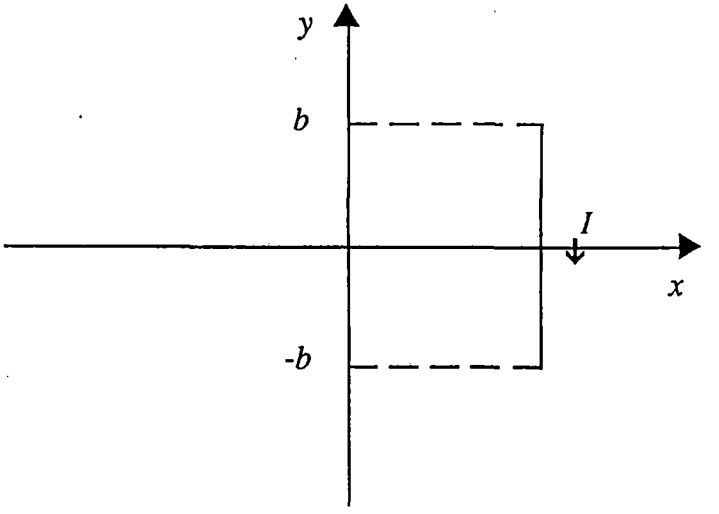
$$B_x = 0$$

$$B_y = \frac{\mu_0 I z}{4\pi} \left(\frac{a-x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} + \frac{a+x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} \right) \quad A^2 = (y-b)^2 + z^2$$

$$B_z = \frac{\mu_0 I (y+b)}{4\pi} \left(\frac{a-x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} + \frac{a+x}{A^2\left[(a-x)^2 + A^2\right]^{\frac{1}{2}}} \right)$$

Formulae for magnetic field calculations for racetrack coil defined on Figure 2-1

Figure 2-4



$$B_y = 0$$

$$B_x = \frac{\mu_0 I z}{4\pi} \int_{-b}^{b} \frac{dt}{\left[(x-a)^2 + (y-t)^2 + z^2\right]^{3/2}}$$

$$B_z = \frac{\mu_0 I (x-a)}{4\pi} \int_{-b}^{b} \frac{dt}{\left[(x-a)^2 + (y-t)^2 + z^2\right]^{3/2}}$$

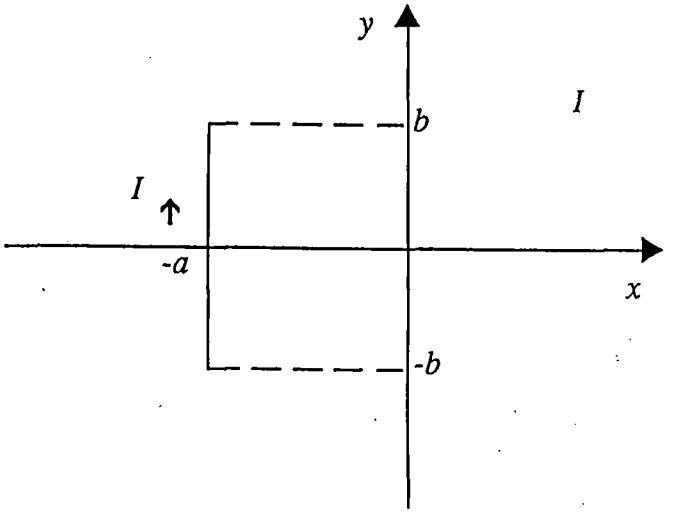
$$B_y = 0$$

$$B_y = \frac{\mu_0 I z}{4\pi}\left(\frac{b-y}{A^2\left[(y-b)^2 + A^2\right]^{\frac{1}{2}}} + \frac{b+y}{A^2\left[(y-b)^2 + A^2\right]^{\frac{1}{2}}}\right) \qquad A^2 = (x-a)^2 + z^2$$

$$B_z = \frac{\mu_0 I (x-a)}{4\pi}\left(\frac{b-y}{A^2\left[(y-b)^2 + A^2\right]^{\frac{1}{2}}} + \frac{b+y}{A^2\left[(y-b)^2 + A^2\right]^{\frac{1}{2}}}\right)$$

Formulae for magnetic field calculations for racetrack coil defined on Figure 2-1

Figure 2-5



$$B_y = 0$$

$$B_x = \frac{\mu_0 I z}{4\pi} \int_{-b}^{b} \frac{dt}{\left[(x-a)^2 + (y-t)^2 + z^2\right]^{3/2}}$$

$$B_z = \frac{\mu_0 I (x+a)}{4\pi} \int_{-b}^{b} \frac{dt}{\left[(x+a)^2 + (y-t)^2 + z^2\right]^{3/2}}$$

$$B_y = 0$$

$$B_y = \frac{\mu_0 I z}{4\pi} \left(\frac{y-b}{A^2\left[(y-b)^2 + A^2\right]^{\frac{1}{2}}} + \frac{y+b}{A^2\left[(y+b)^2 + A^2\right]^{\frac{1}{2}}} \right) \quad A^2 = (x+a)^2 + z^2$$

$$B_z = \frac{\mu_0 I (x+a)}{4\pi} \left(\frac{y-b}{A^2\left[(y-b)^2 + A^2\right]^{\frac{1}{2}}} + \frac{y+b}{A^2\left[(y+b)^2 + A^2\right]^{\frac{1}{2}}} \right)$$

Formulae for magnetic field calculations for racetrack coil defined on Figure 2-1

Figure 2-6

Basic Formula

$$\vec{F} = \frac{\mu_o I_1 I_2}{4\pi} \oint_{l_s} \oint_{l} \frac{d\vec{S}_1 \left(\vec{r} \times d\vec{S}_2 \right)}{r^3}$$

$\vec{F} = (Fx, Fy, Fz)$

Fy: the propulsion force,

Fx: the guidance force,

Fz: the levitation force.

An algorithm computing propulsion force for LSM

Figure 2-7

$$Pf_1(I_1,I_2)=\frac{\mu_0 I_1 I_2}{4\pi}\begin{cases}-[y_o+r_c-4(i+1/4-j/24)\omega]\int_{-l}^{l}\int_{-h}^{h}\dfrac{dx_1dx_2}{\left\{(x_1-x_2)^2+(y_o+r_c-4(i+1/4-j/12)\omega)^2+z_o^2\right\}^{3/2}}\\ [y_o+r_c-4(i-1/4-j/24)\omega]\int_{-l}^{l}\int_{-h}^{h}\dfrac{dx_1dx_2}{\left\{(x_1-x_2)^2+(y_o+r_c-4(i-1/4-j/12)\omega)^2+z_o^2\right\}^{3/2}}\\ -\int_{-l}^{l}\int_{4(i-1/4-j/12)\omega}^{4(i+1/4-j/12)\omega}\dfrac{(x_1-h)dx_1dy_2}{\left\{(x_1-h)^2+(y_o+r_c-y_2)^2+z_o^2\right\}^{3/2}}\\ -\int_{-l}^{l}\int_{4(i+1/4-j/12)\omega}^{4(i+3/4-j/12)\omega}\dfrac{(x_1+h)dx_1dy_2}{\left\{(x_1+h)^2+(y_o+r_c-y_2)^2+z_o^2\right\}^{3/2}}\end{cases}$$

An algorithm computing propulsion force for LSM

Figure 2-8

$$Pf_2(I_1,I_2)=\frac{\mu_0 I_1 I_2}{4\pi}\left\{\begin{array}{l}+\left[y_o+r_c-4(i+1/4-j/24)\omega\right]\int_{-l}^{l}\int_{-h}^{h}\dfrac{dx_1dx_2}{\left\{(x_1-x_2)^2+\left(y_o-r_c-4(i+1/4-j/12)\omega\right)^2+z_o^2\right\}^{3/2}}\\ -\left[y_o-r_c-4(i-1/4-j/24)\omega\right]\int_{-l}^{l}\int_{-h}^{h}\dfrac{dx_1dx_2}{\left\{(x_1-x_2)^2+\left(y_o-r_c-4(i-1/4-j/12)\omega\right)^2+z_o^2\right\}^{3/2}}\\ \int_{-l}^{l}\int_{4(i-1/4-j/12)\omega}^{4(i+1/4-j/12)\omega}\dfrac{(x_1-h)dx_1dy_2}{\left\{(x_1-h)^2+\left(y_o-r_c-y_2\right)^2+z_o^2\right\}^{3/2}}\\ -\int_{-l}^{l}\int_{4(i+1/4-j/12)\omega}^{4(i+3/4-j/12)\omega}\dfrac{(x_1+h)dx_1dy_2}{\left\{(x_1+h)^2+\left(y_o-r_c-y_2\right)^2+z_o^2\right\}^{3/2}}\end{array}\right.$$

An algorithm computing propulsion force for LSM

Figure 2-9

$$Pf_3(I_1,I_2)=\frac{\mu_0 I_1 I_2}{4\pi}\left\{\begin{array}{l}
-\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\int_{-h}^{h}\dfrac{r_c\sin\alpha\left(r_c\sin\alpha+y_o-4(i+1/4-j/24)\omega\right)d\alpha dx}{\left\{\left(r_c\omega s\alpha+l-x\right)^2+\left(r_c\sin\alpha+y_o-4(i+1/4-j/12)\omega\right)^2+z_o^2\right\}^{3/2}} \\
\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\int_{-h}^{h}\dfrac{r_c\sin\alpha\left(r_c\sin\alpha+y_o-4(i-1/4-j/24)\omega\right)d\alpha dx}{\left\{\left(r_c\omega s\alpha+l-x\right)^2+\left(r_c\sin\alpha+y_o-4(i-1/4-j/12)\omega\right)^2+z_o^2\right\}^{3/2}} \\
-\int_{-\frac{\pi}{2}}^{\pi}\int_{4(i-1/4-j/12)\omega}^{4(i+1/4-j/12)\omega}\dfrac{r_c\sin\alpha\left(r_c\cos\alpha+l-h\right)d\alpha dy}{\left\{\left(r_c\omega s\alpha+l-h\right)^2+\left(r_c\sin\alpha+y_o-y\right)^2+z_o^2\right\}^{3/2}} \\
-\int_{-\frac{\pi}{2}}^{\pi}\int_{4(i+1/4-j/12)\omega}^{4(i+3/4-j/12)\omega}\dfrac{r_c\sin\alpha\left(r_c\cos\alpha+l+h\right)d\alpha dy}{\left\{\left(r_c\omega s\alpha+l+h\right)^2+\left(r_c\sin\alpha+y_o-y\right)^2+z_o^2\right\}^{3/2}}
\end{array}\right.$$

An algorithm computing propulsion force for LSM

Figure 2-10

$$Pf_4(I_1,I_2)=\frac{\mu_0 I_1 I_2}{4\pi}\left\{\begin{array}{l}
-\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}}\int_{-h}^{h}\dfrac{r_c\sin\alpha\left(r_c\sin\alpha+y_o-4(i+1/4-j/24)\omega\right)d\alpha dx}{\left\{\left(r_c\omega s\alpha-l-x\right)^2+\left(r_c\sin\alpha+y_o-4(i+1/4-j/12)\omega\right)^2+z_o^2\right\}^{3/2}} \\
\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}}\int_{-h}^{h}\dfrac{r_c\sin\alpha\left(r_c\sin\alpha+y_o-4(i-1/4-j/24)\omega\right)d\alpha dx}{\left\{\left(r_c\omega s\alpha-l-x\right)^2+\left(r_c\sin\alpha+y_o-4(i-1/4-j/12)\omega\right)^2+z_o^2\right\}^{3/2}} \\
-\int_{\frac{\pi}{2}}^{3\pi}\int_{4(i-1/4-j/12)\omega}^{4(i+1/4-j/12)\omega}\dfrac{r_c\sin\alpha\left(r_c\cos\alpha-l-h\right)d\alpha dy}{\left\{\left(r_c\omega s\alpha-l-h\right)^2+\left(r_c\sin\alpha+y_o-y\right)^2+z_o^2\right\}^{3/2}} \\
-\int_{\frac{\pi}{2}}^{3\pi}\int_{4(i+1/4-j/12)\omega}^{4(i+3/4-j/12)\omega}\dfrac{r_c\sin\alpha\left(r_c\cos\alpha-l+h\right)d\alpha dy}{\left\{\left(r_c\omega s\alpha-l+h\right)^2+\left(r_c\sin\alpha+y_o-y\right)^2+z_o^2\right\}^{3/2}}
\end{array}\right.$$

An algorithm computing propulsion force for LSM

Figure 2-11

The propulsion force

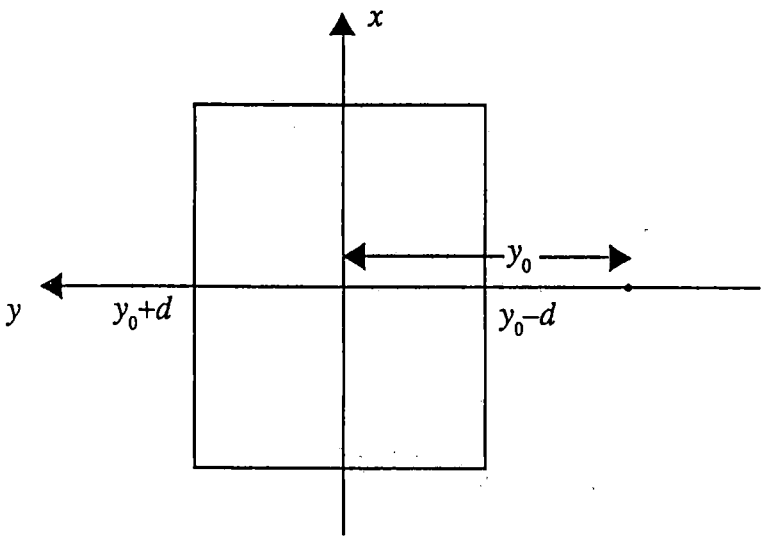
$$Pf = Pf_1 + Pf_2 + Pf_3 + Pf_4$$

For the three-phase track winding, the propulsion force

$$Pf_T = Pf(I_0, I_m) + Pf\left(I_0, I_m e^{i\pi/3}\right) + Pf\left(I_0, I_m e^{2i\pi/3}\right)$$

Propulsion force calculation for the rectangular DC coil

Figure 2-12

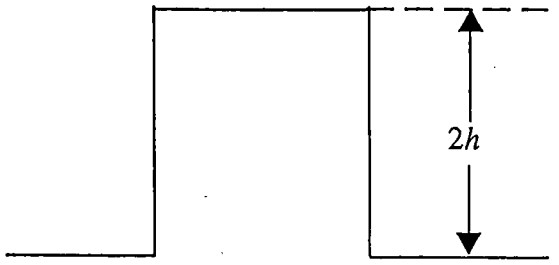


The propulsion force for a rectangular coil

$$Pf_1(I_1,I_2)=\frac{\mu_0 I_1 I_2}{4\pi}\sum_{j=-\infty}^{+\infty}\frac{y_0+d-y_j}{(y_0+d)^2+z_0^2}\left\{\left[(2h)^2+(y_0+d-y_j)^2+z_0^2\right]^{\frac{1}{2}}-\left[(y_0+d-y_j)^2+z_0^2\right]^{\frac{1}{2}}\right\}$$

$$+\sum_{j=-\infty}^{+\infty}\frac{y_0-d-y_j}{(y_0-d)^2+z_0^2}\left\{\left[(2h)^2+(y_0-d-y_j)^2+z_0^2\right]^{\frac{1}{2}}-\left[(y_0-d-y_j)^2+z_0^2\right]^{\frac{1}{2}}\right\}^{(*)}$$

$\{y_j\}$ run over the whole number ladder of the track winding.



track winding

Propulsion force calculation for the rectangular DC coil

Figure 2-13

$$Pf_2(I_1 I_2) = \frac{\mu_o I_1 I_2}{4\pi} \sum_{j=-\infty}^{+\infty} \left\{ \begin{array}{l} \left[(2h)^2 + z_0^2\right] arcsh \dfrac{y_j - y_0 + d}{\sqrt{(2h)^2 + z_0^2}} - z_0^2 arcsh \dfrac{y_j - y_0 + d}{z_0} + \left(y_j - y_0 + d\right) \\ \left(\sqrt{\left(y_j - y_0 + d\right)^2 + (2h)^2 + z_0^2} - \sqrt{\left(y_j - y_0 + d\right)^2 + z_0^2} \right) \\ + \left[(2h)^2 + z_0^2\right] arcsh \dfrac{y_j - y_0 + d}{\sqrt{(2h)^2 + z_0^2}} - z_0^2 arcsh \dfrac{y_j - y_0 - d}{z_0} + \left(y_j - y_0 - d\right) \\ \left(\sqrt{\left(y_j - y_0 - d\right)^2 + (2h)^2 + z_0^2} - \sqrt{\left(y_j - y_0 - d\right)^2 + z_0^2} \right) \end{array} \right\}$$

Propulsion force calculation for the rectangular DC coil

Figure 2-14

$$Pf(I_1, I_2) = Pf_1(I_1, I_2) + Pf_2(I_1, I_2)$$

For the three-phase track winding, the propulsion force

$$Pf_T = Pf(I_0, I_m) + Pf\left(I_0, I_m e^{i\pi/3}\right) + Pf\left(I_0, I_m e^{2i\pi/3}\right)$$

Propulsion force calculation for the rectangular DC coil

Figure 2-15

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Plenary Paper
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MULTIFILAMENTARY Bi-2223 COMPOSITE TAPES MADE BY A METALLIC PRECURSOR ROUTE

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Abstract-- A process based on metallic precursors has been developed for manufacturing high filament count oxide superconductor - silver composite tapes with critical current densities of up to 7.5 kA/cm^2 at 77 K in zero field. A 30-cm prototype multi-strand conductor made of these tapes has a critical current of 240 A at 77 K over a 9 cm gauge length, with an average critical current density of 6 kA/cm^2. The mechanical properties of tapes made from metallic precursors containing up to 10,000 Bi-2223 superconducting oxide filaments were investigated. Critical tensile strains average 0.6%, and bend tests show negligible dropoff in current density up to a 0.70% surface strain. The critical current decrease beyond the 0.70% surface bend strain follows a simple model based on extensive filament damage beyond the critical tensile strain. Increased flow stresses of the composite tapes, compared to similarly processed silver, indicate considerable strengthening of the composite by the oxide filaments.

I. INTRODUCTION

High temperature superconducting (HTS) wires and tapes are of great interest for high current applications such as power transmission cables, motors, magnets and energy storage devices (SMES). These applications will require wires or tapes with (1) high critical current densities (and currents), (2) long lengths, and (3) robust mechanical properties.

Most of the progress toward suitable HTS wires and tapes is focused on the Bi-2223 composition and the oxide-powder-in-tube (OPIT) process. In recent demonstrations of the capabilities of this technology, American Superconductor Corporation (ASC) fabricated a 19-filament composite tape with a core current density J_c (1μV/cm offset criterion [1], 77 K, self-field) of 9.0 kA/cm^2 over 62 meters [2], and Sumitomo Electric Industries fabricated a 61-filament tape with a J_c of 9.7 kA/cm^2 over 114 meters [3]. The record performance over short lengths has reached an impressive 54 kA/cm^2 at 77 K, with much higher values reported at 20 K, even in the presence of large magnetic fields [4].

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With the demonstration of such performance levels, fabrication of first-generation, HTS prototype magnets, coils and multi-strand conductors has begun. Indeed, magnet coils exceeding 1T at 4.2K have already been built [4,5] by a "wind and react" technique. In such a process, the final reaction in the tape is performed at temperatures exceeding 800 °C after the prototype is wound because limitations on the mechanical properties prevent significant handling of the tape after the final reaction. This approach has significant disadvantages, however, including the need for bulky, high-temperature resistant insulation as well as both reaction and insulation process optimization for each prototype configuration. Wind-and-react tapes are also likely to be more sensitive to subsequent mechanical and thermal cycling.

Therefore, a great deal of effort is focused on improving the mechanical properties of HTS wires and tapes (in addition to J_c) so that they allow a "react and wind" process for most applications. Data from ASC [2] and Sumitomo [6] on OPIT tapes indicates a clear improvement in bending strain tolerance with increasing filament count. A key therefore to the manufacture of the flexible and durable wires needed for a react-and-wind sequence is an economically viable process for making composites with large numbers of fine filaments. One promising alternative to OPIT for making such structures with superior mechanical properties and manufacturability is the metallic precursor (MP) method.

We have developed a process for manufacturing long-length, high filament count, superconducting oxide - metal matrix composite tapes from metallic precursors. A large number of 40 cm long tapes with average critical current densities of 6 kA/cm^2 at 77 K in zero field have been made, demonstrating the scalability of the process. A prototype multi-strand conductor made of these tapes has a critical current of 240 A at 77 K in self-field over a 9 cm measured length.

Although the feasibility of a metallic precursor process for forming HTS/Ag composites has been demonstrated for quite some time [7-17], the process had not been extended to the fabrication of multifilamentary composite tapes. Previous work has been focused on the formation of superconducting oxide - silver composites from melt spun metallic precursor ribbons in both the (rare earth)-Ba-Cu-O [7-15] and Bi-Sr-Ca-Cu-O systems [16,17]. The properties of single core, silver sheathed wires made from mechanically alloyed Y-Ba-Cu precursors have also been reported [13]. Here we report on the properties, particularly the promising mechanical properties, of high-filament count Bi-2223 oxide - silver composite tapes prepared by the metallic precursor process.

II. THE METALLIC PRECURSOR PROCESS

The process for fabricating multifilamentary oxide - metal matrix composite wires from metallic precursors is illustrated in Fig. 1. An alloy of the elements corresponding to the desired cationic HTS composition is sheathed in silver, and the tape is formed by standard deformation processing techniques. The ductility of the metallic state gives a significant advantage, as compared to the OPIT process, in processing large billets, and in the multilevel stacking and deformation required for high filament-count composite tapes. Once in tape form, the filaments of the metallic precursor - silver composite are oxidized and reacted to form the oxide superconductor composite. This is made possible in part by the remarkably high diffusivity of oxygen through the silver matrix.

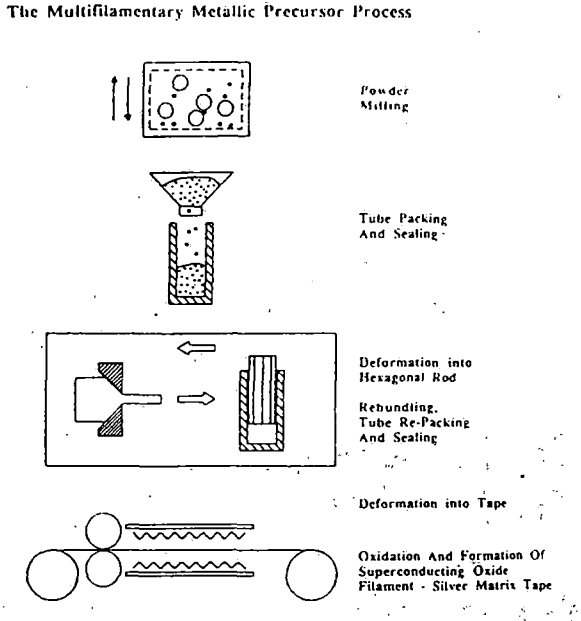


Fig. 1 Overview of the metallic precursor method for fabricating multifilamentary superconducting oxide - silver composite tapes

Although the metallic precursors have commonly been made by the rapid solidification of molten alloys, the method used in this work is mechanical alloying - a technology originally developed for making high-strength structural alloys [18]. The atomic-scale homogeneity yielded by mechanical alloying allows for novel reaction paths to be exploited, without the problems arising from long range segregation and chemical inhomogeneities.

In the Bi-2223 system, a homogeneous Pb-Bi-Sr-Ca-Cu powder of the desired Bi-2223 composition is prepared by mechanical alloying. The alloy powder is packed and sealed in a silver can that is then formed into a hexagonal rod. Cut pieces of the rod are stacked into a multi-rod bundle that is again packed into a can and formed into a hexagonal rod. This process can be repeated several times. In the final step, the can is formed into tape, rather than the hexagonal rod. 703 and 9583 filament tapes can be readily made using double and triple stacking respectively. The latter filament level is well beyond the present capabilities of OPIT technology. Cross sectional area reduction ratios of 100:1 are routinely achieved in each cycle, resulting in tapes with very uniform precursor filaments that are 5 μm or less in thickness.

The microstructures of a typical 9583 filament precursor tape are presented in Fig. 2, showing the excellent deformation uniformity possible with the above-described technique.

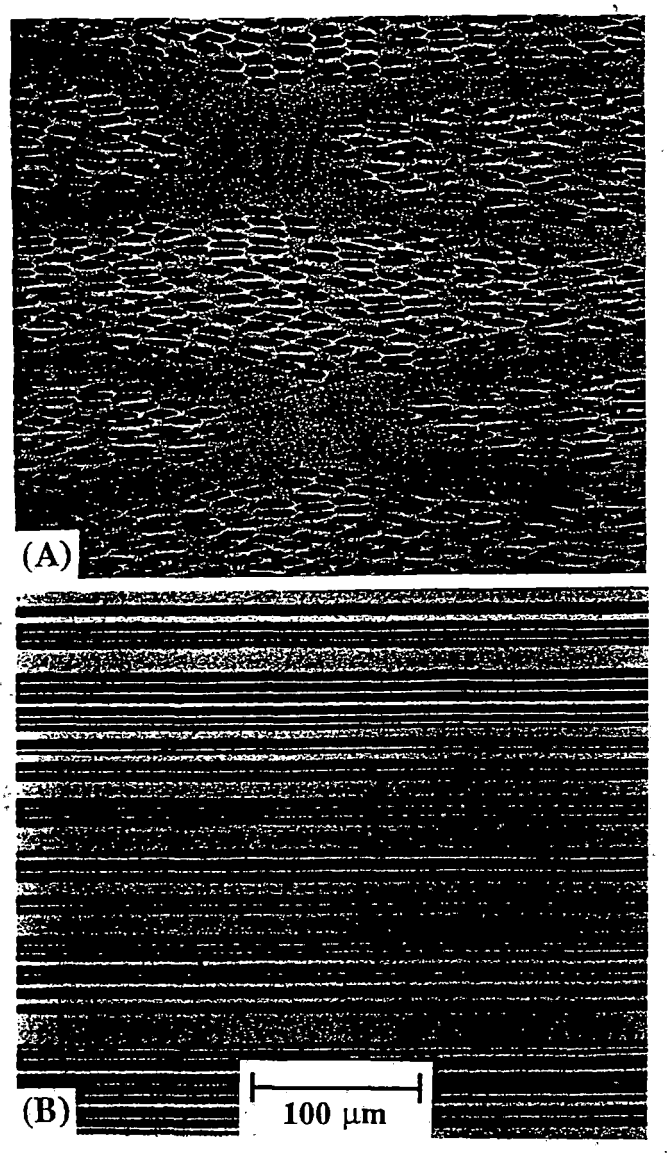


Fig. 2 Short transverse (A) and longitudinal (B) sections of a Pb-Bi-Sr-Ca-Cu alloy filament - silver matrix composite tape containing 9583 filaments (optical images)

Upon suitable oxidation and thermal-mechanical processing, average filament critical current densities of up to 7.5 kA/cm^2 in zero field at 77 K have been achieved in 40 cm lengths. This electrical performance is at a level of interest for

initial prototype applications. As a first step, the 30 cm long prototype multi-strand conductor displayed in Fig. 3 has been constructed from tapes made by the metallic precursor process. The transport critical current over a 9 cm gauge length is 240 A at 77 K in self field, corresponding to an average critical current density of 6 kA/cm^2. The tapes are approximately 0.011 cm thick and they contain 259 filaments.

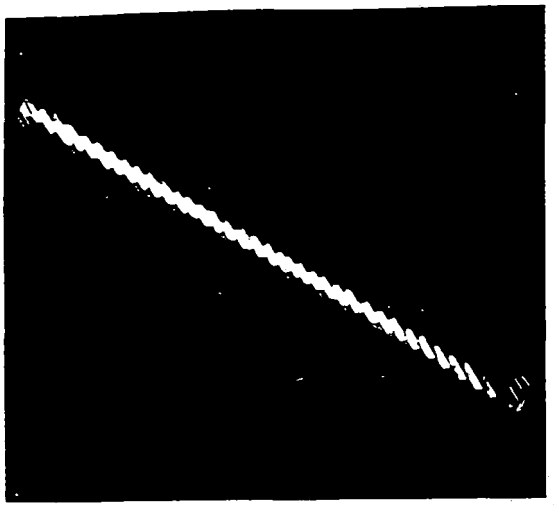


Fig. 3 A 30 cm long prototype multi-strand conductor comprised of Bi-2223 oxide filament - silver composite tapes made from metallic precursors

Because of the special advantages of the metallic precursor tapes in the areas of mechanical properties and high filament count configurations, the rest of this paper is on the mechanical properties and strain tolerance of high filament count, HTS/Ag composite tapes made from metallic precursors.

III. MECHANICAL PROPERTIES

A. Model Of Tensile And Bending Properties

The effects of tensile and bending strain on the critical currents of OPIT Bi-2223 multifilament - silver composite tapes have been reported for several filament configurations and counts [1, 2, 6, 20] and various J_c levels. Typically, in a single-bend test, the critical current is virtually unaffected up to a critical strain ε^*. At ε^* the critical current begins to decrease rapidly. However, the decrease becomes progressively more gradual as strain is increased beyond ε^*.

In perhaps the simplest model of bend effects, one assumes that the superconducting oxide filaments on the tensile side of the tape fracture in tension at some critical strain such that they can no longer transport supercurrent along their entire lengths. One also assumes that critical current is unaffected up to the critical strain. If the filaments are uniformly distributed within the ribbon of thickness $2S_r$ starting at distance $S_m = S_r - S_o$ from the surface as illustrated in Fig. 4, then eqs. 1 to 3 are readily derived to describe the normalized critical current decrease I/I_o for single (S.B.) and double (D.B.) bends to tensile-side surface strain $\varepsilon = S_r/R$.

$$I/I_o = \frac{S_r\varepsilon^*}{2S_o\varepsilon} + \frac{1}{2} \qquad \text{Single Bend} \qquad (1)$$

$$I/I_o = \frac{S_r\varepsilon^*}{S_o\varepsilon} \qquad \text{Double Bend} \qquad (2)$$

$$I/I_o = 1 \quad \forall\ 0 \le \varepsilon S_o \le \varepsilon^* S_r \ . \qquad (3)$$

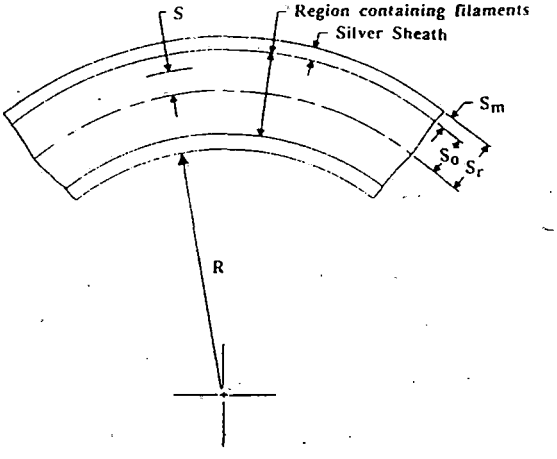


Fig. 4 Schematic of a bent superconducting oxide filament - silver matrix composite tape

These relations incorporate the assumptions that only the tensile side of the tape is damaged by a bend, and that the zero-strain plane is on the center-plane of the tape (e.g. there are no silver work hardening effects and the composite properties are center-plane symmetric). As a result, the additional critical current decrease incurred by the second, reverse bend to strain ε in the double bend doubles the decrease incurred by the single bend. If damage occurs to both the tensile and compressive sides with critical filament strain ε^*, then eq. 2 describes the decrease arising from a single ribbon bend to strain ε.

It is evident by inspection that eqs. 1 to eq. 3 yield a curve-form very similar to published curve-forms for the bend properties of OPIT Bi-2223 multifilament composites [2, 6, 20]. However, in this model, the single bend approaches $I/I_o = 0.5$ asymptotically and the double bend approaches $I/I_o = 0$ asymptotically. These asymptotes are not realistic for very large strains where metal work hardening dominates and center-plane symmetry in properties is lost. The relations are likely, however, to be valid for relatively small strains past ε^*.

The tensile-side surface strain criterion ($\varepsilon = \varepsilon^* S_r/S_o$) in eq. 3 for the onset of critical current decrease exceeds the critical strain ε^* required to fracture a filament in tension by the factor S_r/S_o arising from the geometry associated with having no filaments in the surface region of the tape. The oxide filament distribution therefore affects the relationship between bend

strain and critical current degradation. If all the filaments are in the vicinity of the tape center-plane, then S_f/S_O is large and the ribbon can be bent to much smaller radii (larger surface strains) without critical current decreases. However, the oxide fill factor (and I_c) is severely compromised.

B. Sample Preparation And Measurement Technique

Composite tapes containing either 703 or 9583 metallic precursor filaments were made by the method described in Fig. 1. After oxidation, they were processed in a manner similar to the conventional deform-and-sinter method used in OPIT, yielding tapes with nominal cross sectional dimensions of 0.02 cm x 0.41 cm. The oxide volume fractions were 0.09 and 0.13 for the 703 and 9583 filament configurations, respectively. X-ray diffraction showed that the primary phase was 2223, with the main secondary phases being 2212 and CuO. The micrograph in Fig. 5 illustrates the longitudinal structure of a single filament.

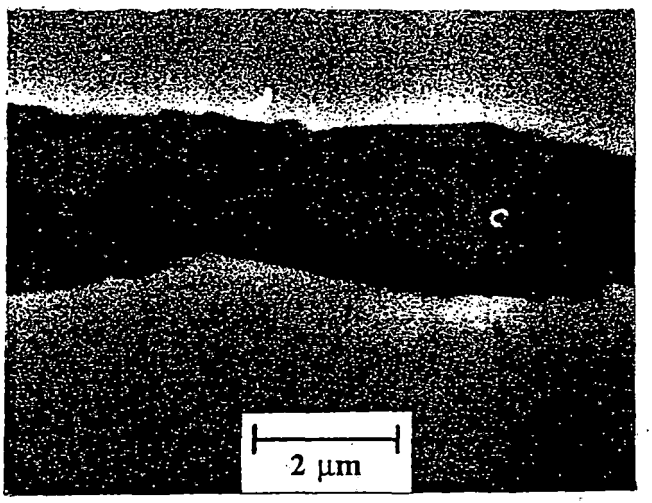


Fig. 5 Longitudinal cross section of a superconducting oxide filament in the 703 filament composite after processing (secondary electron image)

Approximately 10 cm lengths of each tape were strained using a standard tensile-testing machine modified such that critical currents were measured *in-situ* at 77 K as a function of tensile strain as illustrated in Fig. 6 (see also Ref. 2). A strain gauge extensometer with a 10 μm resolution was used to measure strain over a 2.5 cm gauge length. The same gauge length was used to determine the sample critical current. At small strain intervals, the current was ramped in small increments until the voltage far exceeded the equivalent 1 μV/cm point in the I - V relation. The tangent between (I,V) points straddling the voltage criterion was obtained from a curve fit and the critical current was obtained as the extrapolation of the tangent line to V = 0 (the "offset criterion" [1]).

In the bend tests, the critical currents of 5 cm lengths were determined at 77 K using a 1 cm gauge length and the above criterion for critical current. Each length was then bent at ambient temperature in one direction to a certain strain and straightened. The sample critical current was again determined. Some samples were then bent at ambient temperature in the reverse direction to the same strain as the first bend. After straightening, the critical current was again measured.

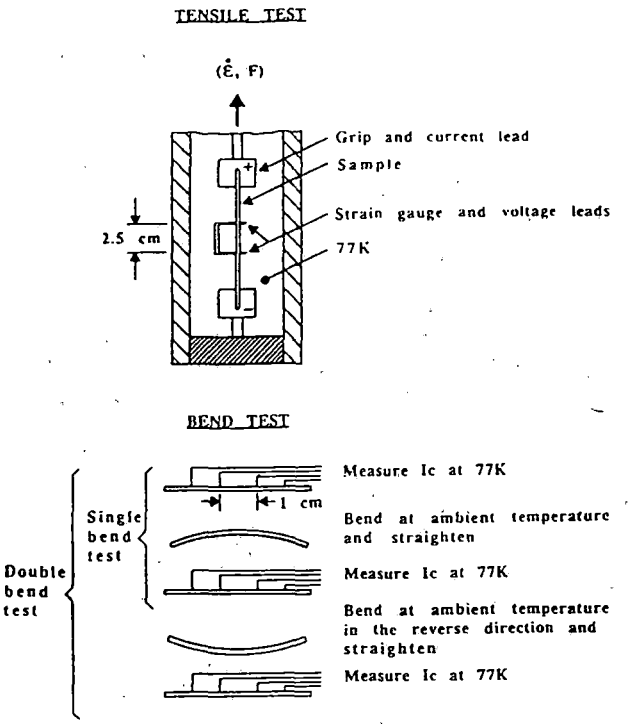


Fig. 6 Schematic of the bend and tensile test methods

C. Tensile Strain Results

The typical tensile properties of both the 703- and 9583-filament composite tapes are presented in Fig. 7. The critical current stays essentially constant up to an average strain of about 0.6%, followed by an initially rapid decrease to about 1/2 the zero-strain critical current values. Further increases in strain to 4% then lead to a gradual decrease in the critical current.

A 0.6% critical tensile strain is superior to results reported so far for OPIT multifilamentary wires where levels up to only 0.3% have been reached [2, 20].

The strain at the onset of the rapid decrease is the critical strain ε^* at which we assume a major fraction of the filaments are damaged sufficiently to reduce the critical current to about 1/2 of its original level. The remarkably gradual subsequent decrease to near-zero critical currents may be due to one of three effects: (1) the filaments fracture in a way that allows some supercurrent transport past their elastic limit, (2) the filament elastic limits to catastrophic failure are highly variable with repect to strain, and, (3) the 1 μV/cm offset voltage criterion used to measure critical current is not sensitive to shunting around cracks through the silver from

one filament to the next at the 2.5 cm gauge length used. This latter effect can be tested by increasing the gauge length or the sensitivity of the voltage measurement. However, a simple analysis of shunting through the silver yielded an ε^{-1} dependence of I/I_o that went to zero considerably more rapidly than the observed decrease.

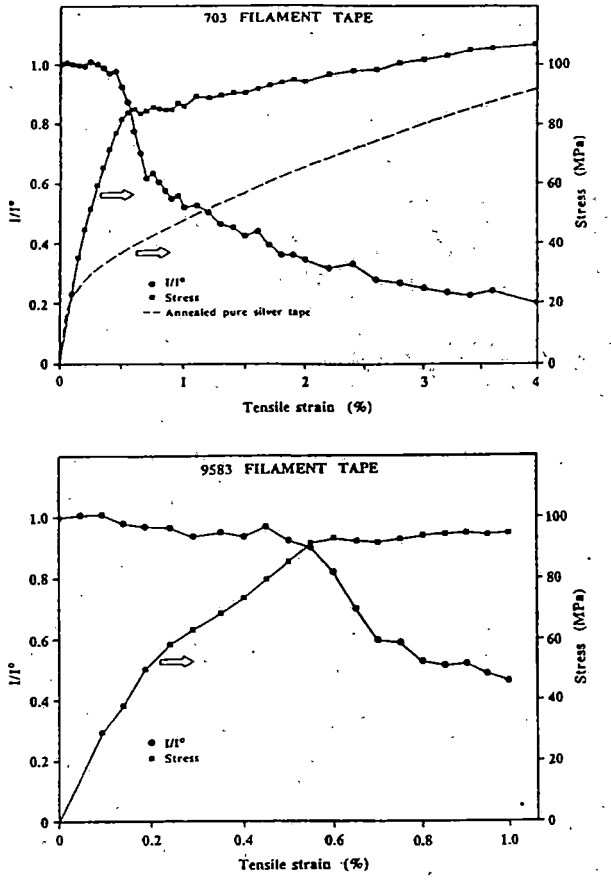


Fig. 7 Variation of normalized critical current and stress with respect to tensile strain for the 703 and 9583 filament samples at 77 K ($J_o = 3$ kA/cm^2)

The stress - strain relationships in Fig. 7 for the 703- and 9583-filament samples demonstrate that the composite tape begins to flow plastically at the critical strain ε^*. This is consistent with the behaviour of a brittle filament - ductile matrix composite in which the filaments are strained to their elastic limit. Further strain in such a composite is accomodated by filament fracture and a small amount of local crack separation that strengthens the ductile medium over some length scale by work hardening. With more strain, the ceramic filament fractures at a new region away from the work hardened area of the previous fracture. The macroscopic flow stress therefore increases very gradually with respect to strain past the elastic limit of the filaments.

The average slopes of the stress strain curves up to the constant flow stress regime yield moduli that are comparable to the modulus of silver [21]. However, the nonlinearity in this region of the stress strain curves as well as considerable sample-to-sample variability introduces significant uncertainty into the accuracy of the composite modulus value.

A comparison of the stress - strain relations for silver and the composites in Fig. 7 demonstrates that the superconducting filaments strengthen the ribbons by a factor of roughly 2.5 at the onset of plastic deformation. The degree of strengthening by the oxide filaments is likely to depend on filament size, distribution, crystallographic texture and phase content.

D. Bending Strain Results

The results in Fig. 8 demonstrate that the 703- and 9583-filament composite tapes behave similarly in both single and double bends. Typically, the critical current stays constant to about 0.7% tape surface strain, followed by an initially rapid decrease. However, the rate of decrease diminishes, with the single- and double-bend normalized critical currents approaching 0.75 and 0.55 respectively at 1.6% strain.

These results are comparable to the best results reported so far, on 1296-filament OPIT tapes [6]. However, a valid in-depth comparison of wire performance quoted in published data to the present work could only be made if the filament distribution within the tapes were similar, or at least known. The geometric correction (S_r/S_o) for tensile side critical strain at the outer limits of the tape region containing filaments could then be used to normalize the data.

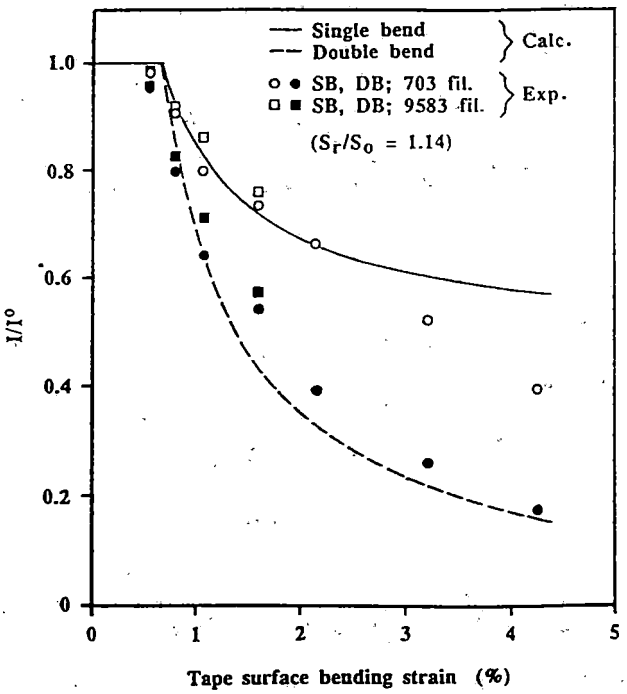


Fig. 8 Variations of normalized critical currents with respect to tape-surface bend strain ($J_o = 3$ kA/cm^2) for single and double bends

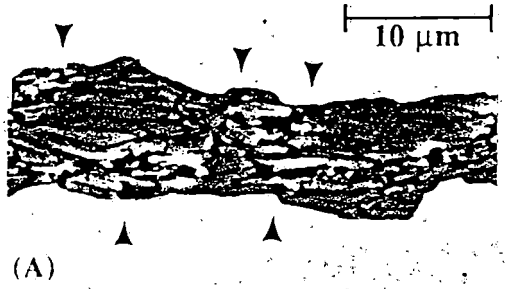
With an average critical tensile strain of 0.6% from the tensile tests for the 703 filament tapes, eqs. 1 and 2 yield the curve-forms in Fig. 8 for a comparison to the experimental

bend behaviour. There is good agreement between the experimental and calculated strain dependences. Deviations between the model and the experimental relations are likely to result from the gradual critical current taper beyond the critical strain rather than the assumed sudden decrease to zero critical current at the critical strain, as well as from silver work hardening and loss of center-plane symmetry in properties.

E. Microstructures And Failure Analysis

Single- and double-bend samples, as well as samples tested in tension, were mounted longitudinally, ground and polished for microscopic failure analysis using optical and scanning electron microscopy.

The micrographs of a 9% tensile-strained 703 filament tape in Fig. 9 display cracks that follow irregular paths through the aligned grains of the filaments. The grains apparantly sheared along their basal planes, allowing cracking at different locations through their thicknesses and separation of the disconnected grain pieces by the telescoping mechanism illustrated in Fig. 10.



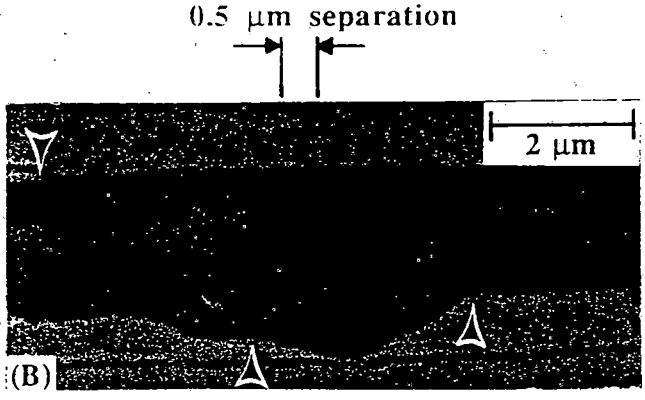


Fig. 9 Cracks (marked with arrows) in 9% tensile-strained 703-filament ribbons (A) view showing the nature and frequency of fracture (secondary electron image), (B) view of basal-plane sheared and telescoped region (backscattered electron image)

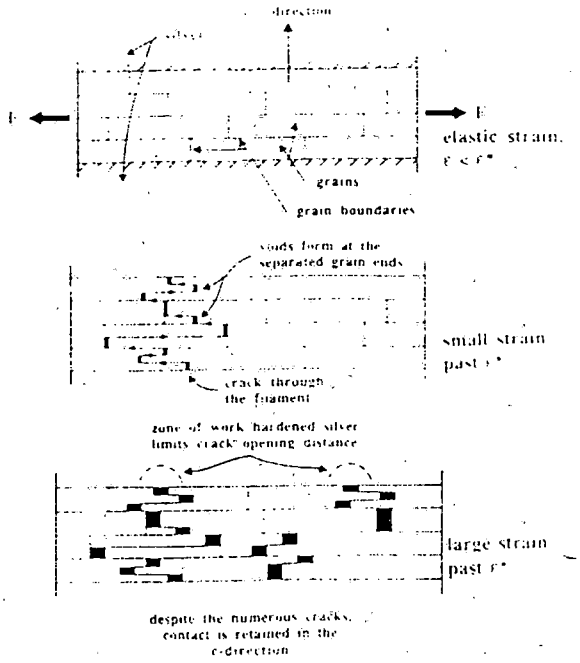


Fig. 10 Basal plane shear and telescoping grain mechanism of well-textured Bi-2223 oxide filament deformation in tension to large strains

Cracks did not open in the direction perpendicular to the filaments, even though the separation (and consequent voids) at grain ends (Fig. 9b) required extensive basal plane shear and sliding. It is evident by inspection of Fig 9a that the sum of void widths along the filament add up approximately to the macroscopic 9% strain of the composite. Local work hardening of the silver would accompany the local strain required to form these voids, distributing the strain to other, less strained regions of the tape and preventing gross local separation of the filaments. This may explain in part the gradual taper to zero critical current at large strains because the filaments, although consisting of sheared grains, could possibly still transport supercurrent by tunnelling across the chemically unbonded, but physically contacting, sheared regions. Magnetic field measurements on variable gauge lengths may aid in resolving the nature of supercurrent transport through these highly strained composites.

Micrographs of typical bending-induced cracks are illustrated in Fig. 11. The predominant damage seen in all samples bent beyond the critical strain consisted of cracks extending part way or completely through the filaments, with no correlation to adjacent filament cracking. Cracks were often quite difficult to resolve with the SEM, due to openings typically less than 0.1 μm. The keying seen between separated regions provides the best evidence for crack propogation through the filaments because voids and second phases do not form these structures. Although the cracks and separation are less extensive in the bent samples than in the tension tested samples, both strain modes yielded cracks with essentially the same morphology.

In well-textured filaments, cracks tend to propogate through the superconducting oxide grains in an irregular manner (Fig. 11a) typical of the fracture of such fibrous composites as wood. In regions of poor texture the cracks followed a more direct route. In regions containing second phases, the cracks often followed the second phase particles through the filament. In some instances, the crack propagation had obviously been stopped by another superconducting oxide grain of slightly different orientation (Fig. 11b) resulting in partial cracking of the filament. Cracks were not seen in the compressive sides of single-bend samples, while cracks were found in both sides of double-bend samples.

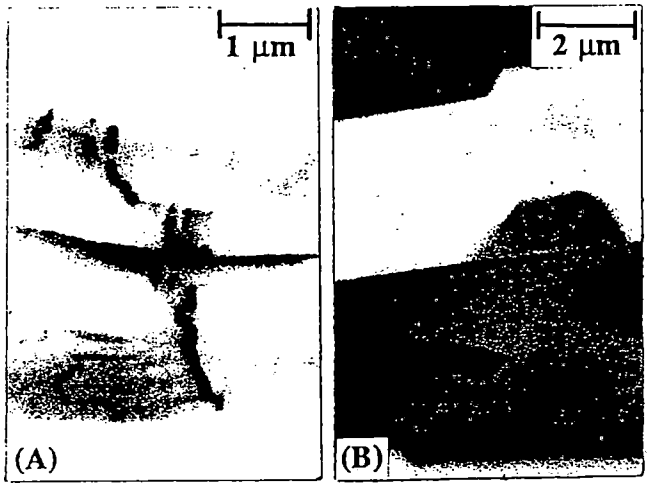


Fig. 11 Micrographs of cracks in bent superconducting 2223 oxide filament - silver composites. (A) shows a fibrous crack through a filament (secondary electron image), (B) a partial crack ending at an off-angle grain (backscattered electron image)

IV. SUMMARY

The properties of Bi-2223/Ag composite multifilamentary tapes prepared by a metallic precursor process are described. Critical current densities of up to 7.5 kA/cm^2 at 77K in zero field have been measured in 40 cm length tapes. A 30 cm prototype multi-strand conductor containing these wires has a 240 A critical current at 77 K in self-field over a 9 cm gauge length. This corresponds to an average critical current density of 6 kA/cm^2 in the 259 filament tapes.

The 77 K tensile and bending properties of tapes made from metallic precursors containing 703 and 9583 Bi-2223 oxide filaments were determined. The initial flow stress of the composites was four times the flow stress of similarly-processed silver, indicating considerable strengthening of the tape by the oxide filaments. The plastic flow regime started at about 0.6% tensile strain, which corresponded to the strain where critical current first started to decrease. The critical currents past this critical strain decreased rapidly to about 1/2 their initial values, followed by very gradual decreases with strain increases to 4%.

Overall, the initial effect of tensile strain on critical current is characteristic of a critical strain mechanism. However, the gradually decreasing critical current beyond the critical strain in the tensile measurements implies that the filaments are damaged nonuniformly by applied strain, with some filaments remaining intact (or partially intact at least) out to much larger strains. The microstructures observed support this mechanism. The aligned grains of a well textured filament accomodate large tensile strains via a basal plane shearing and telescoping mechanism that does not introduce large discontinuities in the filaments. Rather, small voids are formed at the ends of the sheared grains as they slide past each other.

In bend tests, the effect of bend strain on critical current correlated well to the tensile test results. Typically, critical currents remained constant to about 0.7% strain, followed by an initially rapid but tapering critical current decrease as bend strain was increased to 4%. Even at 1.6% strain however, the material retained 0.75 and 0.55 of its initial critical current in single and double bends. Damage was only found on the tensile side of single bend samples.

These results are very promising for the development of HTS wires and tapes with improved mechanical properties.

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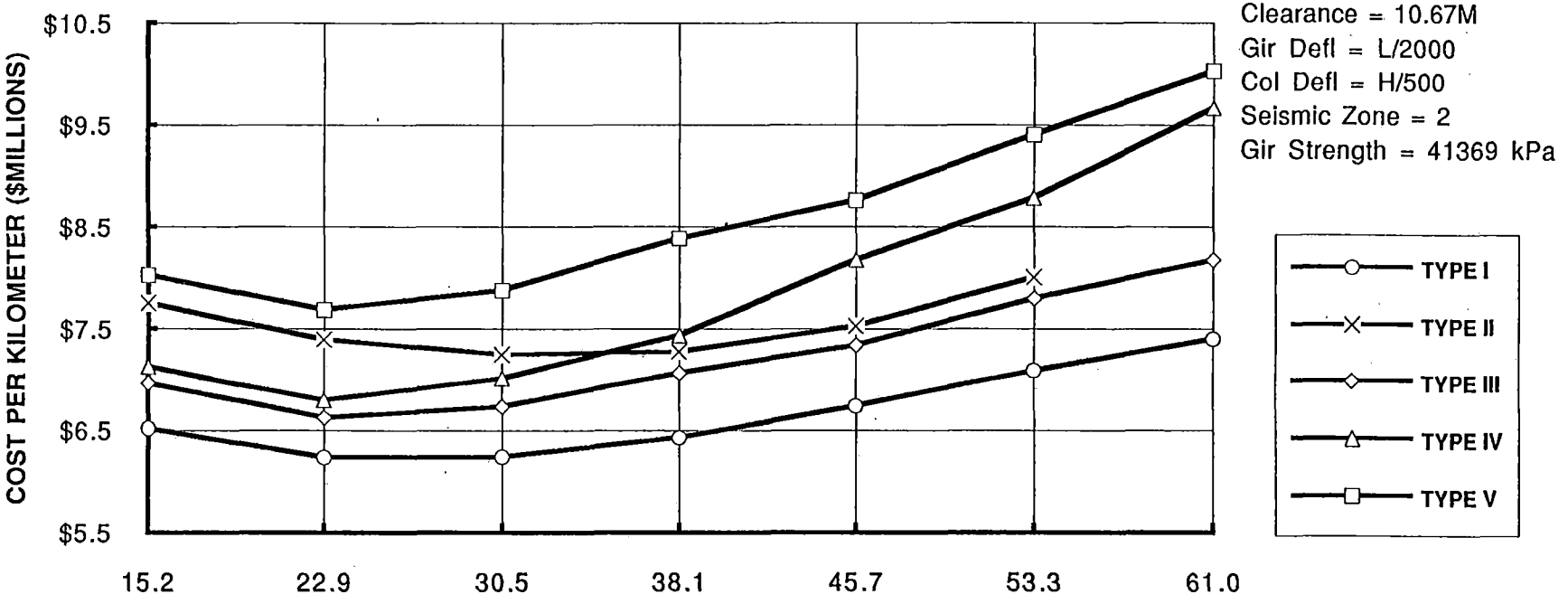
GUIDEWAY COST SUMMARY
(per kilometer)



(Ref: Tables 3-1, 3-2, 3-3, 3-4, & 3-5)

CHART 3-1

GUIDEWAY COST SUMMARY
(per mile)

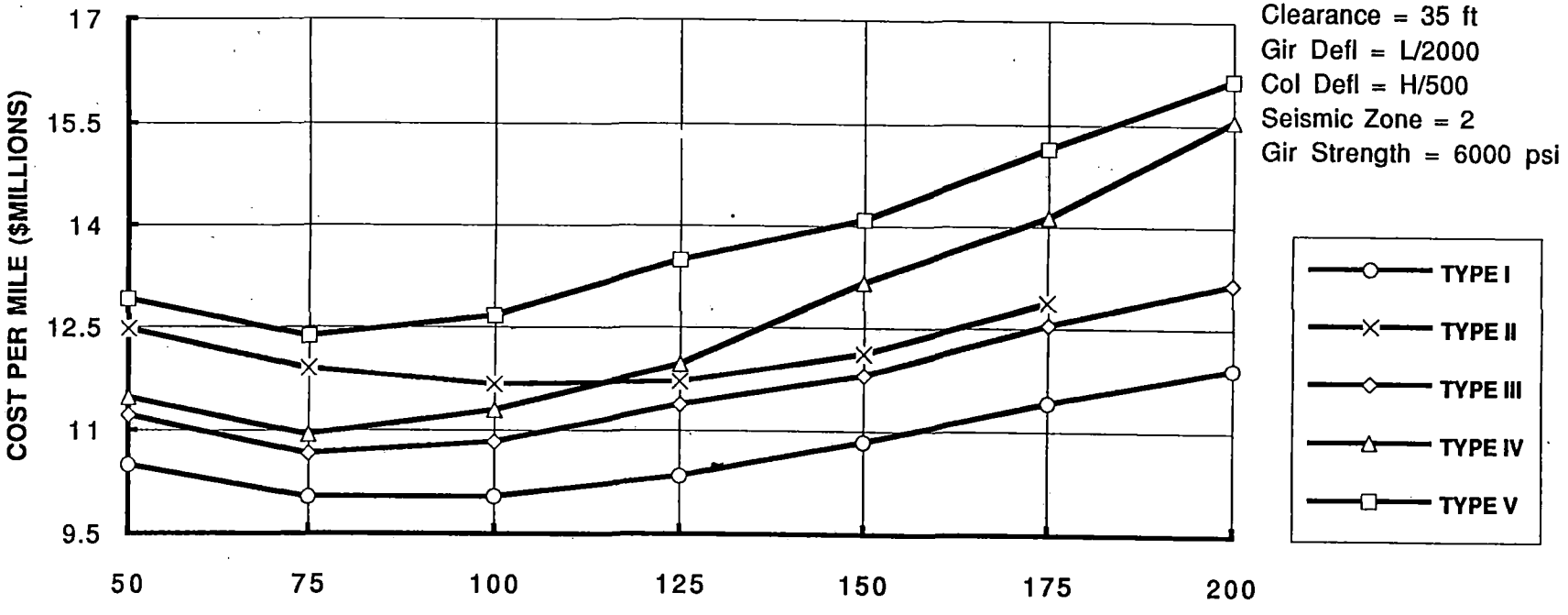


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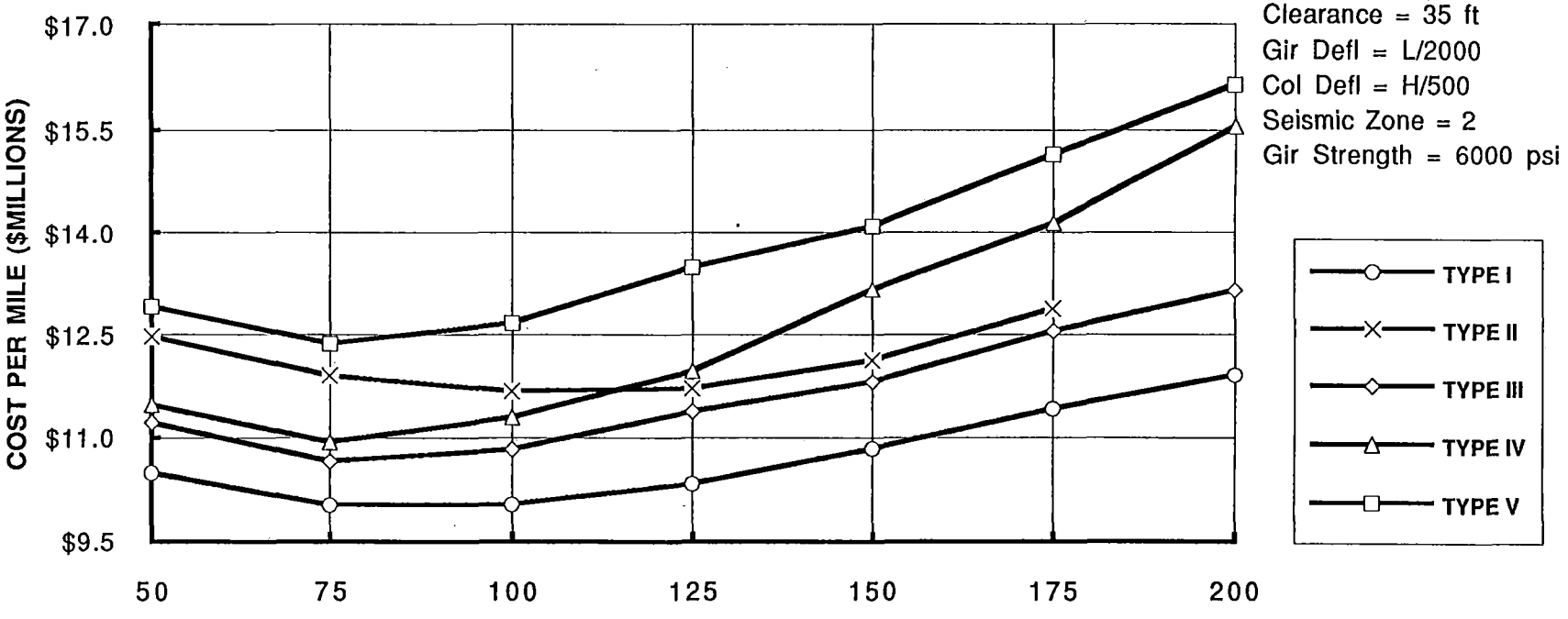
CHART 3-2

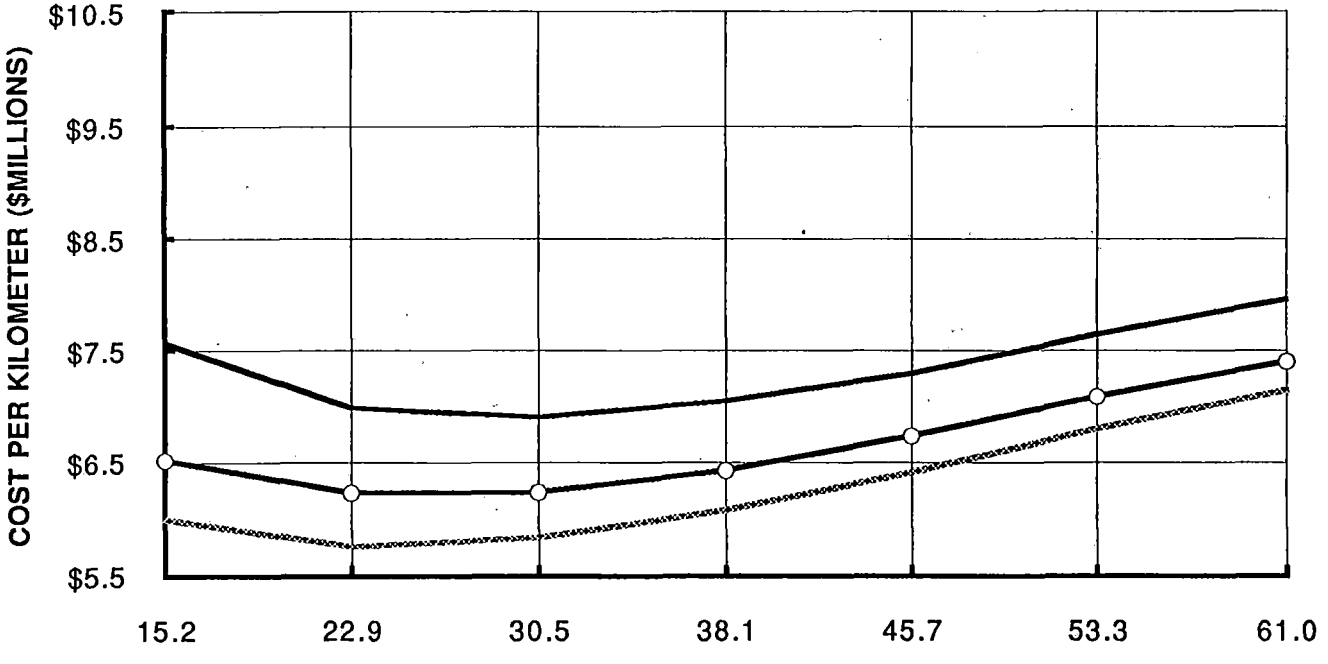
GUIDEWAY COST SUMMARY
(per mile)



(Ref: Tables 3-1, 3-2, 3-3, 3-4, & 3-5)

CHART 3-2

COST VARIATION BY COLUMN HEIGHT
Type I Girder

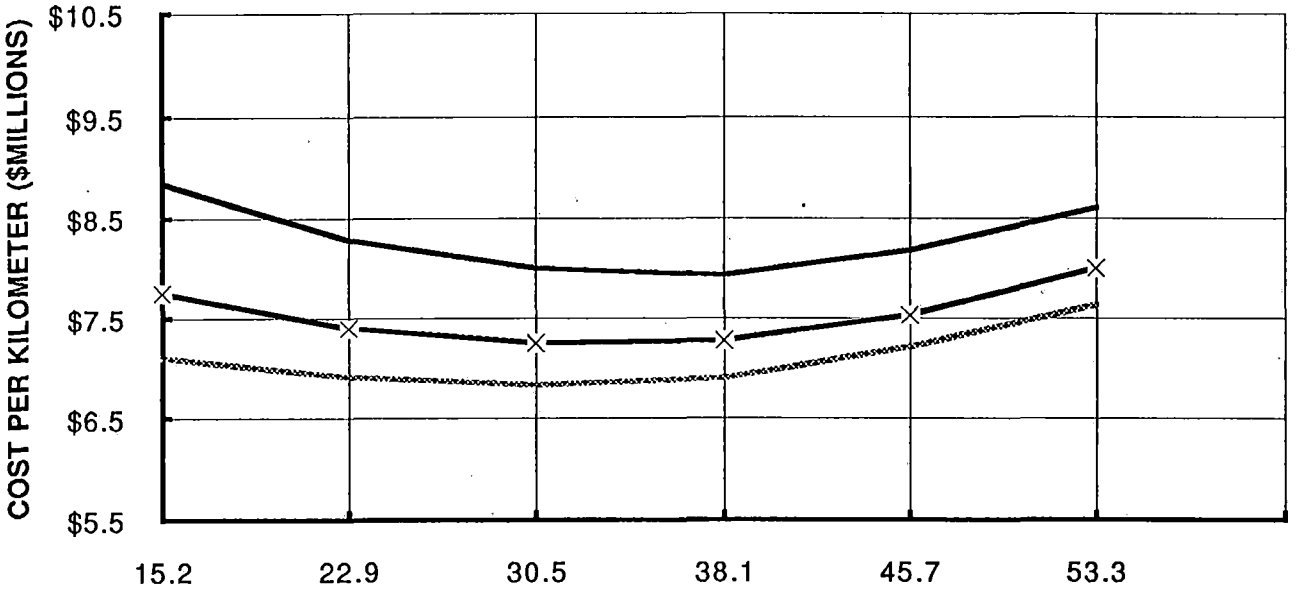


Design Parameters:
Single Column
Clearance =VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base 10.67 M
4.57 M
15.76 M

CHART 3-3

COST VARIATION BY COLUMN HEIGHT
Type II Girder

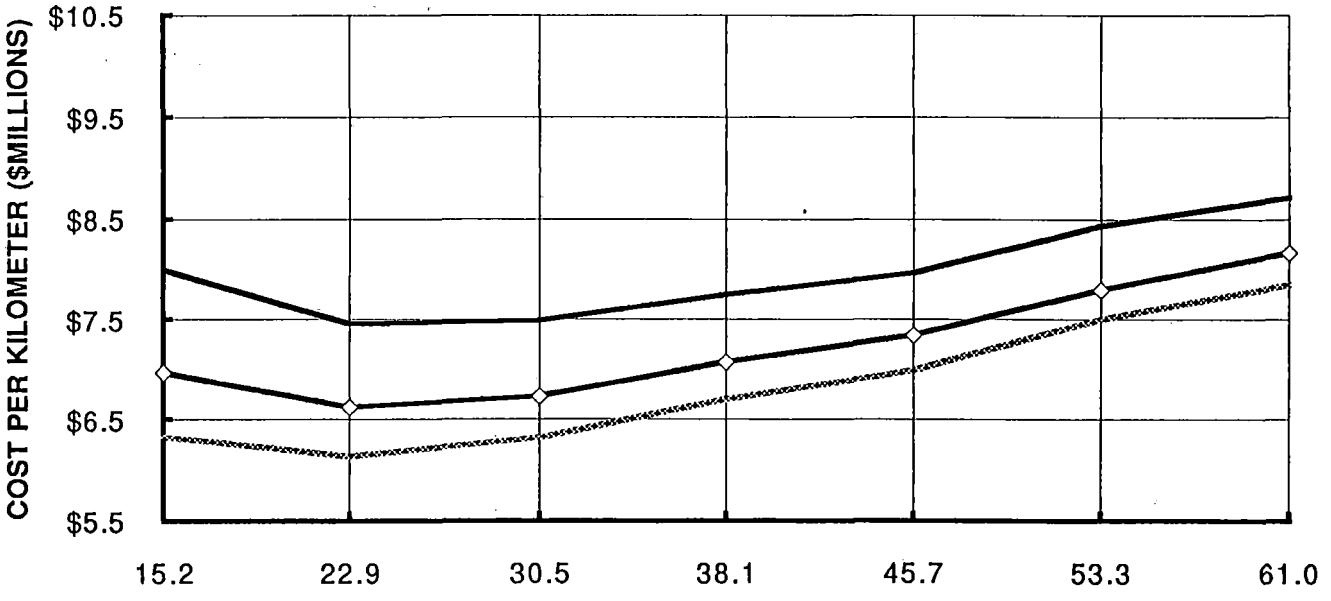


Design Parameters:
Single Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-10.67 M
4.57 M
15.76 M

CHART 3-4

COST VARIATION BY COLUMN HEIGHT
Type III Girder



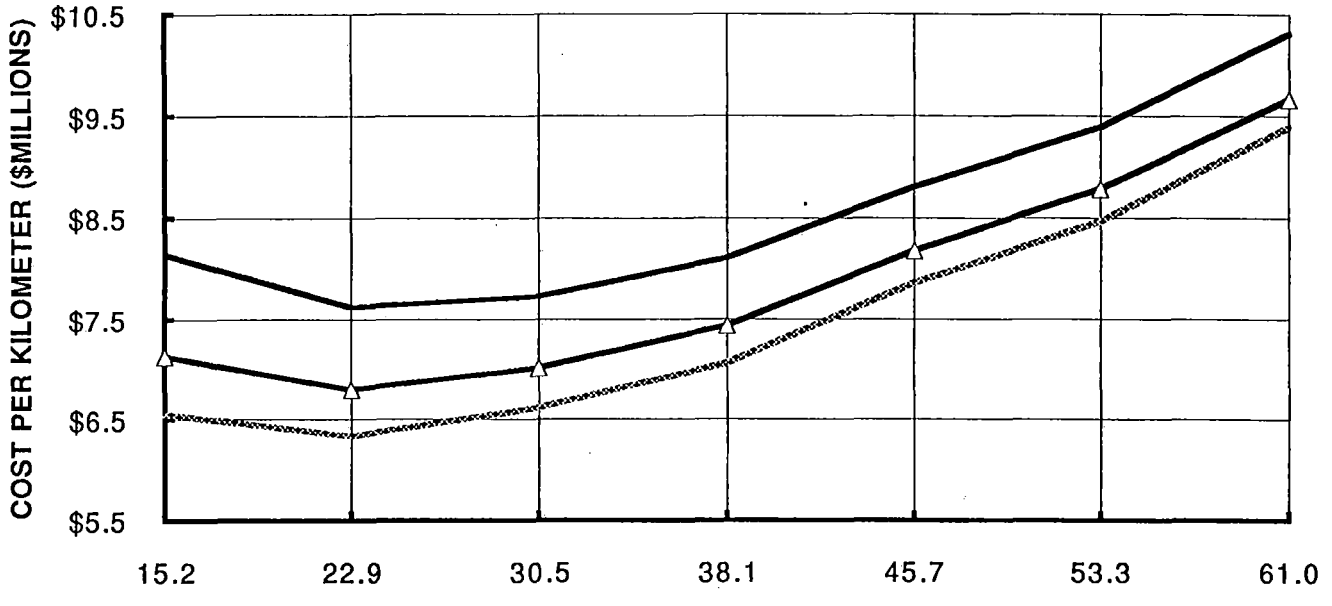
Design Parameters:
Single Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base 10.67 M
4.57 M
15.76 M

(Ref: Tables 3-3, 3-8, & 3-13)

CHART 3-5

COST VARIATION BY COLUMN HEIGHT
Type IV Girder



Design Parameters:
Single Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

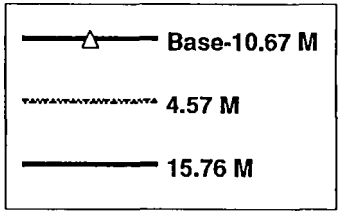
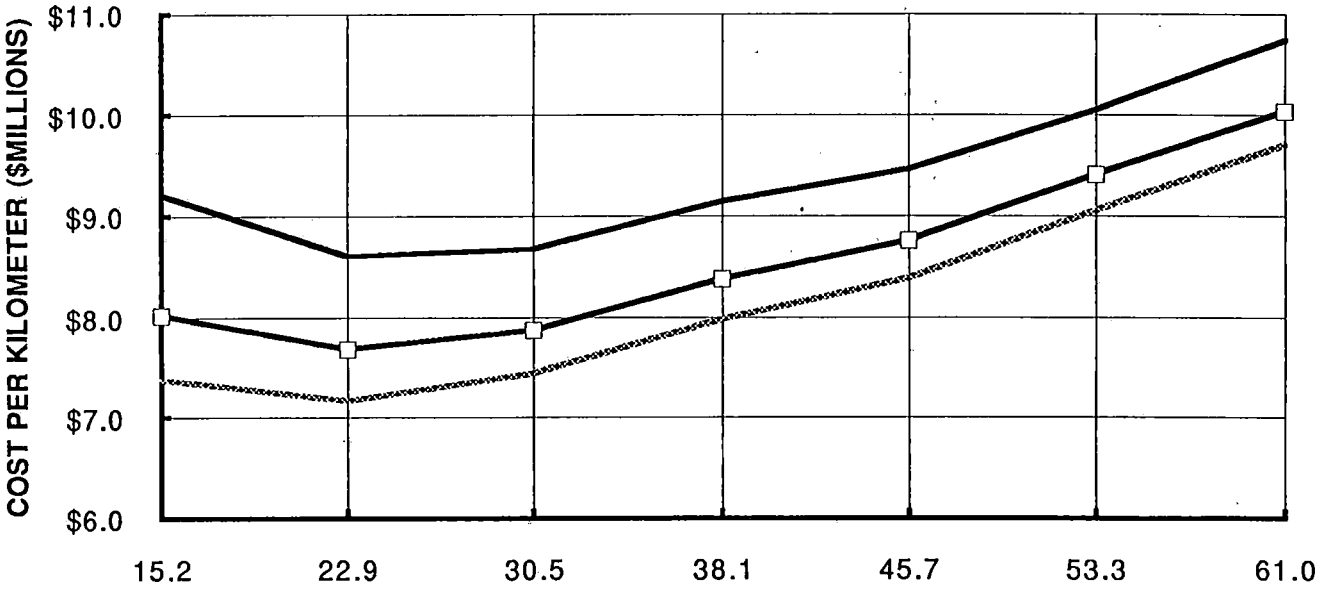


CHART 3-6

COST VARIATION BY COLUMN HEIGHT
Type V Girder



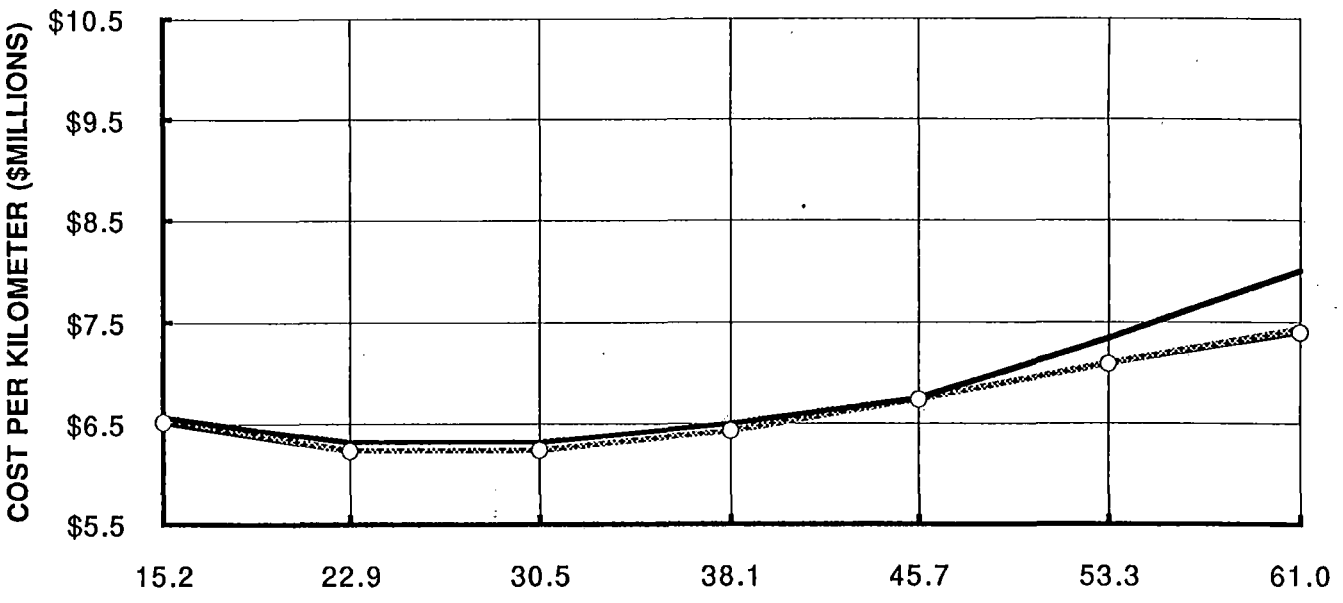
Design Parameters:
Single Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-10.67 M
4.57 M
15.76 M

(Ref: Tables 3-5, 3-10, & 3-15)

CHART 3-7

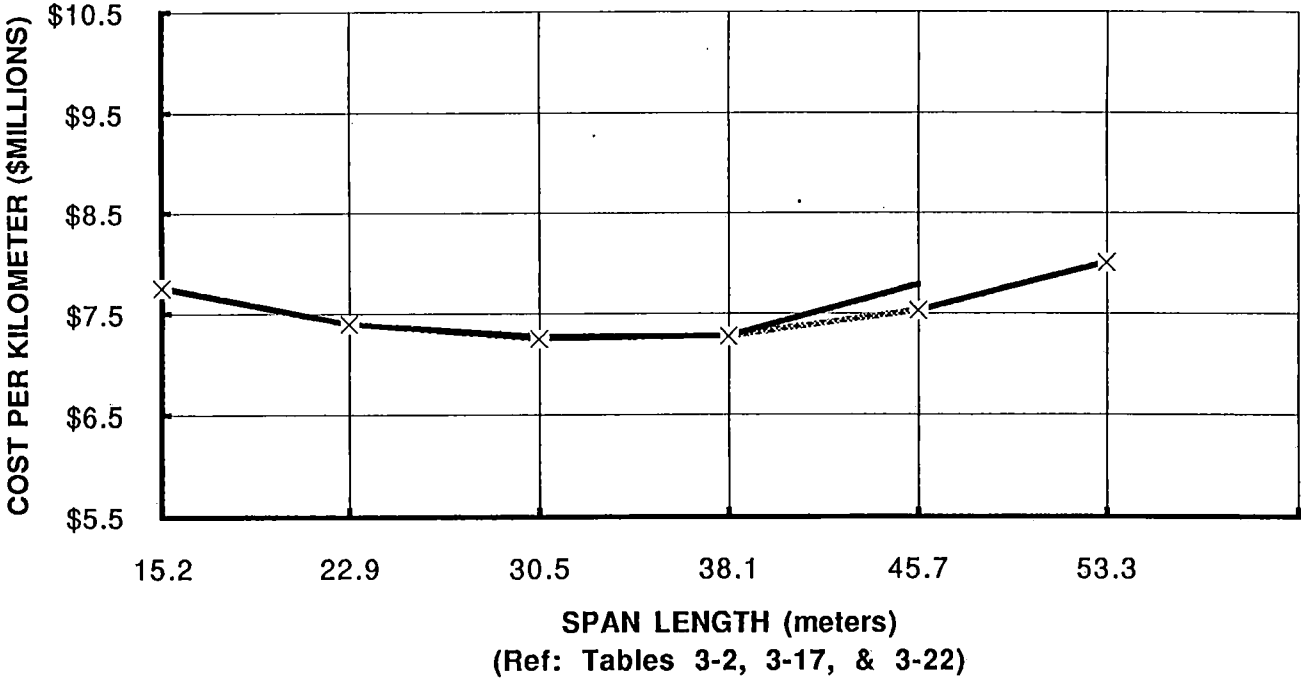
COST VARIATION BY GIRDER DEFLECTION
Type I Girder



Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

CHART 3-8

COST VARIATION BY GIRDER DEFLECTION
Type II Girder



Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

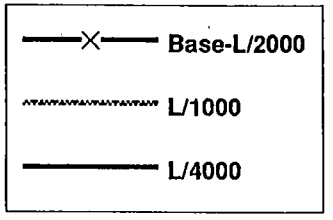
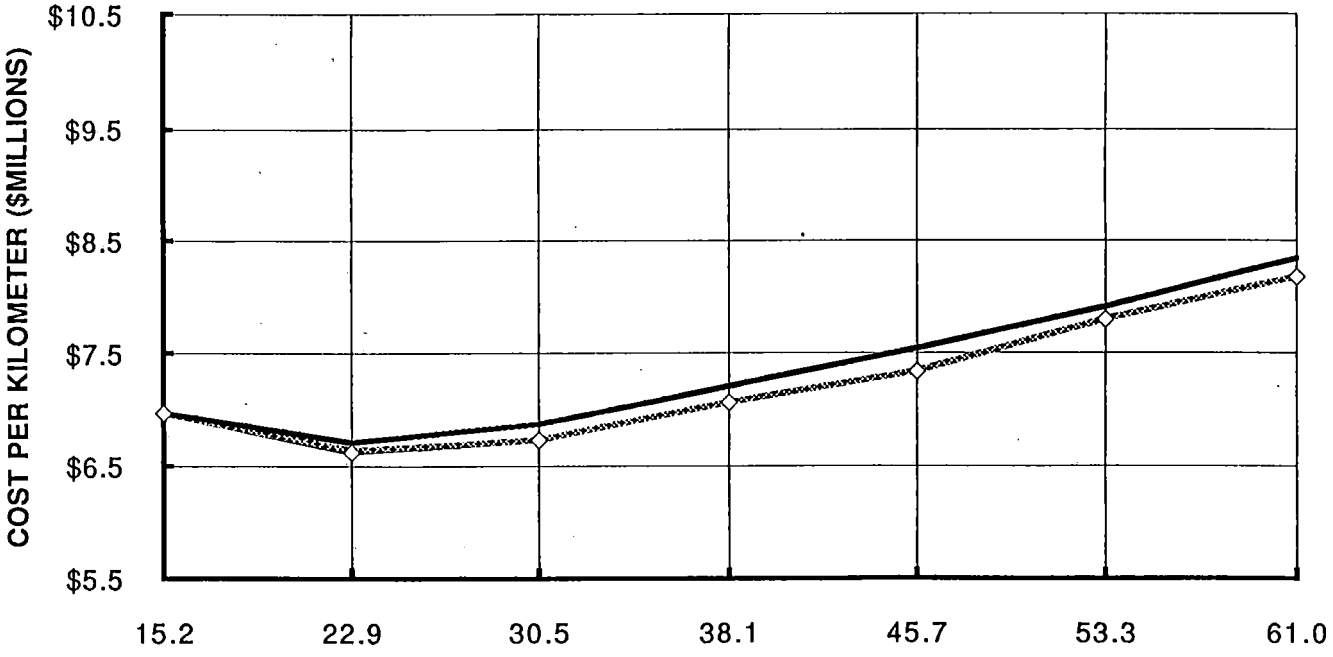


CHART 3-9

COST VARIATION BY GIRDER DEFLECTION
Type III Girder



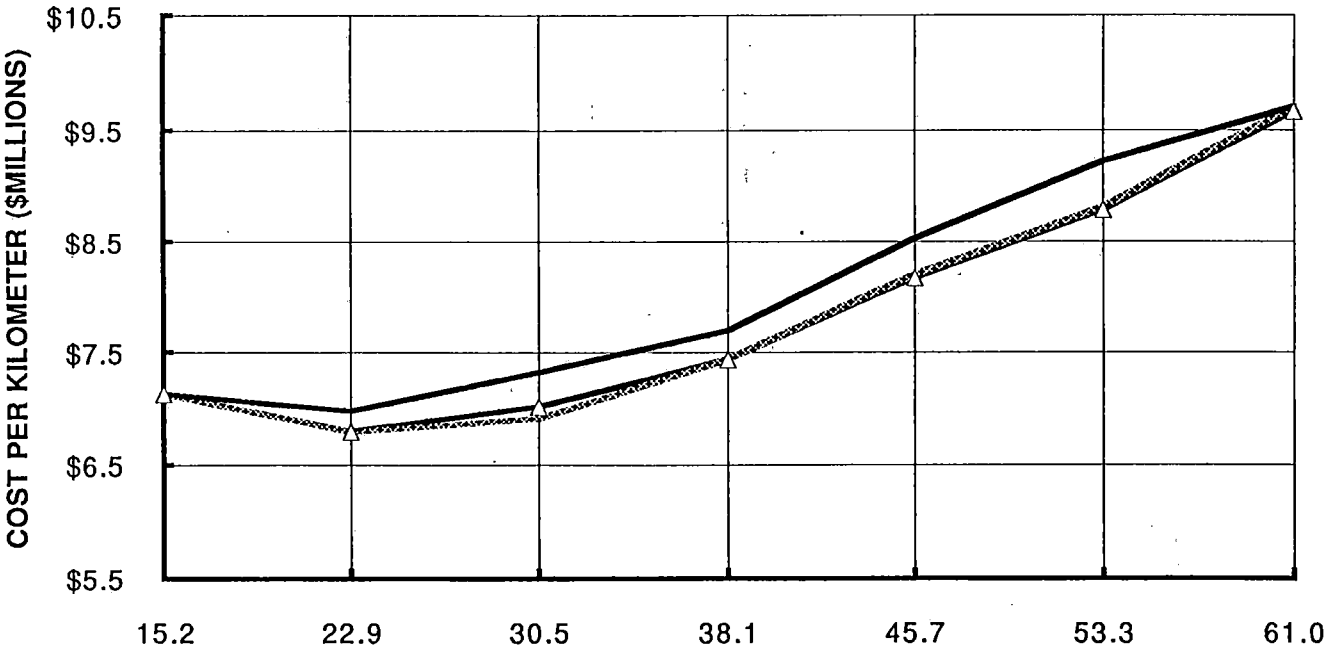
Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-L/2000
L/1000
L/4000

(Ref: Tables 3-3, 3-18, & 3-23)

CHART 3-10

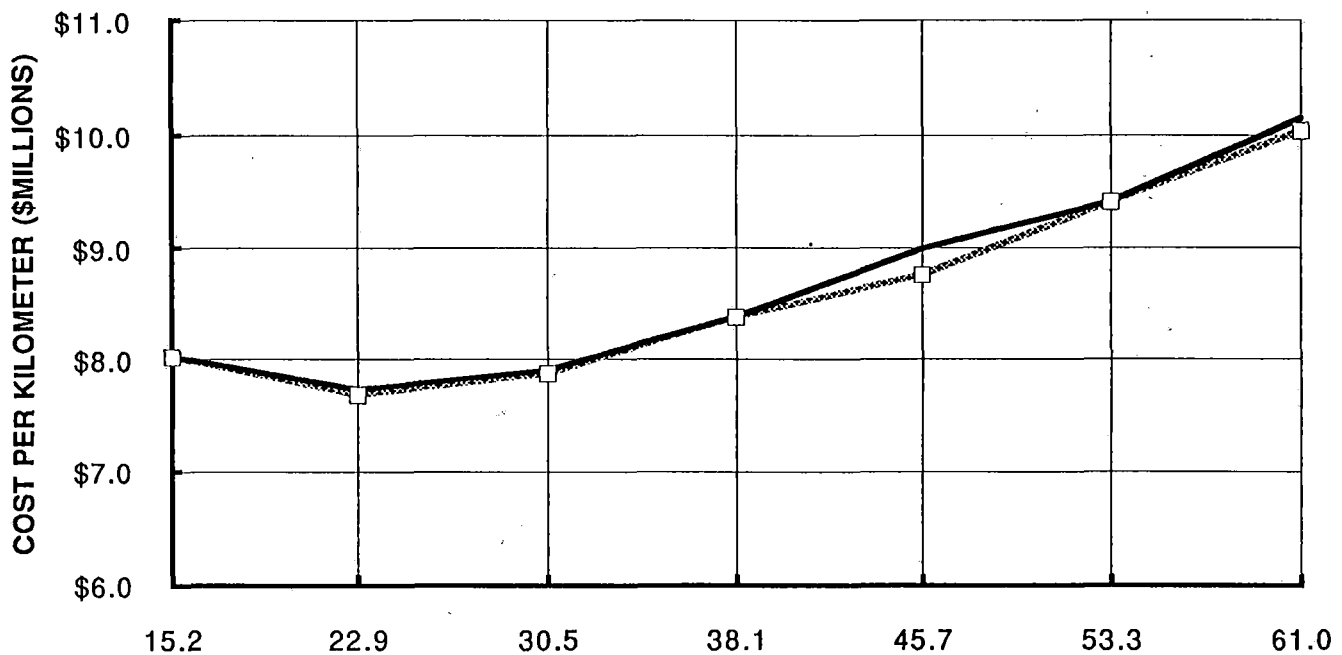
COST VARIATION BY GIRDER DEFLECTION
Type IV Girder



Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl =VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

CHART 3-11

COST VARIATION BY GIRDER DEFLECTION
Type V Girder

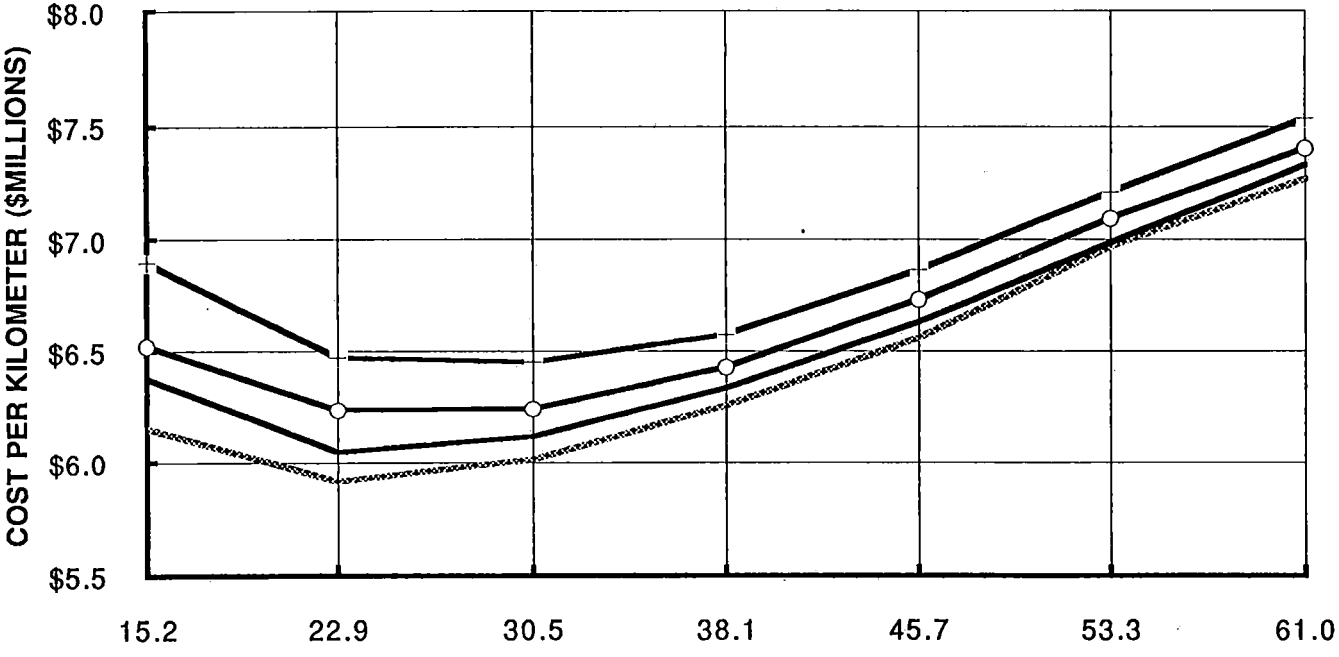


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

(Ref: Tables 3-5, 3-20, & 3-25)

CHART 3-12

COST VARIATION BY COLUMN DEFLECTION
Type I Girder



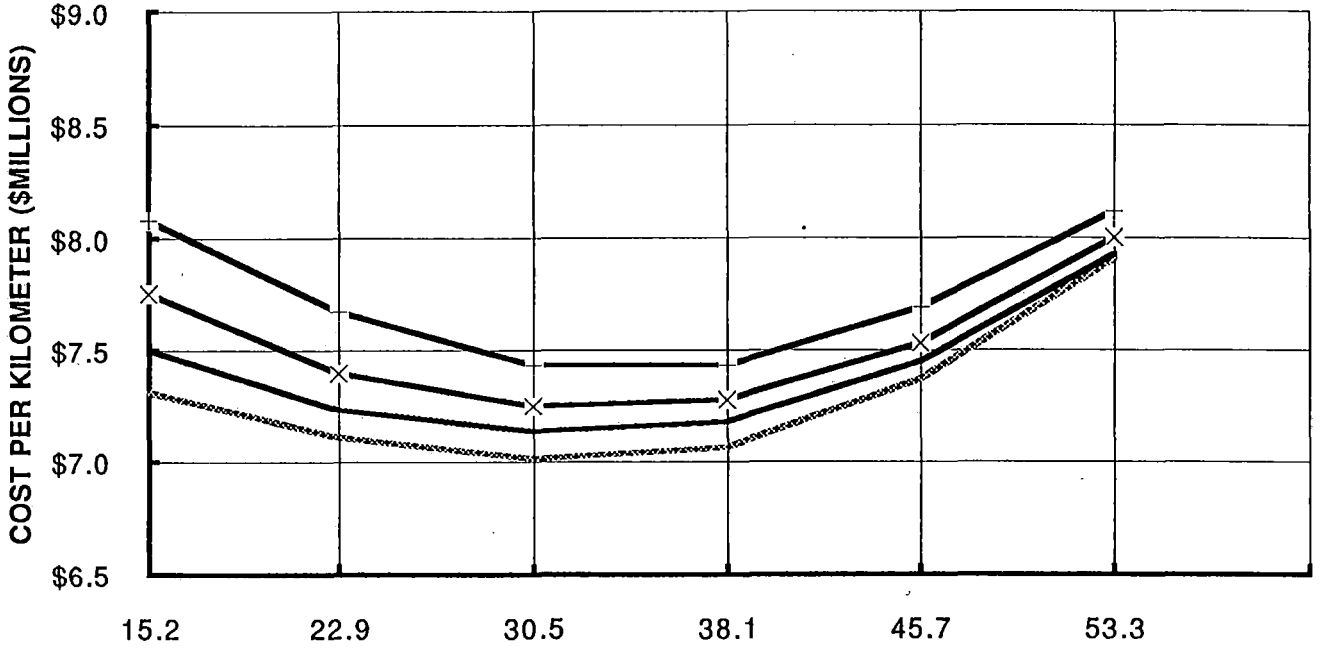
Design Parameters:
Single Column
Clearance =10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

- Base-H/500
- H/100
- H/250
- H/750

(Ref: Tables 3-1, 3-26, 3-31, & 3-36)

CHART 3-13

COST VARIATION BY COLUMN DEFLECTION
Type II Girder



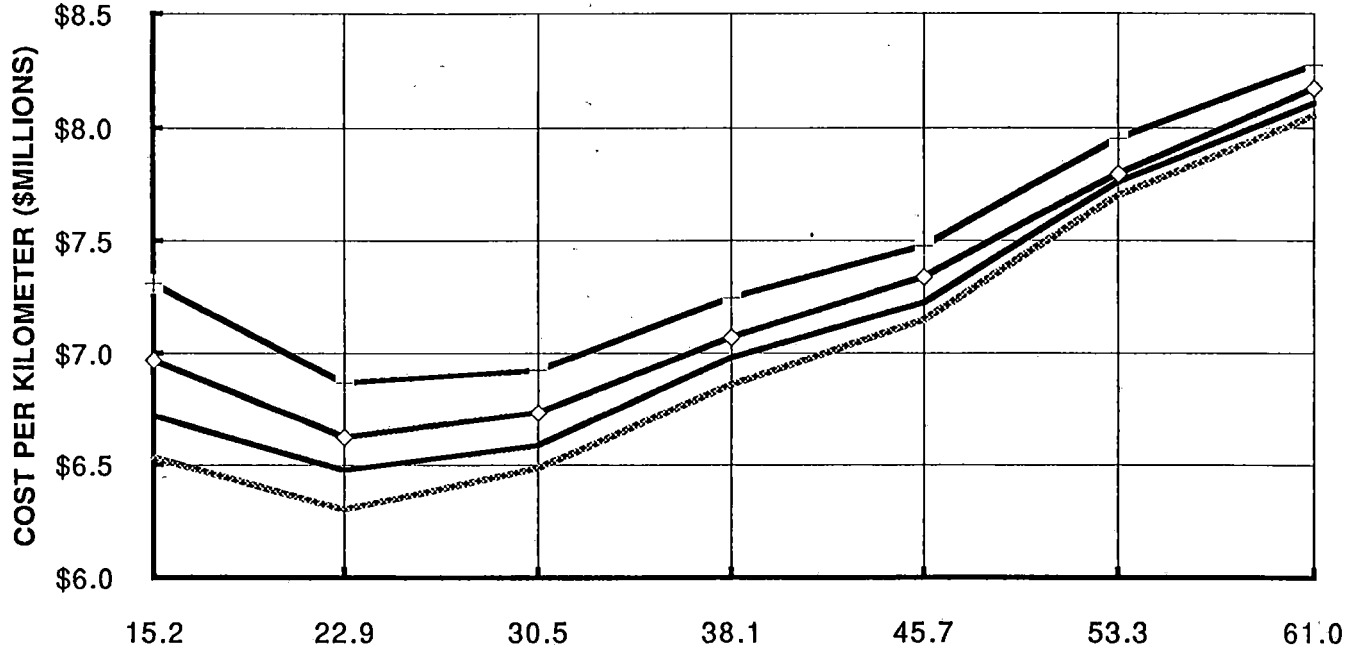
Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

- Base-H/500
- H/100
- H/250
- H/750

(Ref: Tables 3-2, 3-27, 3-32, & 3-37)

CHART 3-14

COST VARIATION BY COLUMN DEFLECTION
Type III Girder



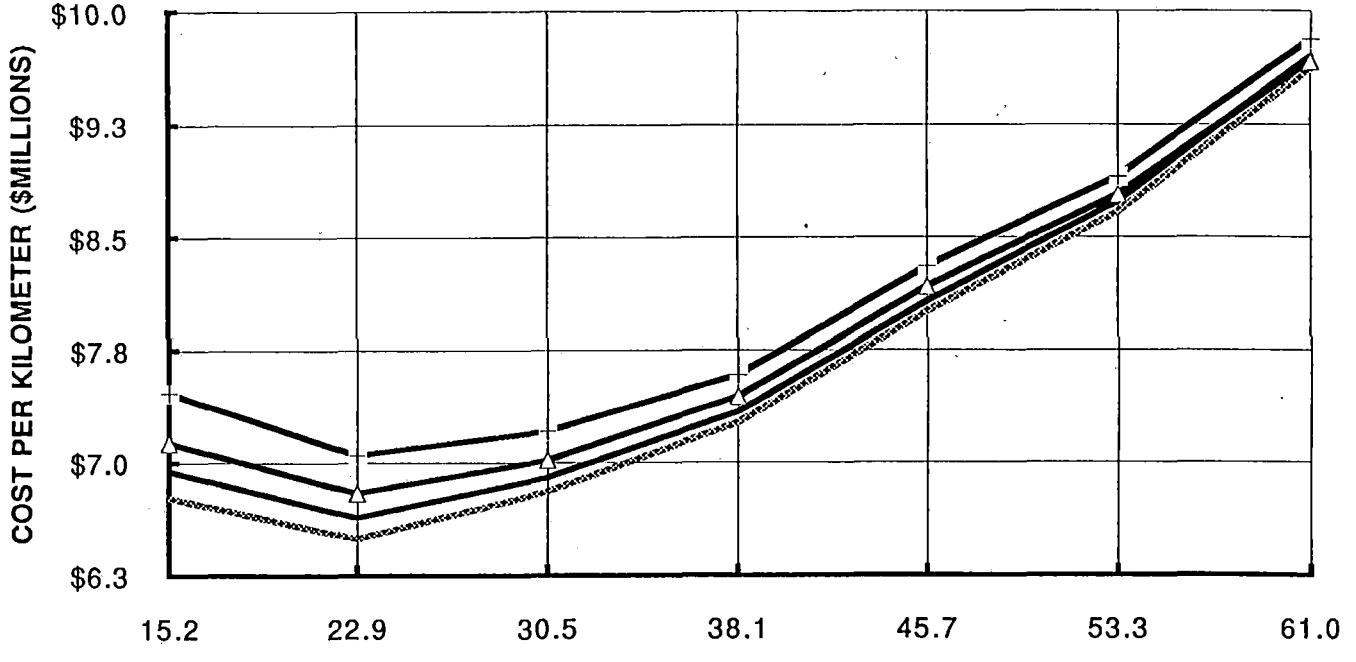
Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-H/500
H/100
H/250
H/750

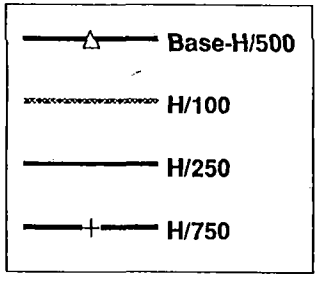
(Ref: Tables 3-3, 3-28, 3-33, & 3-38)

CHART 3-15

COST VARIATION BY COLUMN DEFLECTION
Type IV Girder



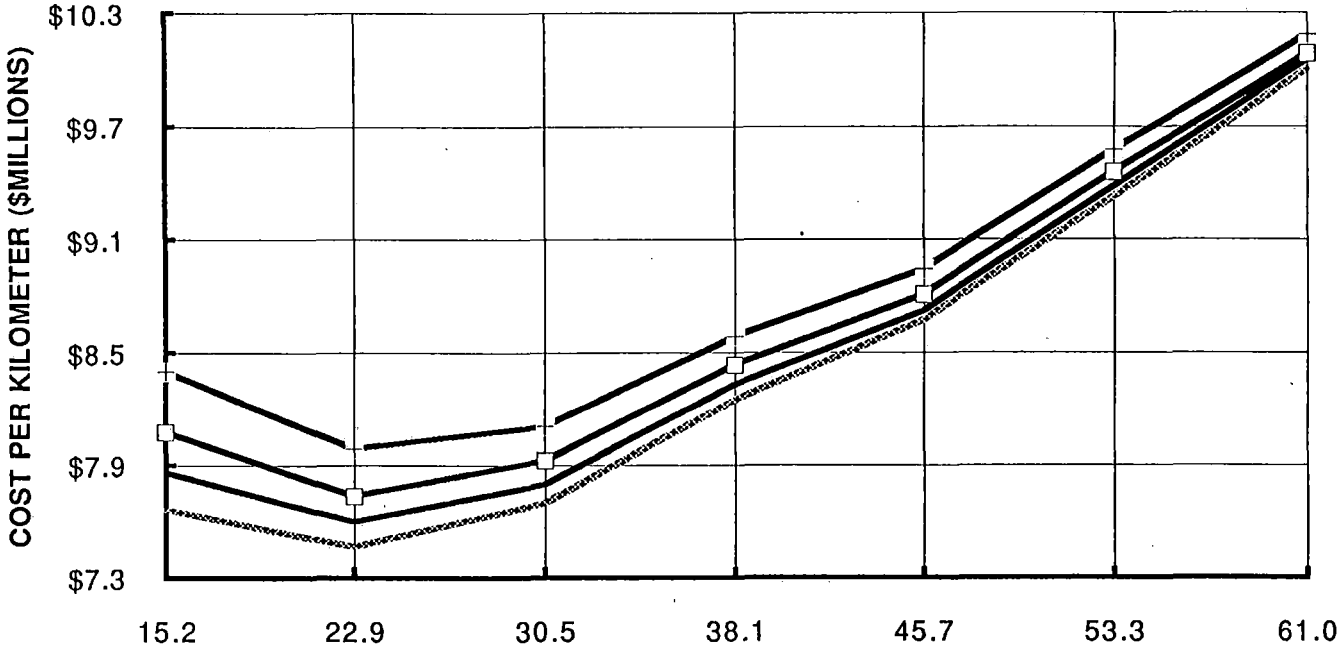
Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa



(Ref: Tables 3-4, 3-29, 3-34, & 3-39)

CHART 3-16

COST VARIATION BY COLUMN DEFLECTION
Type V Girder



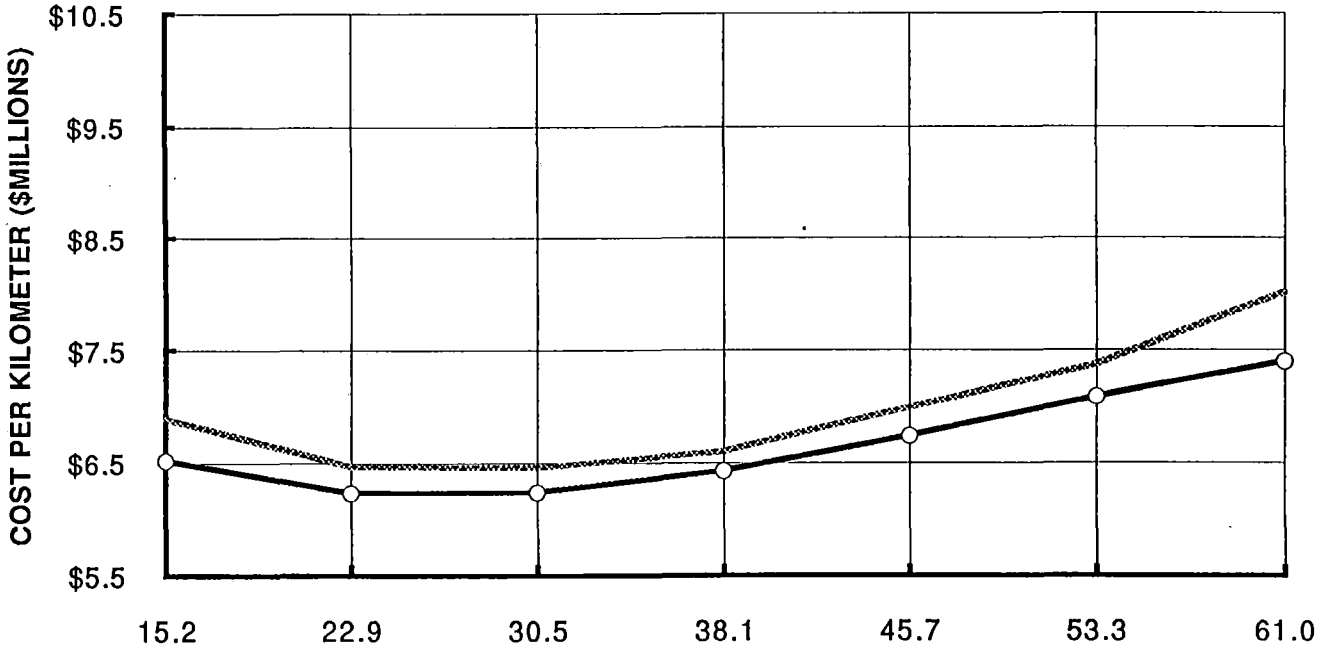
Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-H/500
H/100
L/250
L/750

(Ref: Tables 3-5, 3-30, 3-35, & 3-40)

CHART 3-17

COST VARIATION BY SEISMIC ZONE
Type I Girder

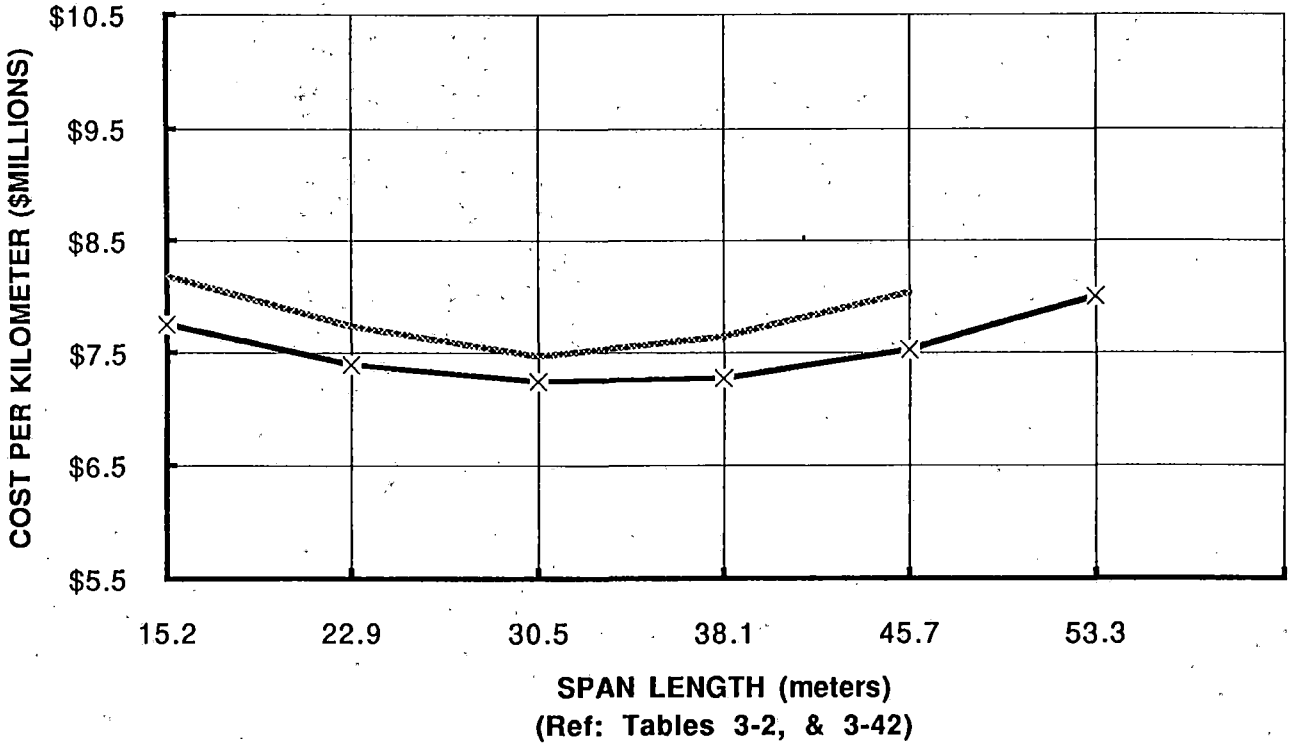


Design Parameters:
Single Column
Clearance =10.67
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-18

COST VARIATION BY SEISMIC ZONE
Type II Girder

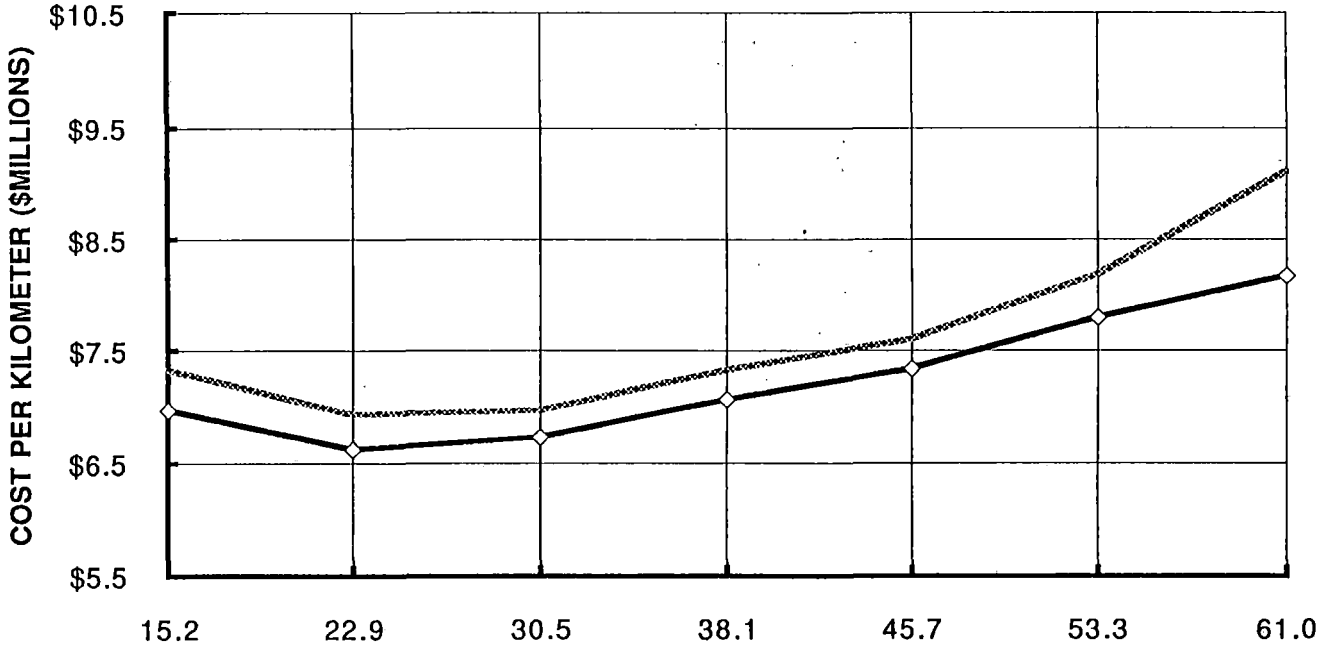


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-19

COST VARIATION BY SEISMIC ZONE
Type III Girder

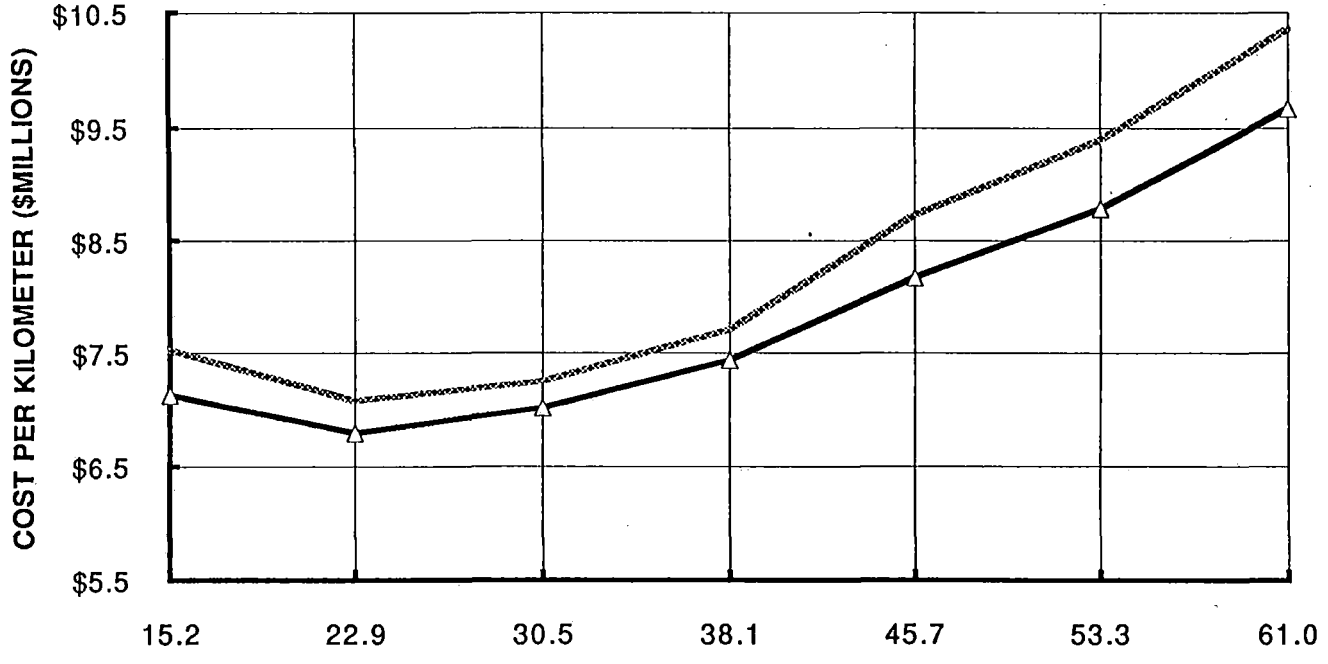


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-20

COST VARIATION BY SEISMIC ZONE
Type IV Girder

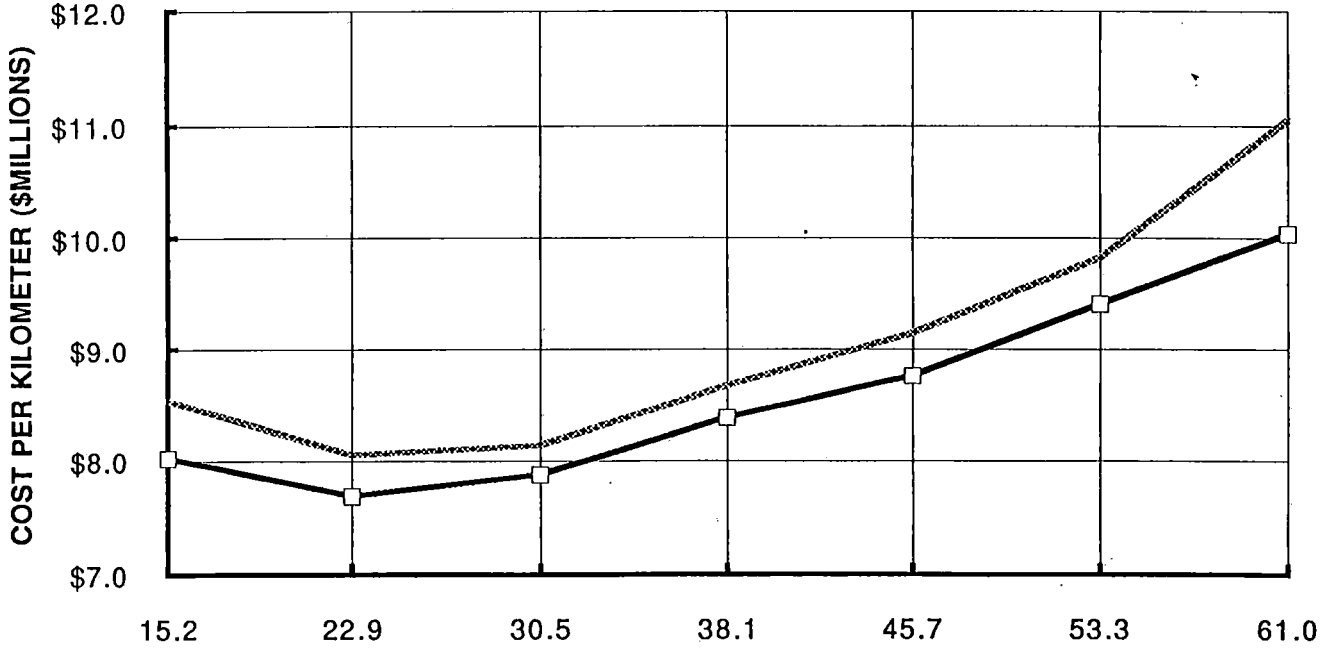


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-21

COST VARIATION BY SEISMIC ZONE
Type V Girder

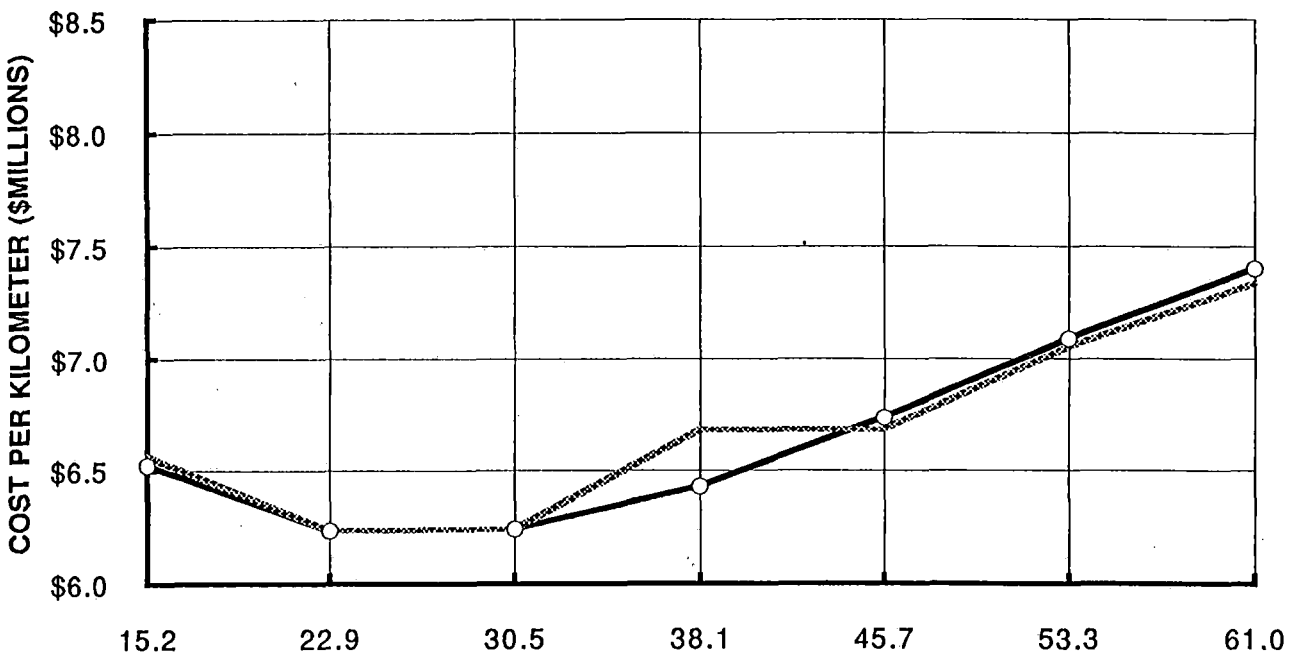


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-22

COST VARIATION BY GIRDER STRENGTH
Type I Girder

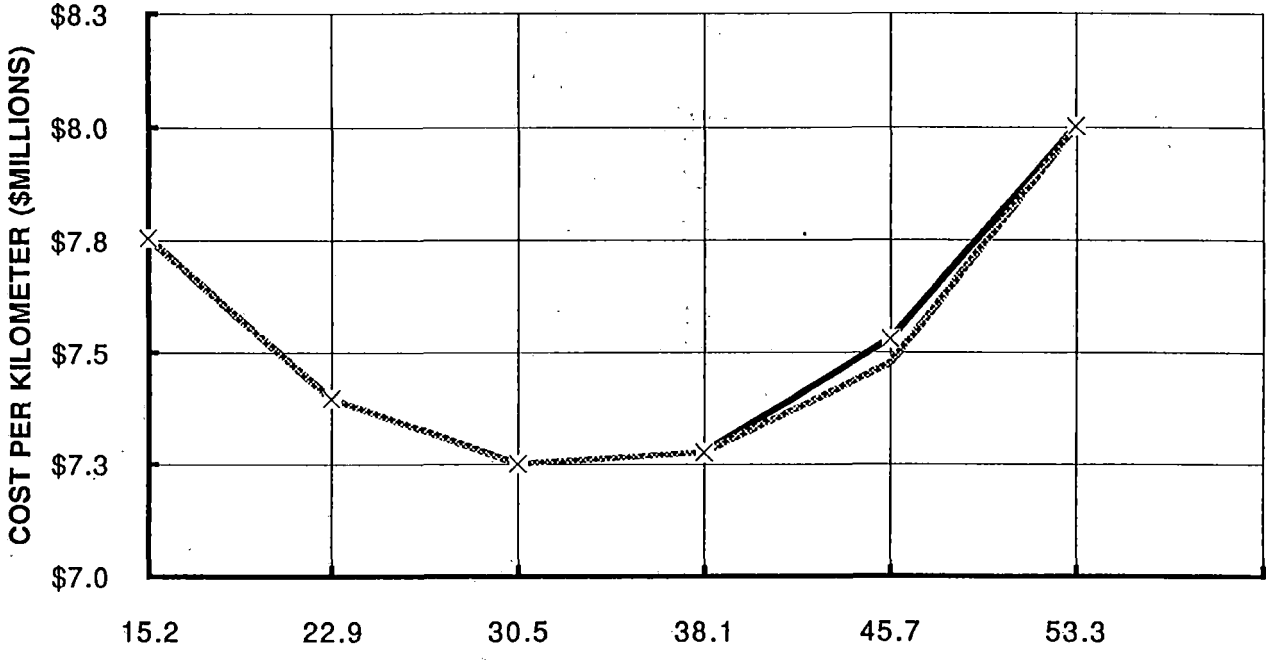


Design Parameters:
Single Column
Clearance =10.67
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369 kPa
55158 kPa

CHART 3-23

COST VARIATION BY GIRDER STRENGTH
Type II Girder



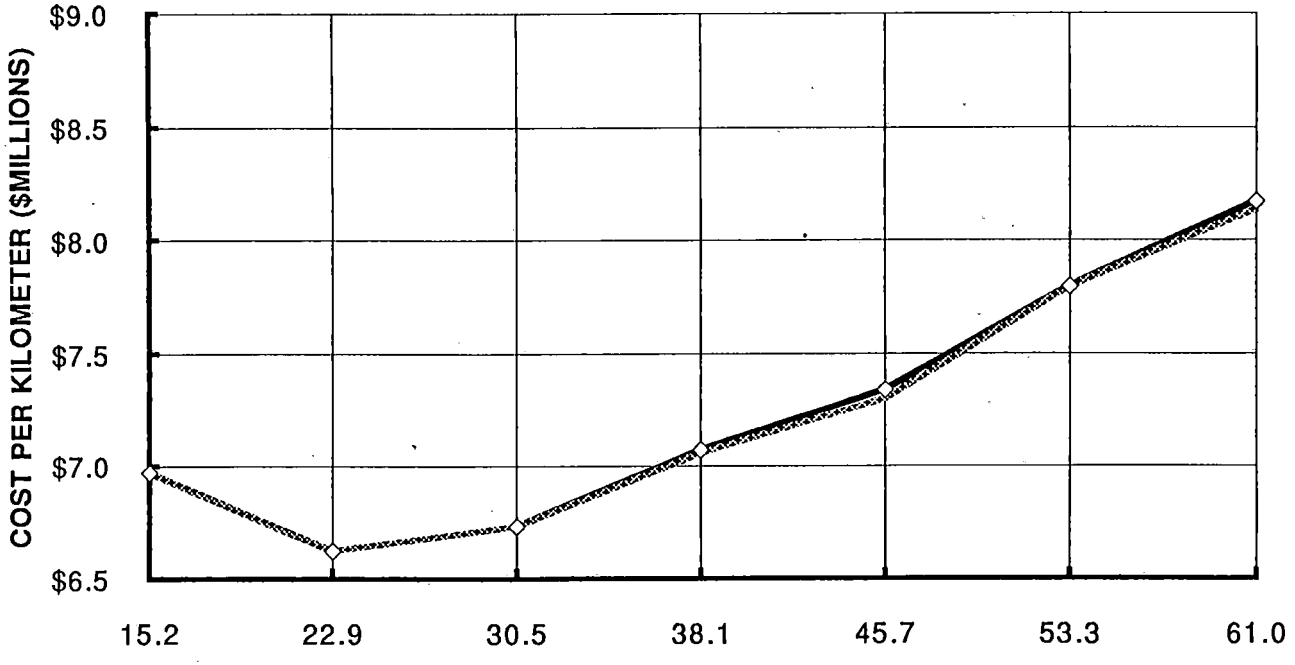
(Ref: Tables 3-2, & 3-47)

Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369kPa
55158 kPa

CHART 3-24

COST VARIATION BY GIRDER STRENGTH
Type III Girder



Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

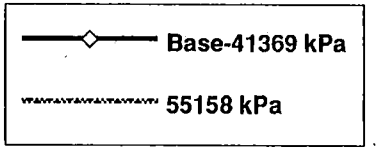
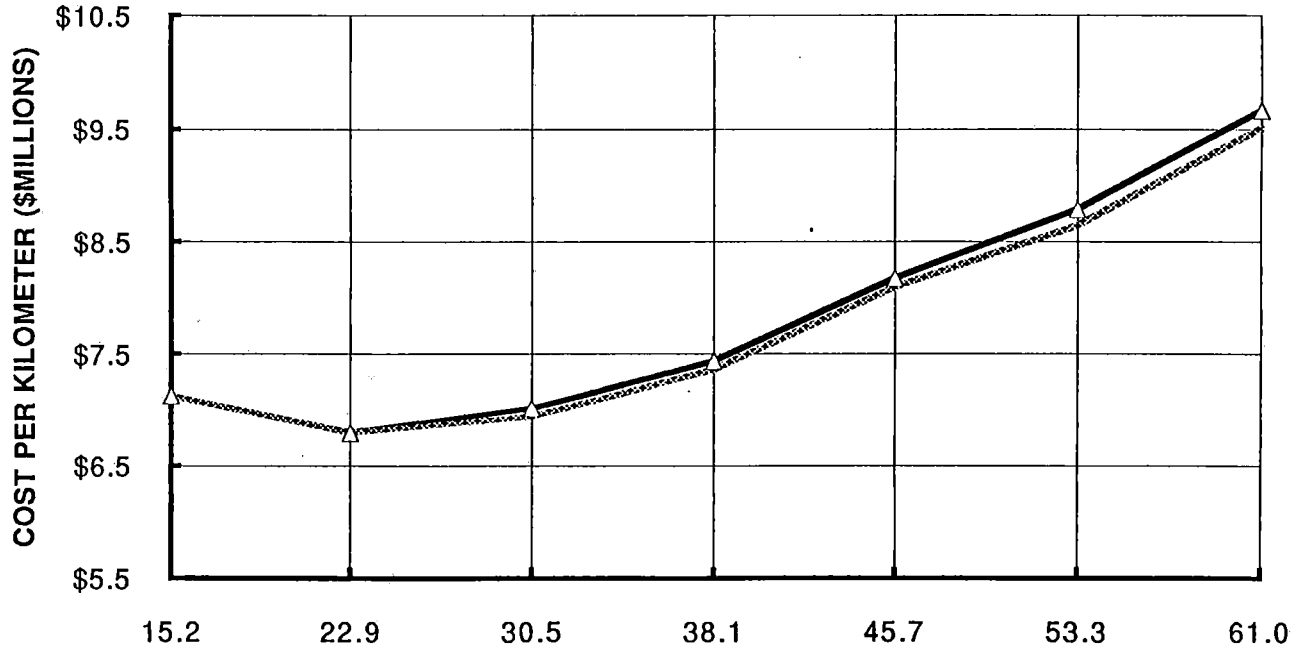


CHART 3-25

COST VARIATION BY GIRDER STRENGTH
Type IV Girder

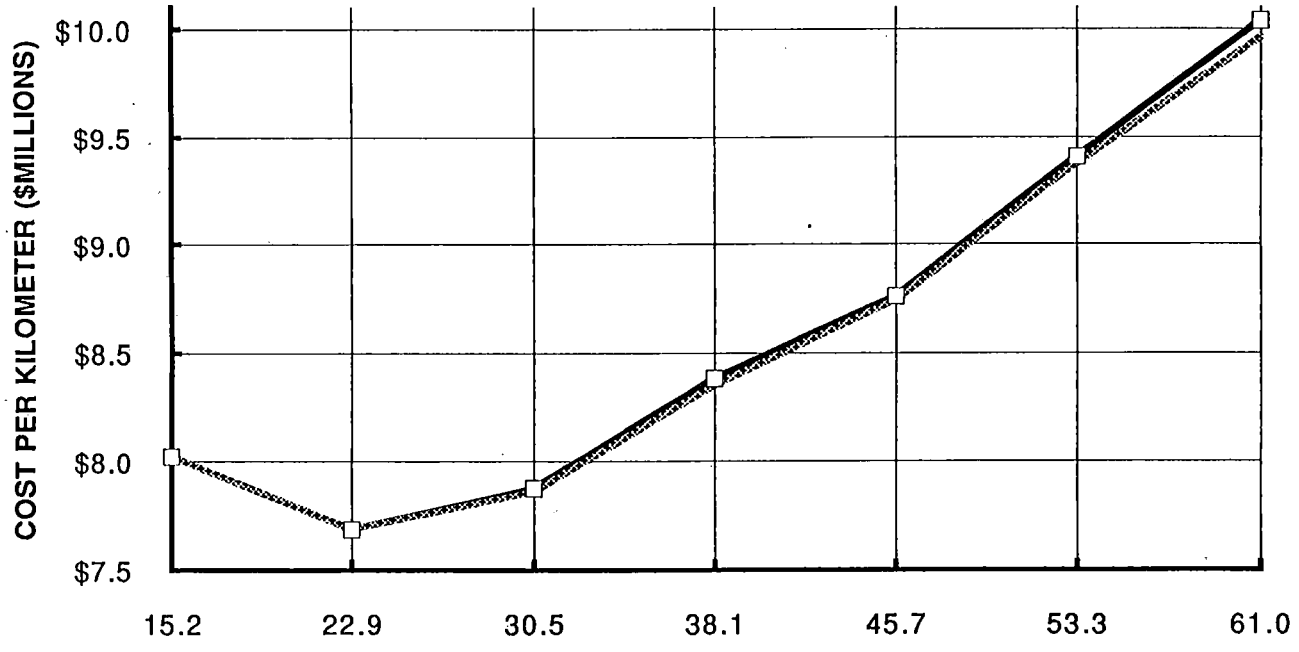


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369 kPa
55158 kPa

CHART 3-26

COST VARIATION BY GIRDER STRENGTH
Type V Girder

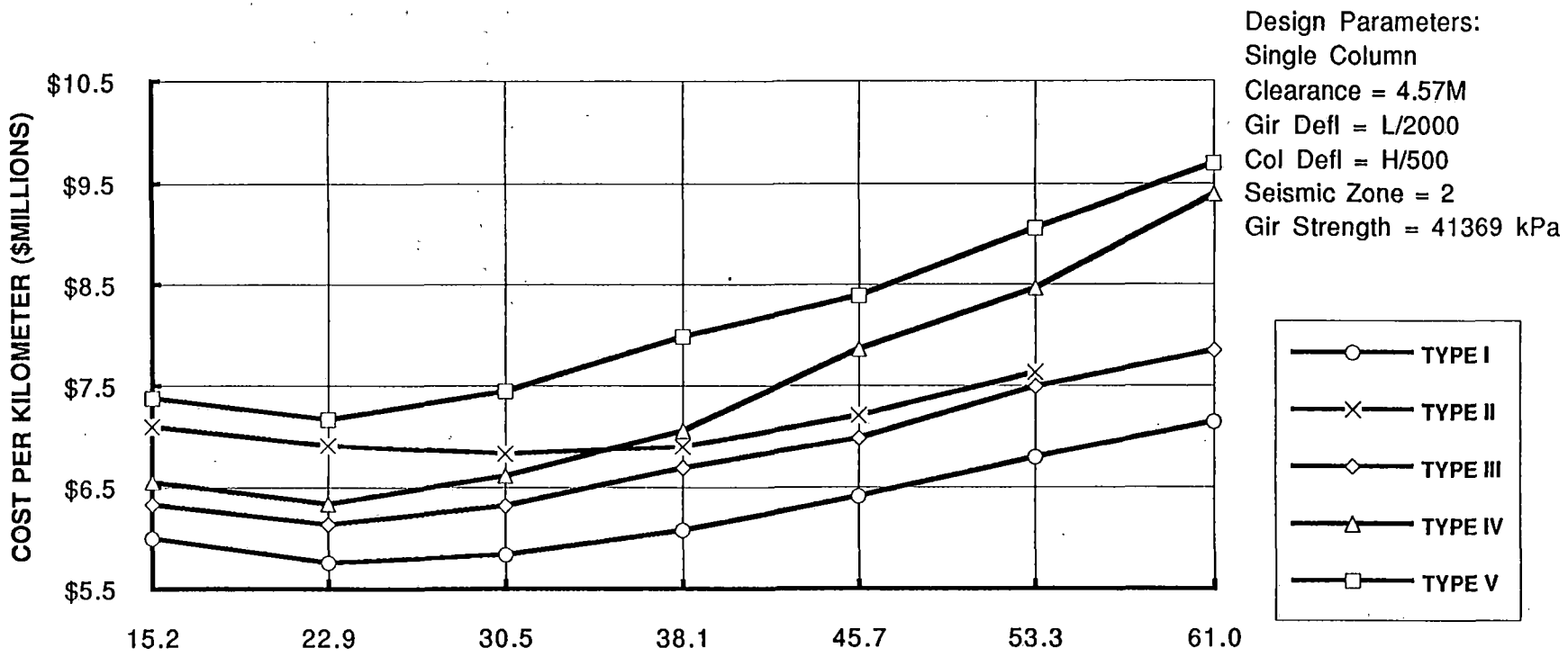


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369 kPa
55158 kPa

CHART 3-27

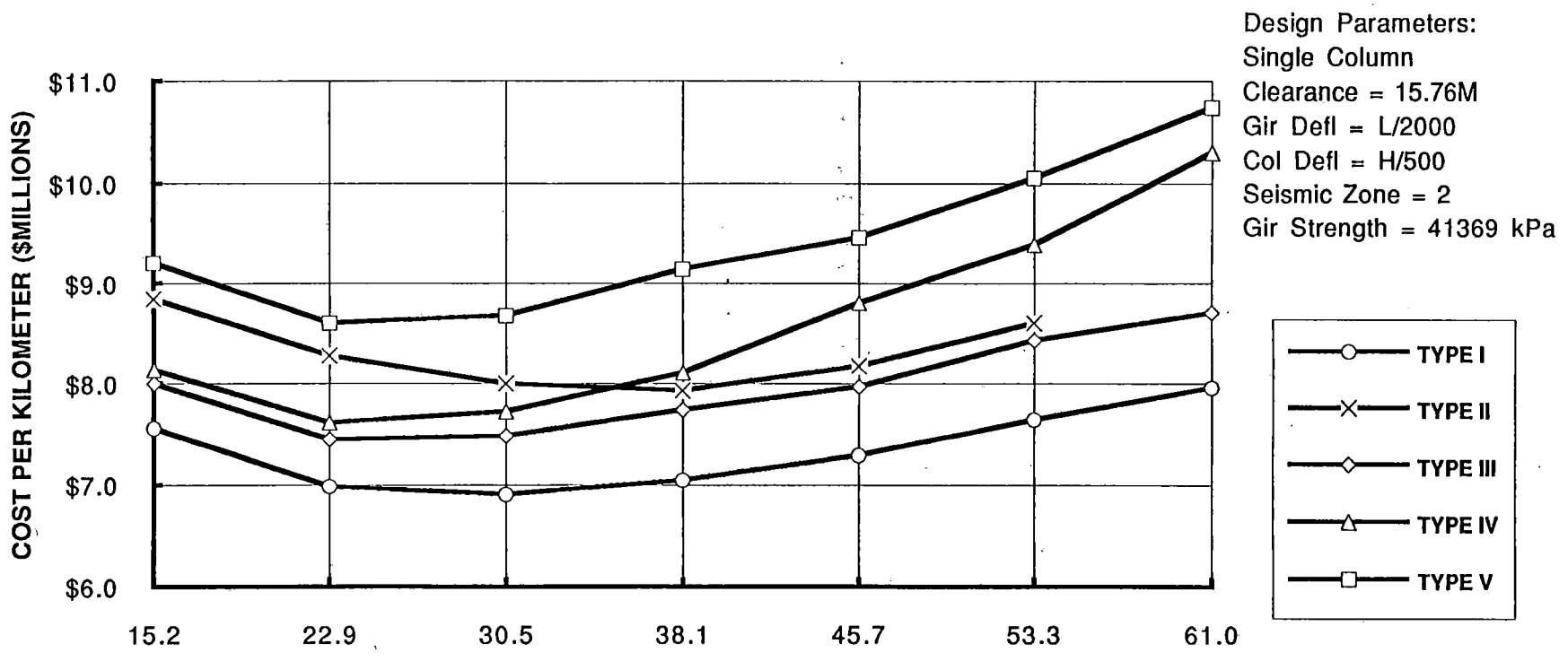
GUIDEWAY COST -4.57 M CLEARANCE



(Ref: Tables 3-6, 3-7, 3-8, 3-9, & 3-10)

CHART 3-28

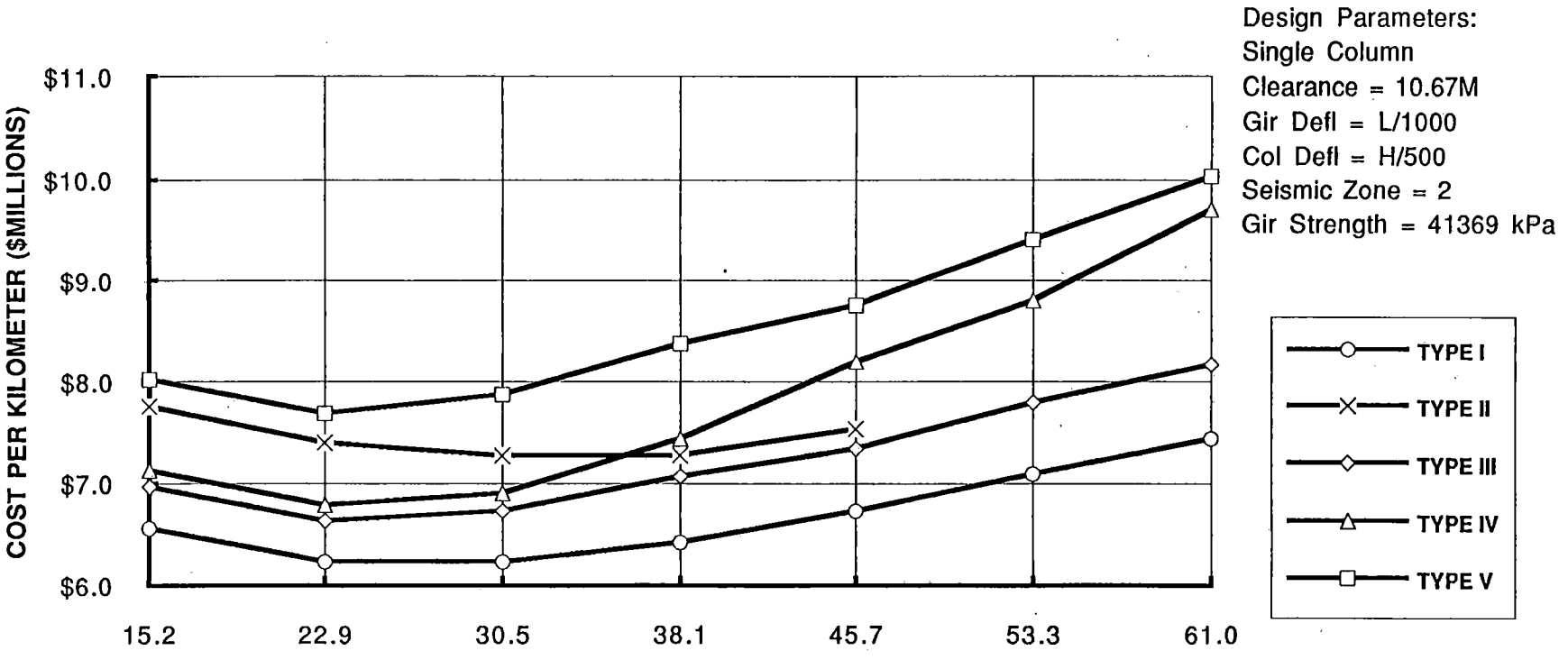
GUIDEWAY COST -15.76 M CLEARANCE



(Ref: Tables 3-11, 3-12, 3-13, 3-14, & 3-15)

CHART 3-29

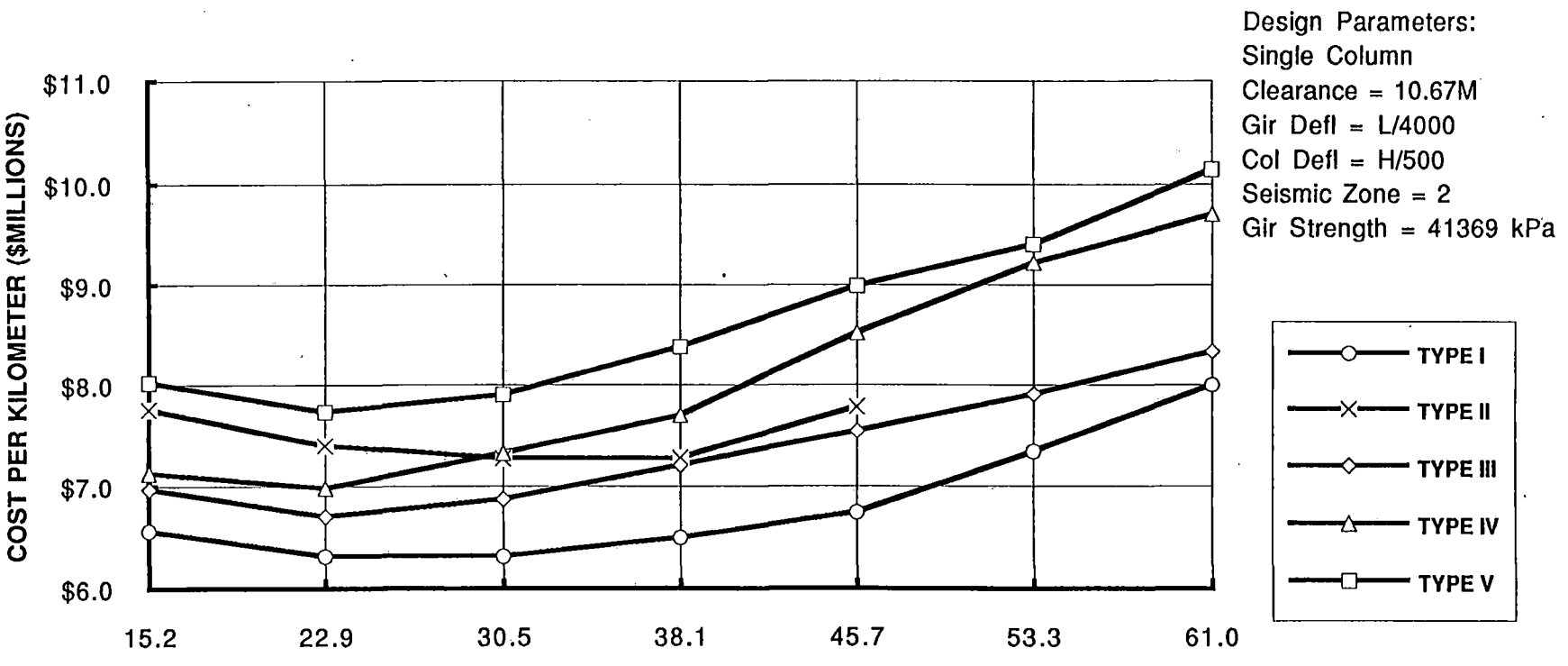
GUIDEWAY COST -L/1000 GIRDER DEFL



(Ref: Tables 3-16, 3-17, 3-18, 3-19, & 3-20)

CHART 3-30

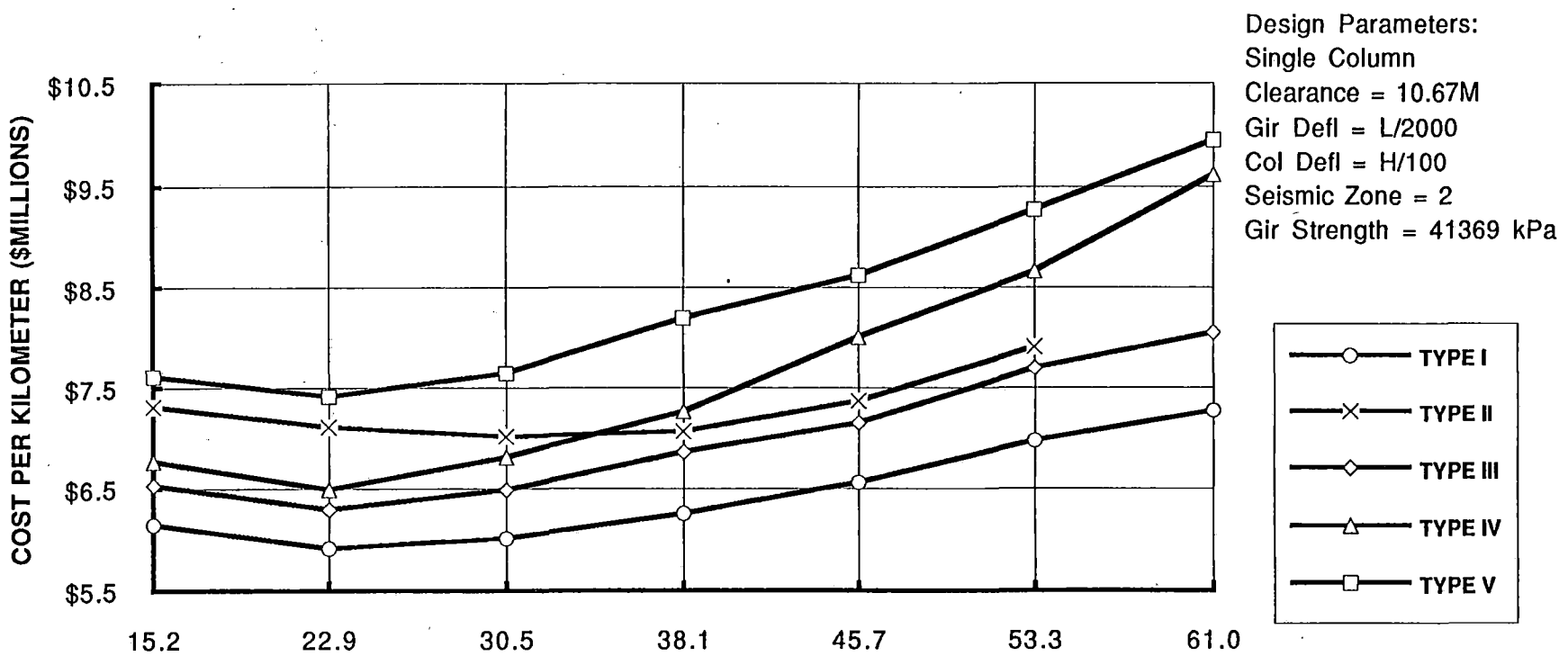
GUIDEWAY COST -L/4000 GIRDER DEFL



(Ref: Tables 3-21, 3-22, 3-23, 3-24, & 3-25)

CHART 3-31

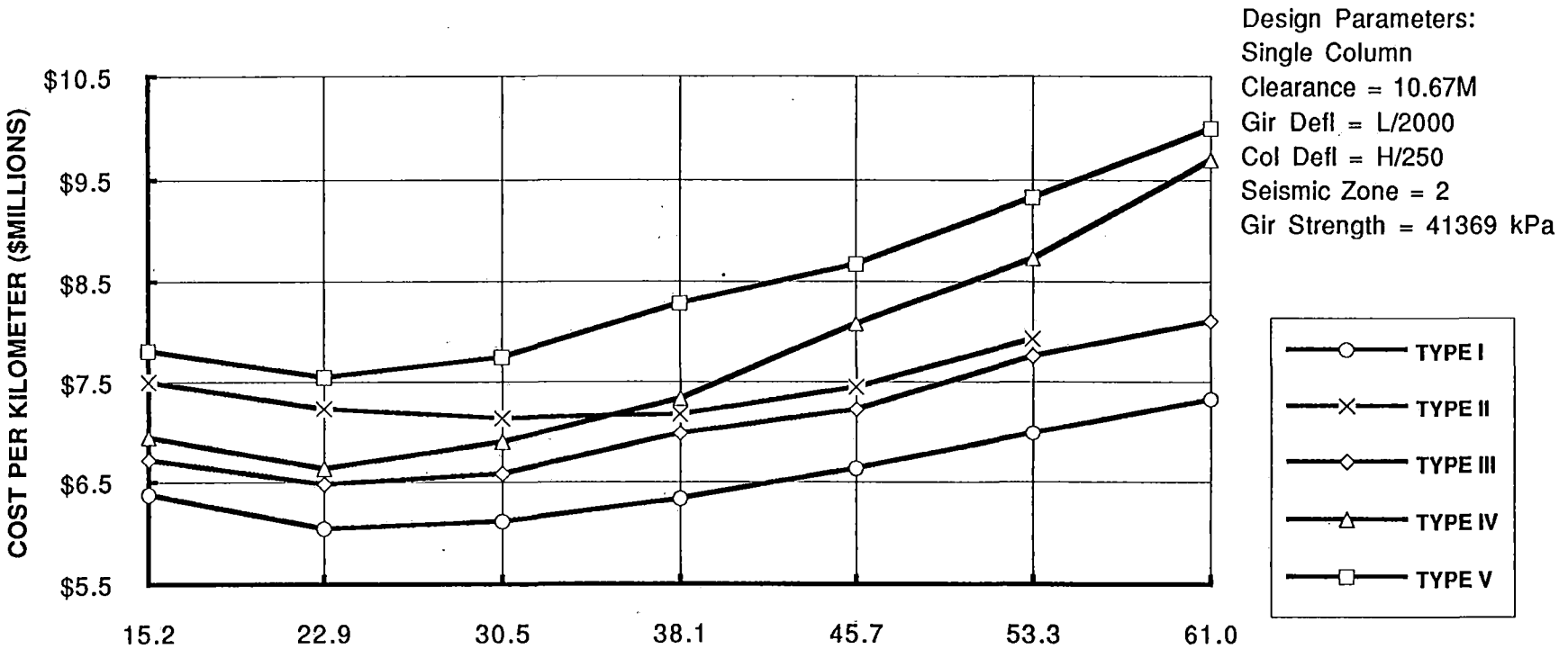
GUIDEWAY COST -H/100 COLUMN DEFL



(Ref: Tables 3-26, 3-27, 3-28, 3-29, & 3-30)

CHART 3-32

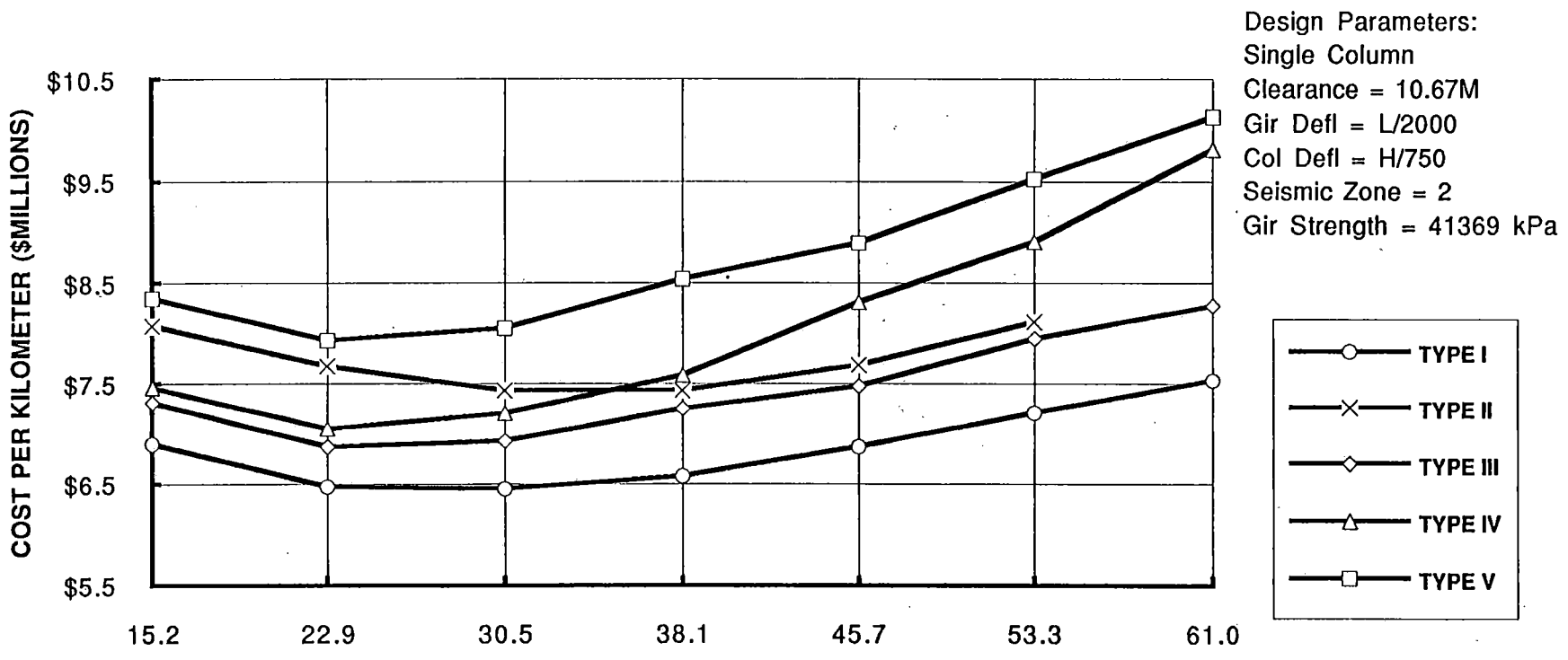
GUIDEWAY COST -H/250 COLUMN DEFL



(Ref: Tables 3-31, 3-32, 3-33, 3-34, & 3-35)

CHART 3-33

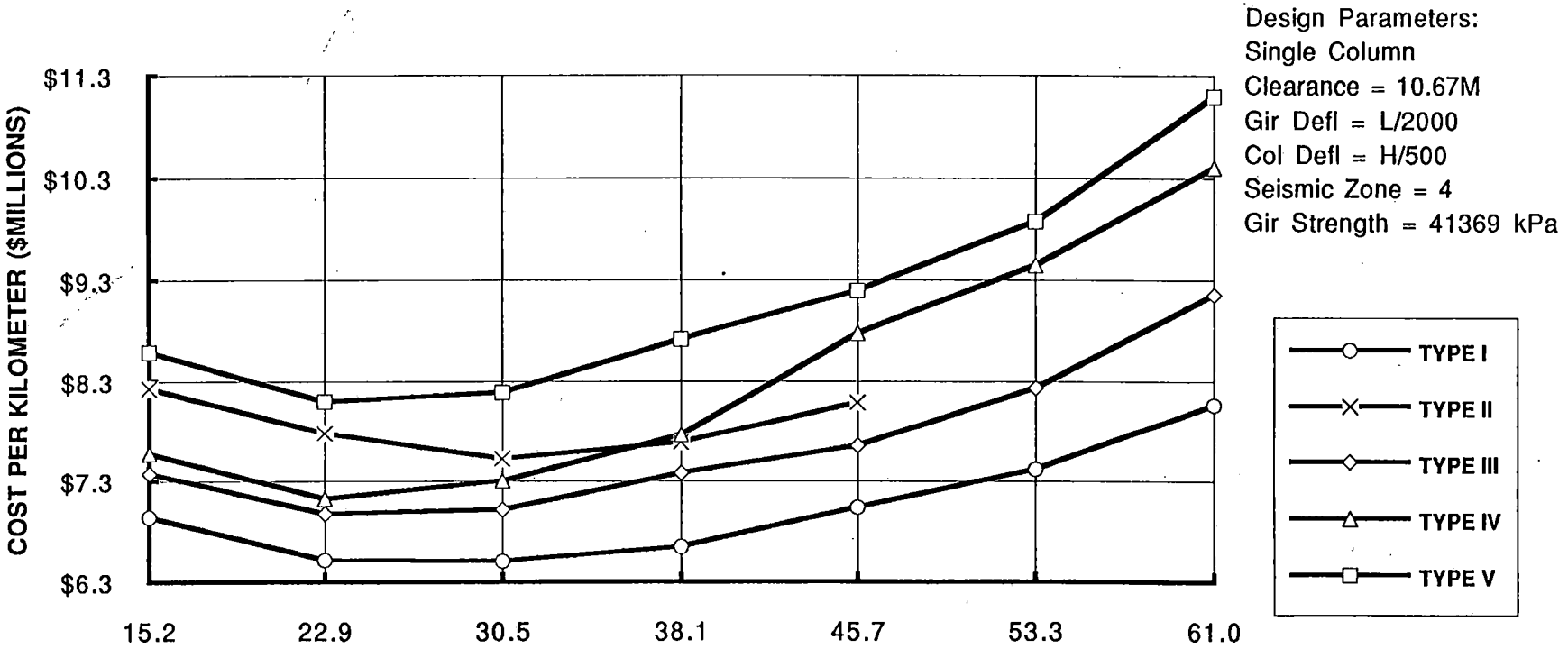
GUIDEWAY COST -H/750 COLUMN DEFL



(Ref: Tables 3-36, 3-37, 3-38, 3-39, & 3-40)

CHART 3-34

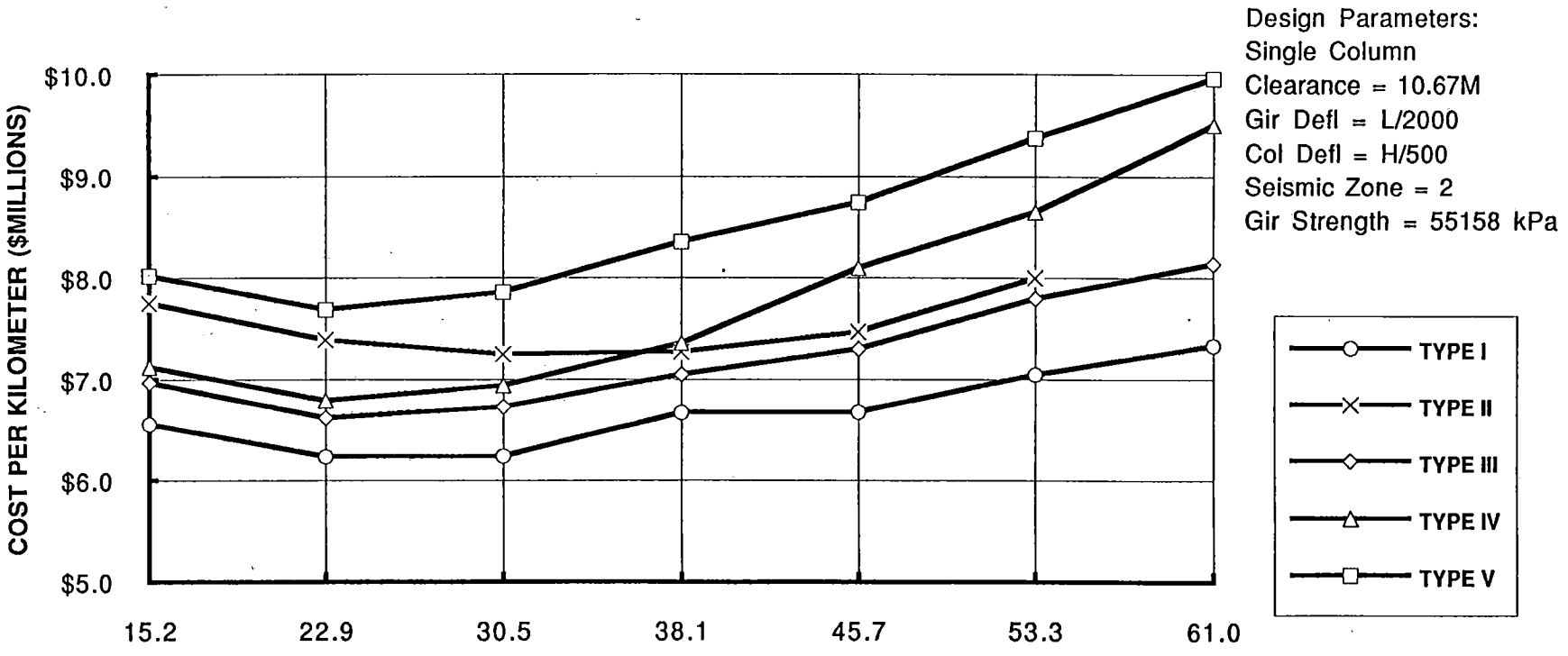
GUIDEWAY COST -SESIMIC ZONE 4



(Ref: Tables 3-41, 3-42, 3-43, 3-44, & 3-45)

CHART 3-35

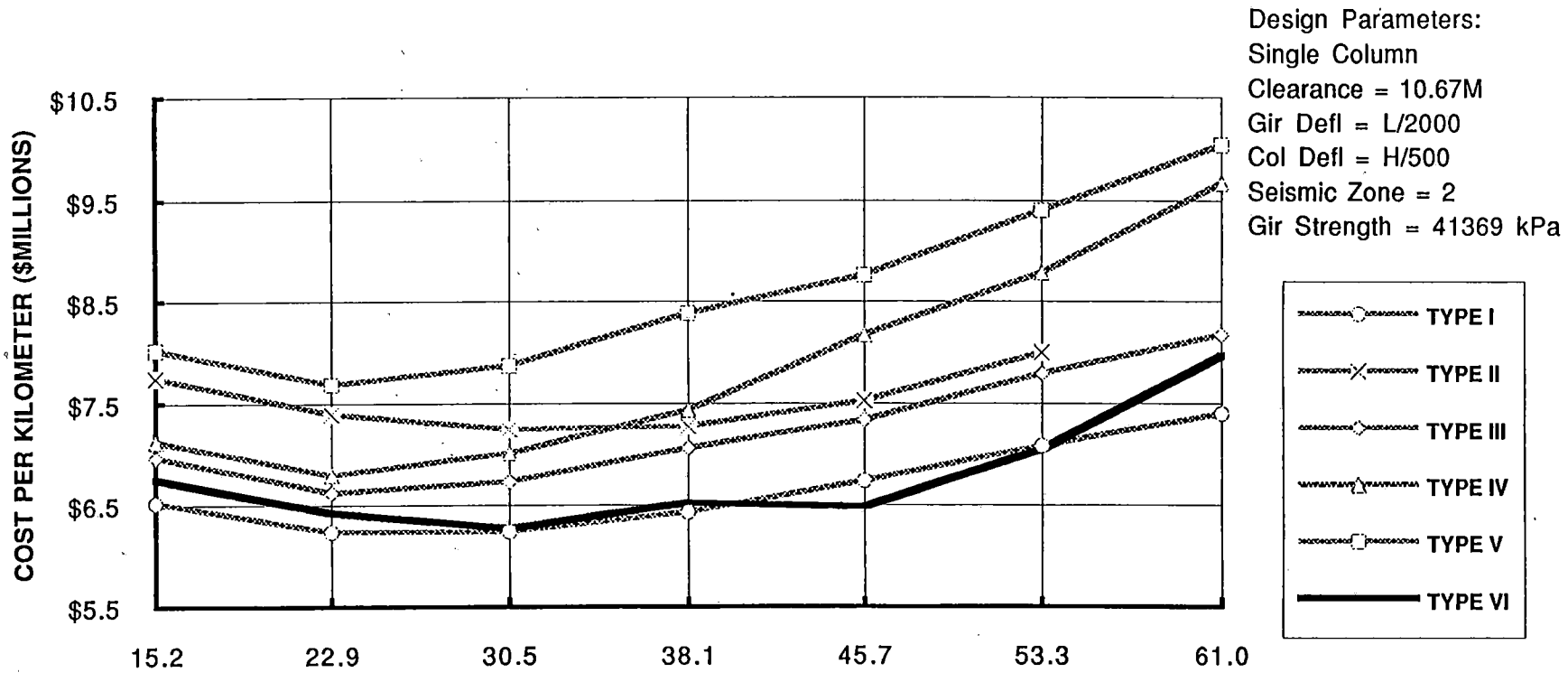
GUIDEWAY COST -55158kPa GIRDER CONCRETE



(Ref: Tables 3-46, 3-47, 3-48, 3-49, & 3-50)

CHART 3-36

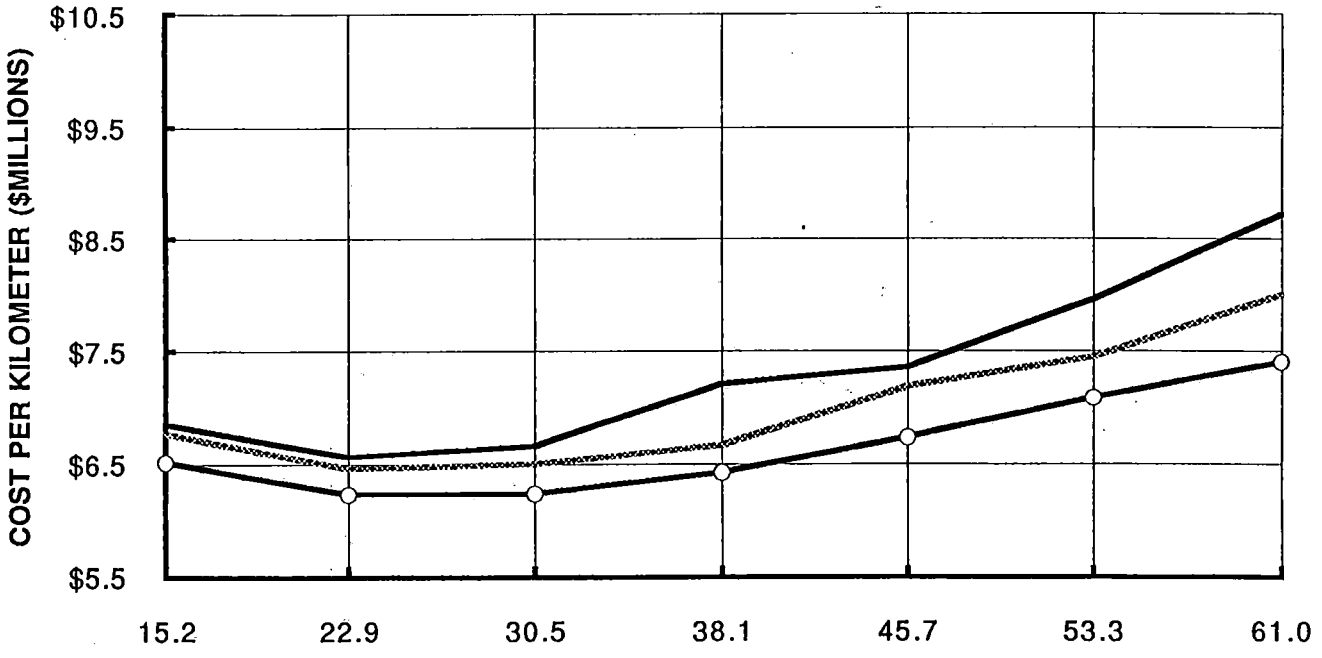
TYPE VI GUIDEWAY COST



(Ref: Tables 3-1, 3-2, 3-3, 3-4, 3-5, & 3-51)

CHART 3-37

COST VARIATION BY PAYLOAD
Type I Girder

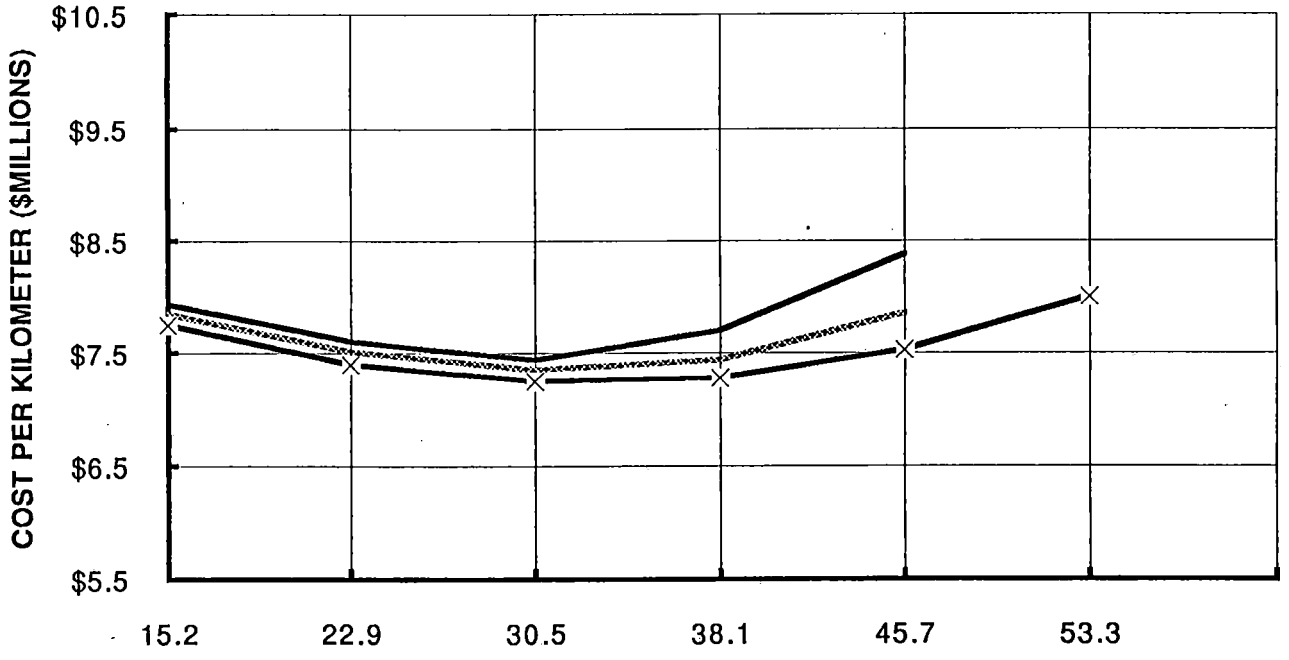


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base Pas'ngr
FRT=1.27t/M
FRT= 1.90 t/M

CHART 3-38

COST VARIATION BY PAYLOAD
Type II Girder

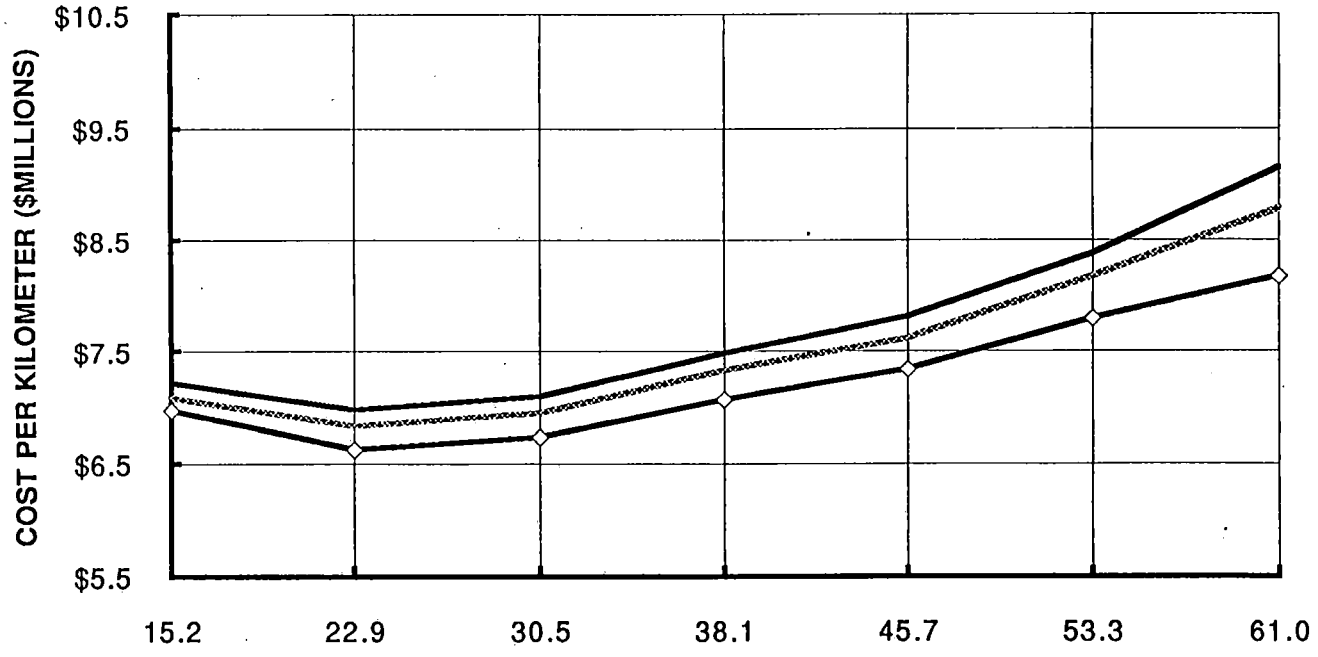


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

(Ref: Tables 3-2, 3-53, & 3-58)

CHART 3-39

COST VARIATION BY PAYLOAD
Type III Girder



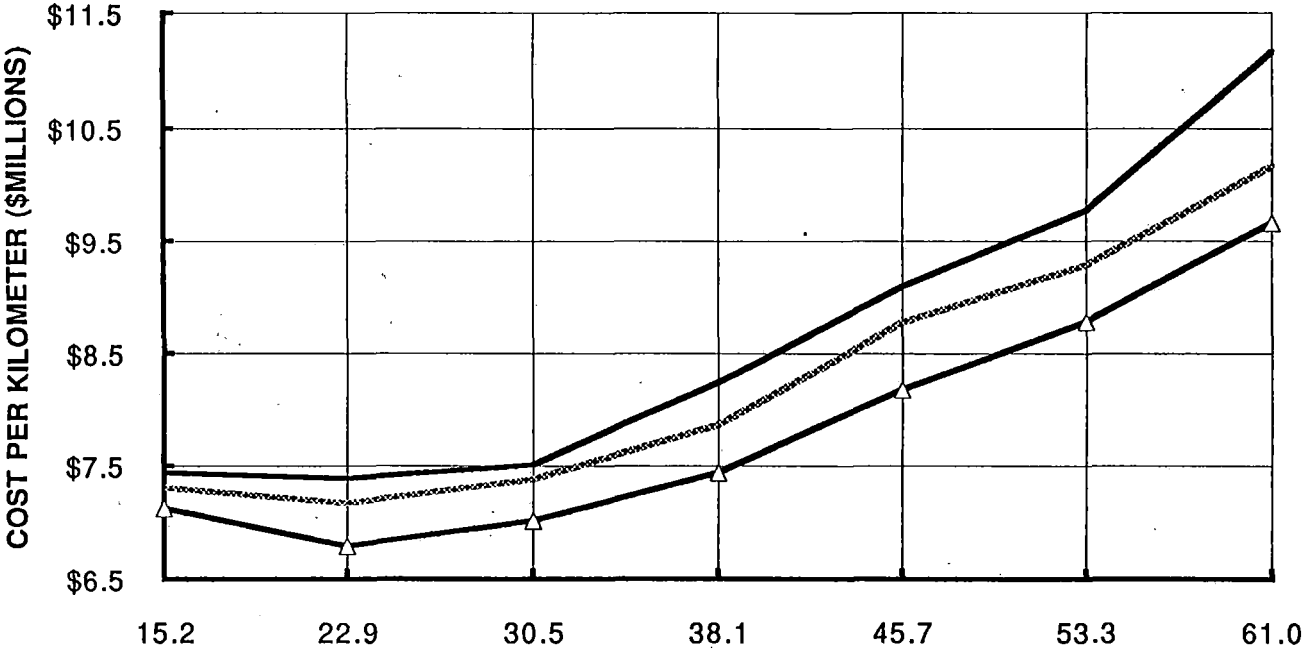
Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-Pas'ngr
FRT = 1.27 t/M
FRT = 1.90 t/M

(Ref: Tables 3-3, 3-54, & 3-59)

CHART 3-40

COST VARIATION BY PAYLOAD
Type IV Girder

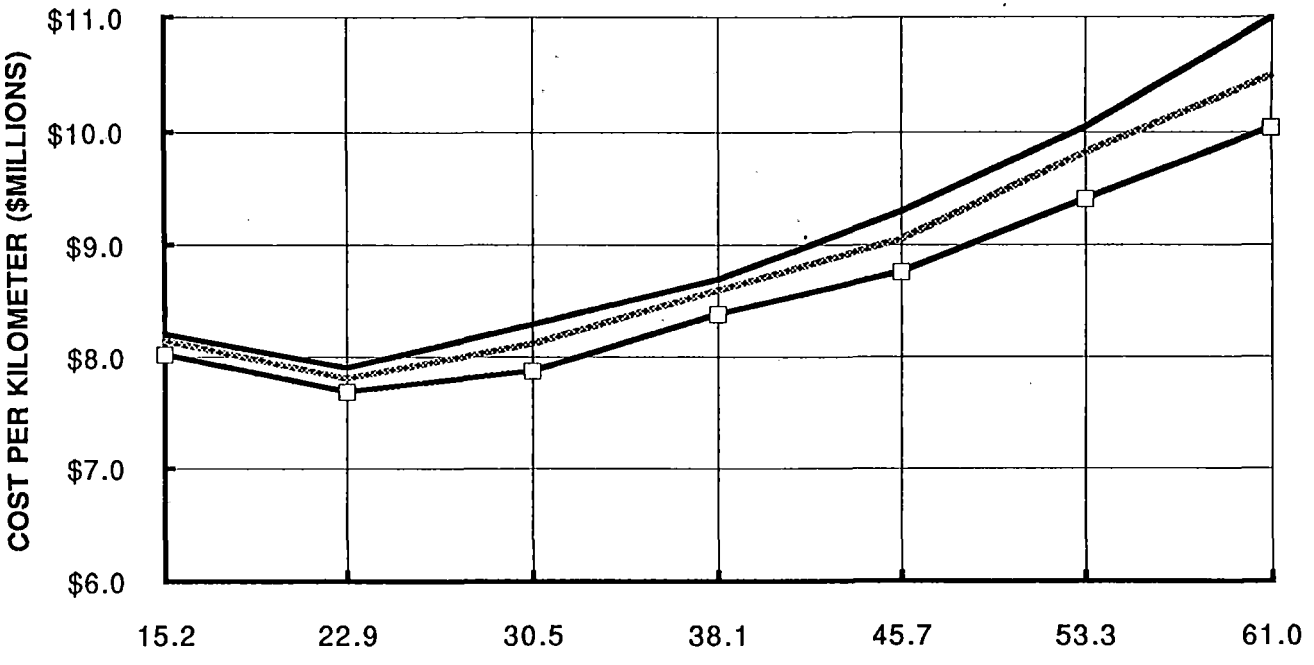


Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl =L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

(Ref: Tables 3-4, 3-55, & 3-60)

CHART 3-41

COST VARIATION BY PAYLOAD
Type V Girder



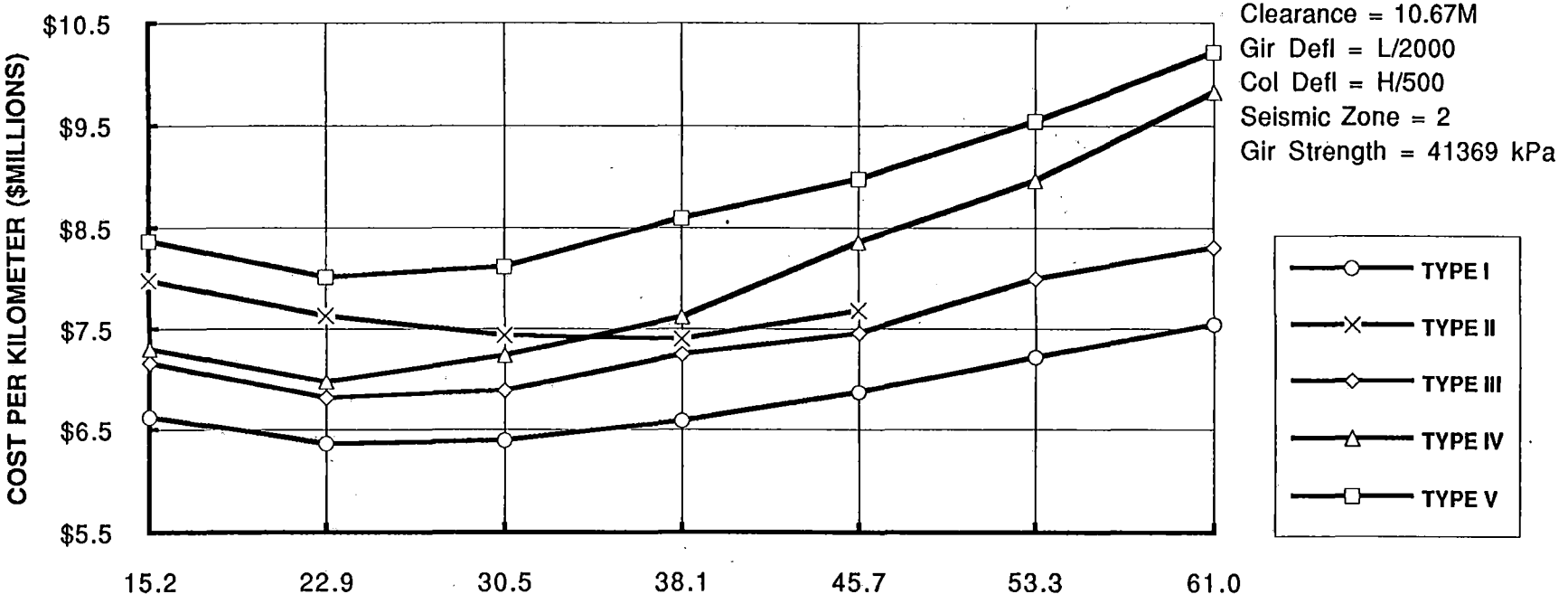
(Ref: Tables 3-5, 3-56, & 3-61)

Design Parameters:
Single Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

- Base-Pas'ngr
- FRT = 1.27 t/M
- FRT = 1.90 t/M

CHART 3-42

GUIDEWAY COST SUMMARY
(per kilometer)

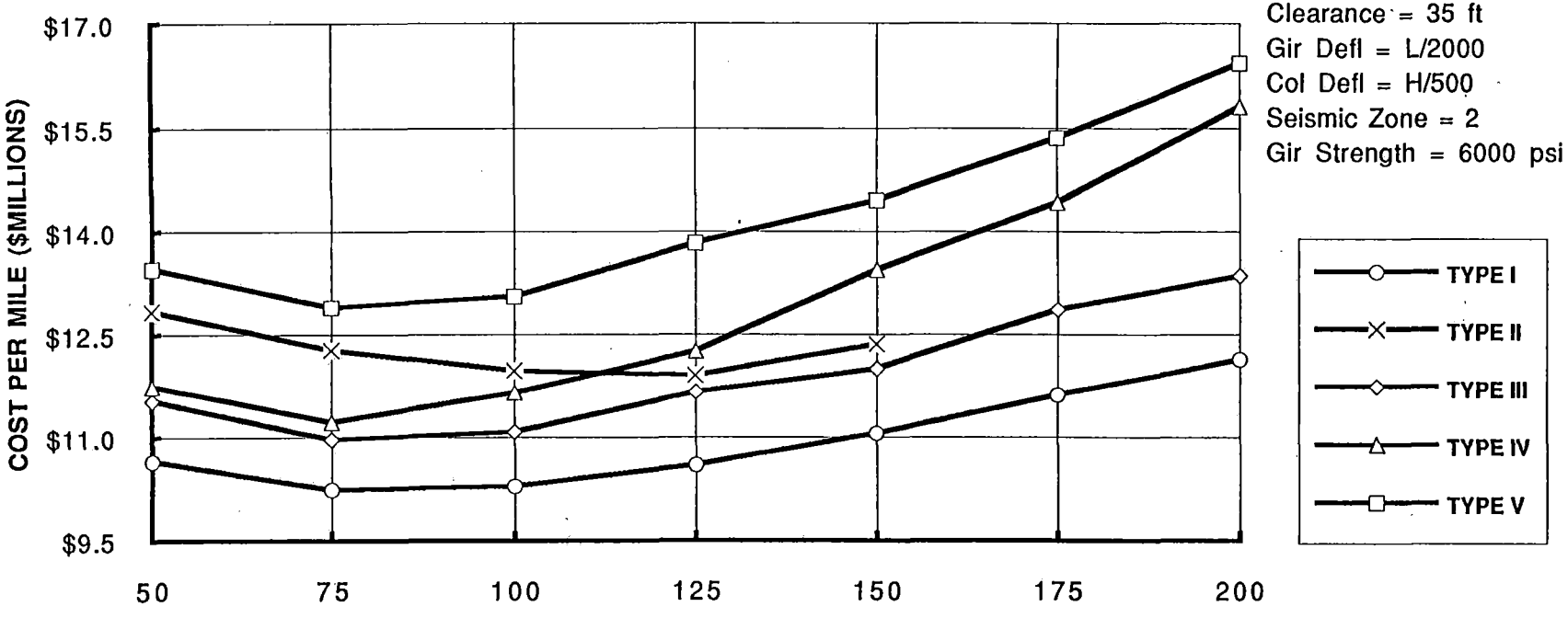


Design Parameters:
Two Column
Clearance = 10.67M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

(Ref: Tables 3-62, 3-63, 3-64, 3-65, & 3-66)

CHART 3-43

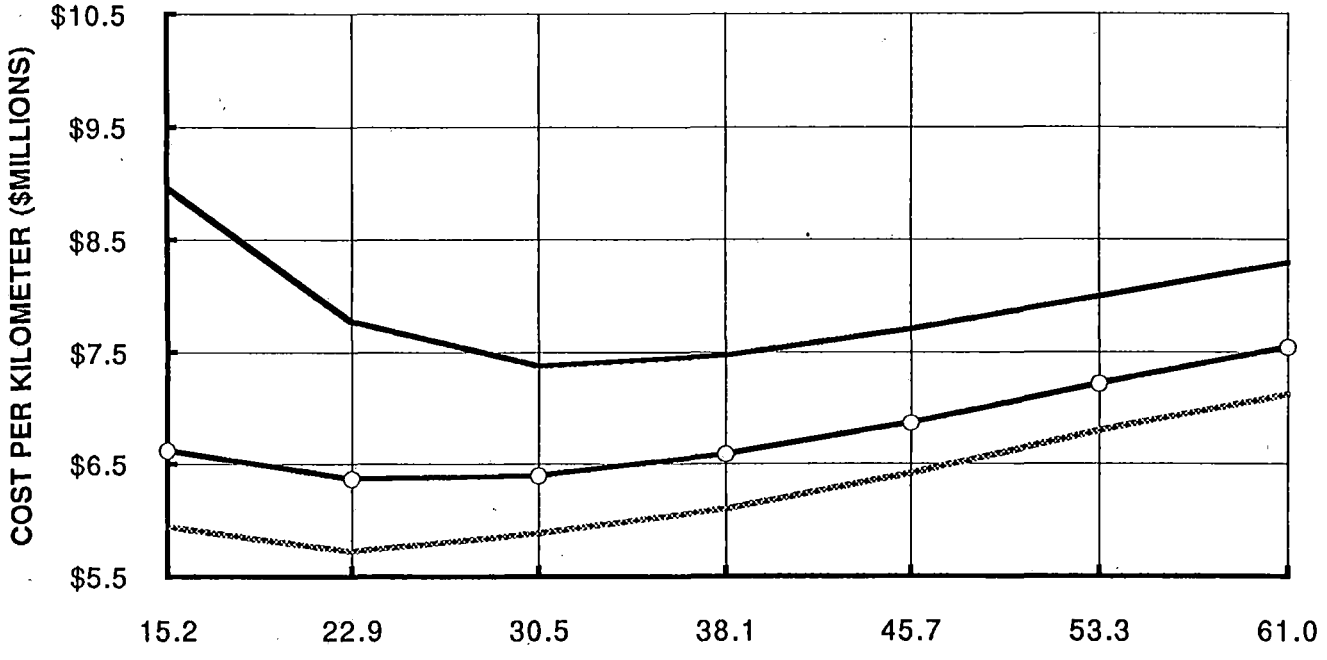
GUIDEWAY COST SUMMARY
(per mile)



(Ref: Tables 3-62, 3-63, 3-64, 3-65, & 3-66)

CHART 3-44

COST VARIATION BY COLUMN HEIGHT
Type I Girder



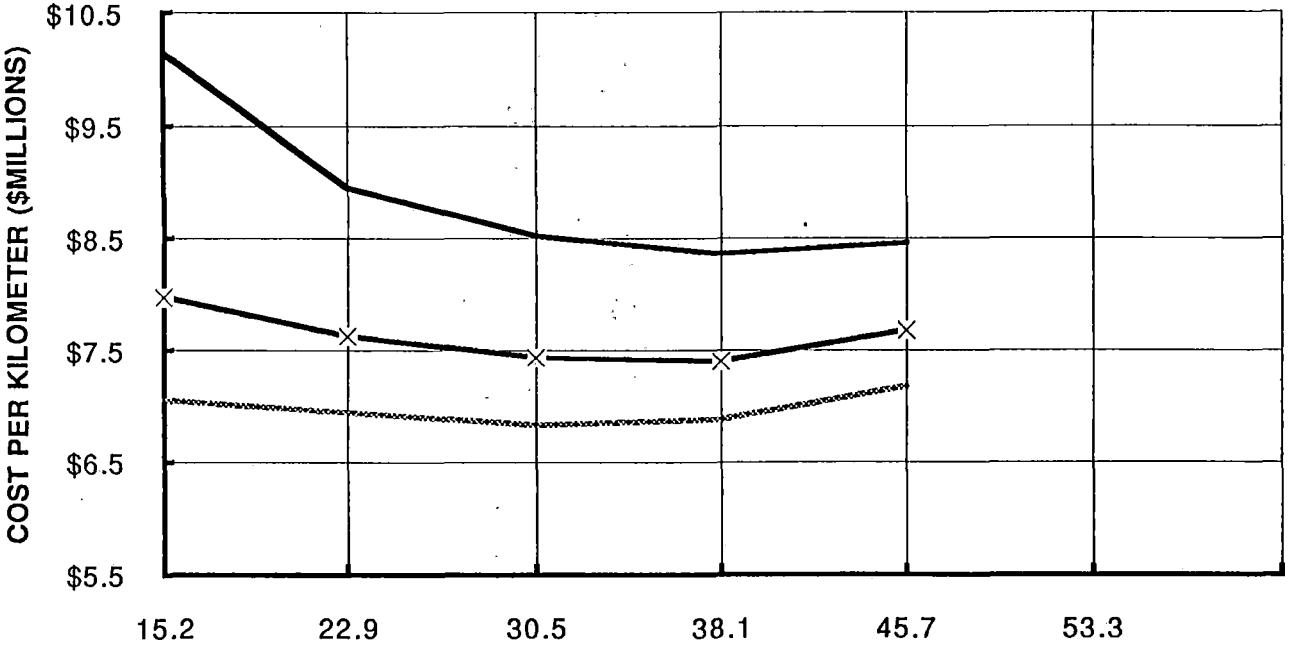
Design Parameters:
Two Column
Clearance =VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base 10.67 M
4.57 M
15.76 M

(Ref: Tables 3-62, 3-67, & 3-72)

CHART 3-45

COST VARIATION BY COLUMN HEIGHT
Type II Girder



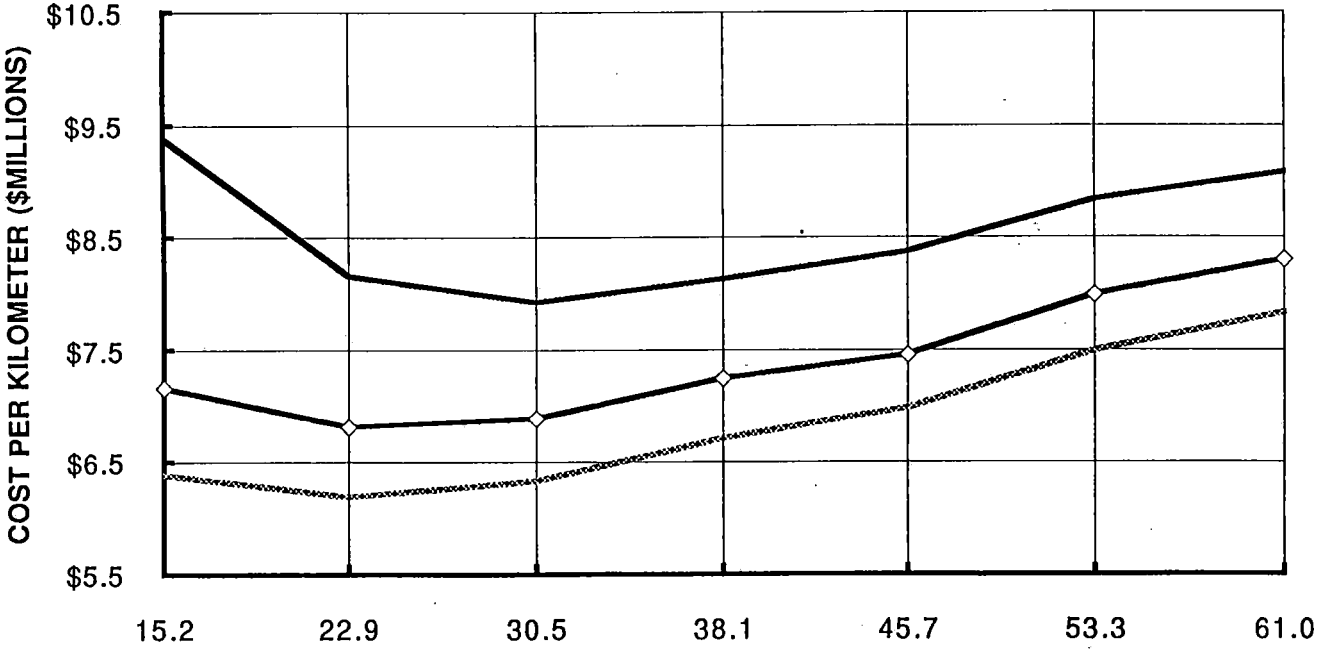
Design Parameters:
Two Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-10.67 M
4.57 M
15.76 M

(Ref: Tables 3-63, 3-68, & 3-73)

CHART 3-46

COST VARIATION BY COLUMN HEIGHT
Type III Girder



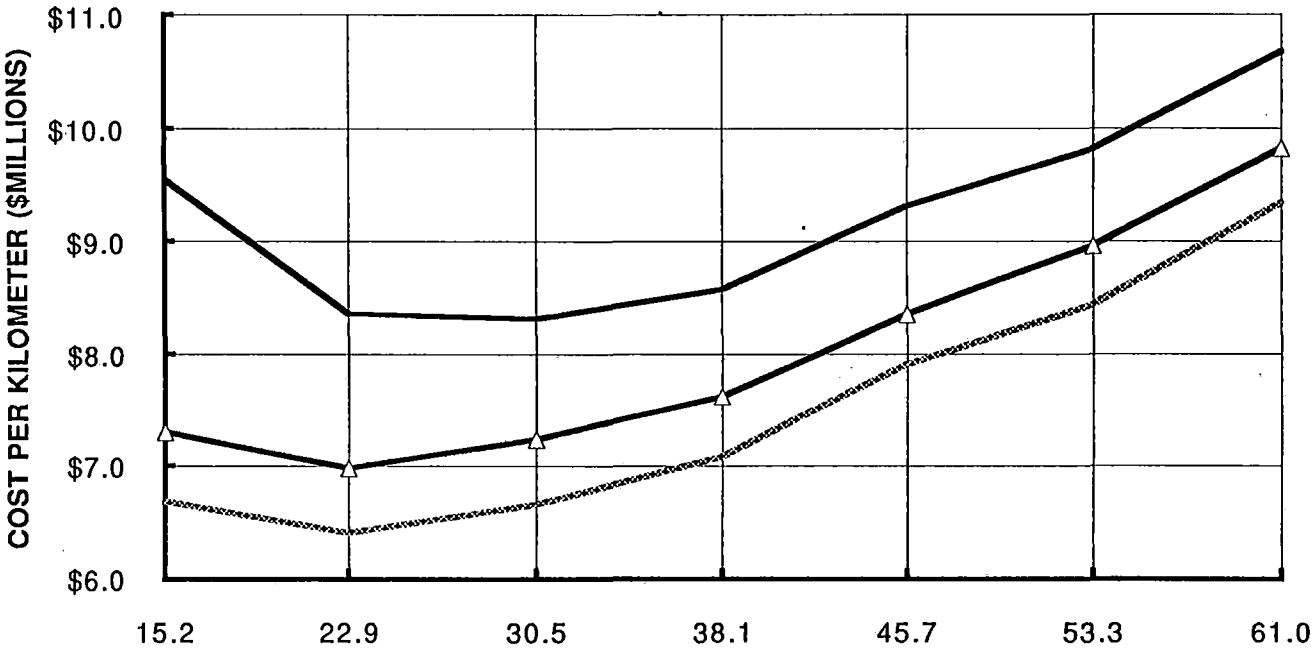
Design Parameters:
Two Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base 10.67 M
4.57 M
15.76 M

(Ref: Tables 3-64, 3-69, & 3-74)

CHART 3-47

COST VARIATION BY COLUMN HEIGHT
Type IV Girder



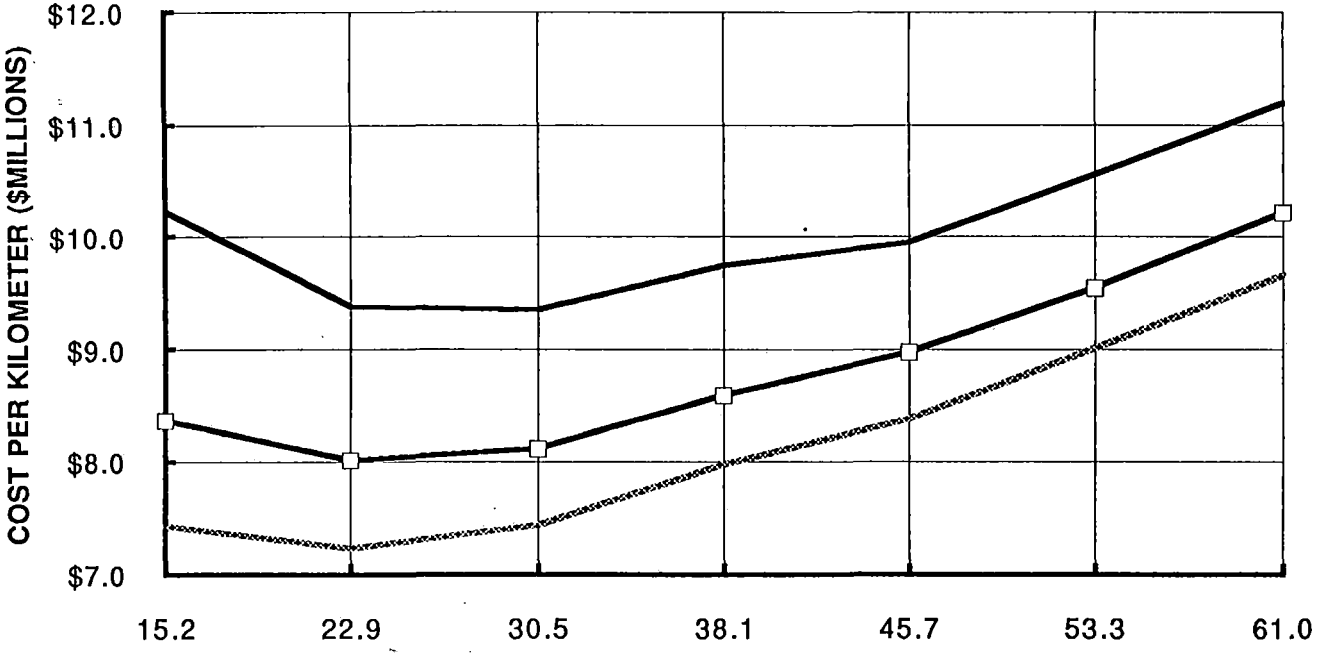
Design Parameters:
Two Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-10.67 M
4.57 M
15.76 M

(Ref: Tables 3-65, 3-70, & 3-75)

CHART 3-48

COST VARIATION BY COLUMN HEIGHT
Type V Girder



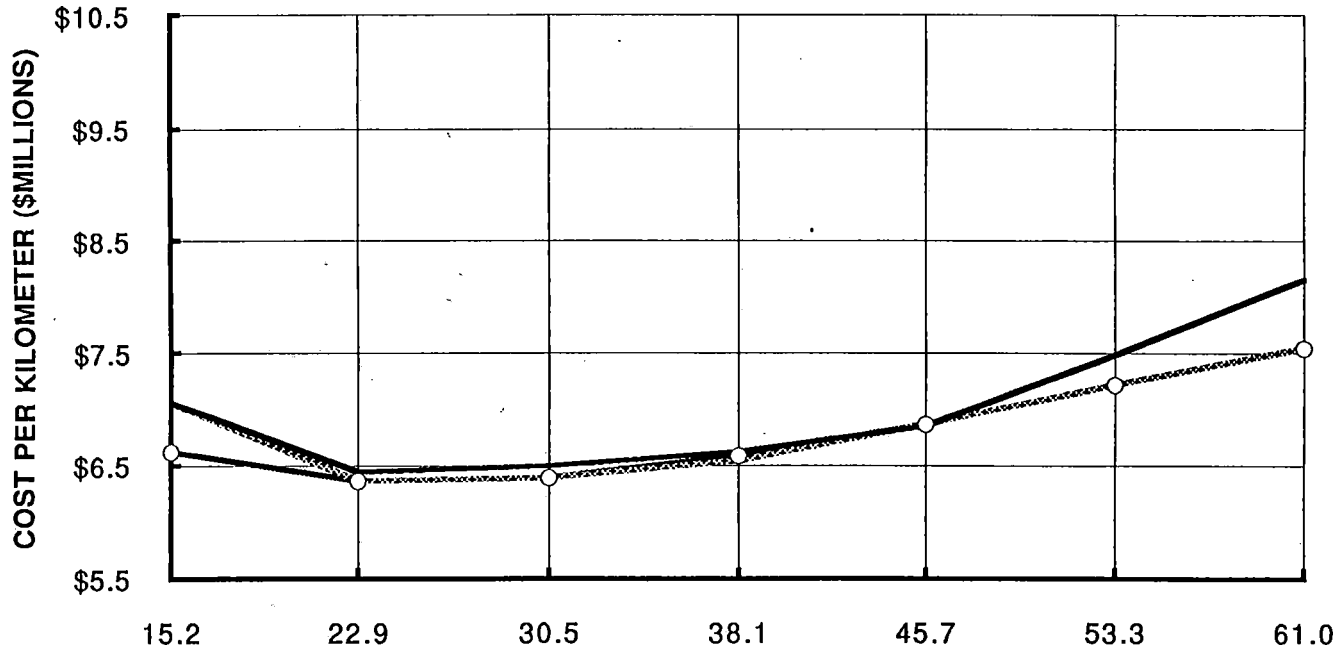
Design Parameters:
Two Column
Clearance = VARIES
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-10.67 M
4.57 M
15.76 M

(Ref: Tables 3-66, 3-71, & 3-76)

CHART 3-49

COST VARIATION BY GIRDER DEFLECTION
Type I Girder



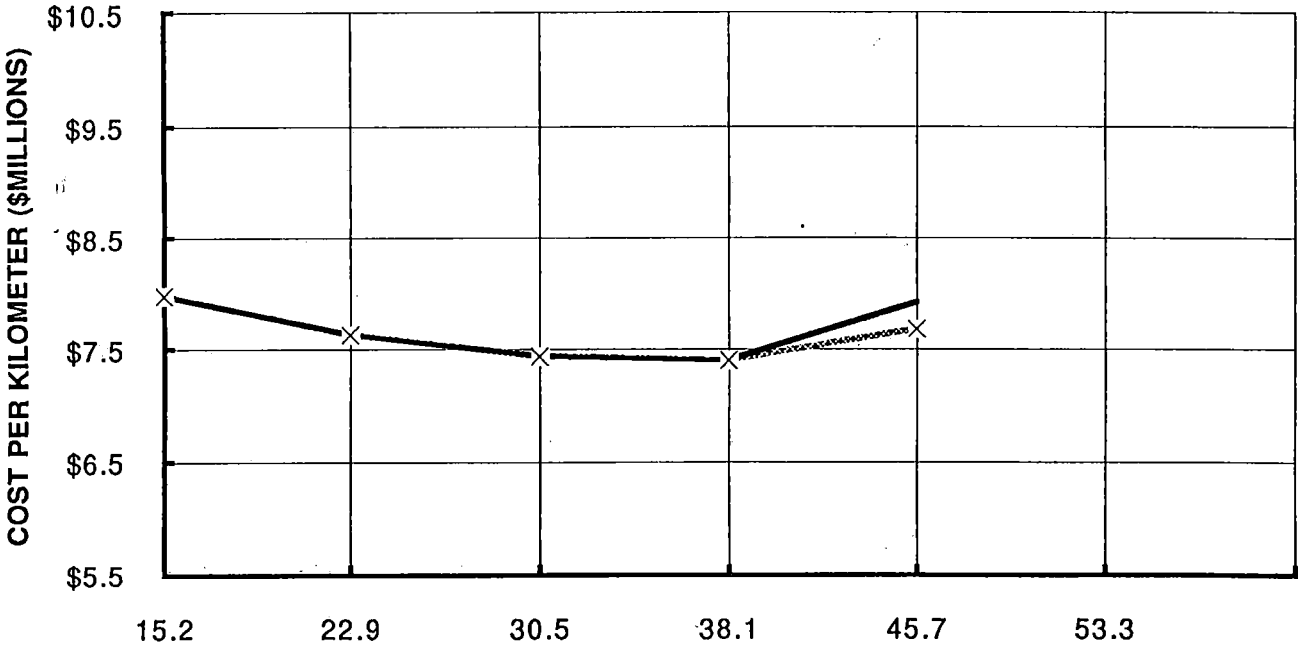
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base L/2000
L/1000
L/4000

(Ref: Tables 3-62, 3-77, & 3-82)

CHART 3-50

COST VARIATION BY GIRDER DEFLECTION
Type II Girder



Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

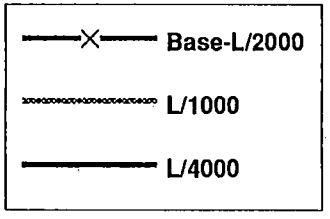
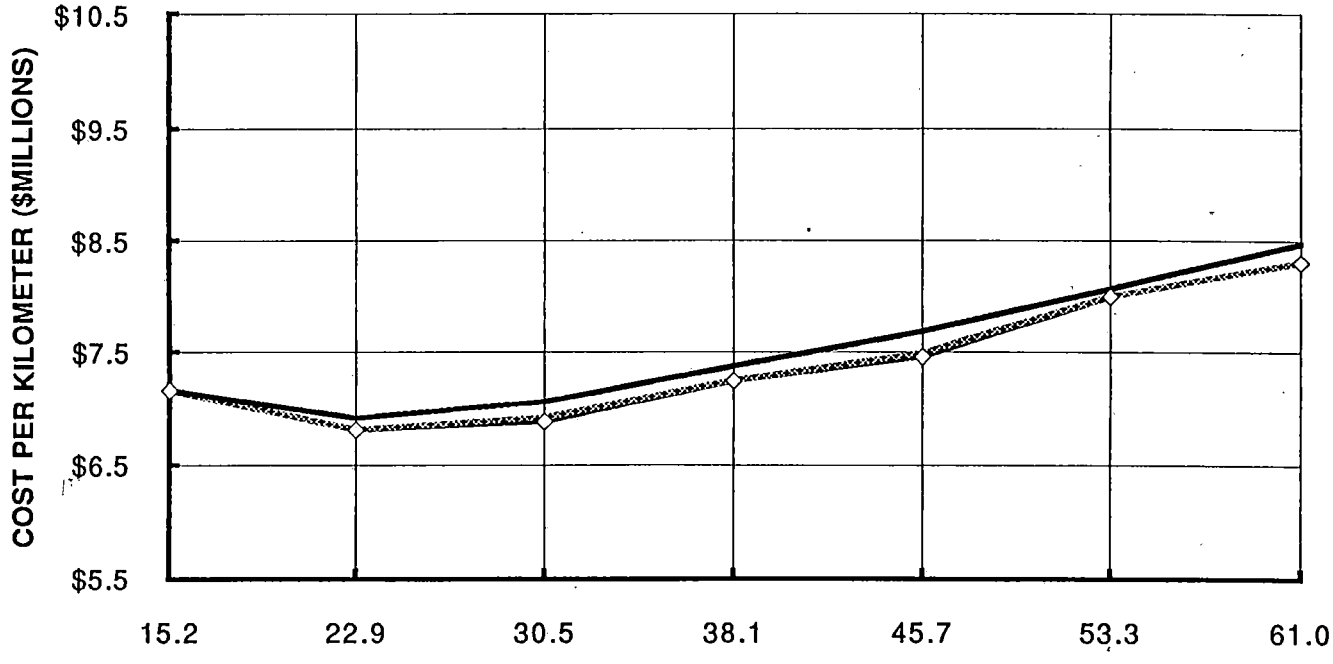


CHART 3-51

COST VARIATION BY GIRDER DEFLECTION
Type III Girder



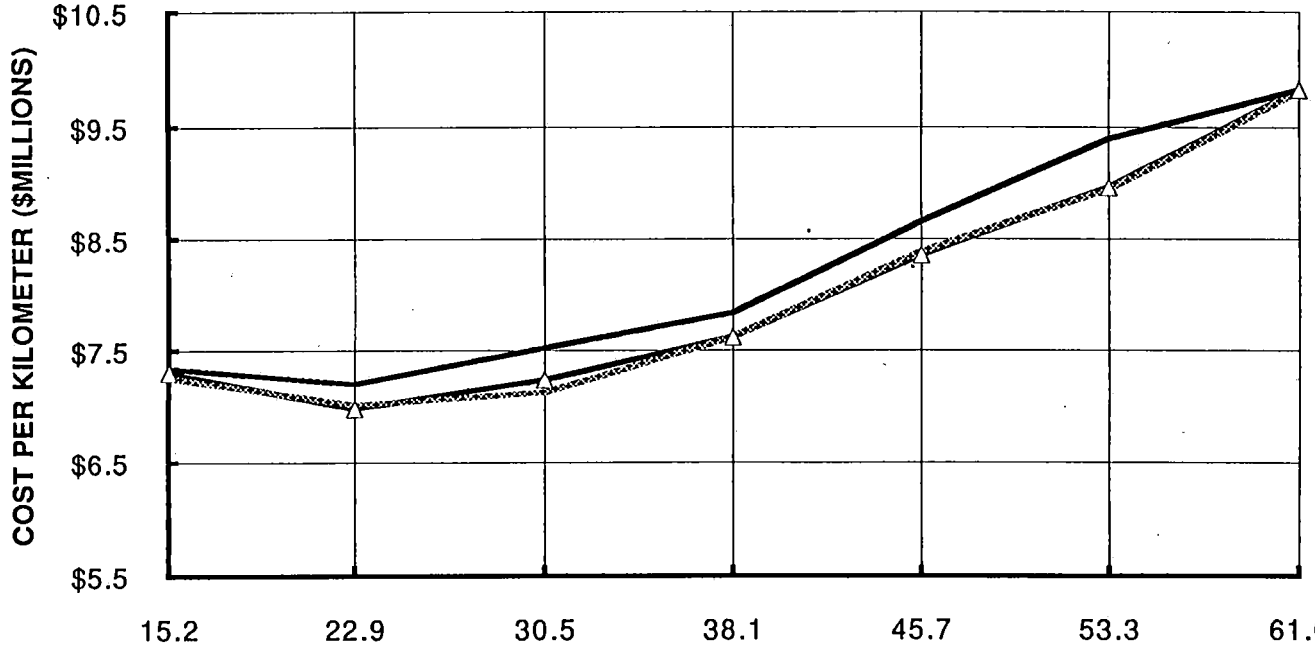
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-L/2000
L/1000
L/4000

(Ref: Tables 3-64, 3-79, & 3-84)

CHART 3-52

COST VARIATION BY GIRDER DEFLECTION
Type IV Girder



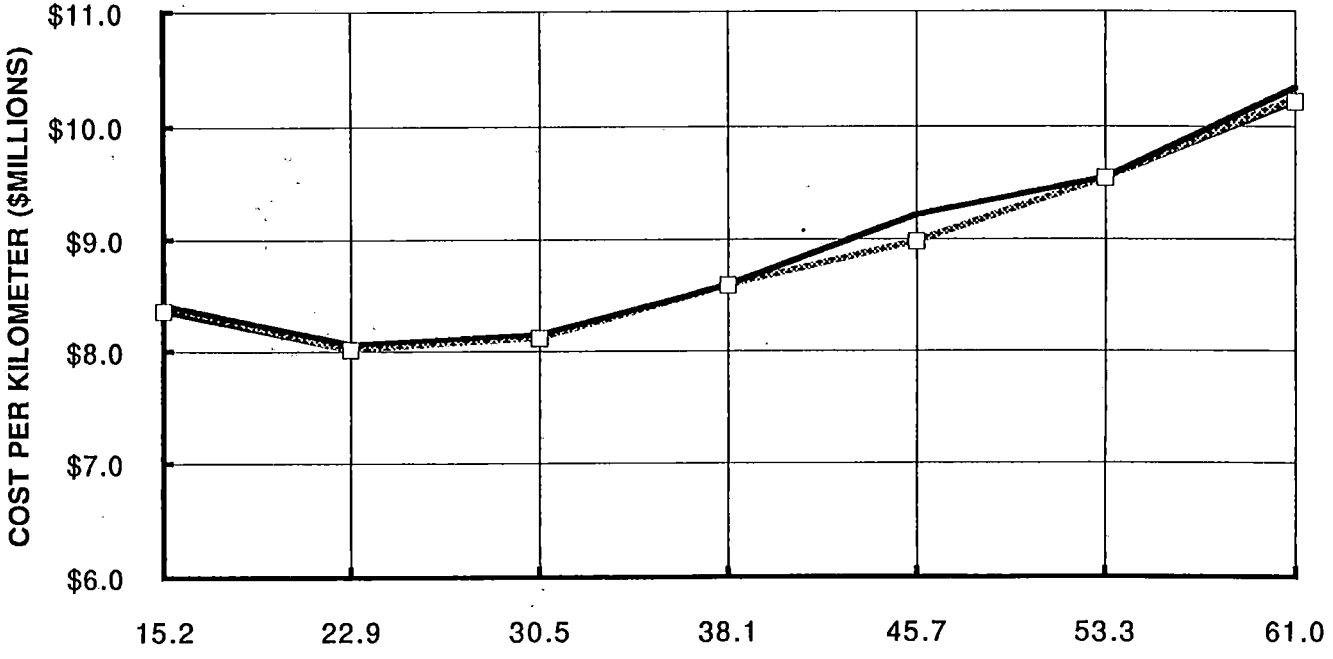
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl =VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-L/2000
L/1000
L/4000

(Ref: Tables 3-65, 3-80, & 3-85)

CHART 3-53

COST VARIATION BY GIRDER DEFLECTION
Type V Girder



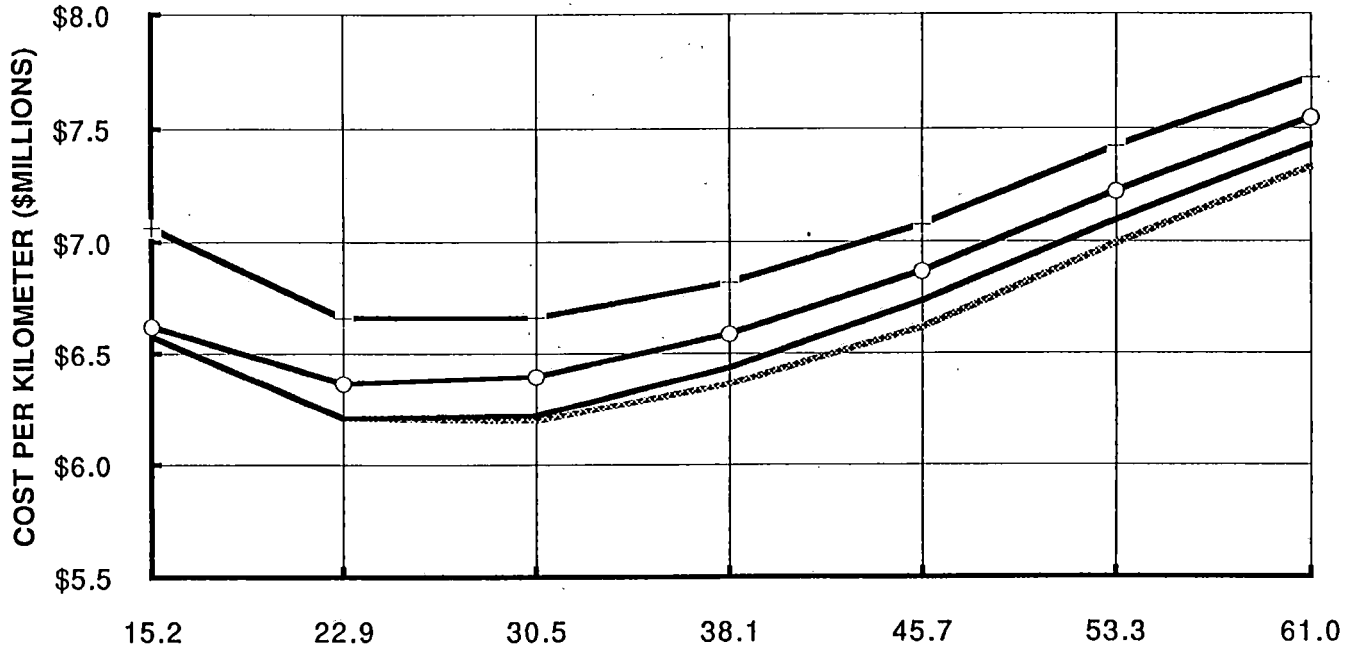
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = VARIES
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-L/2000
L/1000
L/4000

(Ref: Tables 3-66, 3-81, & 3-86)

CHART 3-54

COST VARIATION BY COLUMN DEFLECTION
Type I Girder



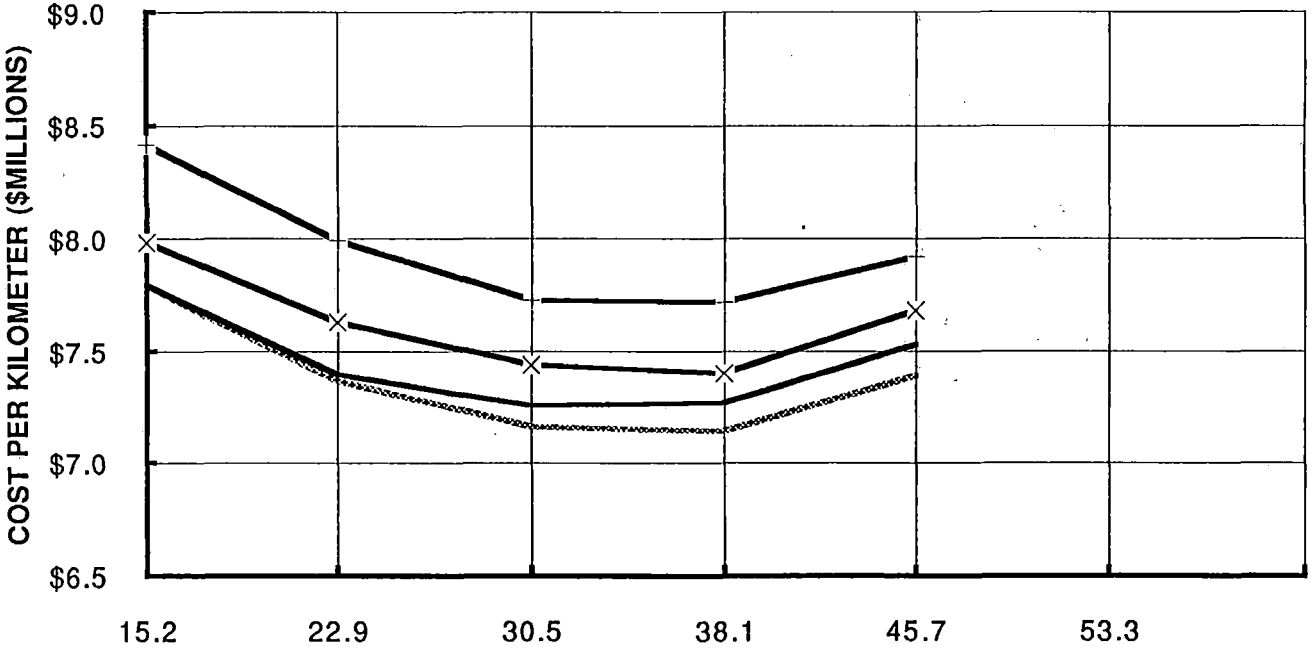
Design Parameters:
Two Column
Clearance =10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-H/500
H/100
H/250
H/750

(Ref: Tables 3-62, 3-87, 3-92, & 3-97)

CHART 3-55

COST VARIATION BY COLUMN DEFLECTION
Type II Girder



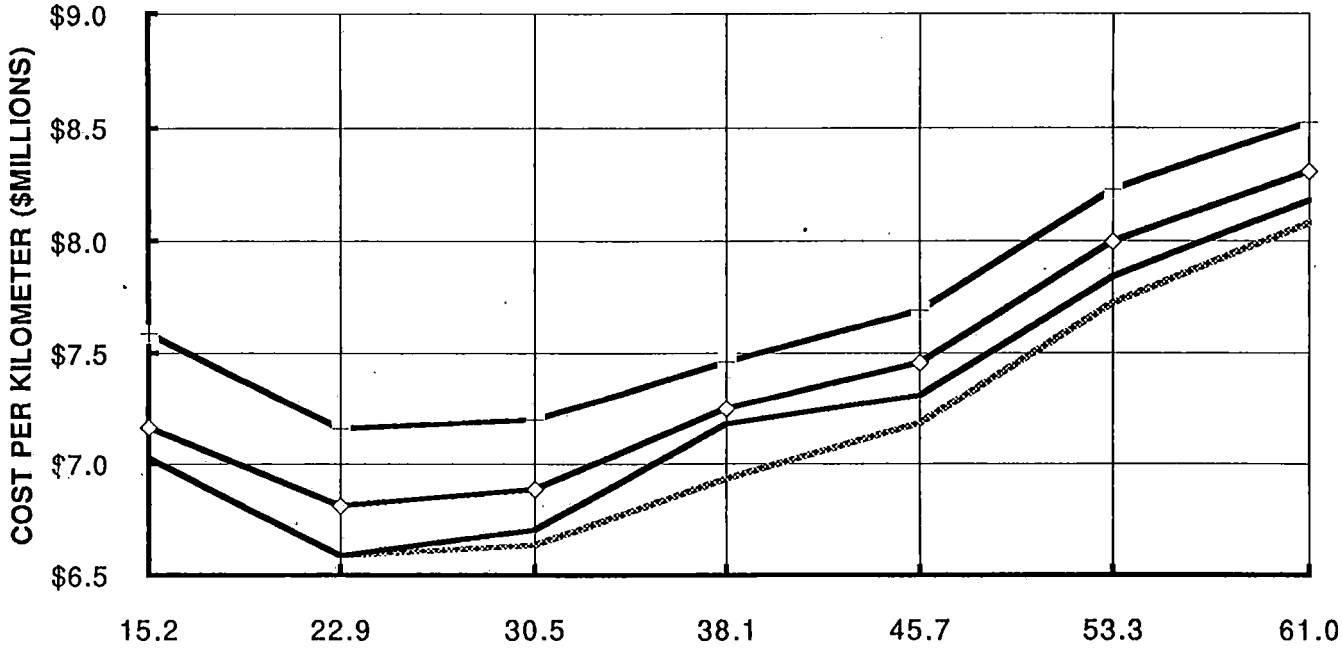
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

- Base-H/500
- H/100
- H/250
- H/750

(Ref: Tables 3-63, 3-88, 3-93, & 3-98)

CHART 3-56

COST VARIATION BY COLUMN DEFLECTION
Type III Girder



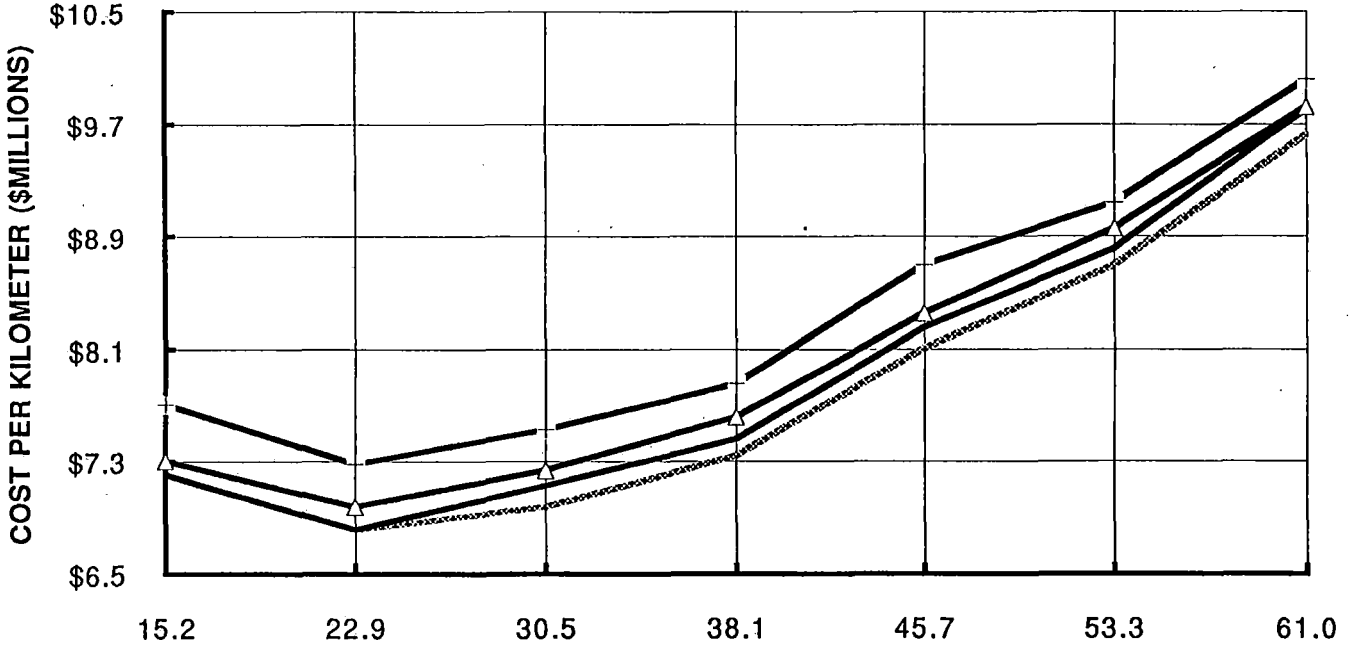
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

- Base-H/500
- H/100
- H/250
- H/750

(Ref: Tables 3-64, 3-89, 3-94, & 3-99)

CHART 3-57

COST VARIATION BY COLUMN DEFLECTION
Type IV Girder



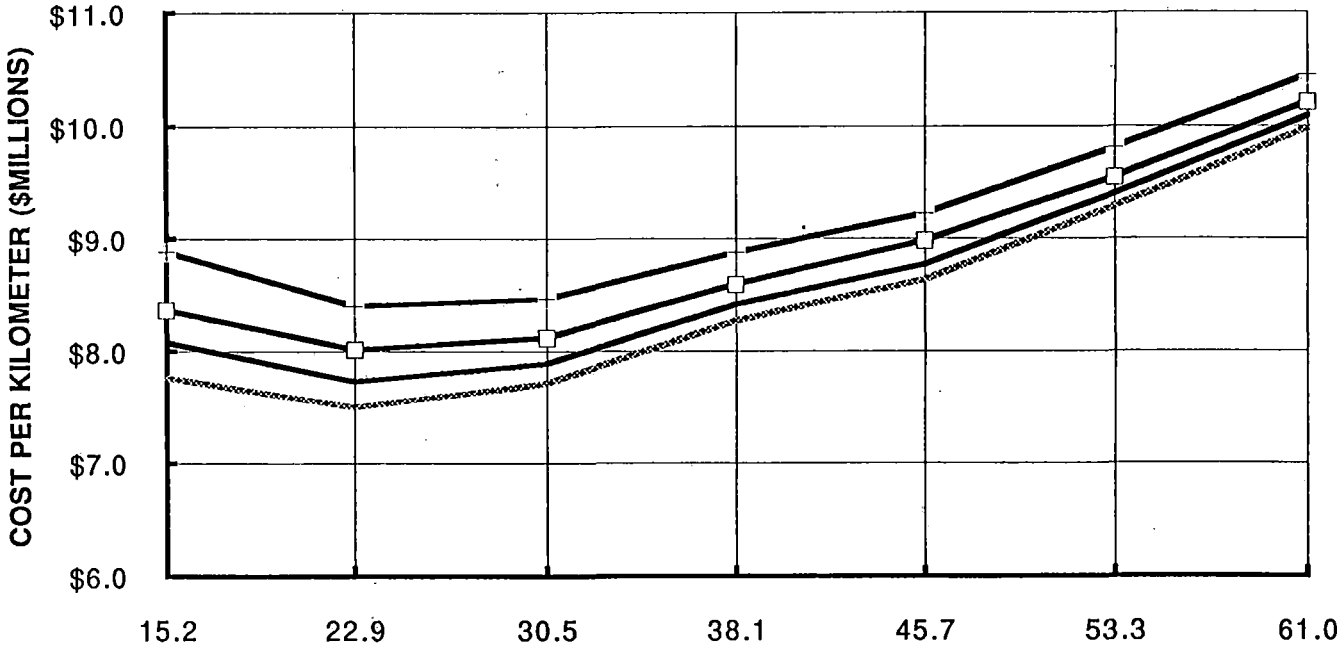
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-H/500
H/100
H/250
H/750

(Ref: Tables 3-65, 3-90, 3-95, & 3-100)

CHART 3-58

COST VARIATION BY COLUMN DEFLECTION
Type V Girder



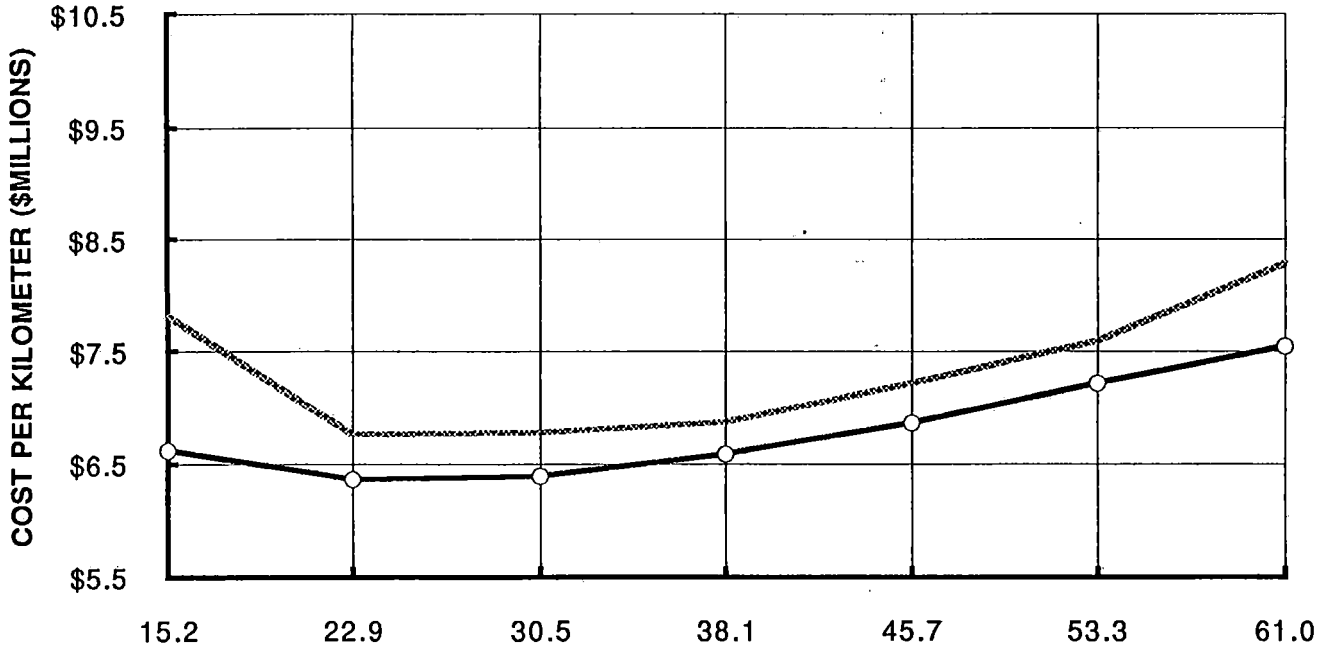
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = VARIES
Seismic Zone = 2
Gir Strength = 41369 kPa

- Base-H/500
- H/100
- L/250
- L/750

(Ref: Tables 3-66, 3-91, 3-96, & 3-101)

CHART 3-59

COST VARIATION BY SEISMIC ZONE
Type I Girder

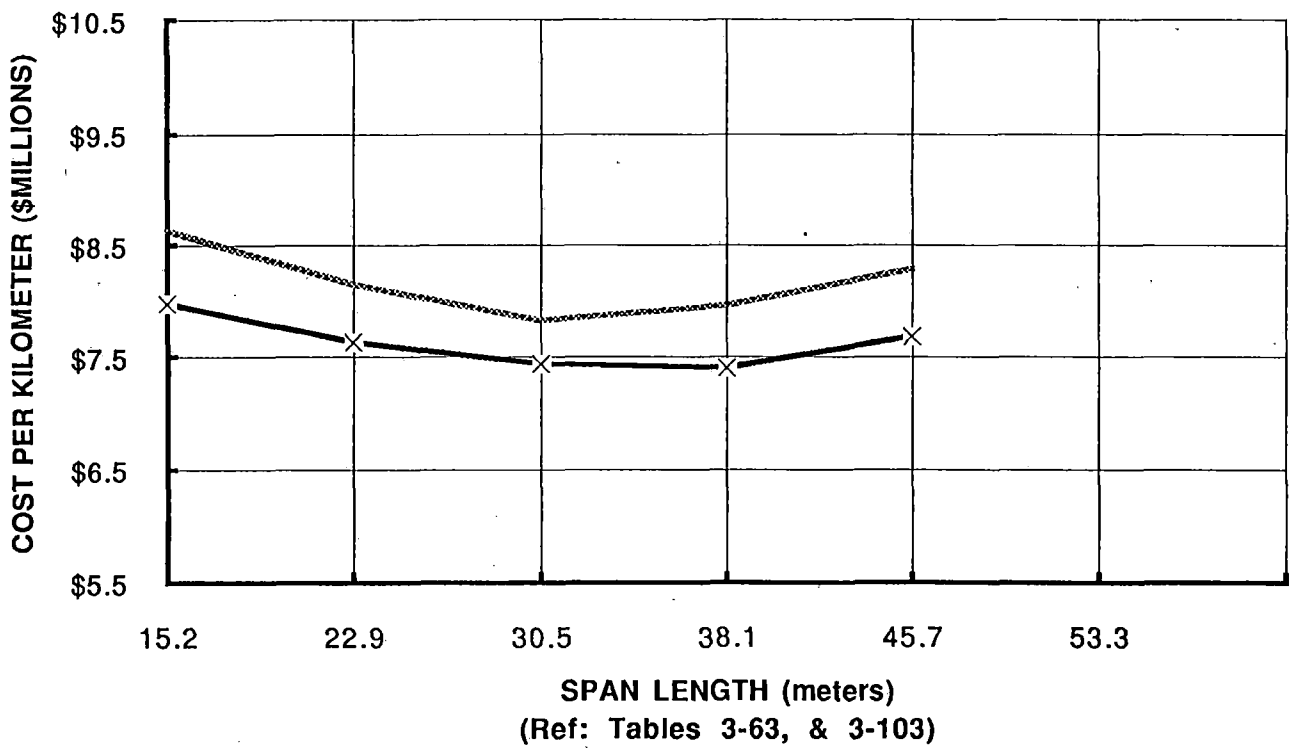


Design Parameters:
Two Column
Clearance =10.67
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-60

COST VARIATION BY SEISMIC ZONE
Type II Girder

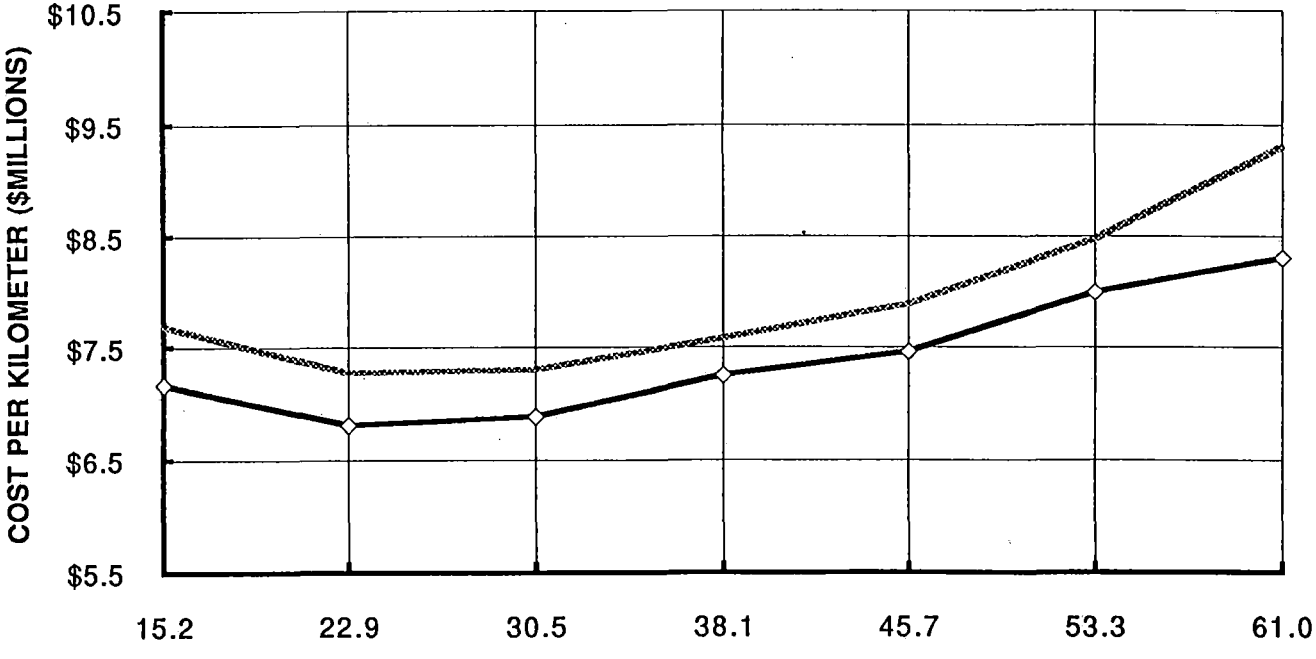


Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-61

COST VARIATION BY SEISMIC ZONE
Type III Girder

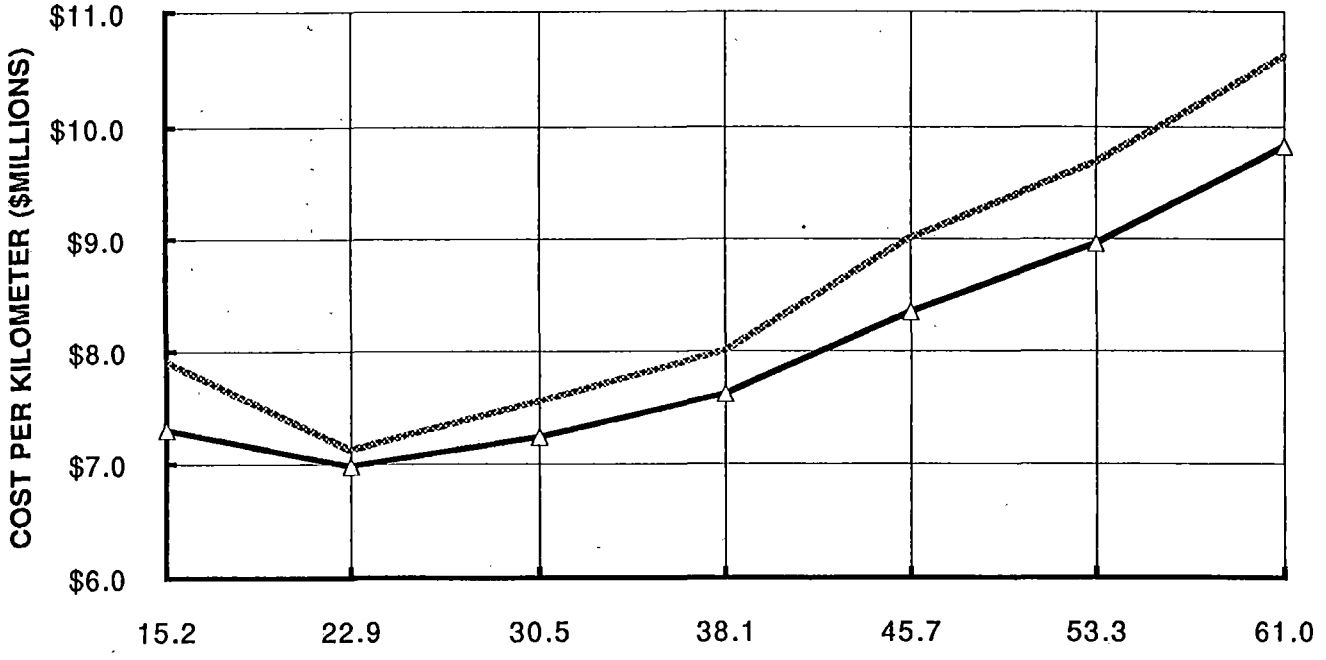


Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-62

COST VARIATION BY SEISMIC ZONE
Type IV Girder

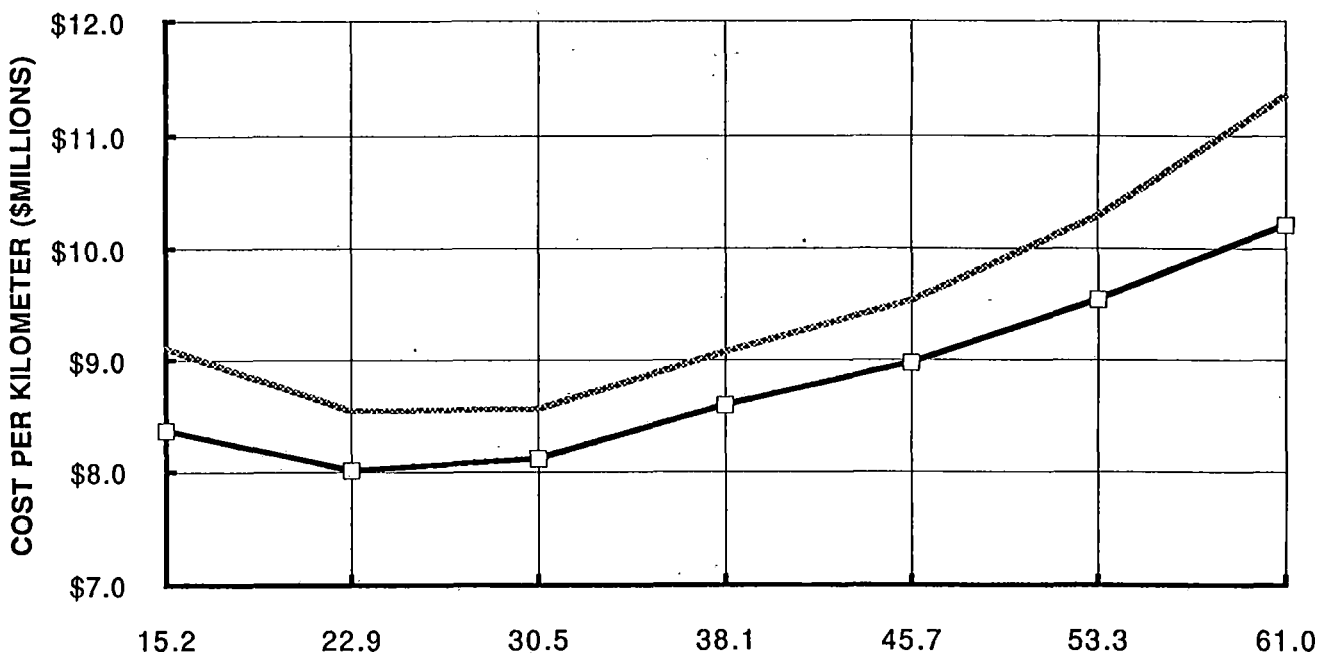


Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-63

COST VARIATION BY SEISMIC ZONE
Type V Girder

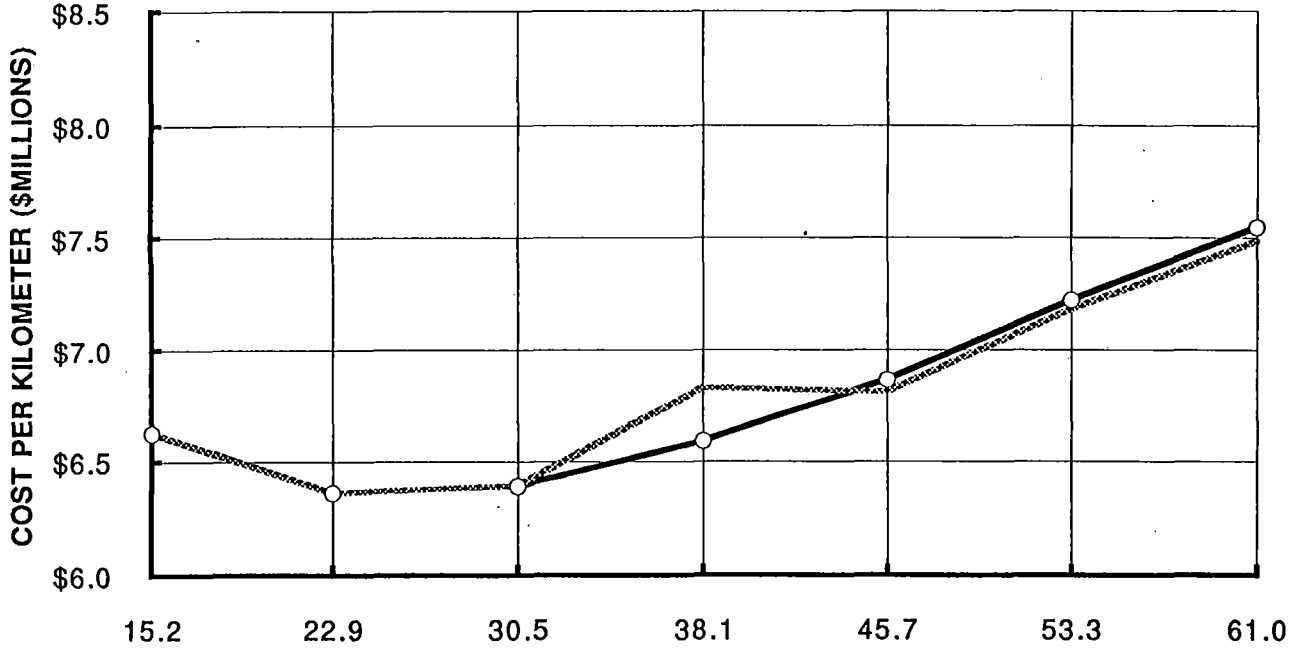


Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = VARIES
Gir Strength = 41369 kPa

Base-ZONE 2
ZONE 4

CHART 3-64

COST VARIATION BY GIRDER STRENGTH
Type I Girder



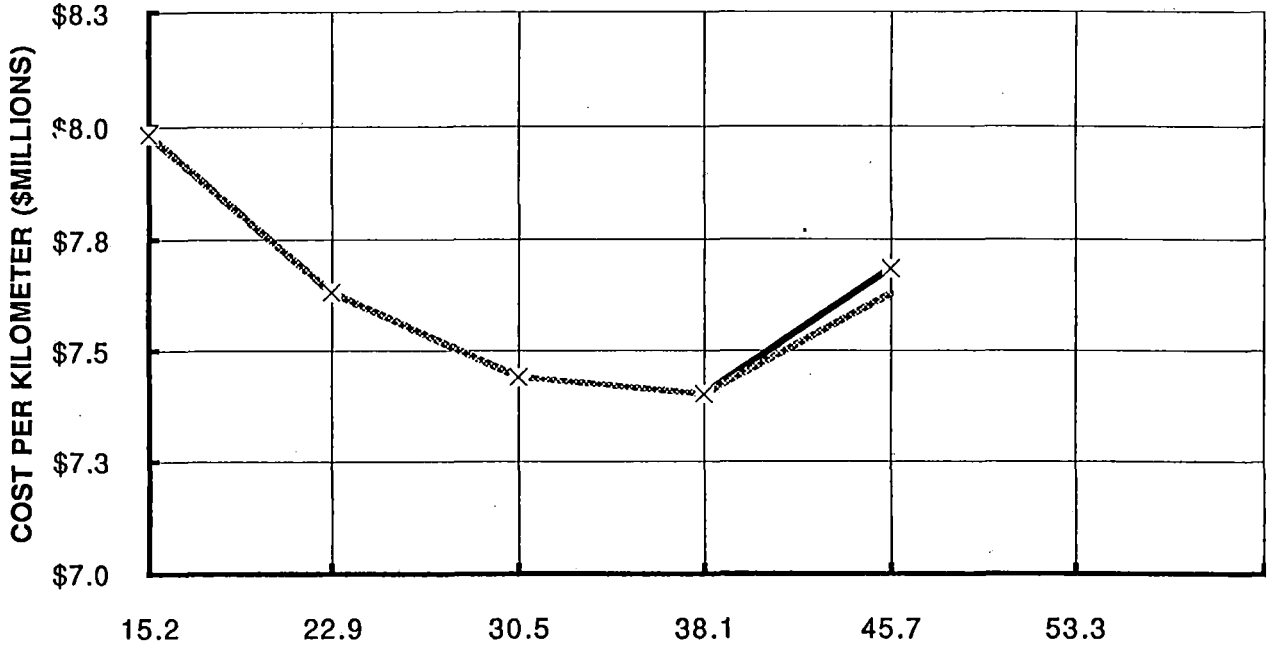
Design Parameters:
Two Column
Clearance =10.67
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369 kPa
55158 kPa

(Ref: Tables 3-62, & 3-107)

CHART 3-65

COST VARIATION BY GIRDER STRENGTH
Type II Girder



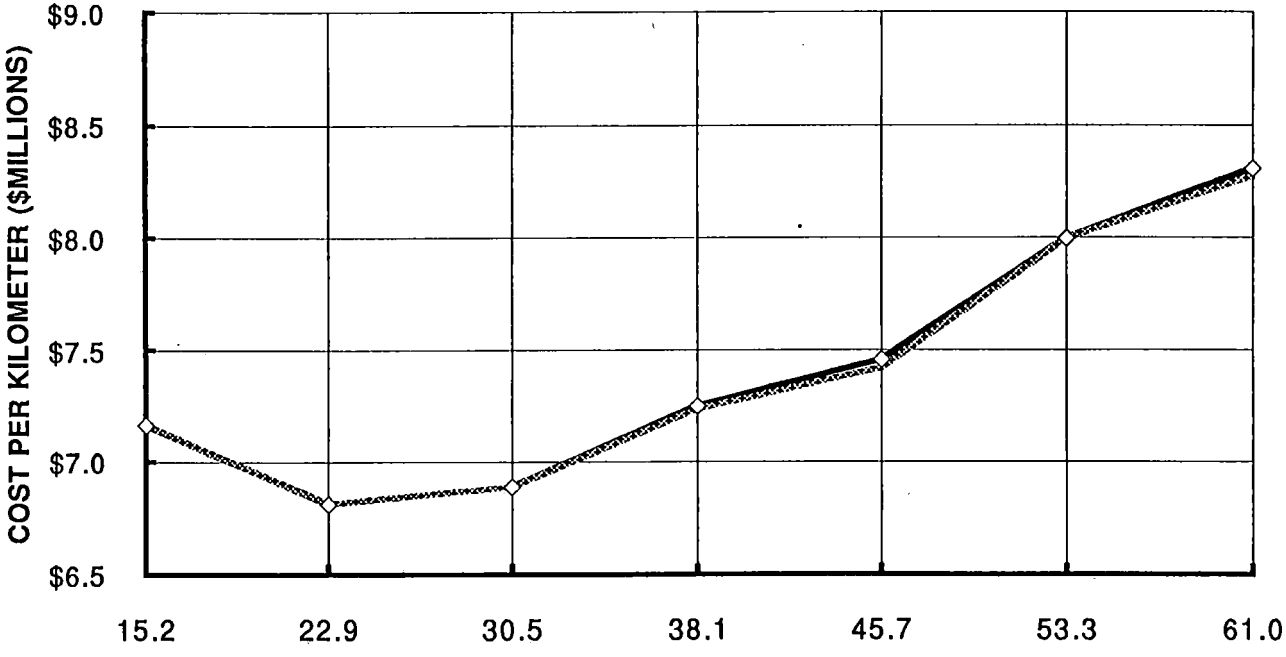
(Ref: Tables 3-63, & 3-108)

Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369kPa
55158 kPa

CHART 3-66

COST VARIATION BY GIRDER STRENGTH
Type III Girder

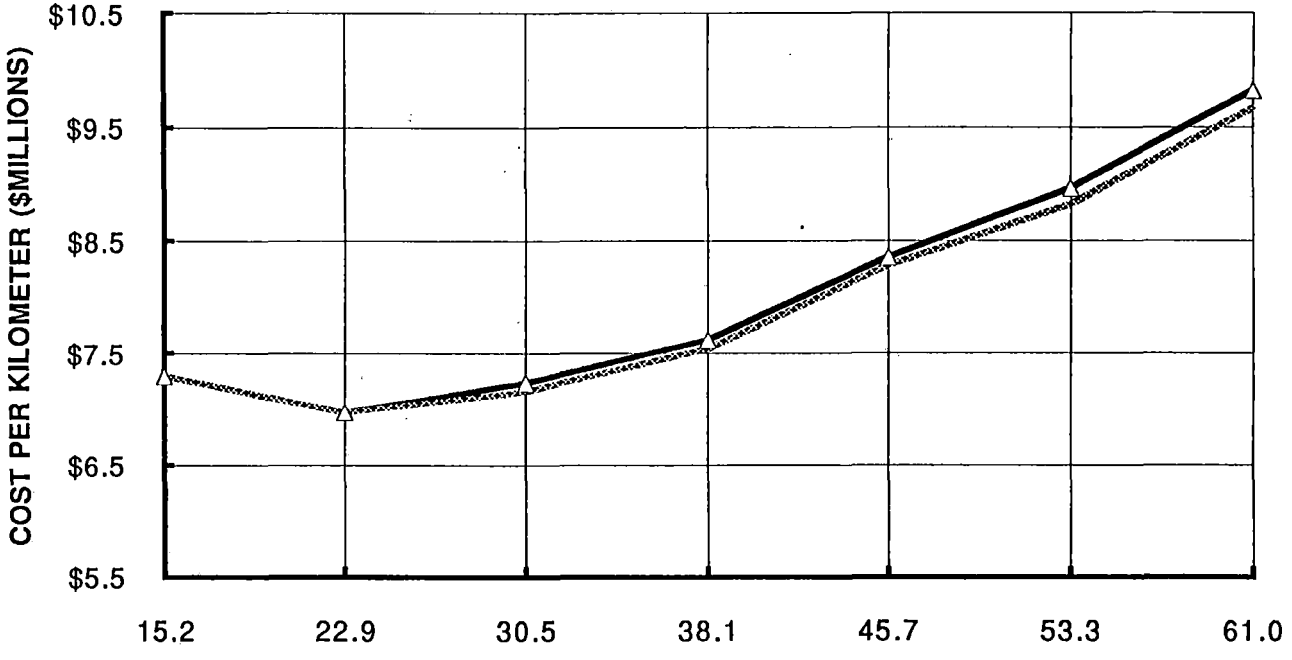


Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369 kPa
55158 kPa

CHART 3-67

COST VARIATION BY GIRDER STRENGTH
Type IV Girder

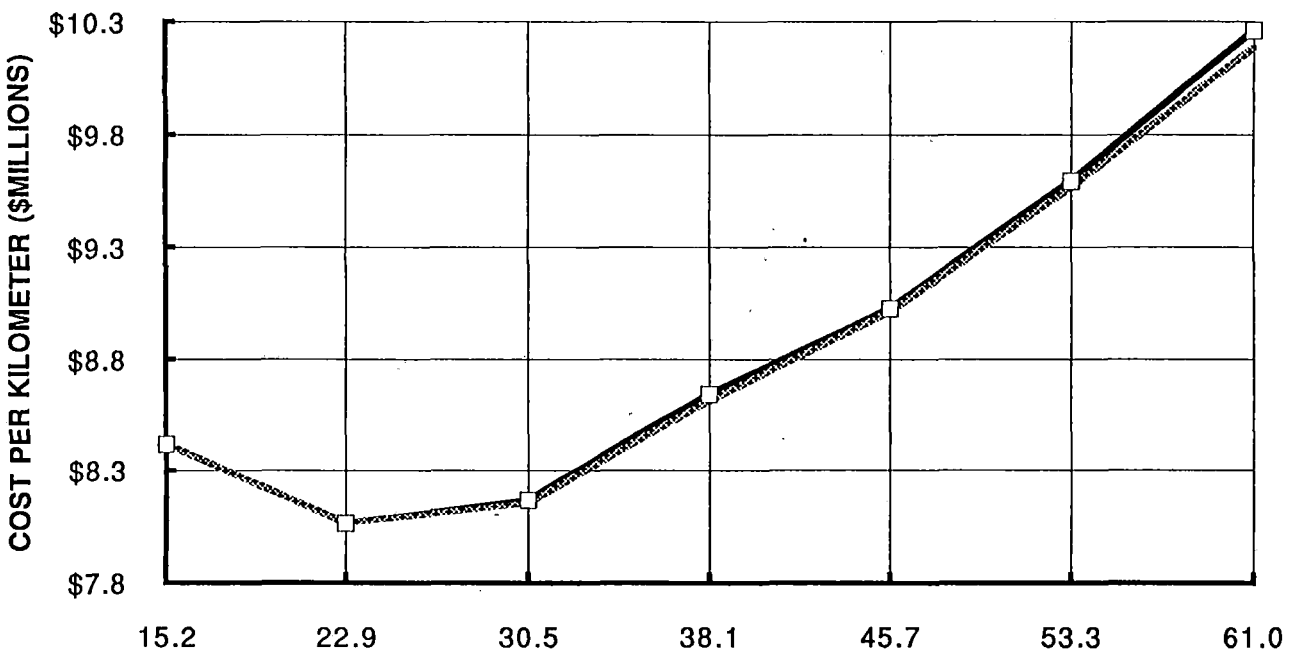


Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369 kPa
55158 kPa

CHART 3-68

COST VARIATION BY GIRDER STRENGTH
Type V Girder



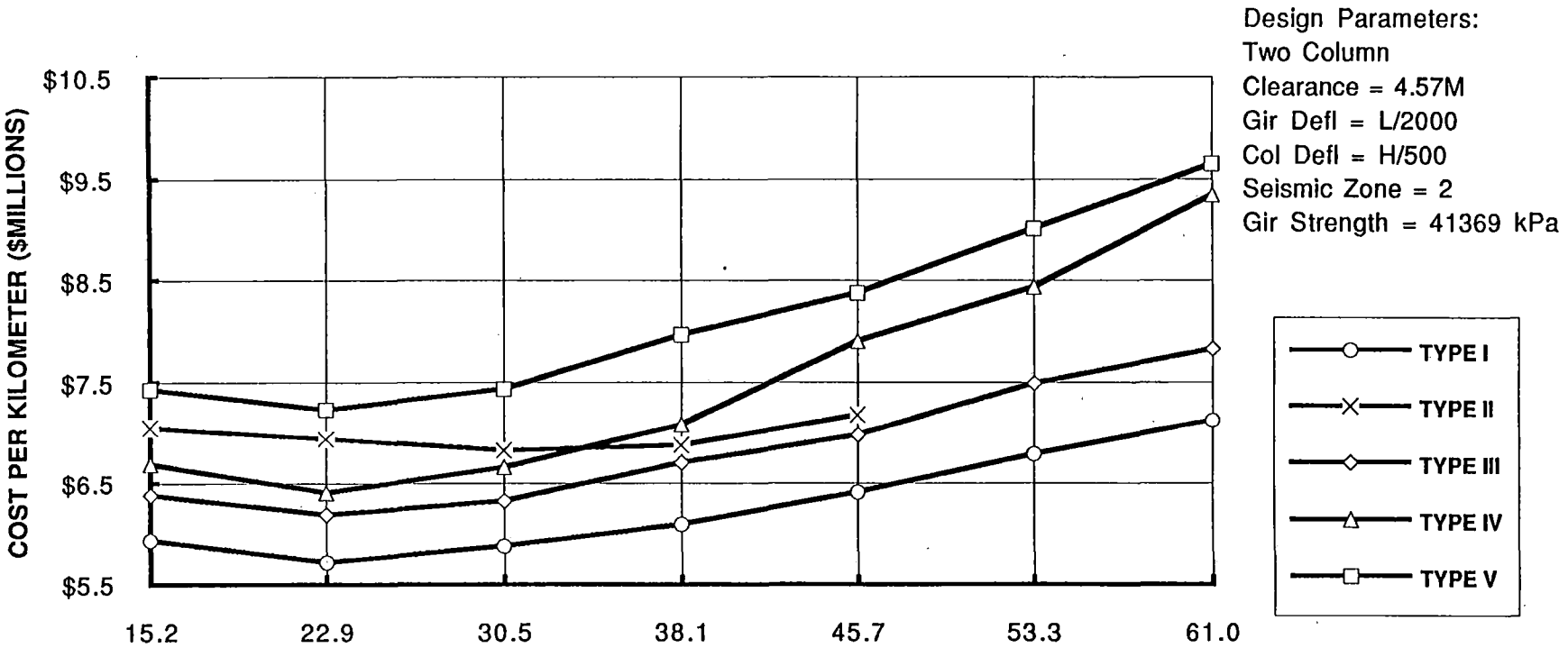
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = VARIES

Base-41369 kPa
55158 kPa

(Ref: Tables 3-66, & 3-111)

CHART 3-69

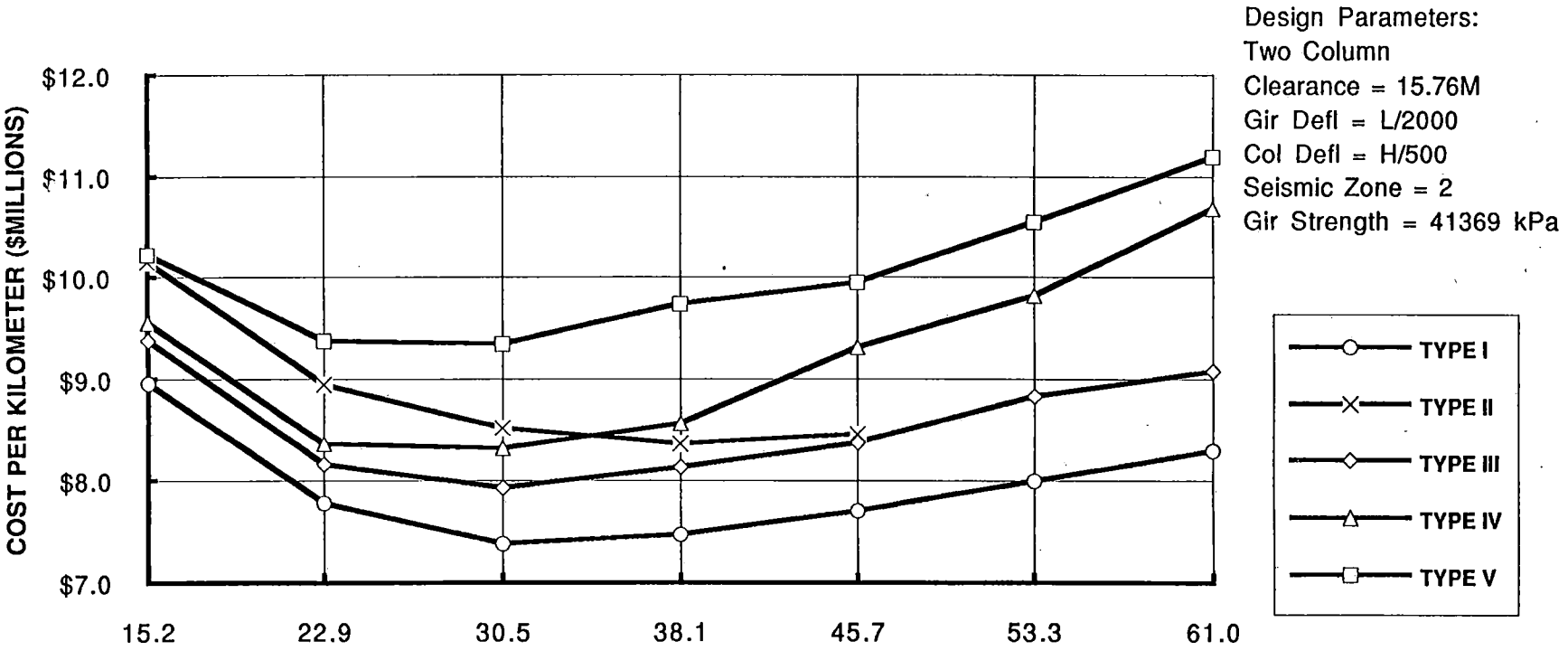
GUIDEWAY COST -4.57 M CLEARANCE



(Ref: Tables 3-67, 3-68, 3-69, 3-70, & 3-71)

CHART 3-70

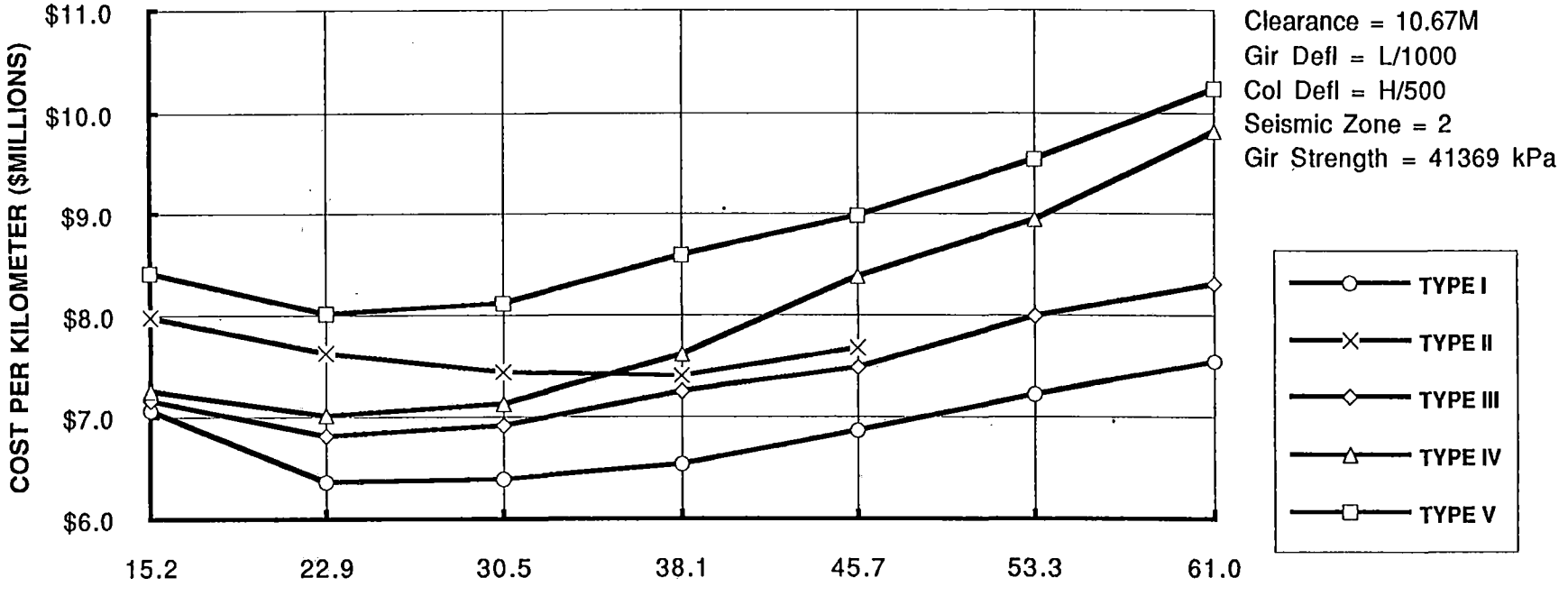
GUIDEWAY COST -15.76 M CLEARANCE



(Ref: Tables 3-72, 3-73, 3-74, 3-175, & 3-76)

CHART 3-71

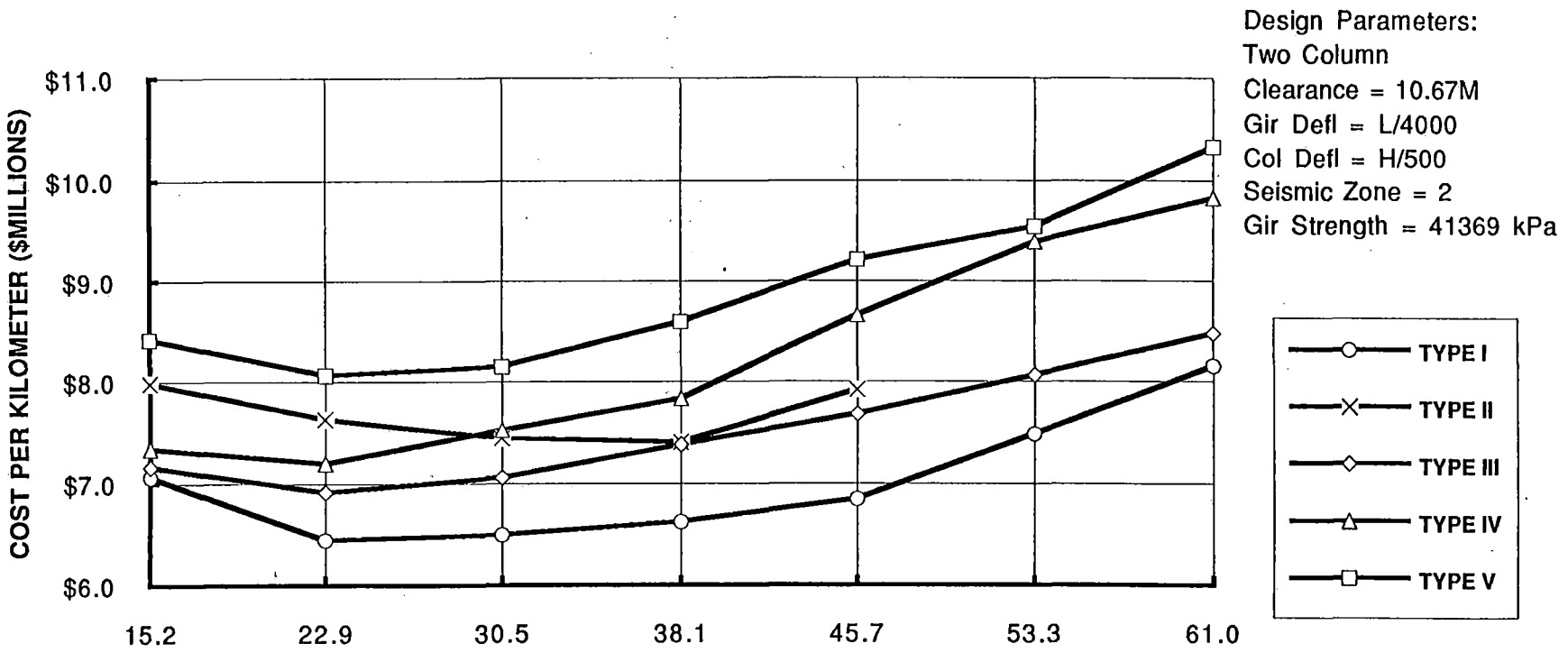
GUIDEWAY COST -L/1000 GIRDER DEFL



(Ref: Tables 3-77, 3-78, 3-79, 3-80, & 3-81)

CHART 3-72

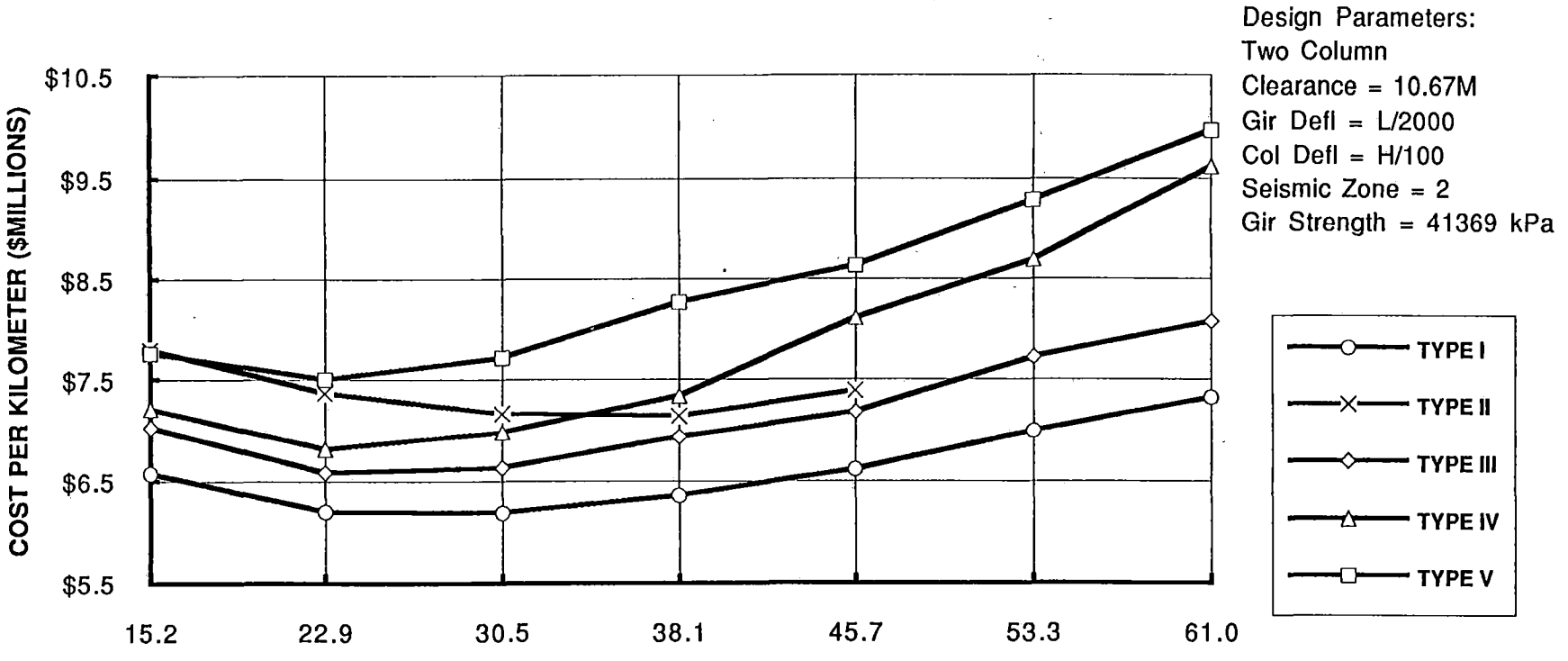
GUIDEWAY COST -L/4000 GIRDER DEFL



(Ref: Tables 3-82, 3-83, 3-84, 3-85, & 3-86)

CHART 3-73

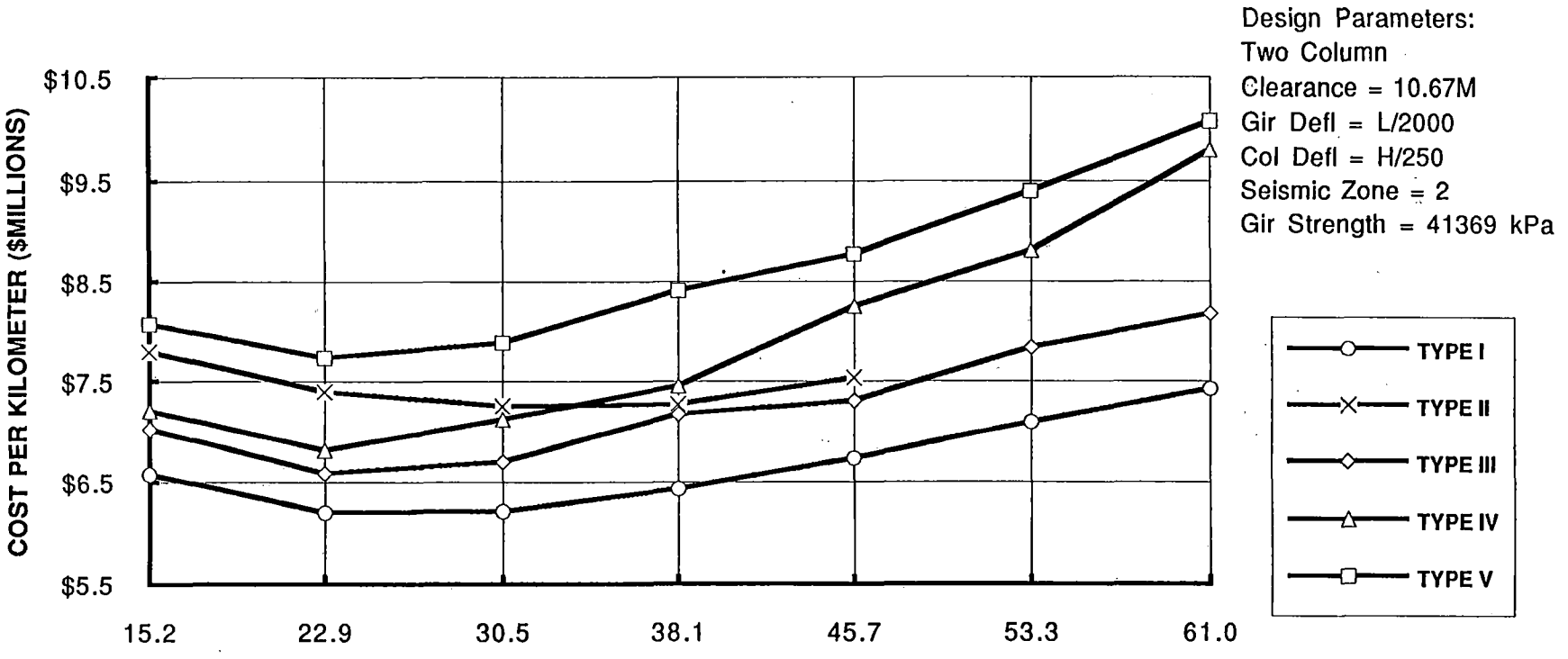
GUIDEWAY COST -H/100 COLUMN DEFL



(Ref: Tables 3-87, 3-88, 3-89, 3-90, & 3-91)

CHART 3-74

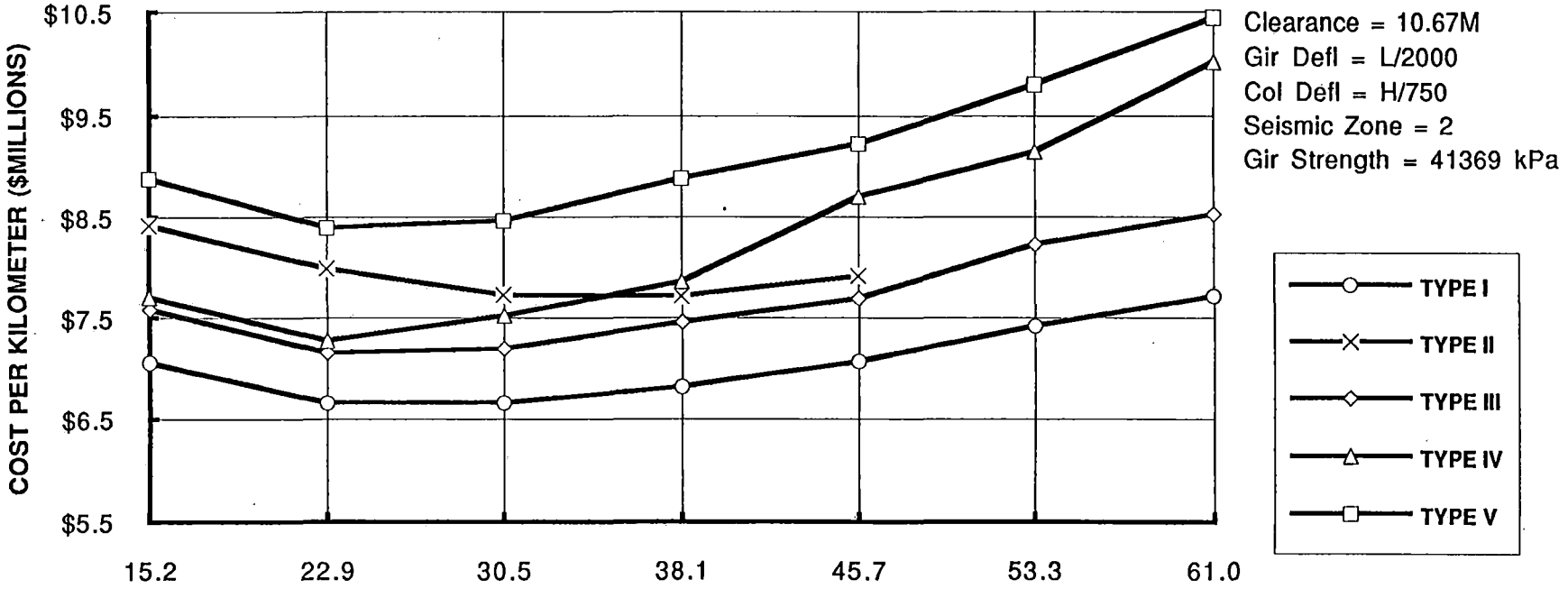
GUIDEWAY COST -H/250 COLUMN DEFL



(Ref: Tables 3-92, 3-93, 3-94, 3-95, & 3-96)

CHART 3-75

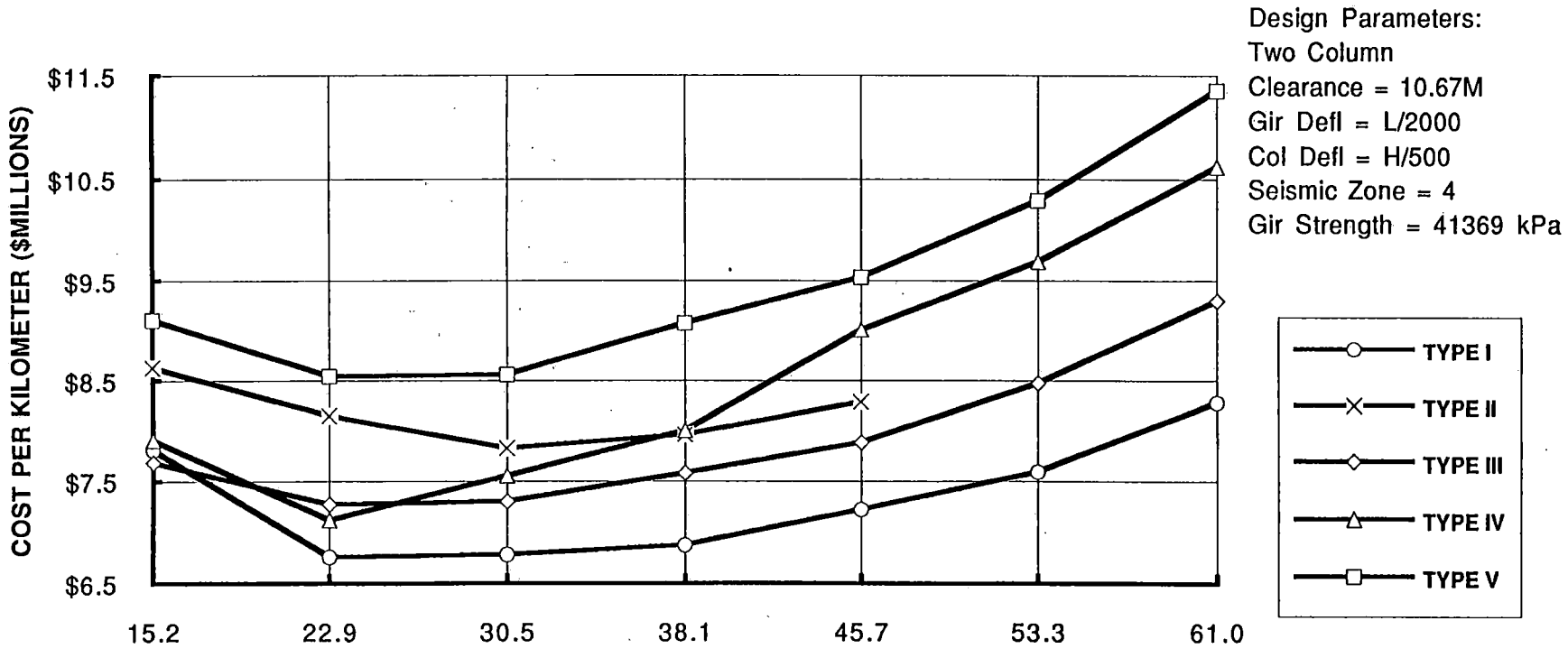
GUIDEWAY COST -H/750 COLUMN DEFL



(Ref: Tables 3-97, 3-98, 3-99, 3-100, & 3-101)

CHART 3-76

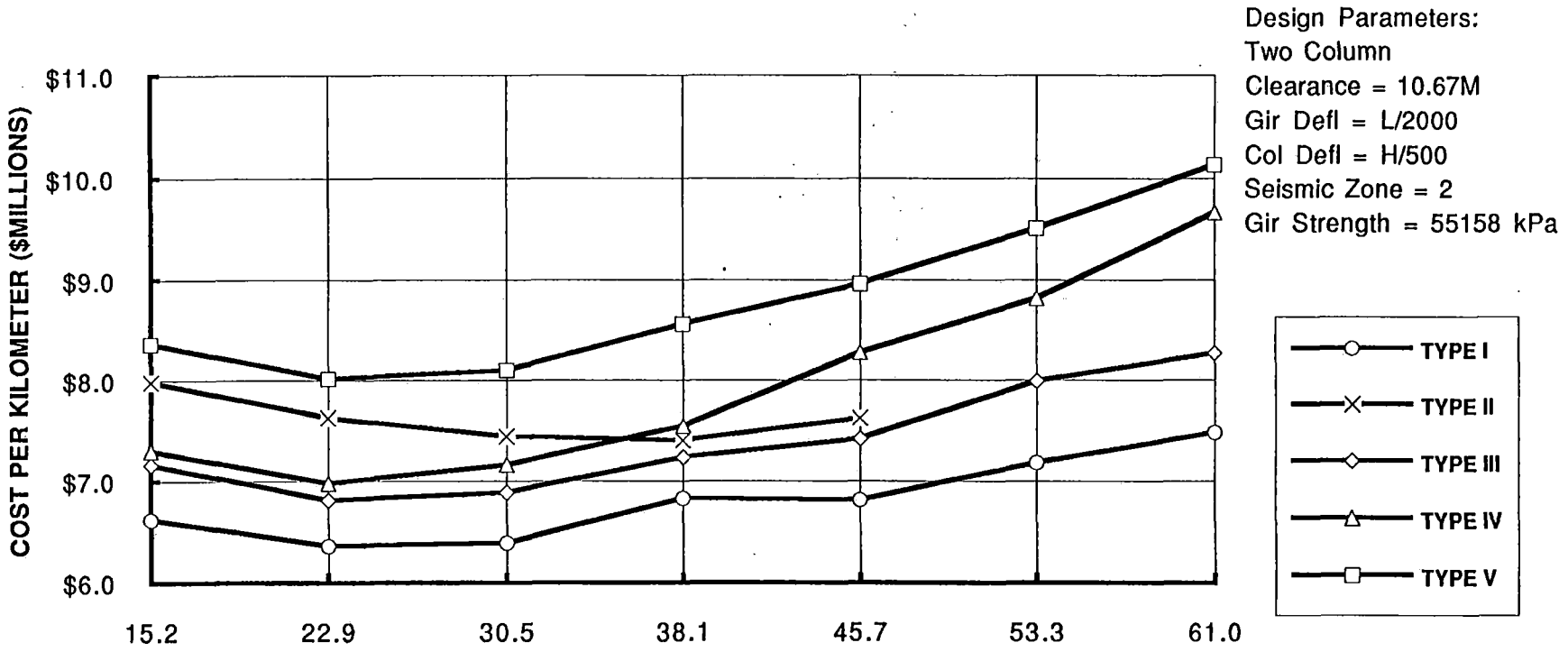
GUIDEWAY COST -SESIMIC ZONE 4



(Ref: Tables 3-102, 3-103, 3-104, 3-105, & 3-106)

CHART 3-77

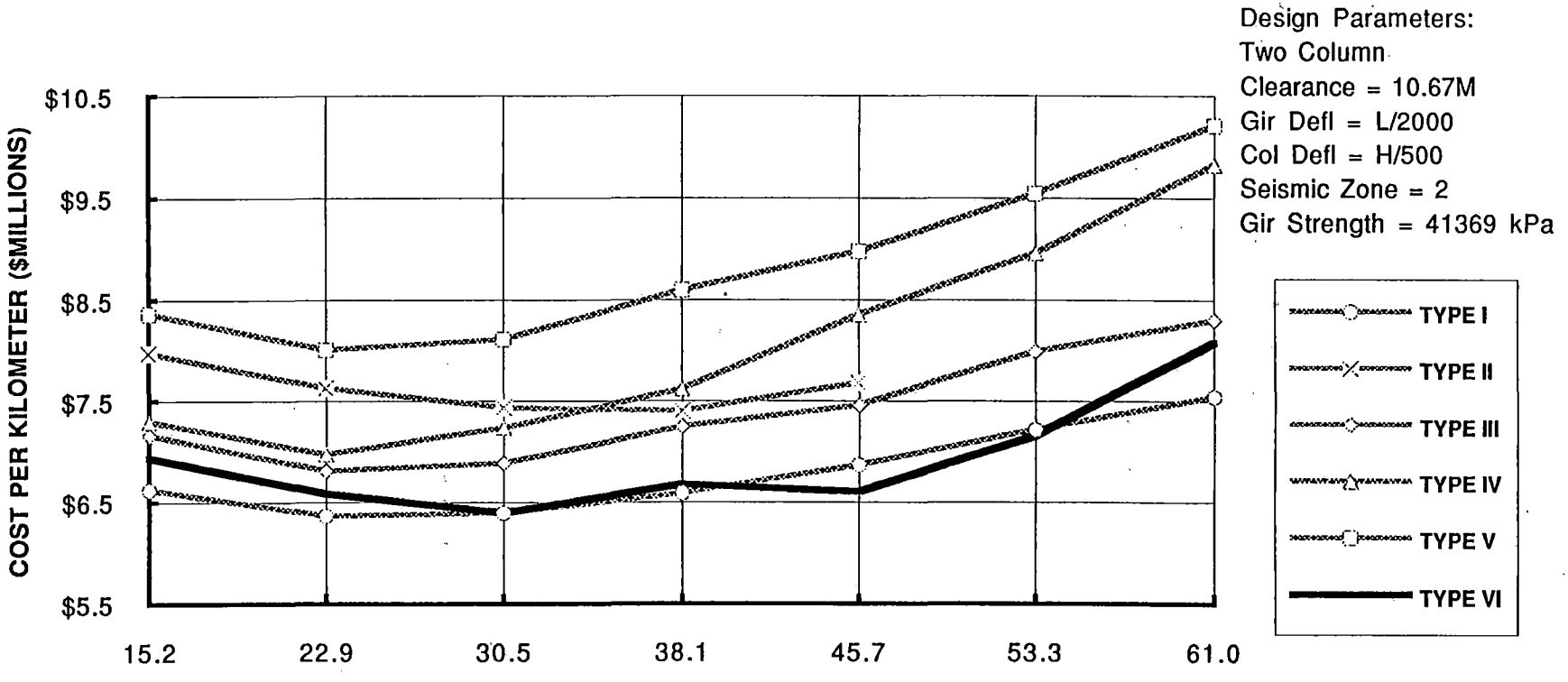
GUIDEWAY COST -55158 kPa GIRDER CONCRETE



(Ref: Tables 3-107, 3-108, 3-109, 3-110, & 3-111)

CHART 3-78

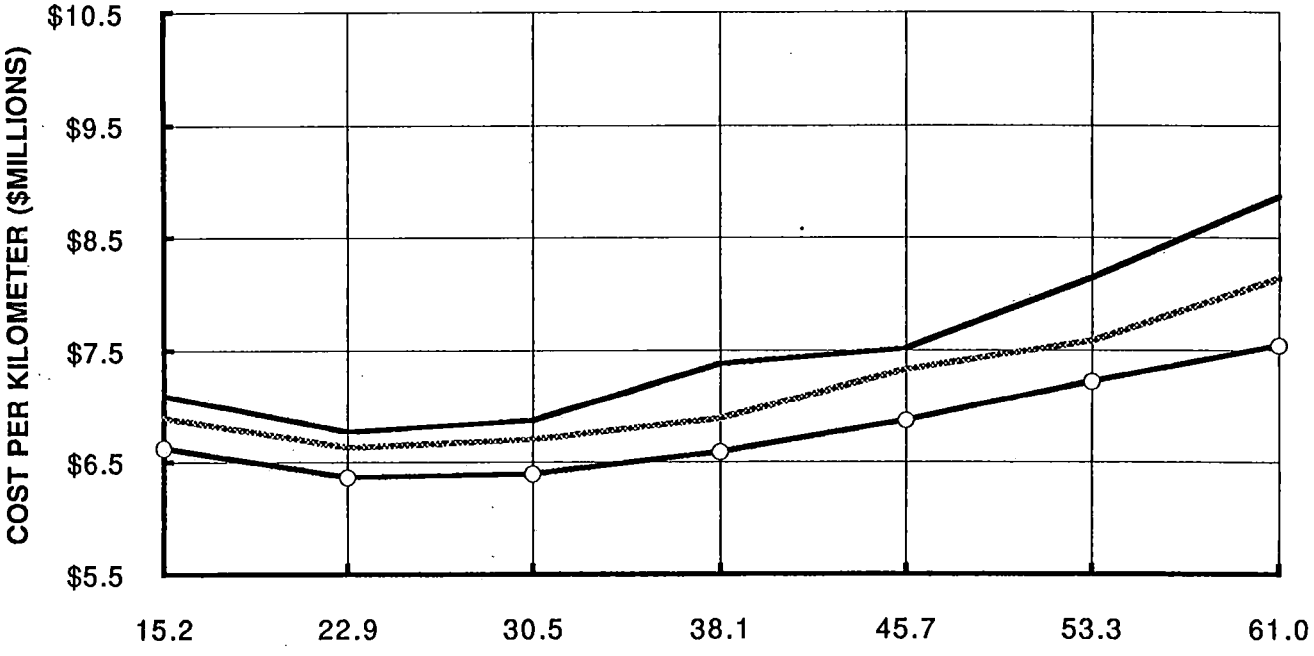
TYPE VI GUIDEWAY COST



(Ref: Tables 3-62, 3-63, 3-64, 3-65, 3-66, & 3-112)

CHART 3-79

COST VARIATION BY PAYLOAD
Type I Girder



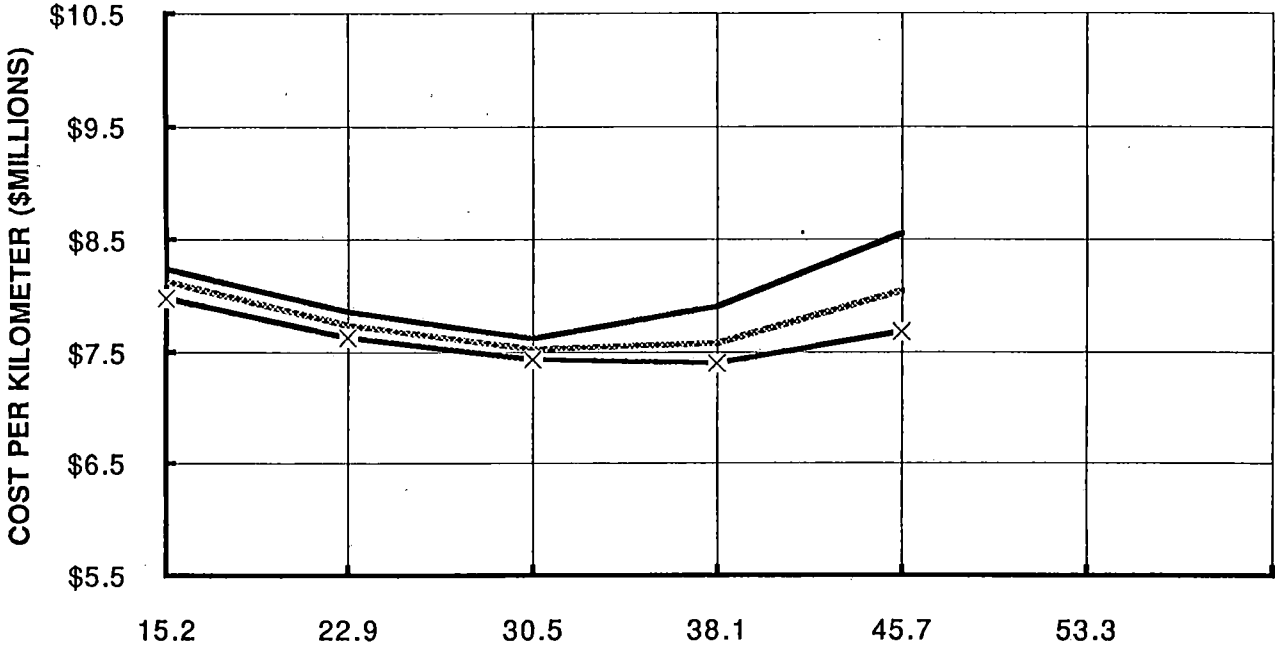
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base Pas'ngr
FRT=1.27t/M
FRT= 1.90 t/M

(Ref: Tables 3-62, 3-113, & 3-118)

CHART 3-80

COST VARIATION BY PAYLOAD
Type II Girder

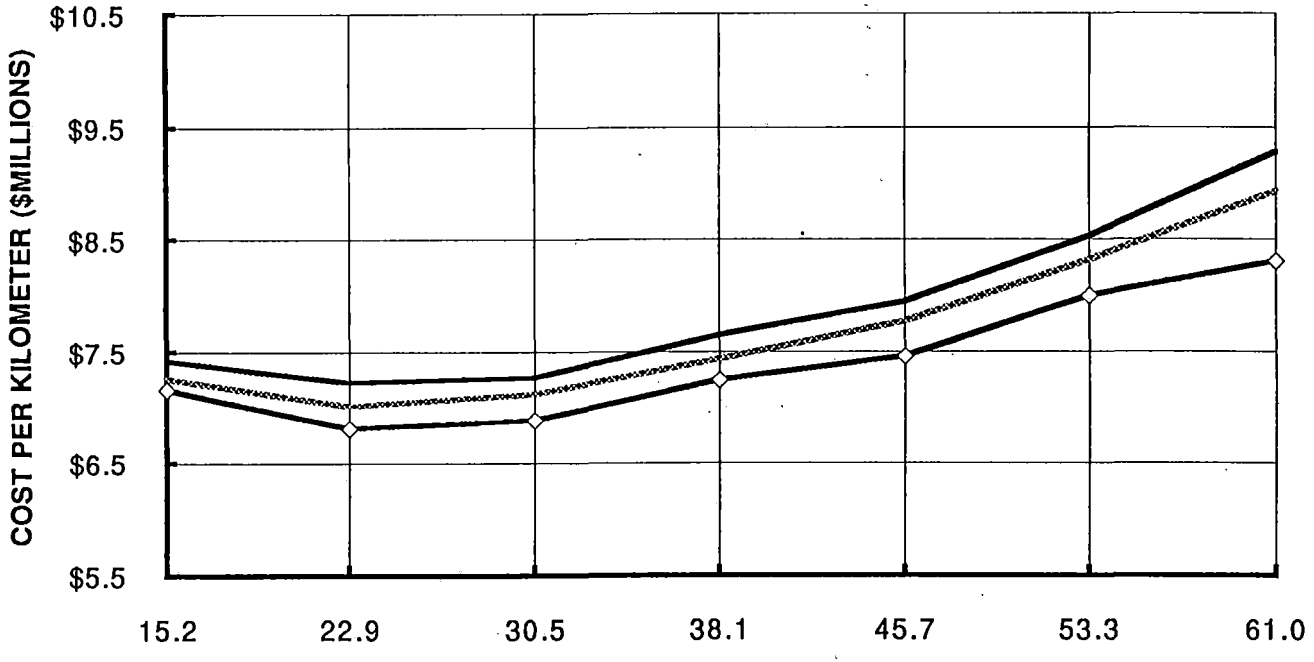


Design Parameters:
TwO Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

(Ref: Tables 3-63, 3-114, & 3-119)

CHART 3-81

COST VARIATION BY PAYLOAD
Type III Girder



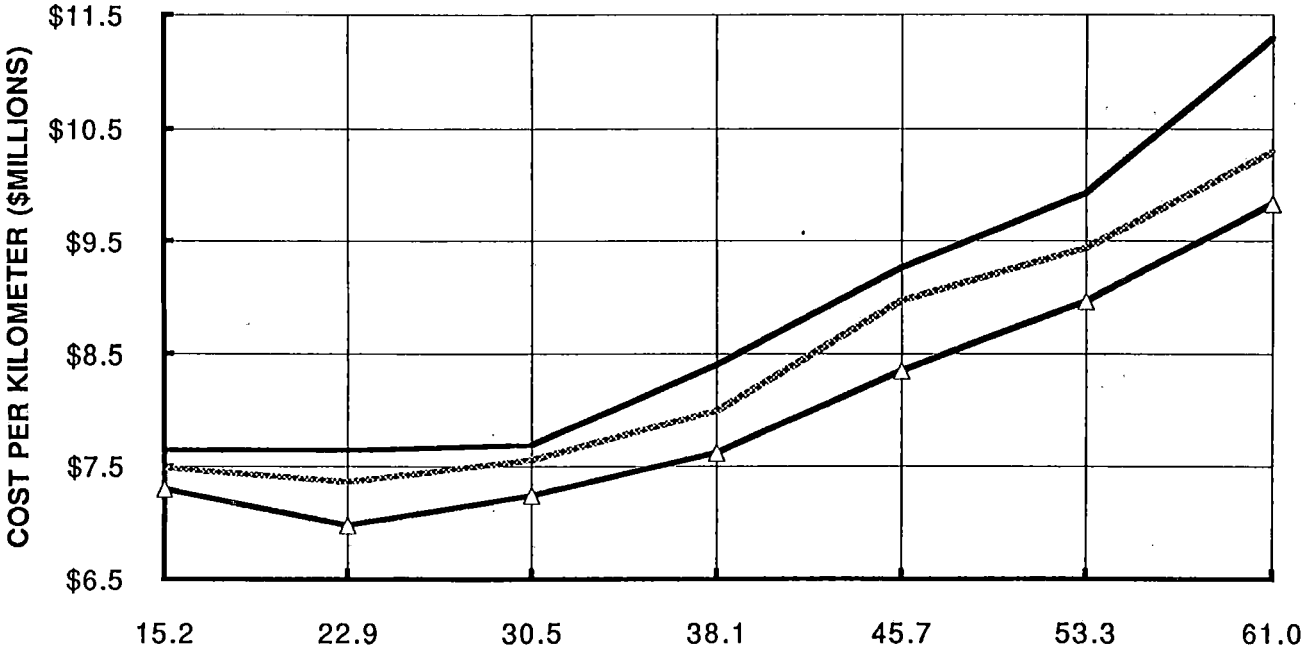
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-Pas'ngr
FRT = 1.27 t/M
FRT = 1.90 t/M

(Ref: Tables 3-64, 3-115, & 3-120)

CHART 3-82

COST VARIATION BY PAYLOAD
Type IV Girder



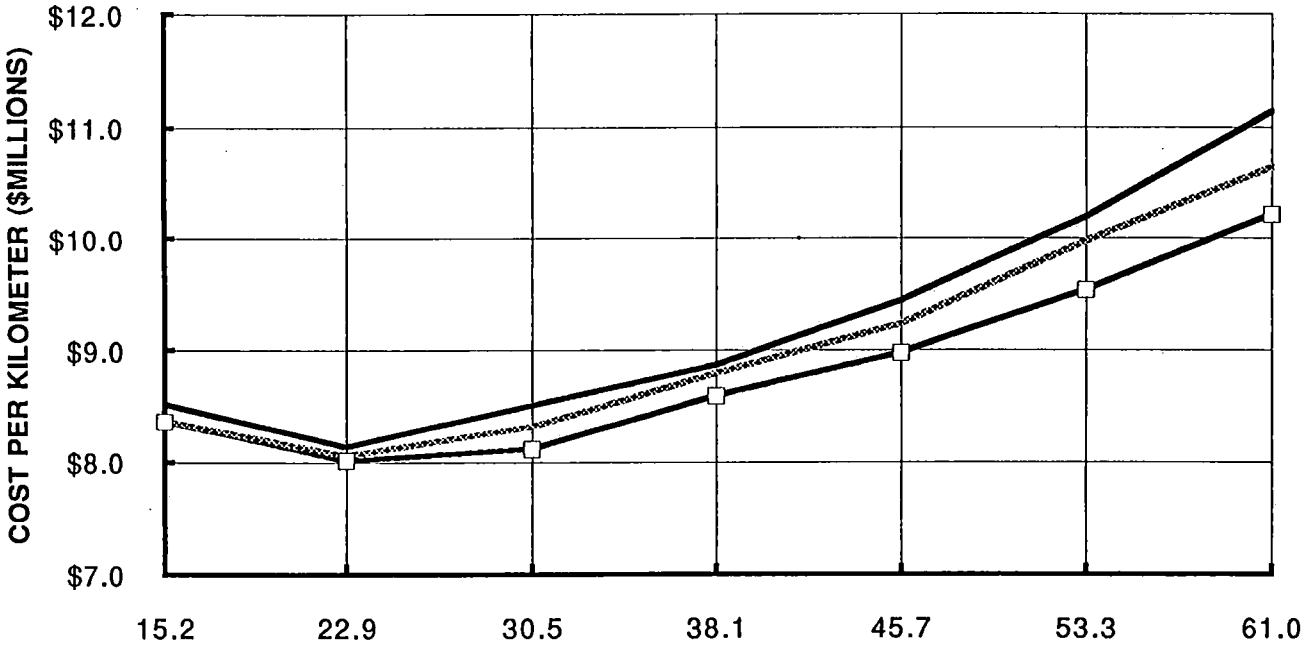
Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl =L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-Pas'ngr
FRT= 1.27 t/M
FRT = 1.90 t/M

(Ref: Tables 3-65, 3-116, & 3-121)

CHART 3-83

COST VARIATION BY PAYLOAD
Type V Girder



Design Parameters:
Two Column
Clearance = 10.67 M
Gir Defl = L/2000
Col Defl = H/500
Seismic Zone = 2
Gir Strength = 41369 kPa

Base-Pas'ngr
FRT = 1.27 t/M
FRT = 1.90 t/M

(Ref: Tables 3-66, 3-117, & 3-122)

CHART 3-84

COST VARIATION BY NUMBER OF COLUMNS
(TYPE I SEISMIC ZONE 2)

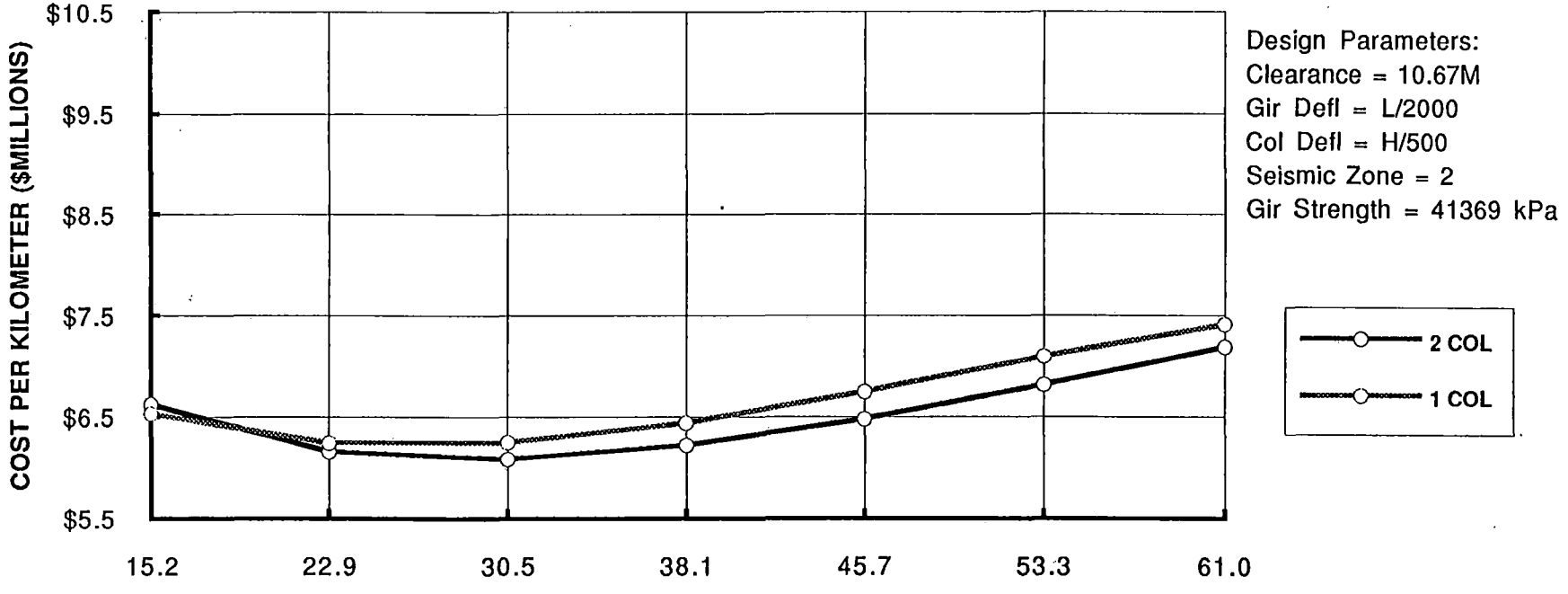


CHART 3-85

COST VARIATION BY NUMBER OF COLUMNS (TYPE II SEISMIC ZONE 2)

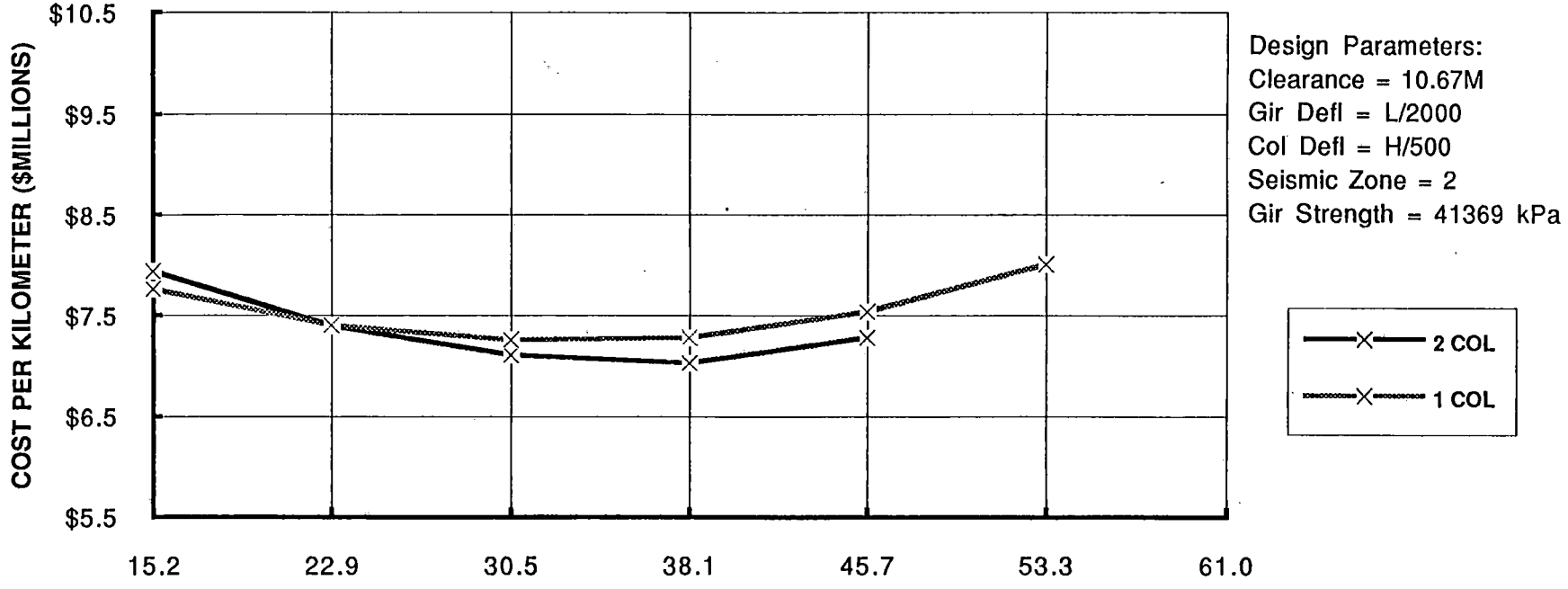


CHART 3-86

COST VARIATION BY NUMBER OF COLUMNS
(TYPE III SEISMIC ZONE 2)

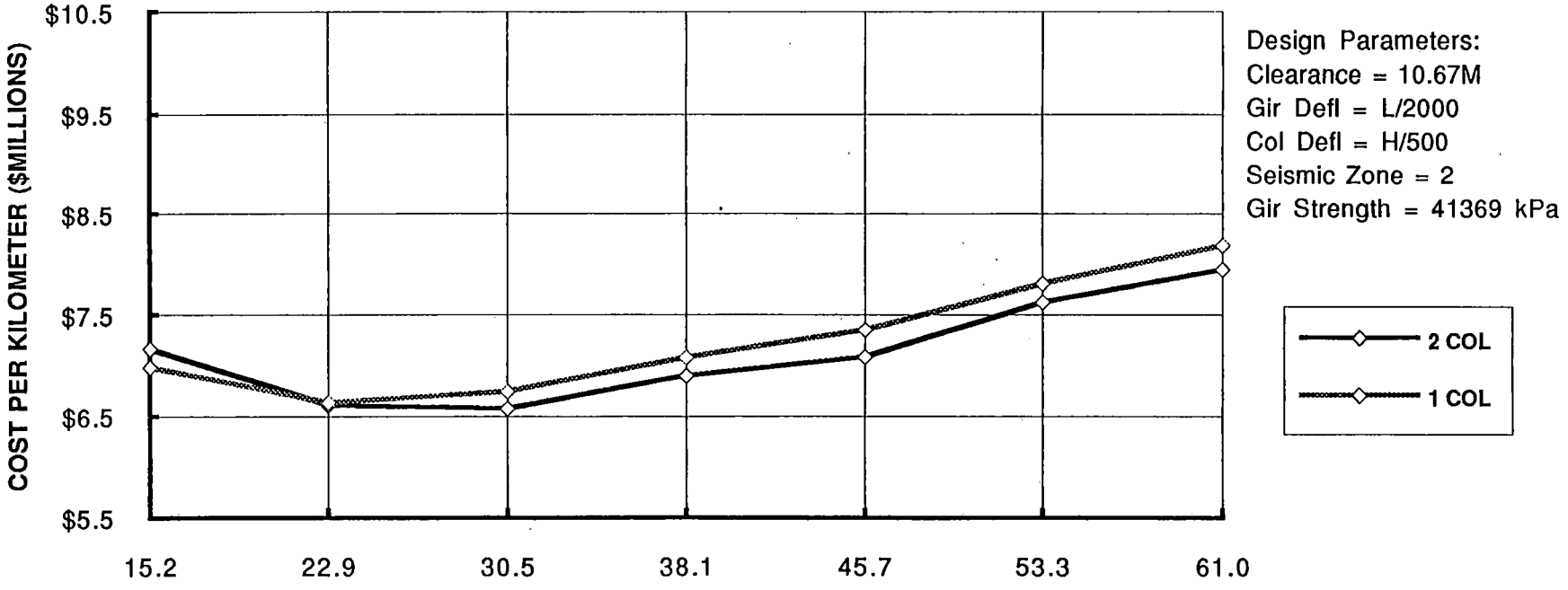


CHART 3-87

COST VARIATION BY NUMBER OF COLUMNS
(TYPE IV SEISMIC ZONE 2)

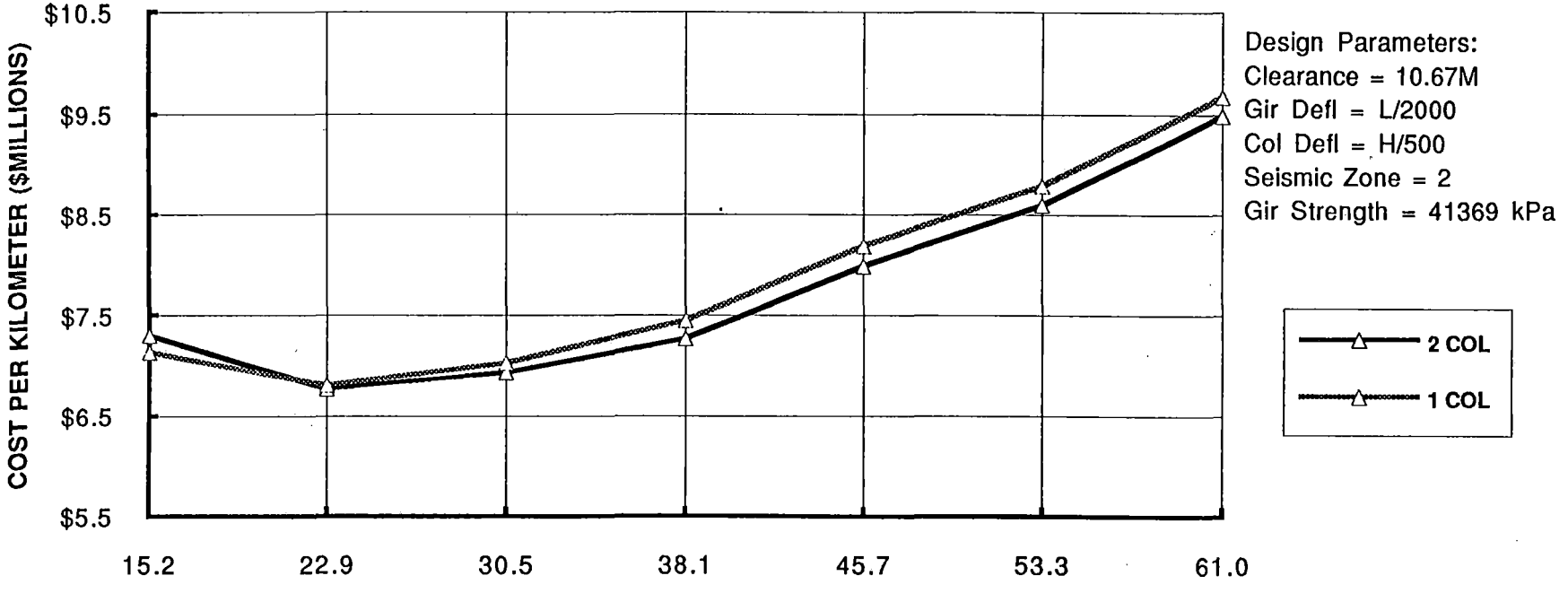


CHART 3-88

COST VARIATION BY NUMBER OF COLUMNS
(TYPE V SEISMIC ZONE 2)

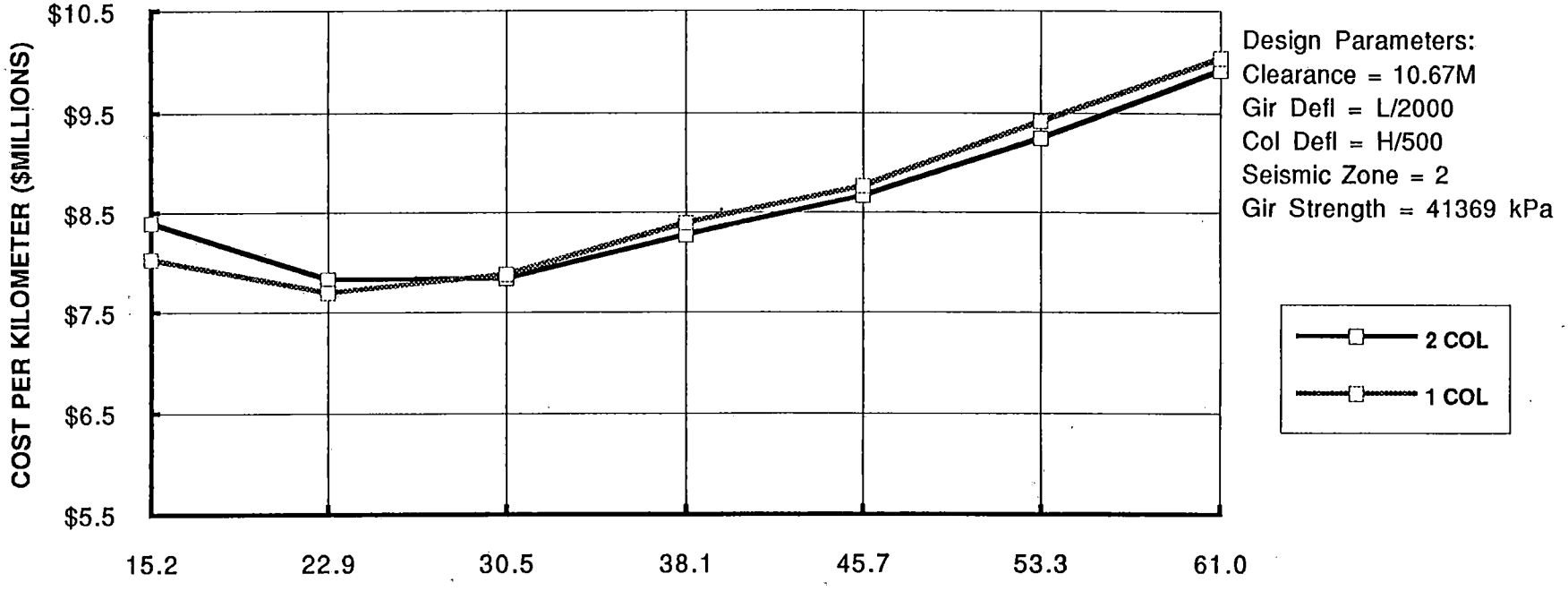


CHART 3-89

COST VARIATION BY NUMBER OF COLUMNS
(TYPE I SEISMIC ZONE 4)

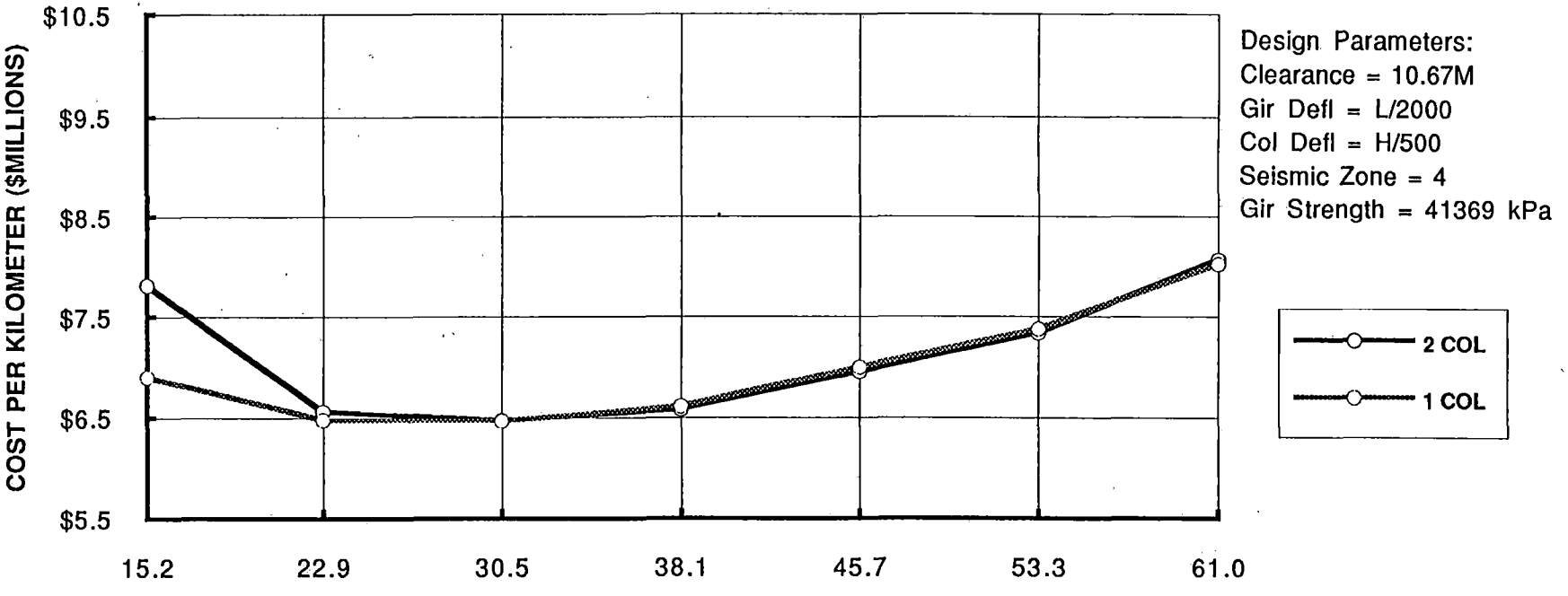


CHART 3-90

COST VARIATION BY NUMBER OF COLUMNS
(TYPE II SEISMIC ZONE 4)

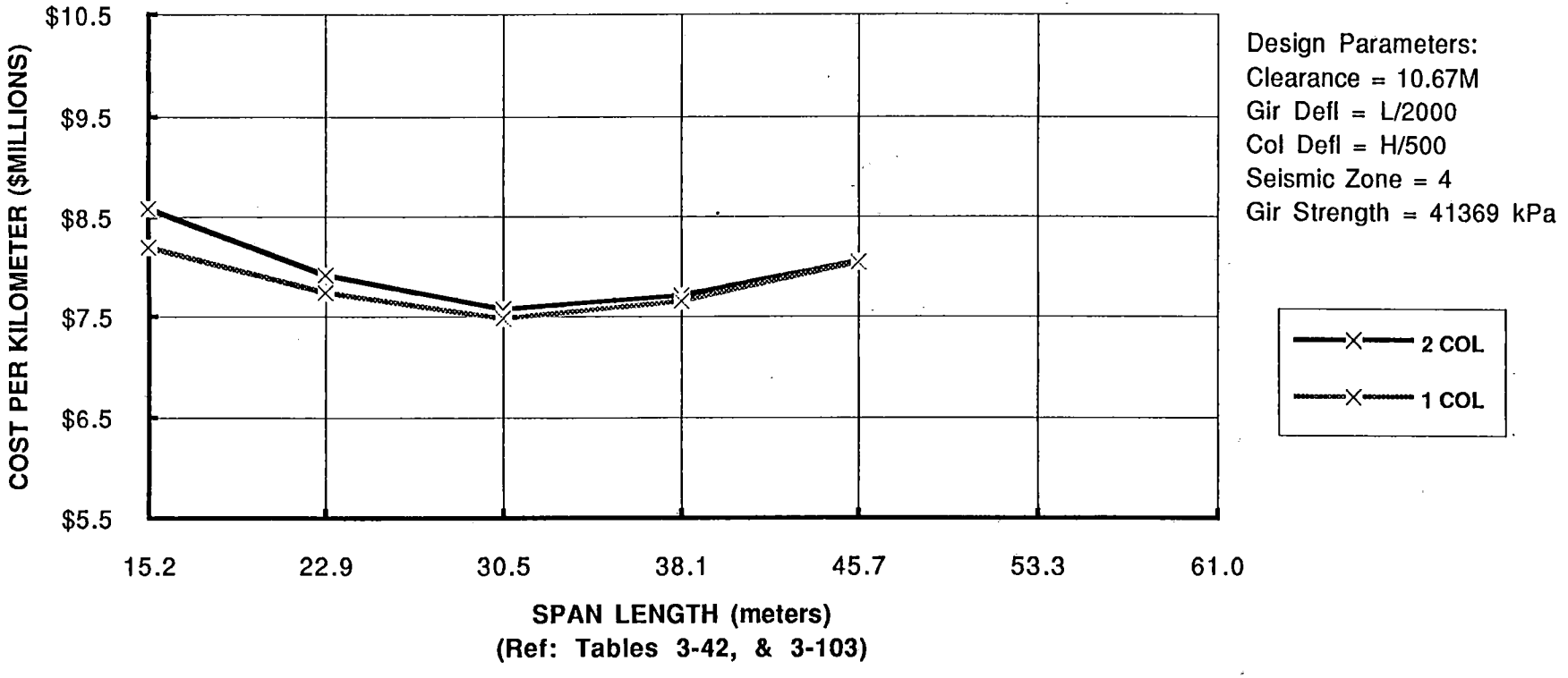
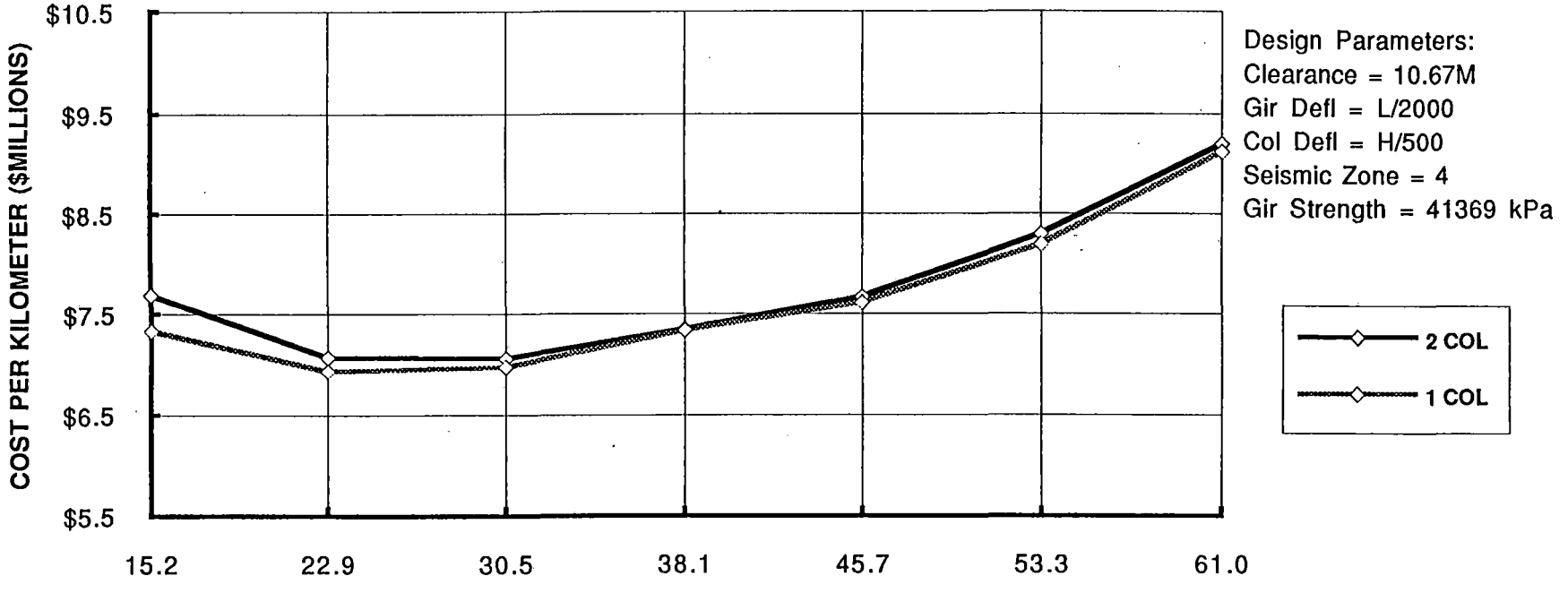


CHART 3-91

COST VARIATION BY NUMBER OF COLUMNS
(TYPE III SEISMIC ZONE 4)



(Ref: Tables 3-43, 3-104)

CHART 3-92

COST VARIATION BY NUMBER OF COLUMNS
(TYPE IV SEISMIC ZONE 4)

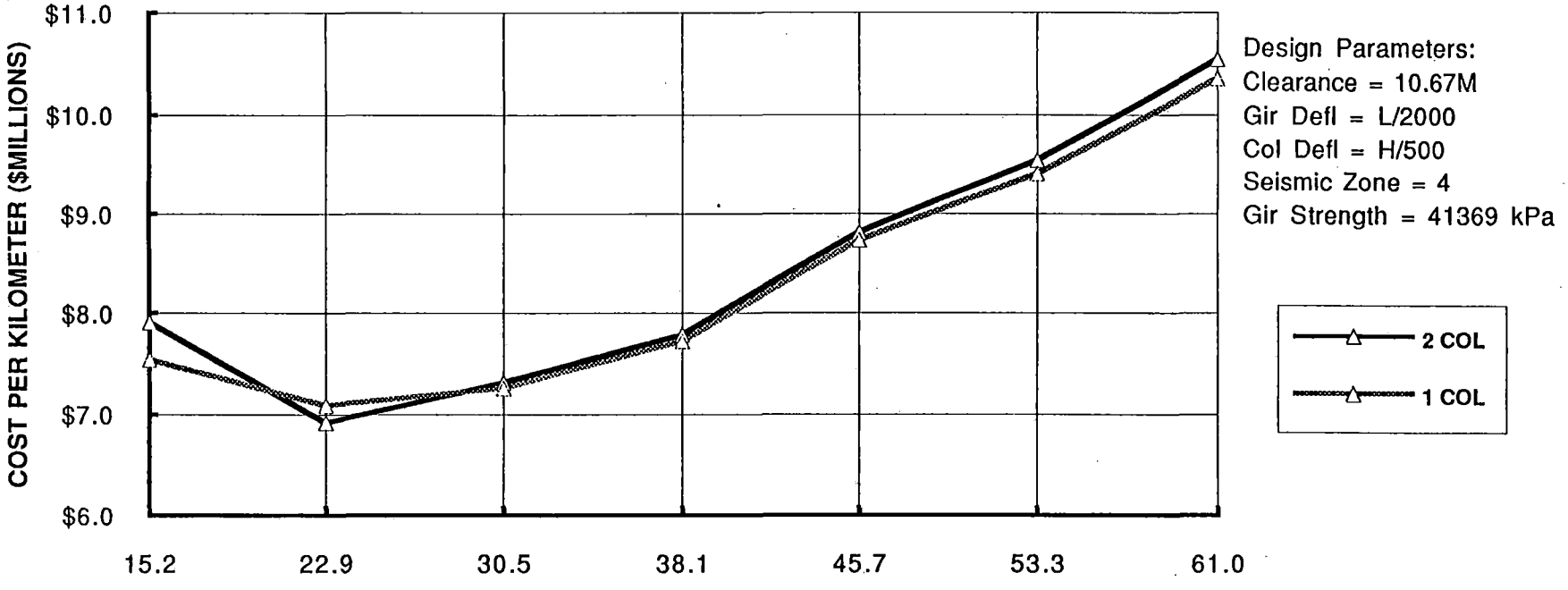


CHART 3-93

COST VARIATION BY NUMBER OF COLUMNS (TYPE V SEISMIC ZONE 4)

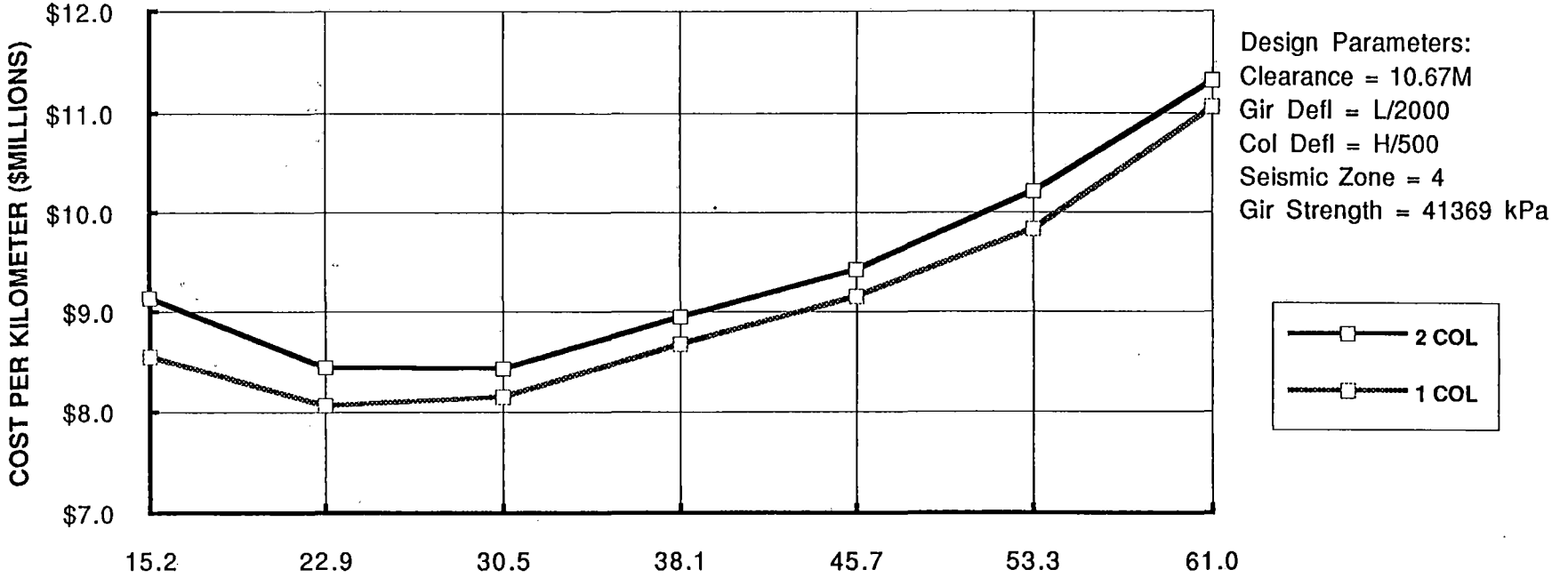


CHART 3-94

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,297,000	$3,012,000	$1,750,000	$6,523,000	$10,497,000
22.9	$31,000	$193,000	$199,000	$1,160,000	$2,903,000	$1,750,000	$6,236,000	$10,036,000
30.5	$31,000	$180,000	$173,000	$1,072,000	$3,035,000	$1,750,000	$6,241,000	$10,044,000
38.1	$31,000	$172,000	$198,000	$1,019,000	$3,260,000	$1,750,000	$6,430,000	$10,348,000
45.7	$31,000	$167,000	$247,000	$983,000	$3,558,000	$1,750,000	$6,736,000	$10,840,000
53.3	$31,000	$163,000	$282,000	$958,000	$3,909,000	$1,750,000	$7,093,000	$11,415,000
61.0	$31,000	$160,000	$311,000	$935,000	$4,217,000	$1,750,000	$7,404,000	$11,915,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	1680	10670	33.7	760
22.9	3610	1070	64200	1470	1850	10670	44.7	760
30.5	3610	1450	99200	1730	1980	10670	55.9	760
38.1	3610	1980	147400	2010	2110	10670	69.9	840
45.7	3610	3020	211800	2290	2240	10670	88.6	990
53.3	3610	2570	293700	2570	2360	10670	107.8	1070
61.0	3610	3610	382200	2920	2490	10670	128.8	1220

TYPE I - SINGLE COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-1

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,348,000	$4,108,000	$1,750,000	$7,755,000	$12,480,000
22.9	$31,000	$193,000	$230,000	$1,194,000	$3,999,000	$1,750,000	$7,397,000	$11,904,000
30.5	$31,000	$180,000	$248,000	$1,098,000	$3,944,000	$1,750,000	$7,251,000	$11,669,000
38.1	$31,000	$172,000	$274,000	$1,040,000	$4,010,000	$1,750,000	$7,277,000	$11,711,000
45.7	$31,000	$167,000	$297,000	$1,000,000	$4,287,000	$1,750,000	$7,532,000	$12,122,000
53.3	$31,000	$163,000	$390,000	$969,000	$4,699,000	$1,750,000	$8,002,000	$12,878,000
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1370	1750	10670	43.5	760
22.9	2790	2130	142500	1650	1930	10670	54.6	760
30.5	2790	2130	189900	1910	2060	10670	68.4	840
38.1	2790	2240	246400	2160	2180	10670	85.3	910
45.7	2790	2440	328300	2460	2310	10670	100.6	1070
53.3	2790	2720	437400	2820	2440	10670	128.8	1220
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-2

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,333,000	$3,339,000	$1,750,000	$6,971,000	$11,219,000
22.9	$31,000	$193,000	$230,000	$1,169,000	$3,252,000	$1,750,000	$6,625,000	$10,662,000
30.5	$31,000	$180,000	$226,000	$1,100,000	$3,446,000	$1,750,000	$6,733,000	$10,836,000
38.1	$31,000	$172,000	$274,000	$1,040,000	$3,804,000	$1,750,000	$7,071,000	$11,380,000
45.7	$31,000	$167,000	$329,000	$999,000	$4,065,000	$1,750,000	$7,341,000	$11,814,000
53.3	$31,000	$163,000	$355,000	$967,000	$4,532,000	$1,750,000	$7,798,000	$12,550,000
61.0	$31,000	$160,000	$457,000	$942,000	$4,834,000	$1,750,000	$8,174,000	$13,155,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	1730	10670	39.9	760
22.9	3510	1140	64300	1570	1880	10670	50.7	760
30.5	3510	1700	103800	1850	2060	10670	65.4	760
38.1	3510	1910	165300	2160	2180	10670	83.6	910
45.7	3510	2740	229200	2490	2310	10670	102.2	1070
53.3	3510	3070	328800	2870	2440	10670	126.8	1220
61.0	3510	3660	421400	3230	2570	10670	153.8	1370

TYPE III - SINGLE COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-3

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,314,000	$3,560,000	$1,750,000	$7,129,000	$11,473,000
22.9	$31,000	$193,000	$199,000	$1,171,000	$3,451,000	$1,750,000	$6,795,000	$10,936,000
30.5	$31,000	$180,000	$198,000	$1,090,000	$3,768,000	$1,750,000	$7,017,000	$11,293,000
38.1	$31,000	$172,000	$244,000	$1,042,000	$4,199,000	$1,750,000	$7,438,000	$11,970,000
45.7	$31,000	$167,000	$297,000	$1,012,000	$4,920,000	$1,750,000	$8,177,000	$13,160,000
53.3	$31,000	$163,000	$390,000	$971,000	$5,478,000	$1,750,000	$8,783,000	$14,135,000
61.0	$31,000	$160,000	$482,000	$947,000	$6,297,000	$1,750,000	$9,667,000	$15,558,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	1700	10670	37.9	760
22.9	3510	1070	75800	1550	1880	10670	48.3	760
30.5	3510	1350	123600	1830	2030	10670	62.7	760
38.1	3510	1980	189700	2130	2180	10670	80.5	910
45.7	3510	2240	295100	2570	2360	10670	105.9	1070
53.3	3510	2490	405200	2950	2460	10670	132.9	1220
61.0	3510	3530	563800	3430	2620	10670	167.2	1450

TYPE IV - SINGLE COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-4

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,382,000	$4,344,000	$1,750,000	$8,025,000	$12,915,000
22.9	$31,000	$193,000	$264,000	$1,216,000	$4,235,000	$1,750,000	$7,689,000	$12,374,000
30.5	$31,000	$180,000	$306,000	$1,133,000	$4,476,000	$1,750,000	$7,876,000	$12,675,000
38.1	$31,000	$172,000	$395,000	$1,072,000	$4,966,000	$1,750,000	$8,386,000	$13,496,000
45.7	$31,000	$167,000	$455,000	$1,022,000	$5,334,000	$1,750,000	$8,759,000	$14,096,000
53.3	$31,000	$163,000	$598,000	$988,000	$5,880,000	$1,750,000	$9,410,000	$15,144,000
61.0	$31,000	$160,000	$674,000	$955,000	$6,468,000	$1,750,000	$10,038,000	$16,155,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	1800	10670	45.9	760
22.9	4320	1070	97800	1780	1980	10670	61.3	760
30.5	4320	1550	152000	2130	2160	10670	80.5	910
38.1	4320	1470	237400	2510	2310	10670	105.9	1070
45.7	4320	2110	327400	2900	2440	10670	130.8	1220
53.3	4320	3020	453500	3350	2590	10670	164.9	1450
61.0	4320	3070	605500	3810	2720	10670	200.7	1600

TYPE V - SINGLE COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-5

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$775,000	$3,012,000	$1,750,000	$6,001,000	$9,657,000
22.9	$31,000	$193,000	$142,000	$744,000	$2,903,000	$1,750,000	$5,763,000	$9,274,000
30.5	$31,000	$180,000	$127,000	$721,000	$3,035,000	$1,750,000	$5,844,000	$9,405,000
38.1	$31,000	$172,000	$166,000	$704,000	$3,260,000	$1,750,000	$6,083,000	$9,789,000
45.7	$31,000	$167,000	$210,000	$694,000	$3,558,000	$1,750,000	$6,410,000	$10,316,000
53.3	$31,000	$163,000	$261,000	$684,000	$3,909,000	$1,750,000	$6,798,000	$10,940,000
61.0	$31,000	$160,000	$317,000	$674,000	$4,217,000	$1,750,000	$7,149,000	$11,505,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	1240	4570	26.6	760
22.9	3610	1070	64200	1470	1400	4570	33.7	760
30.5	3610	1450	99200	1730	1500	4570	43.5	760
38.1	3610	1980	147400	2010	1570	4570	55.9	910
45.7	3610	3020	211800	2290	1680	4570	71.3	1070
53.3	3610	2570	293700	2570	1750	4570	88.6	1220
61.0	3610	3610	382200	2920	1830	4570	107.8	1370

TYPE I - SINGLE COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-6

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$781,000	$4,108,000	$1,750,000	$7,103,000	$11,431,000
22.9	$31,000	$193,000	$199,000	$742,000	$3,999,000	$1,750,000	$6,914,000	$11,127,000
30.5	$31,000	$180,000	$207,000	$720,000	$3,944,000	$1,750,000	$6,832,000	$10,995,000
38.1	$31,000	$172,000	$235,000	$705,000	$4,010,000	$1,750,000	$6,903,000	$11,109,000
45.7	$31,000	$167,000	$285,000	$692,000	$4,287,000	$1,750,000	$7,212,000	$11,607,000
53.3	$31,000	$163,000	$309,000	$683,000	$4,699,000	$1,750,000	$7,635,000	$12,287,000
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1370	1300	4570	31.7	760
22.9	2790	2130	142500	1650	1420	4570	43.5	760
30.5	2790	2130	189900	1910	1520	4570	53.3	910
38.1	2790	2240	246400	2160	1630	4570	66.9	990
45.7	2790	2440	328300	2460	1700	4570	85.3	1140
53.3	2790	2720	437400	2820	1830	4570	102.4	1300
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-7

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$778,000	$3,339,000	$1,750,000	$6,331,000	$10,189,000
22.9	$31,000	$193,000	$169,000	$740,000	$3,252,000	$1,750,000	$6,135,000	$9,873,000
30.5	$31,000	$180,000	$190,000	$721,000	$3,446,000	$1,750,000	$6,318,000	$10,168,000
38.1	$31,000	$172,000	$235,000	$705,000	$3,804,000	$1,750,000	$6,697,000	$10,778,000
45.7	$31,000	$167,000	$285,000	$691,000	$4,065,000	$1,750,000	$6,989,000	$11,248,000
53.3	$31,000	$163,000	$342,000	$680,000	$4,532,000	$1,750,000	$7,498,000	$12,067,000
61.0	$31,000	$160,000	$405,000	$670,000	$4,834,000	$1,750,000	$7,850,000	$12,633,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE GIRDER DIMENSIONS			CAST-IN-PLACE CONCRETE T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	1270	4570	28.6	760
22.9	3510	1140	64300	1570	1400	4570	39.0	760
30.5	3510	1700	103800	1850	1520	4570	50.7	840
38.1	3510	1910	165300	2160	1630	4570	66.9	990
45.7	3510	2740	229200	2490	1700	4570	83.6	1140
53.3	3510	3070	328800	2870	1800	4570	105.9	1300
61.0	3510	3660	421400	3230	1880	4570	126.7	1450

TYPE III - SINGLE COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-8

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$779,000	$3,560,000	$1,750,000	$6,553,000	$10,546,000
22.9	$31,000	$193,000	$169,000	$741,000	$3,451,000	$1,750,000	$6,335,000	$10,195,000
30.5	$31,000	$180,000	$164,000	$722,000	$3,768,000	$1,750,000	$6,615,000	$10,646,000
38.1	$31,000	$172,000	$206,000	$706,000	$4,199,000	$1,750,000	$7,064,000	$11,369,000
45.7	$31,000	$167,000	$304,000	$691,000	$4,920,000	$1,750,000	$7,863,000	$12,654,000
53.3	$31,000	$163,000	$362,000	$679,000	$5,478,000	$1,750,000	$8,463,000	$13,620,000
61.0	$31,000	$160,000	$489,000	$667,000	$6,297,000	$1,750,000	$9,394,000	$15,118,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	1270	4570	28.6	760
22.9	3510	1070	75800	1550	1400	4570	37.9	760
30.5	3510	1350	123600	1830	1520	4570	49.5	840
38.1	3510	1980	189700	2130	1630	4570	64.1	990
45.7	3510	2240	295100	2570	1730	4570	87.0	1220
53.3	3510	2490	405200	2950	1800	4570	111.5	1370
61.0	3510	3530	563800	3430	1910	4570	147.4	1600

TYPE IV - SINGLE COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-9

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$782,000	$4,344,000	$1,750,000	$7,381,000	$11,879,000
22.9	$31,000	$193,000	$218,000	$742,000	$4,235,000	$1,750,000	$7,169,000	$11,538,000
30.5	$31,000	$180,000	$293,000	$719,000	$4,476,000	$1,750,000	$7,449,000	$11,988,000
38.1	$31,000	$172,000	$365,000	$700,000	$4,966,000	$1,750,000	$7,984,000	$12,849,000
45.7	$31,000	$167,000	$423,000	$687,000	$5,334,000	$1,750,000	$8,392,000	$13,506,000
53.3	$31,000	$163,000	$559,000	$673,000	$5,880,000	$1,750,000	$9,056,000	$14,574,000
61.0	$31,000	$160,000	$633,000	$661,000	$6,468,000	$1,750,000	$9,703,000	$15,616,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	1320	4570	36.8	760
22.9	4320	1070	97800	1780	1450	4570	47.1	840
30.5	4320	1550	152000	2130	1570	4570	65.4	990
38.1	4320	1470	237400	2510	1680	4570	85.3	1220
45.7	4320	2110	327400	2900	1780	4570	107.8	1370
53.3	4320	3020	453500	3350	1880	4570	138.9	1600
61.0	4320	3070	605500	3810	1980	4570	171.9	1750

TYPE V - SINGLE COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-10

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$2,204,000	$3,012,000	$1,750,000	$7,562,000	$12,170,000
22.9	$31,000	$193,000	$230,000	$1,880,000	$2,903,000	$1,750,000	$6,987,000	$11,244,000
30.5	$31,000	$180,000	$226,000	$1,682,000	$3,035,000	$1,750,000	$6,904,000	$11,111,000
38.1	$31,000	$172,000	$251,000	$1,585,000	$3,260,000	$1,750,000	$7,049,000	$11,344,000
45.7	$31,000	$167,000	$282,000	$1,506,000	$3,558,000	$1,750,000	$7,294,000	$11,738,000
53.3	$31,000	$163,000	$341,000	$1,452,000	$3,909,000	$1,750,000	$7,646,000	$12,305,000
61.0	$31,000	$160,000	$406,000	$1,396,000	$4,217,000	$1,750,000	$7,960,000	$12,810,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	2030	16760	46.8	760
22.9	3610	1070	64200	1470	2240	16760	57.2	760
30.5	3610	1450	99200	1730	2390	16760	71.3	760
38.1	3610	1980	147400	2010	2570	16760	88.6	840
45.7	3610	3020	211800	2290	2720	16760	109.6	910
53.3	3610	2570	293700	2570	2870	16760	130.8	1070
61.0	3610	3610	382200	2920	3000	16760	156.1	1220

TYPE I - SINGLE COLUMN - 15.76 M CLEARNACE
COST COMPARISON CHART

TABLE 3-11

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$2,393,000	$4,108,000	$1,750,000	$8,847,000	$14,238,000
22.9	$31,000	$193,000	$301,000	$2,010,000	$3,999,000	$1,750,000	$8,284,000	$13,332,000
30.5	$31,000	$180,000	$314,000	$1,784,000	$3,944,000	$1,750,000	$8,003,000	$12,879,000
38.1	$31,000	$172,000	$338,000	$1,632,000	$4,010,000	$1,750,000	$7,933,000	$12,767,000
45.7	$31,000	$167,000	$398,000	$1,545,000	$4,287,000	$1,750,000	$8,178,000	$13,161,000
53.3	$31,000	$163,000	$464,000	$1,497,000	$4,699,000	$1,750,000	$8,604,000	$13,847,000
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1350	2160	16760	54.6	760
22.9	2790	2130	142500	1650	2360	16760	69.9	760
30.5	2790	2130	189900	1910	2510	16760	87.0	840
38.1	2790	2240	246400	2160	2640	16760	105.9	910
45.7	2790	2440	328300	2460	2790	16760	128.8	1070
53.3	2790	2720	437400	2820	2970	16760	153.8	1220
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - 15.76 M CLEARNACE
COST COMPARISON CHART

TABLE 3-12

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$2,316,000	$3,339,000	$1,750,000	$8,001,000	$12,876,000
22.9	$31,000	$193,000	$301,000	$1,929,000	$3,252,000	$1,750,000	$7,456,000	$11,999,000
30.5	$31,000	$180,000	$314,000	$1,765,000	$3,446,000	$1,750,000	$7,486,000	$12,048,000
38.1	$31,000	$172,000	$338,000	$1,651,000	$3,804,000	$1,750,000	$7,746,000	$12,466,000
45.7	$31,000	$167,000	$398,000	$1,561,000	$4,065,000	$1,750,000	$7,972,000	$12,830,000
53.3	$31,000	$163,000	$464,000	$1,493,000	$4,532,000	$1,750,000	$8,433,000	$13,572,000
61.0	$31,000	$160,000	$506,000	$1,431,000	$4,834,000	$1,750,000	$8,712,000	$14,021,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	2110	16760	50.7	760
22.9	3510	1140	64300	1570	2290	16760	65.4	760
30.5	3510	1700	103800	1850	2490	16760	83.6	840
38.1	3510	1910	165300	2160	2670	16760	104.1	910
45.7	3510	2740	229200	2490	2820	16760	126.7	1070
53.3	3510	3070	328800	2870	2970	16760	153.8	1220
61.0	3510	3660	421400	3230	3100	16760	181.2	1300

TYPE III - SINGLE COLUMN - 15.76 M CLEARNACE COST COMPARISON CHART

TABLE 3-13

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$2,279,000	$3,560,000	$1,750,000	$8,138,000	$13,097,000
22.9	$31,000	$193,000	$264,000	$1,931,000	$3,451,000	$1,750,000	$7,620,000	$12,263,000
30.5	$31,000	$180,000	$255,000	$1,743,000	$3,768,000	$1,750,000	$7,727,000	$12,435,000
38.1	$31,000	$172,000	$305,000	$1,653,000	$4,199,000	$1,750,000	$8,110,000	$13,052,000
45.7	$31,000	$167,000	$363,000	$1,573,000	$4,920,000	$1,750,000	$8,804,000	$14,169,000
53.3	$31,000	$163,000	$464,000	$1,504,000	$5,478,000	$1,750,000	$9,390,000	$15,112,000
61.0	$31,000	$160,000	$610,000	$1,459,000	$6,297,000	$1,750,000	$10,307,000	$16,588,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	2080	16760	48.3	760
22.9	3510	1070	75800	1550	2290	16760	62.7	760
30.5	3510	1350	123600	1830	2460	16760	79.0	760
38.1	3510	1980	189700	2130	2670	16760	100.6	910
45.7	3510	2240	295100	2570	2840	16760	128.8	1070
53.3	3510	2490	405200	2950	3000	16760	158.3	1220
61.0	3510	3530	563800	3430	3180	16760	200.7	1450

TYPE IV - SINGLE COLUMN - 15.76 M CLEARNACE COST COMPARISON CHART

TABLE 3-14

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$396,000	$2,462,000	$4,344,000	$1,750,000	$9,203,000	$14,811,000
22.9	$31,000	$193,000	$339,000	$2,059,000	$4,235,000	$1,750,000	$8,607,000	$13,852,000
30.5	$31,000	$180,000	$382,000	$1,861,000	$4,476,000	$1,750,000	$8,680,000	$13,969,000
38.1	$31,000	$172,000	$478,000	$1,745,000	$4,966,000	$1,750,000	$9,142,000	$14,713,000
45.7	$31,000	$167,000	$541,000	$1,636,000	$5,334,000	$1,750,000	$9,459,000	$15,223,000
53.3	$31,000	$163,000	$661,000	$1,568,000	$5,880,000	$1,750,000	$10,053,000	$16,179,000
61.0	$31,000	$160,000	$833,000	$1,502,000	$6,468,000	$1,750,000	$10,744,000	$17,291,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	2210	16760	59.9	760
22.9	4320	1070	97800	1780	2410	16760	77.4	760
30.5	4320	1550	152000	2130	2620	16760	100.6	910
38.1	4320	1470	237400	2510	2820	16760	128.8	1070
45.7	4320	2110	327400	2900	2970	16760	156.1	1220
53.3	4320	3020	453500	3350	3150	16760	193.1	1370
61.0	4320	3070	605500	3810	3300	16760	239.7	1600

TYPE V - SINGLE COLUMN - 15.76 M CLEARNACE COST COMPARISON CHART

TABLE 3-15

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,297,000	$3,012,000	$1,750,000	$6,564,000	$10,563,000
22.9	$31,000	$193,000	$199,000	$1,160,000	$2,903,000	$1,750,000	$6,236,000	$10,036,000
30.5	$31,000	$180,000	$173,000	$1,072,000	$3,035,000	$1,750,000	$6,241,000	$10,044,000
38.1	$31,000	$172,000	$198,000	$1,019,000	$3,260,000	$1,750,000	$6,430,000	$10,348,000
45.7	$31,000	$167,000	$247,000	$983,000	$3,558,000	$1,750,000	$6,736,000	$10,840,000
53.3	$31,000	$163,000	$282,000	$958,000	$3,909,000	$1,750,000	$7,093,000	$11,415,000
61.0	$31,000	$160,000	$341,000	$935,000	$4,217,000	$1,750,000	$7,434,000	$11,964,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	1680	10670	35.7	760
22.9	3610	1070	64200	1470	1850	10670	44.7	760
30.5	3610	1450	99200	1730	1980	10670	55.9	760
38.1	3610	1980	147400	2010	2110	10670	71.3	840
45.7	3610	3020	211800	2290	2240	10670	88.6	990
53.3	3610	2570	293700	2570	2360	10670	107.8	1070
61.0	3610	3610	382200	2920	2490	10670	128.8	1220

TYPE I - SINGLE COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-16

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,350,000	$4,108,000	$1,750,000	$7,757,000	$12,483,000
22.9	$31,000	$193,000	$230,000	$1,194,000	$3,999,000	$1,750,000	$7,397,000	$11,904,000
30.5	$31,000	$180,000	$248,000	$1,121,000	$3,944,000	$1,750,000	$7,274,000	$11,706,000
38.1	$31,000	$172,000	$274,000	$1,040,000	$4,010,000	$1,750,000	$7,277,000	$11,711,000
45.7	$31,000	$167,000	$297,000	$1,000,000	$4,287,000	$1,750,000	$7,532,000	$12,121,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1350	1750	10670	43.5	760
22.9	2790	2130	142500	1650	1930	10670	54.6	760
30.5	2790	2130	189900	1910	2110	10670	68.4	840
38.1	2790	2240	246400	2160	2180	10670	85.3	910
45.7	2790	2440	328300	2460	2310	10670	100.6	1070
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-17

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,333,000	$3,339,000	$1,750,000	$6,971,000	$11,219,000
22.9	$31,000	$193,000	$230,000	$1,184,000	$3,252,000	$1,750,000	$6,640,000	$10,686,000
30.5	$31,000	$180,000	$226,000	$1,100,000	$3,446,000	$1,750,000	$6,733,000	$10,836,000
38.1	$31,000	$172,000	$274,000	$1,040,000	$3,804,000	$1,750,000	$7,071,000	$11,380,000
45.7	$31,000	$167,000	$329,000	$999,000	$4,065,000	$1,750,000	$7,341,000	$11,814,000
53.3	$31,000	$163,000	$355,000	$967,000	$4,532,000	$1,750,000	$7,798,000	$12,550,000
61.0	$31,000	$160,000	$457,000	$942,000	$4,834,000	$1,750,000	$8,174,000	$13,155,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	1730	10670	39.9	760
22.9	3510	1140	64300	1570	1910	10670	50.7	760
30.5	3510	1700	103800	1850	2060	10670	65.4	760
38.1	3510	1910	165300	2160	2180	10670	83.6	910
45.7	3510	2740	229200	2490	2310	10670	102.2	1070
53.3	3510	3070	328800	2870	2440	10670	126.8	1220
61.0	3510	3660	421400	3230	2570	10670	153.8	1370

TYPE III - SINGLE COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-18

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,314,000	$3,560,000	$1,750,000	$7,129,000	$11,473,000
22.9	$31,000	$193,000	$199,000	$1,171,000	$3,451,000	$1,750,000	$6,795,000	$10,936,000
30.5	$31,000	$180,000	$198,000	$1,091,000	$3,657,000	$1,750,000	$6,907,000	$11,116,000
38.1	$31,000	$172,000	$244,000	$1,042,000	$4,199,000	$1,750,000	$7,438,000	$11,970,000
45.7	$31,000	$167,000	$329,000	$1,004,000	$4,920,000	$1,750,000	$8,201,000	$13,198,000
53.3	$31,000	$163,000	$414,000	$971,000	$5,478,000	$1,750,000	$8,807,000	$14,174,000
61.0	$31,000	$160,000	$523,000	$947,000	$6,297,000	$1,750,000	$9,708,000	$15,624,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE GIRDER DIMENSIONS			CAST-IN-PLACE CONCRETE T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	1700	10670	37.9	760
22.9	3510	1070	75800	1550	1880	10670	48.3	760
30.5	3510	1190	116900	1800	2030	10670	61.3	760
38.1	3510	1980	189700	2130	2180	10670	80.5	910
45.7	3510	2240	295100	2570	2340	10670	107.8	1070
53.3	3510	2490	405200	2950	2460	10670	134.9	1300
61.0	3510	3530	563800	3430	2620	10670	171.9	1450

TYPE IV - SINGLE COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-19

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,382,000	$4,344,000	$1,750,000	$8,025,000	$12,915,000
22.9	$31,000	$193,000	$264,000	$1,216,000	$4,235,000	$1,750,000	$7,689,000	$12,374,000
30.5	$31,000	$180,000	$306,000	$1,133,000	$4,476,000	$1,750,000	$7,876,000	$12,675,000
38.1	$31,000	$172,000	$395,000	$1,072,000	$4,966,000	$1,750,000	$8,386,000	$13,496,000
45.7	$31,000	$167,000	$455,000	$1,022,000	$5,334,000	$1,750,000	$8,759,000	$14,096,000
53.3	$31,000	$163,000	$598,000	$988,000	$5,880,000	$1,750,000	$9,410,000	$15,144,000
61.0	$31,000	$160,000	$674,000	$955,000	$6,468,000	$1,750,000	$10,038,000	$16,155,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	1800	10670	45.9	760
22.9	4320	1070	97800	1780	1980	10670	61.3	760
30.5	4320	1550	152000	2130	2160	10670	80.5	910
38.1	4320	1470	237400	2510	2310	10670	105.9	1070
45.7	4320	2110	327400	2900	2440	10670	130.8	1220
53.3	4320	3020	453500	3350	2590	10670	164.9	1450
61.0	4320	3070	605500	3810	2720	10670	200.7	1600

TYPE V - SINGLE COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-20

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,297,000	$3,012,000	$1,750,000	$6,564,000	$10,563,000
22.9	$31,000	$193,000	$199,000	$1,160,000	$2,985,000	$1,750,000	$6,318,000	$10,168,000
30.5	$31,000	$180,000	$173,000	$1,071,000	$3,113,000	$1,750,000	$6,318,000	$10,168,000
38.1	$31,000	$172,000	$198,000	$1,027,000	$3,322,000	$1,750,000	$6,500,000	$10,461,000
45.7	$31,000	$167,000	$247,000	$983,000	$3,566,000	$1,750,000	$6,744,000	$10,853,000
53.3	$31,000	$163,000	$302,000	$961,000	$4,135,000	$1,750,000	$7,342,000	$11,816,000
61.0	$31,000	$160,000	$396,000	$941,000	$4,723,000	$1,750,000	$8,001,000	$12,876,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	1680	10670	35.7	760
22.9	3610	1350	68700	1470	1850	10670	45.9	760
30.5	3610	1960	104900	1750	1980	10670	57.2	760
38.1	3610	2490	153100	2030	2130	10670	71.3	840
45.7	3610	3050	212600	2290	2240	10670	88.6	990
53.3	3610	3300	322500	2670	2390	10670	113.3	1140
61.0	3610	3610	455900	3100	2540	10670	143.2	1300

TYPE I - SINGLE COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-21

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,350,000	$4,108,000	$1,750,000	$7,757,000	$12,483,000
22.9	$31,000	$193,000	$230,000	$1,194,000	$3,999,000	$1,750,000	$7,397,000	$11,904,000
30.5	$31,000	$180,000	$248,000	$1,121,000	$3,944,000	$1,750,000	$7,274,000	$11,706,000
38.1	$31,000	$172,000	$274,000	$1,040,000	$4,010,000	$1,750,000	$7,277,000	$11,711,000
45.7	$31,000	$167,000	$329,000	$1,005,000	$4,500,000	$1,750,000	$7,782,000	$12,524,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1350	1750	10670	43.5	760
22.9	2790	2130	142500	1650	1930	10670	54.6	760
30.5	2790	2130	189900	1910	2110	10670	68.4	840
38.1	2790	2240	246400	2160	2180	10670	85.3	910
45.7	2790	2640	351500	2540	2340	10670	105.9	1070
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-22

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,333,000	$3,339,000	$1,750,000	$6,971,000	$11,219,000
22.9	$31,000	$193,000	$230,000	$1,184,000	$3,320,000	$1,750,000	$6,708,000	$10,795,000
30.5	$31,000	$180,000	$248,000	$1,099,000	$3,562,000	$1,750,000	$6,870,000	$11,056,000
38.1	$31,000	$172,000	$274,000	$1,048,000	$3,935,000	$1,750,000	$7,210,000	$11,603,000
45.7	$31,000	$167,000	$329,000	$1,004,000	$4,262,000	$1,750,000	$7,543,000	$12,139,000
53.3	$31,000	$163,000	$390,000	$972,000	$4,602,000	$1,750,000	$7,908,000	$12,727,000
61.0	$31,000	$160,000	$457,000	$940,000	$5,001,000	$1,750,000	$8,339,000	$13,420,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	1730	10670	39.9	760
22.9	3510	1370	68000	1570	1910	10670	50.7	760
30.5	3510	1830	112300	1880	2060	10670	66.9	840
38.1	3510	2340	177200	2210	2210	10670	85.3	910
45.7	3510	2740	250700	2570	2340	10670	105.9	1070
53.3	3510	3300	337700	2920	2460	10670	128.8	1220
61.0	3510	3660	445700	3280	2570	10670	156.1	1370

TYPE III - SINGLE COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-23

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,314,000	$3,560,000	$1,750,000	$7,129,000	$11,473,000
22.9	$31,000	$193,000	$199,000	$1,169,000	$3,635,000	$1,750,000	$6,977,000	$11,228,000
30.5	$31,000	$180,000	$218,000	$1,099,000	$4,046,000	$1,750,000	$7,324,000	$11,787,000
38.1	$31,000	$172,000	$274,000	$1,048,000	$4,422,000	$1,750,000	$7,697,000	$12,387,000
45.7	$31,000	$167,000	$352,000	$1,009,000	$5,219,000	$1,750,000	$8,528,000	$13,725,000
53.3	$31,000	$163,000	$414,000	$980,000	$5,883,000	$1,750,000	$9,221,000	$14,840,000
61.0	$31,000	$160,000	$523,000	$947,000	$6,297,000	$1,750,000	$9,708,000	$15,624,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	1700	10670	37.9	760
22.9	3510	1320	84200	1570	1880	10670	49.5	760
30.5	3510	1730	140500	1880	2060	10670	65.5	840
38.1	3510	2290	206600	2210	2210	10670	85.3	910
45.7	3510	2640	322300	2640	2360	10670	111.5	1140
53.3	3510	3000	448200	3070	2510	10670	139.0	1300
61.0	3510	3530	563800	3430	2620	10670	171.9	1450

TYPE IV - SINGLE COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-24

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,382,000	$4,344,000	$1,750,000	$8,025,000	$12,915,000
22.9	$31,000	$193,000	$264,000	$1,216,000	$4,281,000	$1,750,000	$7,735,000	$12,448,000
30.5	$31,000	$180,000	$306,000	$1,133,000	$4,507,000	$1,750,000	$7,907,000	$12,725,000
38.1	$31,000	$172,000	$395,000	$1,072,000	$4,966,000	$1,750,000	$8,386,000	$13,496,000
45.7	$31,000	$167,000	$483,000	$1,026,000	$5,537,000	$1,750,000	$8,994,000	$14,475,000
53.3	$31,000	$163,000	$598,000	$988,000	$5,880,000	$1,750,000	$9,410,000	$15,144,000
61.0	$31,000	$160,000	$674,000	$953,000	$6,577,000	$1,750,000	$10,145,000	$16,327,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	1800	10670	45.9	760
22.9	4320	1140	100400	1780	1980	10670	61.3	760
30.5	4320	1600	154200	2130	2160	10670	80.5	910
38.1	4320	1470	237400	2510	2310	10670	105.9	1070
45.7	4320	2440	349500	2970	2460	10670	134.9	1300
53.3	4320	3020	453500	3350	2590	10670	164.9	1450
61.0	4320	3250	621400	3860	2720	10670	203.2	1600

TYPE V - SINGLE COLUMN - GIRDER DEFL L/4000 COST COMPARISON CHART

TABLE 3-25

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$926,000	$3,012,000	$1,750,000	$6,152,000	$9,900,000
22.9	$31,000	$193,000	$169,000	$869,000	$2,903,000	$1,750,000	$5,915,000	$9,519,000
30.5	$31,000	$180,000	$190,000	$826,000	$3,035,000	$1,750,000	$6,012,000	$9,675,000
38.1	$31,000	$172,000	$235,000	$807,000	$3,260,000	$1,750,000	$6,255,000	$10,066,000
45.7	$31,000	$167,000	$266,000	$789,000	$3,558,000	$1,750,000	$6,561,000	$10,559,000
53.3	$31,000	$163,000	$342,000	$775,000	$3,909,000	$1,750,000	$6,970,000	$11,217,000
61.0	$31,000	$160,000	$350,000	$764,000	$4,217,000	$1,750,000	$7,272,000	$11,703,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	1120	10670	32.7	760
22.9	3610	1070	64200	1470	1240	10670	42.4	760
30.5	3610	1450	99200	1730	1320	10670	54.6	840
38.1	3610	1980	147400	2010	1420	10670	69.9	990
45.7	3610	3020	211800	2290	1500	10670	87.0	1070
53.3	3610	2570	293700	2570	1570	10670	107.8	1300
61.0	3610	3610	382200	2920	1650	10670	126.8	1370

TYPE I - SINGLE COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-26

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$949,000	$4,108,000	$1,750,000	$7,312,000	$11,767,000
22.9	$31,000	$193,000	$253,000	$884,000	$3,999,000	$1,750,000	$7,110,000	$11,442,000
30.5	$31,000	$180,000	$271,000	$838,000	$3,944,000	$1,750,000	$7,014,000	$11,288,000
38.1	$31,000	$172,000	$285,000	$817,000	$4,010,000	$1,750,000	$7,065,000	$11,370,000
45.7	$31,000	$167,000	$339,000	$796,000	$4,287,000	$1,750,000	$7,370,000	$11,861,000
53.3	$31,000	$163,000	$487,000	$780,000	$4,699,000	$1,750,000	$7,910,000	$12,730,000
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1370	1170	10670	40.1	760
22.9	2790	2130	142500	1650	1300	10670	53.3	840
30.5	2790	2130	189900	1910	1370	10670	66.9	910
38.1	2790	2240	246400	2160	1470	10670	80.5	1070
45.7	2790	2440	328300	2460	1550	10670	100.6	1220
53.3	2790	2720	437400	2820	1630	10670	128.8	1520
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-27

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$938,000	$3,339,000	$1,750,000	$6,532,000	$10,512,000
22.9	$31,000	$193,000	$199,000	$876,000	$3,252,000	$1,750,000	$6,301,000	$10,140,000
30.5	$31,000	$180,000	$238,000	$839,000	$3,446,000	$1,750,000	$6,484,000	$10,435,000
38.1	$31,000	$172,000	$285,000	$817,000	$3,804,000	$1,750,000	$6,859,000	$11,039,000
45.7	$31,000	$167,000	$339,000	$796,000	$4,065,000	$1,750,000	$7,148,000	$11,504,000
53.3	$31,000	$163,000	$439,000	$784,000	$4,532,000	$1,750,000	$7,699,000	$12,390,000
61.0	$31,000	$160,000	$507,000	$771,000	$4,834,000	$1,750,000	$8,053,000	$12,960,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	1140	10670	36.8	760
22.9	3510	1140	64300	1570	1270	10670	47.1	760
30.5	3510	1700	103800	1850	1370	10670	62.7	910
38.1	3510	1910	165300	2160	1470	10670	80.5	1070
45.7	3510	2740	229200	2490	1550	10670	100.6	1220
53.3	3510	3070	328800	2870	1650	10670	126.7	1370
61.0	3510	3660	421400	3230	1730	10670	151.6	1520

TYPE III - SINGLE COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-28

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$952,000	$3,560,000	$1,750,000	$6,767,000	$10,890,000
22.9	$31,000	$193,000	$199,000	$867,000	$3,451,000	$1,750,000	$6,491,000	$10,446,000
30.5	$31,000	$180,000	$238,000	$839,000	$3,768,000	$1,750,000	$6,806,000	$10,953,000
38.1	$31,000	$172,000	$285,000	$824,000	$4,199,000	$1,750,000	$7,261,000	$11,686,000
45.7	$31,000	$167,000	$339,000	$800,000	$4,920,000	$1,750,000	$8,007,000	$12,886,000
53.3	$31,000	$163,000	$463,000	$783,000	$5,478,000	$1,750,000	$8,668,000	$13,950,000
61.0	$31,000	$160,000	$606,000	$772,000	$6,297,000	$1,750,000	$9,616,000	$15,476,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	1170	10670	36.8	760
22.9	3510	1070	75800	1550	1240	10670	45.9	760
30.5	3510	1350	123600	1830	1370	10670	61.3	910
38.1	3510	1980	189700	2130	1500	10670	80.5	1070
45.7	3510	2240	295100	2570	1570	10670	104.1	1220
53.3	3510	2490	405200	2950	1650	10670	134.9	1450
61.0	3510	3530	563800	3430	1750	10670	169.5	1680

TYPE IV - SINGLE COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-29

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$974,000	$4,344,000	$1,750,000	$7,617,000	$12,259,000
22.9	$31,000	$193,000	$317,000	$890,000	$4,235,000	$1,750,000	$7,416,000	$11,935,000
30.5	$31,000	$180,000	$356,000	$856,000	$4,476,000	$1,750,000	$7,649,000	$12,310,000
38.1	$31,000	$172,000	$451,000	$828,000	$4,966,000	$1,750,000	$8,198,000	$13,194,000
45.7	$31,000	$167,000	$540,000	$804,000	$5,334,000	$1,750,000	$8,626,000	$13,882,000
53.3	$31,000	$163,000	$661,000	$789,000	$5,880,000	$1,750,000	$9,274,000	$14,925,000
61.0	$31,000	$160,000	$771,000	$777,000	$6,468,000	$1,750,000	$9,957,000	$16,024,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	1220	10670	44.7	760
22.9	4320	1070	97800	1780	1320	10670	59.9	910
30.5	4320	1550	152000	2130	1450	10670	79.0	1070
38.1	4320	1470	237400	2510	1550	10670	105.9	1220
45.7	4320	2110	327400	2900	1630	10670	130.8	1450
53.3	4320	3020	453500	3350	1730	10670	164.9	1600
61.0	4320	3070	605500	3810	1830	10670	203.2	1830

TYPE V - SINGLE COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-30

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,110,000	$3,012,000	$1,750,000	$6,377,000	$10,263,000
22.9	$31,000	$193,000	$169,000	$1,000,000	$2,903,000	$1,750,000	$6,046,000	$9,730,000
30.5	$31,000	$180,000	$173,000	$946,000	$3,035,000	$1,750,000	$6,115,000	$9,841,000
38.1	$31,000	$172,000	$217,000	$906,000	$3,260,000	$1,750,000	$6,336,000	$10,197,000
45.7	$31,000	$167,000	$247,000	$880,000	$3,558,000	$1,750,000	$6,633,000	$10,675,000
53.3	$31,000	$163,000	$273,000	$860,000	$3,909,000	$1,750,000	$6,986,000	$11,243,000
61.0	$31,000	$160,000	$330,000	$844,000	$4,217,000	$1,750,000	$7,332,000	$11,800,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	1420	10670	34.6	760
22.9	3610	1070	64200	1470	1550	10670	43.5	760
30.5	3610	1450	99200	1730	1680	10670	55.9	760
38.1	3610	1980	147400	2010	1780	10670	69.9	910
45.7	3610	3020	211800	2290	1880	10670	87.0	990
53.3	3610	2570	293700	2570	1980	10670	105.9	1140
61.0	3610	3610	382200	2920	2080	10670	126.8	1300

TYPE I - SINGLE COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-31

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,137,000	$4,108,000	$1,750,000	$7,500,000	$12,070,000
22.9	$31,000	$193,000	$230,000	$1,030,000	$3,999,000	$1,750,000	$7,233,000	$11,640,000
30.5	$31,000	$180,000	$271,000	$960,000	$3,944,000	$1,750,000	$7,136,000	$11,484,000
38.1	$31,000	$172,000	$297,000	$918,000	$4,010,000	$1,750,000	$7,178,000	$11,552,000
45.7	$31,000	$167,000	$318,000	$895,000	$4,287,000	$1,750,000	$7,448,000	$11,986,000
53.3	$31,000	$163,000	$414,000	$871,000	$4,699,000	$1,750,000	$7,928,000	$12,759,000
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1370	1470	10670	40.1	760
22.9	2790	2130	142500	1650	1630	10670	53.3	760
30.5	2790	2130	189900	1910	1730	10670	68.4	910
38.1	2790	2240	246400	2160	1830	10670	85.3	990
45.7	2790	2440	328300	2460	1960	10670	100.6	1140
53.3	2790	2720	437400	2820	2060	10670	128.8	1300
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-32

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,124,000	$3,339,000	$1,750,000	$6,718,000	$10,812,000
22.9	$31,000	$193,000	$230,000	$1,021,000	$3,252,000	$1,750,000	$6,477,000	$10,424,000
30.5	$31,000	$180,000	$218,000	$961,000	$3,446,000	$1,750,000	$6,586,000	$10,599,000
38.1	$31,000	$172,000	$297,000	$926,000	$3,804,000	$1,750,000	$6,980,000	$11,233,000
45.7	$31,000	$167,000	$318,000	$894,000	$4,065,000	$1,750,000	$7,225,000	$11,628,000
53.3	$31,000	$163,000	$414,000	$870,000	$4,532,000	$1,750,000	$7,760,000	$12,489,000
61.0	$31,000	$160,000	$482,000	$851,000	$4,834,000	$1,750,000	$8,108,000	$13,049,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	1450	10670	37.9	760
22.9	3510	1140	64300	1570	1600	10670	50.7	760
30.5	3510	1700	103800	1850	1730	10670	62.7	840
38.1	3510	1910	165300	2160	1850	10670	83.6	990
45.7	3510	2740	229200	2490	1960	10670	100.6	1140
53.3	3510	3070	328800	2870	2060	10670	126.7	1300
61.0	3510	3660	421400	3230	2160	10670	151.6	1450

TYPE III - SINGLE COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-33

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,125,000	$3,560,000	$1,750,000	$6,940,000	$11,169,000
22.9	$31,000	$193,000	$199,000	$1,009,000	$3,451,000	$1,750,000	$6,633,000	$10,675,000
30.5	$31,000	$180,000	$218,000	$953,000	$3,768,000	$1,750,000	$6,900,000	$11,105,000
38.1	$31,000	$172,000	$265,000	$918,000	$4,199,000	$1,750,000	$7,335,000	$11,805,000
45.7	$31,000	$167,000	$318,000	$892,000	$4,920,000	$1,750,000	$8,078,000	$13,000,000
53.3	$31,000	$163,000	$439,000	$873,000	$5,478,000	$1,750,000	$8,734,000	$14,056,000
61.0	$31,000	$160,000	$606,000	$856,000	$6,297,000	$1,750,000	$9,700,000	$15,611,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	1450	10670	36.8	760
22.9	3510	1070	75800	1550	1570	10670	47.1	760
30.5	3510	1350	123600	1830	1700	10670	61.3	840
38.1	3510	1980	189700	2130	1830	10670	80.5	990
45.7	3510	2240	295100	2570	1960	10670	104.1	1140
53.3	3510	2490	405200	2950	2080	10670	134.9	1370
61.0	3510	3530	563800	3430	2210	10670	171.9	1680

TYPE IV - SINGLE COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-34

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,167,000	$4,344,000	$1,750,000	$7,810,000	$12,569,000
22.9	$31,000	$193,000	$291,000	$1,050,000	$4,235,000	$1,750,000	$7,550,000	$12,151,000
30.5	$31,000	$180,000	$331,000	$981,000	$4,476,000	$1,750,000	$7,749,000	$12,471,000
38.1	$31,000	$172,000	$423,000	$938,000	$4,966,000	$1,750,000	$8,280,000	$13,326,000
45.7	$31,000	$167,000	$483,000	$909,000	$5,334,000	$1,750,000	$8,674,000	$13,960,000
53.3	$31,000	$163,000	$629,000	$879,000	$5,880,000	$1,750,000	$9,332,000	$15,019,000
61.0	$31,000	$160,000	$739,000	$860,000	$6,468,000	$1,750,000	$10,008,000	$16,107,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	1520	10670	44.7	760
22.9	4320	1070	97800	1780	1680	10670	61.3	840
30.5	4320	1550	152000	2130	1800	10670	79.0	990
38.1	4320	1470	237400	2510	1930	10670	105.9	1140
45.7	4320	2110	327400	2900	2060	10670	130.8	1300
53.3	4320	3020	453500	3350	2160	10670	164.9	1520
61.0	4320	3070	605500	3810	2290	10670	203.2	1750

TYPE V - SINGLE COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-35

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,586,000	$3,012,000	$1,750,000	$6,897,000	$11,099,000
22.9	$31,000	$193,000	$230,000	$1,366,000	$2,903,000	$1,750,000	$6,473,000	$10,417,000
30.5	$31,000	$180,000	$198,000	$1,259,000	$3,035,000	$1,750,000	$6,453,000	$10,385,000
38.1	$31,000	$172,000	$180,000	$1,183,000	$3,260,000	$1,750,000	$6,576,000	$10,583,000
45.7	$31,000	$167,000	$228,000	$1,133,000	$3,558,000	$1,750,000	$6,867,000	$11,051,000
53.3	$31,000	$163,000	$262,000	$1,097,000	$3,909,000	$1,750,000	$7,212,000	$11,606,000
61.0	$31,000	$160,000	$320,000	$1,058,000	$4,217,000	$1,750,000	$7,536,000	$12,128,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	2010	10670	37.4	760
22.9	3610	1070	64200	1470	2180	10670	48.1	760
30.5	3610	1450	99200	1730	2360	10670	58.5	760
38.1	3610	1980	147400	2010	2510	10670	71.3	760
45.7	3610	3020	211800	2290	2670	10670	90.3	910
53.3	3610	2570	293700	2570	2820	10670	109.6	990
61.0	3610	3610	382200	2920	2950	10670	130.8	1140

TYPE I - SINGLE COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-36

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,672,000	$4,108,000	$1,750,000	$8,079,000	$13,002,000
22.9	$31,000	$193,000	$264,000	$1,439,000	$3,999,000	$1,750,000	$7,676,000	$12,353,000
30.5	$31,000	$180,000	$226,000	$1,301,000	$3,944,000	$1,750,000	$7,432,000	$11,961,000
38.1	$31,000	$172,000	$251,000	$1,219,000	$4,010,000	$1,750,000	$7,433,000	$11,962,000
45.7	$31,000	$167,000	$305,000	$1,152,000	$4,287,000	$1,750,000	$7,692,000	$12,379,000
53.3	$31,000	$163,000	$365,000	$1,108,000	$4,699,000	$1,750,000	$8,116,000	$13,061,000
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1350	2110	10670	43.5	760
22.9	2790	2130	142500	1650	2310	10670	58.5	760
30.5	2790	2130	189900	1910	2460	10670	69.9	760
38.1	2790	2240	246400	2160	2620	10670	85.3	840
45.7	2790	2440	328300	2460	2740	10670	105.9	990
53.3	2790	2720	437400	2820	2900	10670	128.8	1140
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-37

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,627,000	$3,339,000	$1,750,000	$7,312,000	$11,767,000
22.9	$31,000	$193,000	$230,000	$1,410,000	$3,252,000	$1,750,000	$6,866,000	$11,050,000
30.5	$31,000	$180,000	$226,000	$1,291,000	$3,446,000	$1,750,000	$6,924,000	$11,143,000
38.1	$31,000	$172,000	$274,000	$1,219,000	$3,804,000	$1,750,000	$7,250,000	$11,668,000
45.7	$31,000	$167,000	$305,000	$1,160,000	$4,065,000	$1,750,000	$7,478,000	$12,035,000
53.3	$31,000	$163,000	$365,000	$1,113,000	$4,532,000	$1,750,000	$7,954,000	$12,801,000
61.0	$31,000	$160,000	$431,000	$1,071,000	$4,834,000	$1,750,000	$8,277,000	$13,321,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	2060	10670	41.6	760
22.9	3510	1140	64300	1570	2260	10670	52.0	760
30.5	3510	1700	103800	1850	2440	10670	66.9	760
38.1	3510	1910	165300	2160	2620	10670	85.3	910
45.7	3510	2740	229200	2490	2770	10670	104.1	990
53.3	3510	3070	328800	2870	2920	10670	128.8	1140
61.0	3510	3660	421400	3230	3050	10670	153.8	1300

TYPE III - SINGLE COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-38

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,605,000	$3,560,000	$1,750,000	$7,464,000	$12,012,000
22.9	$31,000	$193,000	$230,000	$1,394,000	$3,451,000	$1,750,000	$7,049,000	$11,344,000
30.5	$31,000	$180,000	$198,000	$1,279,000	$3,768,000	$1,750,000	$7,206,000	$11,597,000
38.1	$31,000	$172,000	$224,000	$1,209,000	$4,199,000	$1,750,000	$7,585,000	$12,207,000
45.7	$31,000	$167,000	$276,000	$1,165,000	$4,920,000	$1,750,000	$8,309,000	$13,372,000
53.3	$31,000	$163,000	$365,000	$1,117,000	$5,478,000	$1,750,000	$8,904,000	$14,330,000
61.0	$31,000	$160,000	$496,000	$1,082,000	$6,297,000	$1,750,000	$9,816,000	$15,797,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	2030	10670	39.9	760
22.9	3510	1070	75800	1550	2240	10670	50.7	760
30.5	3510	1350	123600	1830	2410	10670	64.1	760
38.1	3510	1980	189700	2130	2590	10670	82.1	840
45.7	3510	2240	295100	2570	2790	10670	105.9	990
53.3	3510	2490	405200	2950	2950	10670	134.9	1140
61.0	3510	3530	563800	3430	3120	10670	169.5	1370

TYPE IV - SINGLE COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-39

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,708,000	$4,344,000	$1,750,000	$8,351,000	$13,440,000
22.9	$31,000	$193,000	$264,000	$1,464,000	$4,235,000	$1,750,000	$7,937,000	$12,774,000
30.5	$31,000	$180,000	$280,000	$1,340,000	$4,476,000	$1,750,000	$8,057,000	$12,967,000
38.1	$31,000	$172,000	$366,000	$1,252,000	$4,966,000	$1,750,000	$8,537,000	$13,739,000
45.7	$31,000	$167,000	$426,000	$1,183,000	$5,334,000	$1,750,000	$8,891,000	$14,309,000
53.3	$31,000	$163,000	$566,000	$1,135,000	$5,880,000	$1,750,000	$9,525,000	$15,329,000
61.0	$31,000	$160,000	$642,000	$1,088,000	$6,468,000	$1,750,000	$10,139,000	$16,317,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			*CAST-IN-PLACE CONCRETE*				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	2160	10670	47.1	760
22.9	4320	1070	97800	1780	2360	10670	62.7	760
30.5	4320	1550	152000	2130	2570	10670	80.5	840
38.1	4320	1470	237400	2510	2740	10670	105.9	990
45.7	4320	2110	327400	2900	2900	10670	130.8	1140
53.3	4320	3020	453500	3350	3070	10670	164.9	1370
61.0	4320	3070	605500	3810	3230	10670	203.2	1520

TYPE V - SINGLE COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-40

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,583,000	$3,012,000	$1,750,000	$6,894,000	$11,095,000
22.9	$31,000	$193,000	$230,000	$1,362,000	$2,903,000	$1,750,000	$6,469,000	$10,411,000
30.5	$31,000	$180,000	$226,000	$1,237,000	$3,035,000	$1,750,000	$6,459,000	$10,395,000
38.1	$31,000	$172,000	$228,000	$1,160,000	$3,260,000	$1,750,000	$6,601,000	$10,623,000
45.7	$31,000	$167,000	$311,000	$1,112,000	$3,620,000	$1,750,000	$6,991,000	$11,251,000
53.3	$31,000	$163,000	$373,000	$1,071,000	$3,987,000	$1,750,000	$7,375,000	$11,869,000
61.0	$31,000	$160,000	$440,000	$1,035,000	$4,599,000	$1,750,000	$8,015,000	$12,899,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1240	2010	10670	47.1	760
22.9	3610	1070	64200	1520	2180	10670	59.8	760
30.5	3610	1450	99200	1850	2340	10670	74.3	760
38.1	3610	1980	147400	2210	2490	10670	92.0	760
45.7	3610	3230	218600	2670	2670	10670	117.1	910
53.3	3610	2820	303600	3050	2820	10670	143.2	1070
61.0	3610	3200	437700	3630	3000	10670	178.8	1220

TYPE I - SINGLE COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-41

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$396,000	$1,680,000	$4,108,000	$1,750,000	$8,185,000	$13,172,000
22.9	$31,000	$193,000	$339,000	$1,422,000	$3,999,000	$1,750,000	$7,734,000	$12,447,000
30.5	$31,000	$180,000	$285,000	$1,283,000	$3,944,000	$1,750,000	$7,473,000	$12,027,000
38.1	$31,000	$172,000	$338,000	$1,194,000	$4,158,000	$1,750,000	$7,643,000	$12,300,000
45.7	$31,000	$167,000	$435,000	$1,131,000	$4,526,000	$1,750,000	$8,040,000	$12,939,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1500	2130	10670	58.5	760
22.9	2790	2130	142500	1850	2310	10670	75.8	760
30.5	2790	2130	189900	2160	2460	10670	90.3	760
38.1	2790	2390	259900	2540	2620	10670	111.5	910
45.7	2790	2540	354400	2970	2770	10670	141.0	1070
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-42

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,644,000	$3,339,000	$1,750,000	$7,329,000	$11,795,000
22.9	$31,000	$193,000	$301,000	$1,402,000	$3,252,000	$1,750,000	$6,929,000	$11,151,000
30.5	$31,000	$180,000	$285,000	$1,277,000	$3,446,000	$1,750,000	$6,969,000	$11,216,000
38.1	$31,000	$172,000	$338,000	$1,198,000	$3,842,000	$1,750,000	$7,331,000	$11,798,000
45.7	$31,000	$167,000	$370,000	$1,132,000	$4,157,000	$1,750,000	$7,607,000	$12,242,000
53.3	$31,000	$163,000	$472,000	$1,077,000	$4,695,000	$1,750,000	$8,188,000	$13,177,000
61.0	$31,000	$160,000	$622,000	$1,054,000	$5,492,000	$1,750,000	$9,109,000	$14,660,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1370	2080	10670	53.3	760
22.9	3510	1140	64300	1680	2260	10670	68.4	760
30.5	3510	1700	103800	2060	2440	10670	87.0	760
38.1	3510	2030	168800	2490	2620	10670	111.5	910
45.7	3510	2740	239200	2950	2770	10670	134.9	990
53.3	3510	3610	349600	3510	2920	10670	169.5	1140
61.0	3510	3580	517100	4140	3180	10670	218.5	1370

TYPE III - SINGLE COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-43

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,622,000	$3,560,000	$1,750,000	$7,528,000	$12,115,000
22.9	$31,000	$193,000	$264,000	$1,388,000	$3,451,000	$1,750,000	$7,077,000	$11,389,000
30.5	$31,000	$180,000	$255,000	$1,267,000	$3,768,000	$1,750,000	$7,251,000	$11,669,000
38.1	$31,000	$172,000	$310,000	$1,188,000	$4,263,000	$1,750,000	$7,714,000	$12,415,000
45.7	$31,000	$167,000	$435,000	$1,143,000	$5,200,000	$1,750,000	$8,726,000	$14,043,000
53.3	$31,000	$163,000	$503,000	$1,085,000	$5,863,000	$1,750,000	$9,395,000	$15,120,000
61.0	$31,000	$160,000	$656,000	$1,039,000	$6,721,000	$1,750,000	$10,357,000	$16,668,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1350	2060	10670	52.0	760
22.9	3510	1070	75800	1630	2240	10670	65.5	760
30.5	3510	1350	123600	2010	2410	10670	83.7	760
38.1	3510	1910	194500	2460	2590	10670	107.8	840
45.7	3510	2620	320600	3070	2820	10670	145.3	1070
53.3	3510	2970	446000	3630	2970	10670	176.5	1220
61.0	3510	3730	615200	4290	3150	10670	226.3	1450

TYPE IV - SINGLE COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-44

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$451,000	$1,745,000	$4,344,000	$1,750,000	$8,541,000	$13,746,000
22.9	$31,000	$193,000	$381,000	$1,464,000	$4,235,000	$1,750,000	$8,054,000	$12,962,000
30.5	$31,000	$180,000	$388,000	$1,318,000	$4,476,000	$1,750,000	$8,143,000	$13,105,000
38.1	$31,000	$172,000	$485,000	$1,234,000	$4,997,000	$1,750,000	$8,669,000	$13,952,000
45.7	$31,000	$167,000	$587,000	$1,153,000	$5,459,000	$1,750,000	$9,147,000	$14,721,000
53.3	$31,000	$163,000	$750,000	$961,000	$6,168,000	$1,750,000	$9,823,000	$15,809,000
61.0	$31,000	$160,000	$947,000	$1,048,000	$7,115,000	$1,750,000	$11,051,000	$17,785,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1600	2210	10670	66.9	760
22.9	4320	1070	97800	1980	2390	10670	85.3	760
30.5	4320	1550	152000	2410	2570	10670	107.8	840
38.1	4320	1520	240300	2920	2770	10670	141.0	990
45.7	4320	2310	341000	3480	2920	10670	171.9	1220
53.3	4320	2570	490200	4090	2620	10670	215.9	1450
61.0	4320	3200	699700	4880	3330	10670	276.5	1600

TYPE V - SINGLE COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-45

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,297,000	$3,012,000	$1,750,000	$6,564,000	$10,563,000
22.9	$31,000	$193,000	$199,000	$1,160,000	$2,903,000	$1,750,000	$6,236,000	$10,036,000
30.5	$31,000	$180,000	$173,000	$1,072,000	$3,035,000	$1,750,000	$6,241,000	$10,044,000
38.1	$31,000	$172,000	$198,000	$1,026,000	$3,502,000	$1,750,000	$6,679,000	$10,749,000
45.7	$31,000	$167,000	$247,000	$984,000	$3,503,000	$1,750,000	$6,682,000	$10,753,000
53.3	$31,000	$163,000	$282,000	$958,000	$3,870,000	$1,750,000	$7,054,000	$11,352,000
61.0	$31,000	$160,000	$311,000	$930,000	$4,154,000	$1,750,000	$7,336,000	$11,806,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1220	1680	10670	35.7	760
22.9	3610	1070	64200	1470	1850	10670	44.7	760
30.5	3610	1450	99200	1730	1980	10670	55.9	760
38.1	3610	1570	169400	2060	2130	10670	74.3	840
45.7	3610	2840	205800	2260	2240	10670	88.6	990
53.3	3610	2440	288700	2570	2360	10670	107.8	1070
61.0	3610	3400	373100	2900	2460	10670	126.8	1220

TYPE I - SINGLE COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-46

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,348,000	$4,108,000	$1,750,000	$7,755,000	$12,480,000
22.9	$31,000	$193,000	$230,000	$1,194,000	$3,999,000	$1,750,000	$7,397,000	$11,904,000
30.5	$31,000	$180,000	$248,000	$1,098,000	$3,944,000	$1,750,000	$7,251,000	$11,669,000
38.1	$31,000	$172,000	$274,000	$1,040,000	$4,010,000	$1,750,000	$7,277,000	$11,711,000
45.7	$31,000	$167,000	$297,000	$1,001,000	$4,230,000	$1,750,000	$7,476,000	$12,031,000
53.3	$31,000	$163,000	$390,000	$969,000	$4,699,000	$1,750,000	$8,002,000	$12,878,000
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^3)	THICKNESS (mm)
15.2	2790	2130	95000	1370	1750	10670	43.5	760
22.9	2790	2130	142500	1650	1930	10670	54.6	760
30.5	2790	2130	189900	1910	2060	10670	68.4	840
38.1	2790	2240	246400	2160	2180	10670	85.3	910
45.7	2790	2390	322100	2440	2310	10670	100.6	1070
53.3	2790	2720	437400	2820	2440	10670	128.8	1220
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-47

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,333,000	$3,339,000	$1,750,000	$6,971,000	$11,219,000
22.9	$31,000	$193,000	$230,000	$1,169,000	$3,252,000	$1,750,000	$6,625,000	$10,662,000
30.5	$31,000	$180,000	$226,000	$1,100,000	$3,445,000	$1,750,000	$6,732,000	$10,834,000
38.1	$31,000	$172,000	$274,000	$1,040,000	$3,789,000	$1,750,000	$7,056,000	$11,356,000
45.7	$31,000	$167,000	$329,000	$999,000	$4,026,000	$1,750,000	$7,302,000	$11,751,000
53.3	$31,000	$163,000	$355,000	$967,000	$4,532,000	$1,750,000	$7,798,000	$12,550,000
61.0	$31,000	$160,000	$457,000	$942,000	$4,798,000	$1,750,000	$8,138,000	$13,097,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1300	1730	10670	39.9	760
22.9	3510	1140	64300	1570	1880	10670	50.7	760
30.5	3510	1600	103700	1850	2060	10670	65.4	760
38.1	3510	1850	163900	2160	2180	10670	83.6	910
45.7	3510	2620	225000	2490	2310	10670	102.2	1070
53.3	3510	3070	328800	2870	2440	10670	126.8	1220
61.0	3510	3660	416200	3230	2570	10670	151.6	1370

TYPE III - SINGLE COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-48

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,314,000	$3,560,000	$1,750,000	$7,129,000	$11,473,000
22.9	$31,000	$193,000	$199,000	$1,171,000	$3,451,000	$1,750,000	$6,795,000	$10,936,000
30.5	$31,000	$180,000	$198,000	$1,090,000	$3,694,000	$1,750,000	$6,943,000	$11,174,000
38.1	$31,000	$172,000	$244,000	$1,042,000	$4,124,000	$1,750,000	$7,363,000	$11,850,000
45.7	$31,000	$167,000	$297,000	$1,005,000	$4,845,000	$1,750,000	$8,095,000	$13,028,000
53.3	$31,000	$163,000	$390,000	$973,000	$5,336,000	$1,750,000	$8,643,000	$13,910,000
61.0	$31,000	$160,000	$482,000	$949,000	$6,135,000	$1,750,000	$9,507,000	$15,300,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1270	1700	10670	37.9	760
22.9	3510	1070	75800	1550	1880	10670	48.3	760
30.5	3510	1240	119200	1830	2030	10670	62.7	760
38.1	3510	1880	184000	2130	2180	10670	80.5	910
45.7	3510	2130	288300	2540	2340	10670	104.1	1070
53.3	3510	2310	390100	2900	2460	10670	132.9	1220
61.0	3510	3330	544100	3380	2620	10670	165.0	1450

TYPE IV - SINGLE COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-49

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,382,000	$4,344,000	$1,750,000	$8,025,000	$12,915,000
22.9	$31,000	$193,000	$264,000	$1,216,000	$4,235,000	$1,750,000	$7,689,000	$12,374,000
30.5	$31,000	$180,000	$306,000	$1,134,000	$4,461,000	$1,750,000	$7,862,000	$12,653,000
38.1	$31,000	$172,000	$395,000	$1,072,000	$4,935,000	$1,750,000	$8,355,000	$13,446,000
45.7	$31,000	$167,000	$455,000	$1,022,000	$5,318,000	$1,750,000	$8,743,000	$14,071,000
53.3	$31,000	$163,000	$598,000	$988,000	$5,848,000	$1,750,000	$9,378,000	$15,093,000
61.0	$31,000	$160,000	$674,000	$956,000	$6,390,000	$1,750,000	$9,961,000	$16,031,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1470	1800	10670	45.9	760
22.9	4320	1070	97800	1780	1980	10670	61.3	760
30.5	4320	1520	150800	2110	2160	10670	80.5	910
38.1	4320	1420	234600	2510	2310	10670	105.9	1070
45.7	4320	2080	325700	2900	2440	10670	130.8	1220
53.3	4320	2970	449500	3350	2590	10670	164.9	1450
61.0	4320	2950	594200	3780	2720	10670	198.2	1600

TYPE V - SINGLE COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-50

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,295,000	$3,201,000	$1,750,000	$6,751,000	$10,865,000
22.9	$31,000	$193,000	$199,000	$1,159,000	$3,092,000	$1,750,000	$6,424,000	$10,339,000
30.5	$31,000	$180,000	$198,000	$1,072,000	$3,037,000	$1,750,000	$6,268,000	$10,088,000
38.1	$31,000	$172,000	$198,000	$1,019,000	$3,348,000	$1,750,000	$6,518,000	$10,490,000
45.7	$31,000	$167,000	$228,000	$978,000	$3,326,000	$1,750,000	$6,480,000	$10,429,000
53.3	$31,000	$163,000	$282,000	$959,000	$3,866,000	$1,750,000	$7,051,000	$11,348,000
61.0	$31,000	$160,000	$396,000	$937,000	$4,693,000	$1,750,000	$7,967,000	$12,822,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2490	62000	1240	1680	10670	35.7	760
22.9	2790	2490	93000	1500	1850	10670	45.9	760
30.5	2790	2490	124000	1730	1980	10670	57.1	760
38.1	2790	2490	186200	2010	2110	10670	71.3	840
45.7	2790	2490	223400	2210	2210	10670	83.6	910
53.3	2790	2740	331400	2540	2360	10670	105.9	1070
61.0	2790	3280	500700	3050	2510	10670	141.0	1300

TYPE VI - SINGLE COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-51

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,458,000	$3,012,000	$1,750,000	$6,769,000	$10,894,000
22.9	$31,000	$193,000	$264,000	$1,269,000	$2,955,000	$1,750,000	$6,462,000	$10,400,000
30.5	$31,000	$180,000	$226,000	$1,178,000	$3,137,000	$1,750,000	$6,502,000	$10,464,000
38.1	$31,000	$172,000	$244,000	$1,053,000	$3,416,000	$1,750,000	$6,666,000	$10,728,000
45.7	$31,000	$167,000	$305,000	$1,042,000	$3,893,000	$1,750,000	$7,188,000	$11,568,000
53.3	$31,000	$163,000	$355,000	$998,000	$4,150,000	$1,750,000	$7,447,000	$11,985,000
61.0	$31,000	$160,000	$419,000	$958,000	$4,684,000	$1,750,000	$8,002,000	$12,878,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1350	1880	10670	43.5	760
22.9	3610	1240	67000	1680	2060	10670	57.1	760
30.5	3610	1780	106600	1980	2240	10670	71.3	760
38.1	3610	2490	161600	2310	2240	10670	86.9	910
45.7	3610	2460	248300	2640	2460	10670	107.8	990
53.3	3610	3350	324500	2970	2570	10670	126.8	1220
61.0	3610	3480	450200	3300	2640	10670	153.8	1370

TYPE I - SINGLE COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-52

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,445,000	$4,108,000	$1,750,000	$7,852,000	$12,637,000
22.9	$31,000	$193,000	$264,000	$1,275,000	$3,999,000	$1,750,000	$7,512,000	$12,090,000
30.5	$31,000	$180,000	$280,000	$1,170,000	$3,944,000	$1,750,000	$7,355,000	$11,837,000
38.1	$31,000	$172,000	$297,000	$1,097,000	$4,091,000	$1,750,000	$7,438,000	$11,971,000
45.7	$31,000	$167,000	$352,000	$1,037,000	$4,520,000	$1,750,000	$7,857,000	$12,645,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1500	1880	10670	45.9	760
22.9	2790	2130	142500	1830	2080	10670	61.3	760
30.5	2790	2130	189900	2110	2240	10670	77.4	840
38.1	2790	2130	253700	2410	2360	10670	93.6	990
45.7	2790	2340	353700	2740	2460	10670	115.2	1140
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-53

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,449,000	$3,339,000	$1,750,000	$7,087,000	$11,406,000
22.9	$31,000	$193,000	$264,000	$1,280,000	$3,310,000	$1,750,000	$6,828,000	$10,989,000
30.5	$31,000	$180,000	$280,000	$1,170,000	$3,539,000	$1,750,000	$6,950,000	$11,185,000
38.1	$31,000	$172,000	$331,000	$1,095,000	$3,949,000	$1,750,000	$7,328,000	$11,794,000
45.7	$31,000	$167,000	$389,000	$1,036,000	$4,248,000	$1,750,000	$7,621,000	$12,265,000
53.3	$31,000	$163,000	$453,000	$998,000	$4,779,000	$1,750,000	$8,174,000	$13,155,000
61.0	$31,000	$160,000	$566,000	$966,000	$5,314,000	$1,750,000	$8,787,000	$14,142,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1450	1880	10670	44.7	760
22.9	3510	1220	67500	1750	2080	10670	59.9	760
30.5	3510	1750	110600	2110	2240	10670	77.4	840
38.1	3510	2030	178400	2440	2360	10670	97.1	990
45.7	3510	2640	249200	2770	2460	10670	117.1	1140
53.3	3510	3330	360200	3150	2590	10670	145.3	1300
61.0	3510	3660	491300	3560	2720	10670	178.7	1450

TYPE III - SINGLE COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-54

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,451,000	$3,560,000	$1,750,000	$7,310,000	$11,765,000
22.9	$31,000	$193,000	$264,000	$1,280,000	$3,653,000	$1,750,000	$7,171,000	$11,541,000
30.5	$31,000	$180,000	$280,000	$1,172,000	$3,971,000	$1,750,000	$7,384,000	$11,884,000
38.1	$31,000	$172,000	$331,000	$1,095,000	$4,479,000	$1,750,000	$7,858,000	$12,647,000
45.7	$31,000	$167,000	$389,000	$1,031,000	$5,406,000	$1,750,000	$8,774,000	$14,121,000
53.3	$31,000	$163,000	$493,000	$1,003,000	$5,844,000	$1,750,000	$9,284,000	$14,941,000
61.0	$31,000	$160,000	$596,000	$967,000	$6,665,000	$1,750,000	$10,169,000	$16,366,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1420	1880	10670	44.7	760
22.9	3510	1350	85000	1750	2080	10670	59.9	760
30.5	3510	1630	136000	2080	2240	10670	75.8	840
38.1	3510	2160	210900	2440	2360	10670	95.3	990
45.7	3510	2900	339300	2870	2460	10670	122.9	1140
53.3	3510	3150	444000	3200	2620	10670	151.6	1300
61.0	3510	3560	608400	3680	2740	10670	188.4	1520

TYPE IV - SINGLE COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-55

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,459,000	$4,344,000	$1,750,000	$8,149,000	$13,115,000
22.9	$31,000	$193,000	$331,000	$1,268,000	$4,235,000	$1,750,000	$7,808,000	$12,566,000
30.5	$31,000	$180,000	$371,000	$1,170,000	$4,617,000	$1,750,000	$8,119,000	$13,067,000
38.1	$31,000	$172,000	$466,000	$1,102,000	$5,075,000	$1,750,000	$8,596,000	$13,834,000
45.7	$31,000	$167,000	$528,000	$1,053,000	$5,521,000	$1,750,000	$9,050,000	$14,565,000
53.3	$31,000	$163,000	$681,000	$1,013,000	$6,184,000	$1,750,000	$9,822,000	$15,807,000
61.0	$31,000	$160,000	$815,000	$974,000	$6,765,000	$1,750,000	$10,495,000	$16,890,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1600	1910	10670	50.7	760
22.9	4320	1070	97800	1930	2080	10670	68.4	840
30.5	4320	1780	162200	2310	2260	10670	90.3	990
38.1	4320	1650	247300	2690	2410	10670	117.1	1140
45.7	4320	2410	347800	3100	2570	10670	143.2	1300
53.3	4320	2590	492100	3580	2720	10670	181.2	1520
61.0	4320	3560	648600	4060	2840	10670	223.6	1680

TYPE V - SINGLE COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-56

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,540,000	$3,012,000	$1,750,000	$6,851,000	$11,026,000
22.9	$31,000	$193,000	$264,000	$1,341,000	$2,985,000	$1,750,000	$6,564,000	$10,564,000
30.5	$31,000	$180,000	$255,000	$1,230,000	$3,215,000	$1,750,000	$6,661,000	$10,720,000
38.1	$31,000	$172,000	$305,000	$1,141,000	$3,814,000	$1,750,000	$7,213,000	$11,609,000
45.7	$31,000	$167,000	$363,000	$1,084,000	$3,963,000	$1,750,000	$7,358,000	$11,842,000
53.3	$31,000	$163,000	$426,000	$1,030,000	$4,564,000	$1,750,000	$7,964,000	$12,817,000
61.0	$31,000	$160,000	$566,000	$981,000	$5,230,000	$1,750,000	$8,718,000	$14,031,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	1450	1980	10670	48.3	760
22.9	3610	1350	68700	1800	2180	10670	64.1	760
30.5	3610	2030	112300	2160	2360	10670	80.5	760
38.1	3610	2130	197700	2540	2490	10670	102.4	910
45.7	3610	2690	256000	2840	2620	10670	122.9	1070
53.3	3610	3050	377000	3250	2720	10670	147.4	1220
61.0	3610	3610	529600	3660	2790	10670	181.2	1450

TYPE I - SINGLE COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-57

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,526,000	$4,108,000	$1,750,000	$7,933,000	$12,767,000
22.9	$31,000	$193,000	$301,000	$1,330,000	$3,999,000	$1,750,000	$7,604,000	$12,238,000
30.5	$31,000	$180,000	$314,000	$1,223,000	$3,944,000	$1,750,000	$7,442,000	$11,977,000
38.1	$31,000	$172,000	$331,000	$1,136,000	$4,283,000	$1,750,000	$7,703,000	$12,397,000
45.7	$31,000	$167,000	$455,000	$1,066,000	$4,910,000	$1,750,000	$8,379,000	$13,485,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	1600	1980	10670	50.7	760
22.9	2790	2130	142500	1960	2180	10670	69.9	760
30.5	2790	2130	189900	2260	2360	10670	85.3	840
38.1	2790	2390	271200	2620	2490	10670	105.9	990
45.7	2790	3100	396200	3020	2590	10670	132.9	1220
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - SINGLE COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-58

#N/A-Due to vehicle and shipping constraints, girder could be be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,533,000	$3,339,000	$1,750,000	$7,218,000	$11,617,000
22.9	$31,000	$193,000	$301,000	$1,333,000	$3,366,000	$1,750,000	$6,974,000	$11,224,000
30.5	$31,000	$180,000	$314,000	$1,223,000	$3,601,000	$1,750,000	$7,099,000	$11,425,000
38.1	$31,000	$172,000	$366,000	$1,135,000	$4,029,000	$1,750,000	$7,483,000	$12,043,000
45.7	$31,000	$167,000	$426,000	$1,076,000	$4,365,000	$1,750,000	$7,815,000	$12,577,000
53.3	$31,000	$163,000	$493,000	$1,023,000	$4,919,000	$1,750,000	$8,379,000	$13,485,000
61.0	$31,000	$160,000	$642,000	$980,000	$5,593,000	$1,750,000	$9,156,000	$14,735,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	1520	1980	10670	50.7	760
22.9	3510	1520	70500	1910	2180	10670	68.4	760
30.5	3510	1960	115100	2260	2360	10670	85.3	840
38.1	3510	2590	185700	2640	2490	10670	107.8	990
45.7	3510	3020	261900	3000	2620	10670	128.8	1140
53.3	3510	3280	378000	3380	2720	10670	156.1	1300
61.0	3510	3910	531800	3810	2820	10670	195.7	1520

TYPE III - SINGLE COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-59

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,536,000	$3,560,000	$1,750,000	$7,442,000	$11,977,000
22.9	$31,000	$193,000	$301,000	$1,333,000	$3,783,000	$1,750,000	$7,391,000	$11,895,000
30.5	$31,000	$180,000	$314,000	$1,225,000	$4,008,000	$1,750,000	$7,508,000	$12,083,000
38.1	$31,000	$172,000	$366,000	$1,133,000	$4,787,000	$1,750,000	$8,239,000	$13,260,000
45.7	$31,000	$167,000	$455,000	$1,072,000	$5,621,000	$1,750,000	$9,096,000	$14,639,000
53.3	$31,000	$163,000	$566,000	$1,018,000	$6,247,000	$1,750,000	$9,775,000	$15,732,000
61.0	$31,000	$160,000	$760,000	$983,000	$7,489,000	$1,750,000	$11,173,000	$17,981,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	1500	1980	10670	50.7	760
22.9	3510	1520	90900	1910	2180	10670	66.9	760
30.5	3510	1680	138200	2240	2360	10670	85.3	840
38.1	3510	2620	234200	2670	2490	10670	107.8	990
45.7	3510	2460	358900	3070	2620	10670	134.9	1220
53.3	3510	2970	486700	3480	2720	10670	167.2	1370
61.0	3510	3510	708200	4010	2870	10670	218.5	1680

TYPE IV - SINGLE COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-60

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,519,000	$4,344,000	$1,750,000	$8,209,000	$13,211,000
22.9	$31,000	$193,000	$373,000	$1,322,000	$4,235,000	$1,750,000	$7,904,000	$12,721,000
30.5	$31,000	$180,000	$413,000	$1,210,000	$4,710,000	$1,750,000	$8,294,000	$13,348,000
38.1	$31,000	$172,000	$466,000	$1,122,000	$5,153,000	$1,750,000	$8,694,000	$13,992,000
45.7	$31,000	$167,000	$609,000	$1,061,000	$5,677,000	$1,750,000	$9,295,000	$14,959,000
53.3	$31,000	$163,000	$734,000	$1,028,000	$6,340,000	$1,750,000	$10,046,000	$16,168,000
61.0	$31,000	$160,000	$912,000	$983,000	$7,162,000	$1,750,000	$10,998,000	$17,700,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	1680	1980	10670	53.3	760
22.9	4320	1070	97800	2060	2180	10670	74.2	840
30.5	4320	1930	169000	2460	2360	10670	97.1	990
38.1	4320	1780	254400	2870	2490	10670	121.0	1140
45.7	4320	2670	364900	3280	2620	10670	153.8	1370
53.3	4320	2840	512000	3710	2790	10670	193.1	1520
61.0	4320	3280	706500	4270	2920	10670	242.5	1750

TYPE V - SINGLE COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-61

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$176,000	$1,434,000	$3,012,000	$1,750,000	$6,623,000	$10,658,000
22.9	$31,000	$193,000	$199,000	$1,289,000	$2,903,000	$1,750,000	$6,365,000	$10,243,000
30.5	$31,000	$180,000	$198,000	$1,200,000	$3,035,000	$1,750,000	$6,394,000	$10,290,000
38.1	$31,000	$172,000	$204,000	$1,172,000	$3,260,000	$1,750,000	$6,589,000	$10,604,000
45.7	$31,000	$167,000	$233,000	$1,129,000	$3,558,000	$1,750,000	$6,868,000	$11,053,000
53.3	$31,000	$163,000	$266,000	$1,103,000	$3,909,000	$1,750,000	$7,222,000	$11,623,000
61.0	$31,000	$160,000	$326,000	$1,063,000	$4,217,000	$1,750,000	$7,547,000	$12,146,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	530	910	10670	35.3	760
22.9	3610	1070	64200	640	1020	10670	48.3	760
30.5	3610	1450	99200	790	1090	10670	61.3	760
38.1	3610	1980	147400	940	1190	10670	77.4	760
45.7	3610	3020	211800	1170	1270	10670	98.8	840
53.3	3610	2570	293700	1320	1350	10670	119.0	910
61.0	3610	3610	382200	1570	1400	10670	143.2	1070

TYPE I - TWO COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-62

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,576,000	$4,108,000	$1,750,000	$7,983,000	$12,847,000
22.9	$31,000	$193,000	$264,000	$1,394,000	$3,999,000	$1,750,000	$7,631,000	$12,281,000
30.5	$31,000	$180,000	$255,000	$1,282,000	$3,944,000	$1,750,000	$7,442,000	$11,977,000
38.1	$31,000	$172,000	$228,000	$1,213,000	$4,010,000	$1,750,000	$7,404,000	$11,915,000
45.7	$31,000	$167,000	$282,000	$1,167,000	$4,287,000	$1,750,000	$7,684,000	$12,366,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	640	990	10670	45.9	760
22.9	2790	2130	142500	790	1090	10670	61.3	760
30.5	2790	2130	189900	940	1170	10670	75.8	760
38.1	2790	2240	246400	1070	1240	10670	90.3	760
45.7	2790	2440	328300	1240	1320	10670	111.5	910
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-63

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,527,000	$3,339,000	$1,750,000	$7,165,000	$11,531,000
22.9	$31,000	$193,000	$230,000	$1,358,000	$3,252,000	$1,750,000	$6,814,000	$10,966,000
30.5	$31,000	$180,000	$226,000	$1,255,000	$3,446,000	$1,750,000	$6,888,000	$11,085,000
38.1	$31,000	$172,000	$280,000	$1,212,000	$3,804,000	$1,750,000	$7,249,000	$11,666,000
45.7	$31,000	$167,000	$282,000	$1,164,000	$4,065,000	$1,750,000	$7,459,000	$12,004,000
53.3	$31,000	$163,000	$373,000	$1,147,000	$4,532,000	$1,750,000	$7,996,000	$12,868,000
61.0	$31,000	$160,000	$413,000	$1,120,000	$4,834,000	$1,750,000	$8,308,000	$13,370,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	580	970	10670	45.9	760
22.9	3510	1140	64300	710	1070	10670	54.6	760
30.5	3510	1700	103800	890	1140	10670	71.3	760
38.1	3510	1910	165300	1090	1240	10670	93.6	840
45.7	3510	2740	229200	1300	1320	10670	111.5	910
53.3	3510	3070	328800	1550	1420	10670	143.2	1070
61.0	3510	3660	421400	1780	1500	10670	169.5	1140

TYPE III - TWO COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-64

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,527,000	$3,560,000	$1,750,000	$7,301,000	$11,750,000
22.9	$31,000	$193,000	$230,000	$1,323,000	$3,451,000	$1,750,000	$6,978,000	$11,230,000
30.5	$31,000	$180,000	$226,000	$1,284,000	$3,768,000	$1,750,000	$7,239,000	$11,650,000
38.1	$31,000	$172,000	$228,000	$1,238,000	$4,199,000	$1,750,000	$7,618,000	$12,260,000
45.7	$31,000	$167,000	$282,000	$1,206,000	$4,920,000	$1,750,000	$8,356,000	$13,448,000
53.3	$31,000	$163,000	$373,000	$1,166,000	$5,478,000	$1,750,000	$8,961,000	$14,421,000
61.0	$31,000	$160,000	$476,000	$1,114,000	$6,297,000	$1,750,000	$9,828,000	$15,817,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	560	970	10670	38.8	760
22.9	3510	1070	75800	690	1040	10670	53.3	760
30.5	3510	1350	123600	860	1170	10670	69.9	760
38.1	3510	1980	189700	1070	1270	10670	90.3	760
45.7	3510	2240	295100	1320	1370	10670	115.2	910
53.3	3510	2490	405200	1550	1450	10670	147.4	1070
61.0	3510	3530	563800	1880	1500	10670	186.0	1220

TYPE IV - TWO COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-65

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,677,000	$4,344,000	$1,750,000	$8,367,000	$13,466,000
22.9	$31,000	$193,000	$301,000	$1,506,000	$4,235,000	$1,750,000	$8,016,000	$12,901,000
30.5	$31,000	$180,000	$285,000	$1,397,000	$4,476,000	$1,750,000	$8,119,000	$13,067,000
38.1	$31,000	$172,000	$373,000	$1,304,000	$4,966,000	$1,750,000	$8,596,000	$13,834,000
45.7	$31,000	$167,000	$435,000	$1,263,000	$5,334,000	$1,750,000	$8,980,000	$14,452,000
53.3	$31,000	$163,000	$510,000	$1,211,000	$5,880,000	$1,750,000	$9,545,000	$15,361,000
61.0	$31,000	$160,000	$630,000	$1,175,000	$6,468,000	$1,750,000	$10,214,000	$16,438,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	660	1040	10670	53.3	760
22.9	4320	1070	97800	810	1170	10670	69.9	760
30.5	4320	1550	152000	1020	1270	10670	90.3	760
38.1	4320	1470	237400	1220	1350	10670	117.1	910
45.7	4320	2110	327400	1470	1450	10670	145.3	1070
53.3	4320	3020	453500	1780	1520	10670	181.2	1140
61.0	4320	3070	605500	2030	1600	10670	223.6	1300

TYPE V - TWO COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-66

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$143,000	$779,000	$3,012,000	$1,750,000	$5,935,000	$9,551,000
22.9	$31,000	$193,000	$95,000	$752,000	$2,903,000	$1,750,000	$5,724,000	$9,212,000
30.5	$31,000	$180,000	$149,000	$733,000	$3,035,000	$1,750,000	$5,878,000	$9,460,000
38.1	$31,000	$172,000	$152,000	$731,000	$3,260,000	$1,750,000	$6,096,000	$9,810,000
45.7	$31,000	$167,000	$180,000	$724,000	$3,558,000	$1,750,000	$6,410,000	$10,316,000
53.3	$31,000	$163,000	$228,000	$711,000	$3,909,000	$1,750,000	$6,792,000	$10,931,000
61.0	$31,000	$160,000	$264,000	$703,000	$4,217,000	$1,750,000	$7,125,000	$11,466,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	480	640	4570	30.9	760
22.9	3610	1070	64200	580	710	4570	31.8	760
30.5	3610	1450	99200	710	760	4570	44.7	760
38.1	3610	1980	147400	860	840	4570	55.9	840
45.7	3610	3020	211800	1070	910	4570	71.3	910
53.3	3610	2570	293700	1220	940	4570	90.3	1070
61.0	3610	3610	382200	1450	990	4570	109.6	1140

TYPE I - TWO COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-67

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$143,000	$806,000	$4,108,000	$1,750,000	$7,058,000	$11,359,000
22.9	$31,000	$193,000	$199,000	$772,000	$3,999,000	$1,750,000	$6,944,000	$11,175,000
30.5	$31,000	$180,000	$173,000	$749,000	$3,944,000	$1,750,000	$6,827,000	$10,987,000
38.1	$31,000	$172,000	$180,000	$735,000	$4,010,000	$1,750,000	$6,878,000	$11,069,000
45.7	$31,000	$167,000	$221,000	$729,000	$4,287,000	$1,750,000	$7,185,000	$11,563,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE GIRDER DIMENSIONS			CAST-IN-PLACE CONCRETE T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	580	690	4570	30.9	760
22.9	2790	2130	142500	740	760	4570	44.7	760
30.5	2790	2130	189900	860	810	4570	54.6	760
38.1	2790	2240	246400	970	860	4570	66.9	760
45.7	2790	2440	328300	1320	970	4570	85.3	990
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-68

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$792,000	$3,339,000	$1,750,000	$6,386,000	$10,277,000
22.9	$31,000	$193,000	$199,000	$762,000	$3,252,000	$1,750,000	$6,187,000	$9,957,000
30.5	$31,000	$180,000	$173,000	$749,000	$3,446,000	$1,750,000	$6,329,000	$10,186,000
38.1	$31,000	$172,000	$217,000	$734,000	$3,804,000	$1,750,000	$6,708,000	$10,795,000
45.7	$31,000	$167,000	$247,000	$721,000	$4,065,000	$1,750,000	$6,981,000	$11,235,000
53.3	$31,000	$163,000	$302,000	$721,000	$4,532,000	$1,750,000	$7,499,000	$12,069,000
61.0	$31,000	$160,000	$341,000	$722,000	$4,834,000	$1,750,000	$7,838,000	$12,614,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	530	660	4570	41.2	760
22.9	3510	1140	64300	660	740	4570	44.7	760
30.5	3510	1700	103800	840	810	4570	52.0	760
38.1	3510	1910	165300	990	860	4570	68.4	910
45.7	3510	2740	229200	1190	910	4570	85.3	990
53.3	3510	3070	328800	1400	1020	4570	107.8	1140
61.0	3510	3660	421400	1600	1120	4570	130.8	1220

TYPE III - TWO COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-69

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$176,000	$953,000	$3,560,000	$1,750,000	$6,690,000	$10,767,000
22.9	$31,000	$193,000	$142,000	$841,000	$3,451,000	$1,750,000	$6,408,000	$10,313,000
30.5	$31,000	$180,000	$149,000	$785,000	$3,768,000	$1,750,000	$6,663,000	$10,723,000
38.1	$31,000	$172,000	$174,000	$756,000	$4,199,000	$1,750,000	$7,082,000	$11,397,000
45.7	$31,000	$167,000	$305,000	$739,000	$4,920,000	$1,750,000	$7,912,000	$12,733,000
53.3	$31,000	$163,000	$302,000	$716,000	$5,478,000	$1,750,000	$8,440,000	$13,583,000
61.0	$31,000	$160,000	$396,000	$709,000	$6,297,000	$1,750,000	$9,343,000	$15,036,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	510	910	4570	35.3	760
22.9	3510	1070	75800	640	910	4570	38.8	760
30.5	3510	1350	123600	790	910	4570	49.5	760
38.1	3510	1980	189700	990	940	4570	65.5	840
45.7	3510	2240	295100	1190	990	4570	115.2	990
53.3	3510	2490	405200	1400	990	4570	111.5	1140
61.0	3510	3530	563800	1730	1070	4570	145.3	1300

TYPE IV - TWO COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-70

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$835,000	$4,344,000	$1,750,000	$7,434,000	$11,964,000
22.9	$31,000	$193,000	$230,000	$794,000	$4,235,000	$1,750,000	$7,233,000	$11,641,000
30.5	$31,000	$180,000	$226,000	$775,000	$4,476,000	$1,750,000	$7,438,000	$11,971,000
38.1	$31,000	$172,000	$297,000	$759,000	$4,966,000	$1,750,000	$7,975,000	$12,835,000
45.7	$31,000	$167,000	$352,000	$748,000	$5,334,000	$1,750,000	$8,382,000	$13,490,000
53.3	$31,000	$163,000	$453,000	$737,000	$5,880,000	$1,750,000	$9,014,000	$14,507,000
61.0	$31,000	$160,000	$523,000	$720,000	$6,468,000	$1,750,000	$9,652,000	$15,534,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	610	740	4570	37.9	760
22.9	4320	1070	97800	740	810	4570	50.7	760
30.5	4320	1550	152000	910	890	4570	66.9	760
38.1	4320	1470	237400	1090	970	4570	88.6	990
45.7	4320	2110	327400	1320	1040	4570	111.5	1140
53.3	4320	3020	453500	1600	1120	4570	141.0	1300
61.0	4320	3070	605500	1830	1140	4570	176.5	1450

TYPE V - TWO COLUMN - 4.57 M CLEARANCE
COST COMPARISON CHART

TABLE 3-71

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$3,648,000	$3,012,000	$1,750,000	$8,959,000	$14,418,000
22.9	$31,000	$193,000	$264,000	$2,637,000	$2,903,000	$1,750,000	$7,778,000	$12,517,000
30.5	$31,000	$180,000	$255,000	$2,132,000	$3,035,000	$1,750,000	$7,383,000	$11,882,000
38.1	$31,000	$172,000	$254,000	$2,005,000	$3,260,000	$1,750,000	$7,472,000	$12,025,000
45.7	$31,000	$167,000	$285,000	$1,915,000	$3,558,000	$1,750,000	$7,706,000	$12,401,000
53.3	$31,000	$163,000	$320,000	$1,825,000	$3,909,000	$1,750,000	$7,998,000	$12,871,000
61.0	$31,000	$160,000	$387,000	$1,748,000	$4,217,000	$1,750,000	$8,293,000	$13,346,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	560	1400	16760	50.7	760
22.9	3610	1070	64200	690	1400	16760	64.1	760
30.5	3610	1450	99200	840	1400	16760	80.5	760
38.1	3610	1980	147400	1020	1500	16760	100.6	760
45.7	3610	3020	211800	1240	1600	16760	122.9	840
53.3	3610	2570	293700	1420	1680	16760	147.4	910
61.0	3610	3610	382200	1680	1750	16760	181.2	990

TYPE I - TWO COLUMN - 15.76 M CLEARANCE
COST COMPARISON CHART

TABLE 3-72

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$396,000	$3,648,000	$4,108,000	$1,750,000	$10,153,000	$16,339,000
22.9	$31,000	$193,000	$339,000	$2,637,000	$3,999,000	$1,750,000	$8,949,000	$14,402,000
30.5	$31,000	$180,000	$318,000	$2,297,000	$3,944,000	$1,750,000	$8,520,000	$13,711,000
38.1	$31,000	$172,000	$311,000	$2,087,000	$4,010,000	$1,750,000	$8,361,000	$13,456,000
45.7	$31,000	$167,000	$204,000	$2,022,000	$4,287,000	$1,750,000	$8,461,000	$13,617,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	690	1400	16760	62.7	760
22.9	2790	2130	142500	840	1400	16760	79.0	760
30.5	2790	2130	189900	990	1470	16760	97.1	760
38.1	2790	2240	246400	1140	1550	16760	117.1	760
45.7	2790	2440	328300	1500	1680	16760	85.3	910
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - 15.76 M CLEARANCE
COST COMPARISON CHART

TABLE 3-73

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$396,000	$3,648,000	$3,339,000	$1,750,000	$9,384,000	$15,102,000
22.9	$31,000	$193,000	$301,000	$2,637,000	$3,252,000	$1,750,000	$8,164,000	$13,139,000
30.5	$31,000	$180,000	$285,000	$2,239,000	$3,446,000	$1,750,000	$7,931,000	$12,764,000
38.1	$31,000	$172,000	$311,000	$2,064,000	$3,804,000	$1,750,000	$8,132,000	$13,087,000
45.7	$31,000	$167,000	$373,000	$1,986,000	$4,065,000	$1,750,000	$8,372,000	$13,473,000
53.3	$31,000	$163,000	$409,000	$1,950,000	$4,532,000	$1,750,000	$8,835,000	$14,219,000
61.0	$31,000	$160,000	$450,000	$1,859,000	$4,834,000	$1,750,000	$9,084,000	$14,619,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	640	1400	16760	58.5	760
22.9	3510	1140	64300	760	1400	16760	71.3	760
30.5	3510	1700	103800	970	1450	16760	90.3	760
38.1	3510	1910	165300	1170	1550	16760	117.1	760
45.7	3510	2740	229200	1400	1650	16760	143.2	910
53.3	3510	3070	328800	1650	1780	16760	174.2	990
61.0	3510	3660	421400	1910	1850	16760	203.2	1070

TYPE III - TWO COLUMN - 15.76 M CLEARANCE
COST COMPARISON CHART

TABLE 3-74

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$3,648,000	$3,560,000	$1,750,000	$9,554,000	$15,376,000
22.9	$31,000	$193,000	$301,000	$2,637,000	$3,451,000	$1,750,000	$8,363,000	$13,459,000
30.5	$31,000	$180,000	$285,000	$2,302,000	$3,768,000	$1,750,000	$8,316,000	$13,383,000
38.1	$31,000	$172,000	$282,000	$2,136,000	$4,199,000	$1,750,000	$8,570,000	$13,792,000
45.7	$31,000	$167,000	$373,000	$2,072,000	$4,920,000	$1,750,000	$9,313,000	$14,988,000
53.3	$31,000	$163,000	$442,000	$1,956,000	$5,478,000	$1,750,000	$9,820,000	$15,804,000
61.0	$31,000	$160,000	$556,000	$1,889,000	$6,297,000	$1,750,000	$10,683,000	$17,193,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	580	1400	16760	53.3	760
22.9	3510	1070	75800	740	1400	16760	69.9	760
30.5	3510	1350	123600	940	1470	16760	90.3	760
38.1	3510	1980	189700	1140	1570	16760	113.3	760
45.7	3510	2240	295100	1420	1700	16760	147.4	910
53.3	3510	2490	405200	1650	1780	16760	181.2	990
61.0	3510	3530	563800	1930	1880	16760	229.0	1140

TYPE IV - TWO COLUMN - 15.76 M CLEARANCE
COST COMPARISON CHART

TABLE 3-75

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$451,000	$3,431,000	$4,344,000	$1,750,000	$10,227,000	$16,459,000
22.9	$31,000	$193,000	$381,000	$2,787,000	$4,235,000	$1,750,000	$9,377,000	$15,091,000
30.5	$31,000	$180,000	$389,000	$2,524,000	$4,476,000	$1,750,000	$9,350,000	$15,048,000
38.1	$31,000	$172,000	$447,000	$2,374,000	$4,966,000	$1,750,000	$9,740,000	$15,675,000
45.7	$31,000	$167,000	$477,000	$2,187,000	$5,334,000	$1,750,000	$9,946,000	$16,007,000
53.3	$31,000	$163,000	$635,000	$2,092,000	$5,880,000	$1,750,000	$10,551,000	$16,980,000
61.0	$31,000	$160,000	$720,000	$2,071,000	$6,468,000	$1,750,000	$11,200,000	$18,025,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	710	1350	16760	68.4	760
22.9	4320	1070	97800	860	1450	16760	88.6	760
30.5	4320	1550	152000	1090	1570	16760	117.1	760
38.1	4320	1470	237400	1320	1700	16760	147.4	910
45.7	4320	2110	327400	1570	1780	16760	178.8	990
53.3	4320	3020	453500	1830	1880	16760	223.6	1140
61.0	4320	3070	605500	2010	2010	16760	267.8	1300

TYPE V - TWO COLUMN - 15.76 M CLEARANCE
COST COMPARISON CHART

TABLE 3-76

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,838,000	$3,012,000	$1,750,000	$7,064,000	$11,368,000
22.9	$31,000	$193,000	$199,000	$1,289,000	$2,903,000	$1,750,000	$6,365,000	$10,243,000
30.5	$31,000	$180,000	$198,000	$1,200,000	$3,035,000	$1,750,000	$6,394,000	$10,290,000
38.1	$31,000	$172,000	$180,000	$1,148,000	$3,260,000	$1,750,000	$6,541,000	$10,527,000
45.7	$31,000	$167,000	$233,000	$1,129,000	$3,558,000	$1,750,000	$6,868,000	$11,053,000
53.3	$31,000	$163,000	$266,000	$1,103,000	$3,909,000	$1,750,000	$7,222,000	$11,623,000
61.0	$31,000	$160,000	$326,000	$1,063,000	$4,217,000	$1,750,000	$7,547,000	$12,146,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	530	1120	10670	39.9	760
22.9	3610	1070	64200	640	1020	10670	48.3	760
30.5	3610	1450	99200	790	1090	10670	62.7	760
38.1	3610	1980	147400	940	1170	10670	75.8	760
45.7	3610	3020	211800	1170	1270	10670	98.8	840
53.3	3610	2570	293700	1320	1350	10670	119.0	910
61.0	3610	3610	382200	1570	1400	10670	143.2	1070

TYPE I - TWO COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-77

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,576,000	$4,108,000	$1,750,000	$7,983,000	$12,847,000
22.9	$31,000	$193,000	$264,000	$1,394,000	$3,999,000	$1,750,000	$7,631,000	$12,281,000
30.5	$31,000	$180,000	$255,000	$1,284,000	$3,944,000	$1,750,000	$7,444,000	$11,980,000
38.1	$31,000	$172,000	$228,000	$1,213,000	$4,010,000	$1,750,000	$7,404,000	$11,915,000
45.7	$31,000	$167,000	$282,000	$1,167,000	$4,287,000	$1,750,000	$7,684,000	$12,366,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	640	990	10670	45.9	760
22.9	2790	2130	142500	790	1090	10670	61.3	760
30.5	2790	2130	189900	940	1170	10670	75.8	760
38.1	2790	2240	246400	1070	1240	10670	90.3	760
45.7	2790	2440	328300	1240	1320	10670	111.5	910
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-78

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,527,000	$3,339,000	$1,750,000	$7,165,000	$11,531,000
22.9	$31,000	$193,000	$230,000	$1,358,000	$3,252,000	$1,750,000	$6,814,000	$10,966,000
30.5	$31,000	$180,000	$226,000	$1,284,000	$3,446,000	$1,750,000	$6,917,000	$11,132,000
38.1	$31,000	$172,000	$280,000	$1,212,000	$3,804,000	$1,750,000	$7,249,000	$11,666,000
45.7	$31,000	$167,000	$311,000	$1,164,000	$4,065,000	$1,750,000	$7,488,000	$12,051,000
53.3	$31,000	$163,000	$373,000	$1,147,000	$4,532,000	$1,750,000	$7,996,000	$12,868,000
61.0	$31,000	$160,000	$413,000	$1,120,000	$4,834,000	$1,750,000	$8,308,000	$13,370,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	580	970	10670	45.9	760
22.9	3510	1140	64300	710	1070	10670	54.6	760
30.5	3510	1700	103800	890	1170	10670	71.3	760
38.1	3510	1910	165300	1090	1240	10670	93.6	840
45.7	3510	2740	229200	1300	1320	10670	115.1	910
53.3	3510	3070	328800	1550	1420	10670	143.2	1070
61.0	3510	3660	421400	1780	1500	10670	169.5	1140

TYPE III - TWO COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-79

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,480,000	$3,560,000	$1,750,000	$7,254,000	$11,674,000
22.9	$31,000	$193,000	$230,000	$1,358,000	$3,451,000	$1,750,000	$7,013,000	$11,286,000
30.5	$31,000	$180,000	$226,000	$1,284,000	$3,657,000	$1,750,000	$7,128,000	$11,471,000
38.1	$31,000	$172,000	$228,000	$1,238,000	$4,199,000	$1,750,000	$7,618,000	$12,260,000
45.7	$31,000	$167,000	$311,000	$1,206,000	$4,920,000	$1,750,000	$8,385,000	$13,494,000
53.3	$31,000	$163,000	$373,000	$1,147,000	$5,478,000	$1,750,000	$8,942,000	$14,391,000
61.0	$31,000	$160,000	$447,000	$1,134,000	$6,297,000	$1,750,000	$9,819,000	$15,802,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	560	940	10670	38.8	760
22.9	3510	1070	75800	690	1070	10670	54.6	760
30.5	3510	1190	116900	840	1170	10670	68.4	760
38.1	3510	1980	189700	1070	1270	10670	90.3	760
45.7	3510	2240	295100	1320	1370	10670	119.0	910
53.3	3510	2490	405200	1550	1420	10670	147.4	1070
61.0	3510	3530	563800	1880	1520	10670	188.4	1140

TYPE IV - TWO COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-80

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,729,000	$4,344,000	$1,750,000	$8,419,000	$13,549,000
22.9	$31,000	$193,000	$301,000	$1,506,000	$4,235,000	$1,750,000	$8,016,000	$12,901,000
30.5	$31,000	$180,000	$285,000	$1,397,000	$4,476,000	$1,750,000	$8,119,000	$13,067,000
38.1	$31,000	$172,000	$373,000	$1,304,000	$4,966,000	$1,750,000	$8,596,000	$13,834,000
45.7	$31,000	$167,000	$435,000	$1,263,000	$5,334,000	$1,750,000	$8,980,000	$14,452,000
53.3	$31,000	$163,000	$510,000	$1,216,000	$5,880,000	$1,750,000	$9,550,000	$15,370,000
61.0	$31,000	$160,000	$630,000	$1,202,000	$6,468,000	$1,750,000	$10,241,000	$16,482,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	660	1070	10670	53.3	760
22.9	4320	1070	97800	810	1170	10670	69.9	760
30.5	4320	1550	152000	1020	1270	10670	90.3	760
38.1	4320	1470	237400	1220	1350	10670	117.1	910
45.7	4320	2110	327400	1470	1450	10670	145.3	1070
53.3	4320	3020	453500	1780	1520	10670	181.2	1140
61.0	4320	3070	605500	2030	1630	10670	226.3	1300

TYPE V - TWO COLUMN - GIRDER DEFL L/1000
COST COMPARISON CHART

TABLE 3-81

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,838,000	$3,012,000	$1,750,000	$7,064,000	$11,368,000
22.9	$31,000	$193,000	$199,000	$1,289,000	$2,985,000	$1,750,000	$6,447,000	$10,375,000
30.5	$31,000	$180,000	$198,000	$1,227,000	$3,113,000	$1,750,000	$6,499,000	$10,459,000
38.1	$31,000	$172,000	$180,000	$1,170,000	$3,322,000	$1,750,000	$6,625,000	$10,662,000
45.7	$31,000	$167,000	$209,000	$1,129,000	$3,566,000	$1,750,000	$6,852,000	$11,027,000
53.3	$31,000	$163,000	$289,000	$1,116,000	$4,135,000	$1,750,000	$7,484,000	$12,044,000
61.0	$31,000	$160,000	$381,000	$1,108,000	$4,723,000	$1,750,000	$8,153,000	$13,121,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	530	1120	10670	39.9	760
22.9	3610	1350	68700	660	1020	10670	48.3	760
30.5	3610	1960	104900	810	1120	10670	62.7	760
38.1	3610	2490	153100	990	1190	10670	77.3	760
45.7	3610	3050	212600	1170	1270	10670	95.3	840
53.3	3610	3300	322500	1420	1370	10670	126.8	990
61.0	3610	3610	455900	1680	1470	10670	160.5	1140

TYPE I - TWO COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-82

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,576,000	$4,108,000	$1,750,000	$7,983,000	$12,847,000
22.9	$31,000	$193,000	$264,000	$1,394,000	$3,999,000	$1,750,000	$7,631,000	$12,281,000
30.5	$31,000	$180,000	$255,000	$1,282,000	$3,944,000	$1,750,000	$7,442,000	$11,977,000
38.1	$31,000	$172,000	$228,000	$1,213,000	$4,010,000	$1,750,000	$7,404,000	$11,915,000
45.7	$31,000	$167,000	$311,000	$1,164,000	$4,500,000	$1,750,000	$7,923,000	$12,751,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	640	990	10670	45.9	760
22.9	2790	2130	142500	790	1090	10670	61.3	760
30.5	2790	2130	189900	940	1170	10670	75.8	760
38.1	2790	2240	246400	1070	1240	10670	90.3	760
45.7	2790	2640	351500	1300	1320	10670	117.1	910
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-83

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,527,000	$3,339,000	$1,750,000	$7,165,000	$11,531,000
22.9	$31,000	$193,000	$264,000	$1,358,000	$3,320,000	$1,750,000	$6,916,000	$11,130,000
30.5	$31,000	$180,000	$255,000	$1,284,000	$3,562,000	$1,750,000	$7,062,000	$11,365,000
38.1	$31,000	$172,000	$280,000	$1,209,000	$3,935,000	$1,750,000	$7,377,000	$11,872,000
45.7	$31,000	$167,000	$311,000	$1,161,000	$4,262,000	$1,750,000	$7,682,000	$12,363,000
53.3	$31,000	$163,000	$373,000	$1,146,000	$4,602,000	$1,750,000	$8,065,000	$12,979,000
61.0	$31,000	$160,000	$413,000	$1,118,000	$5,001,000	$1,750,000	$8,473,000	$13,636,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	580	970	10670	45.9	760
22.9	3510	1370	68000	740	1070	10670	57.1	760
30.5	3510	1830	112300	910	1170	10670	74.2	760
38.1	3510	2340	177200	1140	1240	10670	95.3	840
45.7	3510	2740	250700	1350	1320	10670	117.1	910
53.3	3510	3300	337700	1570	1420	10670	143.2	1070
61.0	3510	3660	445700	1800	1500	10670	171.9	1140

TYPE III - TWO COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-84

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,527,000	$3,560,000	$1,750,000	$7,342,000	$11,816,000
22.9	$31,000	$193,000	$230,000	$1,358,000	$3,635,000	$1,750,000	$7,197,000	$11,583,000
30.5	$31,000	$180,000	$226,000	$1,291,000	$4,046,000	$1,750,000	$7,524,000	$12,109,000
38.1	$31,000	$172,000	$228,000	$1,235,000	$4,422,000	$1,750,000	$7,838,000	$12,614,000
45.7	$31,000	$167,000	$337,000	$1,152,000	$5,219,000	$1,750,000	$8,656,000	$13,931,000
53.3	$31,000	$163,000	$406,000	$1,160,000	$5,883,000	$1,750,000	$9,393,000	$15,117,000
61.0	$31,000	$160,000	$476,000	$1,114,000	$6,297,000	$1,750,000	$9,828,000	$15,817,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	560	970	10670	40.1	760
22.9	3510	1320	84200	740	1070	10670	54.6	760
30.5	3510	1730	140500	910	1190	10670	72.8	760
38.1	3510	2290	206600	1120	1270	10670	93.6	760
45.7	3510	2640	322300	1400	1350	10670	126.8	990
53.3	3510	3000	448200	1650	1450	10670	158.3	1070
61.0	3510	3530	563800	1880	1500	10670	188.4	1220

TYPE IV - TWO COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-85

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,729,000	$4,344,000	$1,750,000	$8,419,000	$13,549,000
22.9	$31,000	$193,000	$301,000	$1,506,000	$4,281,000	$1,750,000	$8,062,000	$12,975,000
30.5	$31,000	$180,000	$285,000	$1,397,000	$4,507,000	$1,750,000	$8,150,000	$13,116,000
38.1	$31,000	$172,000	$373,000	$1,304,000	$4,966,000	$1,750,000	$8,596,000	$13,834,000
45.7	$31,000	$167,000	$474,000	$1,259,000	$5,537,000	$1,750,000	$9,218,000	$14,835,000
53.3	$31,000	$163,000	$510,000	$1,211,000	$5,880,000	$1,750,000	$9,545,000	$15,361,000
61.0	$31,000	$160,000	$630,000	$1,190,000	$6,577,000	$1,750,000	$10,338,000	$16,638,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	660	1070	10670	53.3	760
22.9	4320	1140	100400	810	1170	10670	69.9	760
30.5	4320	1600	154200	1020	1270	10670	90.3	760
38.1	4320	1470	237400	1220	1350	10670	117.1	910
45.7	4320	2440	349500	1520	1450	10670	151.6	1070
53.3	4320	3020	453500	1780	1520	10670	181.2	1140
61.0	4320	3250	621400	2080	1630	10670	226.3	1300

TYPE V - TWO COLUMN - GIRDER DEFL L/4000
COST COMPARISON CHART

TABLE 3-86

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$176,000	$1,389,000	$3,012,000	$1,750,000	$6,578,000	$10,586,000
22.9	$31,000	$193,000	$199,000	$1,132,000	$2,903,000	$1,750,000	$6,208,000	$9,991,000
30.5	$31,000	$180,000	$198,000	$1,003,000	$3,035,000	$1,750,000	$6,197,000	$9,973,000
38.1	$31,000	$172,000	$224,000	$923,000	$3,260,000	$1,750,000	$6,360,000	$10,235,000
45.7	$31,000	$167,000	$228,000	$882,000	$3,558,000	$1,750,000	$6,616,000	$10,647,000
53.3	$31,000	$163,000	$311,000	$828,000	$3,909,000	$1,750,000	$6,992,000	$11,252,000
61.0	$31,000	$160,000	$350,000	$819,000	$4,217,000	$1,750,000	$7,327,000	$11,792,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	530	890	10670	35.3	760
22.9	3610	1070	64200	640	890	10670	47.1	760
30.5	3610	1450	99200	790	890	10670	62.7	760
38.1	3610	1980	147400	940	890	10670	77.4	840
45.7	3610	3020	211800	1170	910	10670	93.6	910
53.3	3610	2570	293700	1320	890	10670	119.0	1070
61.0	3610	3610	382200	1550	940	10670	143.2	1140

TYPE I - TWO COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-87

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,389,000	$4,108,000	$1,750,000	$7,796,000	$12,546,000
22.9	$31,000	$193,000	$264,000	$1,132,000	$3,999,000	$1,750,000	$7,369,000	$11,859,000
30.5	$31,000	$180,000	$255,000	$1,002,000	$3,944,000	$1,750,000	$7,162,000	$11,526,000
38.1	$31,000	$172,000	$274,000	$904,000	$4,010,000	$1,750,000	$7,141,000	$11,492,000
45.7	$31,000	$167,000	$305,000	$852,000	$4,287,000	$1,750,000	$7,392,000	$11,896,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	640	890	10670	45.9	760
22.9	2790	2130	142500	790	890	10670	61.3	760
30.5	2790	2130	189900	910	890	10670	75.8	760
38.1	2790	2240	246400	1070	860	10670	90.3	910
45.7	2790	2440	328300	1240	860	10670	111.5	990
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-88

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,389,000	$3,339,000	$1,750,000	$7,027,000	$11,309,000
22.9	$31,000	$193,000	$230,000	$1,132,000	$3,252,000	$1,750,000	$6,588,000	$10,602,000
30.5	$31,000	$180,000	$226,000	$1,003,000	$3,446,000	$1,750,000	$6,636,000	$10,680,000
38.1	$31,000	$172,000	$274,000	$903,000	$3,804,000	$1,750,000	$6,934,000	$11,159,000
45.7	$31,000	$167,000	$305,000	$864,000	$4,065,000	$1,750,000	$7,182,000	$11,558,000
53.3	$31,000	$163,000	$399,000	$849,000	$4,532,000	$1,750,000	$7,724,000	$12,431,000
61.0	$31,000	$160,000	$468,000	$837,000	$4,834,000	$1,750,000	$8,080,000	$13,004,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	580	890	10670	45.9	760
22.9	3510	1140	64300	710	890	10670	54.6	760
30.5	3510	1700	103800	890	890	10670	69.9	760
38.1	3510	1910	165300	1090	860	10670	90.3	910
45.7	3510	2740	229200	1300	890	10670	111.5	990
53.3	3510	3070	328800	1520	940	10670	141.0	1140
61.0	3510	3660	421400	1750	990	10670	169.5	1300

TYPE III - TWO COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-89

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,434,000	$3,560,000	$1,750,000	$7,208,000	$11,600,000
22.9	$31,000	$193,000	$230,000	$1,161,000	$3,451,000	$1,750,000	$6,816,000	$10,969,000
30.5	$31,000	$180,000	$226,000	$1,025,000	$3,768,000	$1,750,000	$6,980,000	$11,233,000
38.1	$31,000	$172,000	$251,000	$938,000	$4,199,000	$1,750,000	$7,341,000	$11,814,000
45.7	$31,000	$167,000	$363,000	$878,000	$4,920,000	$1,750,000	$8,109,000	$13,050,000
53.3	$31,000	$163,000	$426,000	$848,000	$5,478,000	$1,750,000	$8,696,000	$13,995,000
61.0	$31,000	$160,000	$536,000	$846,000	$6,297,000	$1,750,000	$9,620,000	$15,482,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	560	910	10670	38.8	760
22.9	3510	1070	75800	690	910	10670	53.3	760
30.5	3510	1350	123600	860	910	10670	69.9	760
38.1	3510	1980	189700	1070	910	10670	88.6	840
45.7	3510	2240	295100	1320	910	10670	121.0	1070
53.3	3510	2490	405200	1550	940	10670	147.4	1220
61.0	3510	3530	563800	1880	1020	10670	188.4	1370

TYPE IV - TWO COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-90

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,076,000	$4,344,000	$1,750,000	$7,766,000	$12,498,000
22.9	$31,000	$193,000	$301,000	$995,000	$4,235,000	$1,750,000	$7,505,000	$12,078,000
30.5	$31,000	$180,000	$343,000	$936,000	$4,476,000	$1,750,000	$7,716,000	$12,418,000
38.1	$31,000	$172,000	$435,000	$916,000	$4,966,000	$1,750,000	$8,270,000	$13,310,000
45.7	$31,000	$167,000	$466,000	$889,000	$5,334,000	$1,750,000	$8,637,000	$13,900,000
53.3	$31,000	$163,000	$579,000	$883,000	$5,880,000	$1,750,000	$9,286,000	$14,945,000
61.0	$31,000	$160,000	$704,000	$865,000	$6,468,000	$1,750,000	$9,978,000	$16,058,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	660	690	10670	52.0	760
22.9	4320	1070	97800	810	760	10670	68.4	760
30.5	4320	1550	152000	1020	810	10670	88.6	910
38.1	4320	1470	237400	1220	890	10670	117.1	1070
45.7	4320	2110	327400	1470	940	10670	145.3	1140
53.3	4320	3020	453500	1750	1020	10670	181.2	1300
61.0	4320	3070	605500	2030	1070	10670	226.3	1450

TYPE V - TWO COLUMN - COLUMN DEFL H/100
COST COMPARISON CHART

TABLE 3-91

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$176,000	$1,389,000	$3,012,000	$1,750,000	$6,578,000	$10,586,000
22.9	$31,000	$193,000	$199,000	$1,132,000	$2,903,000	$1,750,000	$6,208,000	$9,991,000
30.5	$31,000	$180,000	$198,000	$1,025,000	$3,035,000	$1,750,000	$6,219,000	$10,008,000
38.1	$31,000	$172,000	$224,000	$999,000	$3,260,000	$1,750,000	$6,436,000	$10,358,000
45.7	$31,000	$167,000	$254,000	$978,000	$3,558,000	$1,750,000	$6,738,000	$10,844,000
53.3	$31,000	$163,000	$289,000	$952,000	$3,909,000	$1,750,000	$7,094,000	$11,417,000
61.0	$31,000	$160,000	$326,000	$943,000	$4,217,000	$1,750,000	$7,427,000	$11,952,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	530	890	10670	35.3	760
22.9	3610	1070	64200	640	890	10670	47.1	760
30.5	3610	1450	99200	790	910	10670	62.7	760
38.1	3610	1980	147400	940	990	10670	77.4	840
45.7	3610	3020	211800	1170	1070	10670	98.8	910
53.3	3610	2570	293700	1320	1120	10670	119.0	990
61.0	3610	3610	382200	1570	1190	10670	143.2	1070

TYPE I - TWO COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-92

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,389,000	$4,108,000	$1,750,000	$7,796,000	$12,546,000
22.9	$31,000	$193,000	$264,000	$1,161,000	$3,999,000	$1,750,000	$7,398,000	$11,906,000
30.5	$31,000	$180,000	$255,000	$1,095,000	$3,944,000	$1,750,000	$7,255,000	$11,676,000
38.1	$31,000	$172,000	$274,000	$1,034,000	$4,010,000	$1,750,000	$7,271,000	$11,701,000
45.7	$31,000	$167,000	$305,000	$993,000	$4,287,000	$1,750,000	$7,533,000	$12,123,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	640	890	10670	45.9	760
22.9	2790	2130	142500	790	910	10670	61.3	760
30.5	2790	2130	189900	910	990	10670	75.8	760
38.1	2790	2240	246400	1070	1040	10670	90.3	910
45.7	2790	2440	328300	1240	1090	10670	111.5	990
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-93

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,389,000	$3,339,000	$1,750,000	$7,027,000	$11,309,000
22.9	$31,000	$193,000	$230,000	$1,132,000	$3,252,000	$1,750,000	$6,588,000	$10,602,000
30.5	$31,000	$180,000	$226,000	$1,072,000	$3,446,000	$1,750,000	$6,705,000	$10,791,000
38.1	$31,000	$172,000	$280,000	$1,141,000	$3,804,000	$1,750,000	$7,178,000	$11,552,000
45.7	$31,000	$167,000	$305,000	$991,000	$4,065,000	$1,750,000	$7,309,000	$11,763,000
53.3	$31,000	$163,000	$373,000	$991,000	$4,532,000	$1,750,000	$7,840,000	$12,617,000
61.0	$31,000	$160,000	$440,000	$964,000	$4,834,000	$1,750,000	$8,179,000	$13,163,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	580	890	10670	45.9	760
22.9	3510	1140	64300	710	890	10670	54.6	760
30.5	3510	1700	103800	890	970	10670	69.9	760
38.1	3510	1910	165300	1090	1170	10670	93.6	840
45.7	3510	2740	229200	1300	1090	10670	111.5	990
53.3	3510	3070	328800	1520	1190	10670	141.0	1070
61.0	3510	3660	421400	1750	1240	10670	169.5	1220

TYPE III - TWO COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-94

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,434,000	$3,560,000	$1,750,000	$7,208,000	$11,600,000
22.9	$31,000	$193,000	$230,000	$1,161,000	$3,451,000	$1,750,000	$6,816,000	$10,969,000
30.5	$31,000	$180,000	$226,000	$1,173,000	$3,768,000	$1,750,000	$7,128,000	$11,471,000
38.1	$31,000	$172,000	$251,000	$1,054,000	$4,199,000	$1,750,000	$7,457,000	$12,001,000
45.7	$31,000	$167,000	$363,000	$1,025,000	$4,920,000	$1,750,000	$8,256,000	$13,287,000
53.3	$31,000	$163,000	$399,000	$990,000	$5,478,000	$1,750,000	$8,811,000	$14,180,000
61.0	$31,000	$160,000	$506,000	$1,065,000	$6,297,000	$1,750,000	$9,809,000	$15,786,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	560	910	10670	38.8	760
22.9	3510	1070	75800	690	910	10670	53.3	760
30.5	3510	1350	123600	860	1070	10670	69.9	760
38.1	3510	1980	189700	1070	1070	10670	88.6	840
45.7	3510	2240	295100	1320	1140	10670	121.0	1070
53.3	3510	2490	405200	1550	1190	10670	147.4	1140
61.0	3510	3530	563800	1880	1420	10670	188.4	1300

TYPE IV - TWO COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-95

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,389,000	$4,344,000	$1,750,000	$8,079,000	$13,002,000
22.9	$31,000	$193,000	$301,000	$1,224,000	$4,235,000	$1,750,000	$7,734,000	$12,447,000
30.5	$31,000	$180,000	$314,000	$1,141,000	$4,476,000	$1,750,000	$7,892,000	$12,701,000
38.1	$31,000	$172,000	$404,000	$1,091,000	$4,966,000	$1,750,000	$8,414,000	$13,541,000
45.7	$31,000	$167,000	$435,000	$1,056,000	$5,334,000	$1,750,000	$8,773,000	$14,119,000
53.3	$31,000	$163,000	$545,000	$1,030,000	$5,880,000	$1,750,000	$9,399,000	$15,127,000
61.0	$31,000	$160,000	$667,000	$1,012,000	$6,468,000	$1,750,000	$10,088,000	$16,235,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	660	890	10670	52.0	760
22.9	4320	1070	97800	810	970	10670	68.4	760
30.5	4320	1550	152000	1020	1040	10670	90.3	840
38.1	4320	1470	237400	1220	1120	10670	117.1	990
45.7	4320	2110	327400	1470	1190	10670	145.3	1070
53.3	4320	3020	453500	1750	1270	10670	181.2	1220
61.0	4320	3070	605500	2030	1350	10670	223.6	1370

TYPE V - TWO COLUMN - COLUMN DEFL H/250
COST COMPARISON CHART

TABLE 3-96

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,838,000	$3,012,000	$1,750,000	$7,064,000	$11,368,000
22.9	$31,000	$193,000	$199,000	$1,585,000	$2,903,000	$1,750,000	$6,661,000	$10,720,000
30.5	$31,000	$180,000	$198,000	$1,469,000	$3,035,000	$1,750,000	$6,663,000	$10,723,000
38.1	$31,000	$172,000	$204,000	$1,404,000	$3,260,000	$1,750,000	$6,821,000	$10,977,000
45.7	$31,000	$167,000	$212,000	$1,355,000	$3,558,000	$1,750,000	$7,073,000	$11,383,000
53.3	$31,000	$163,000	$266,000	$1,304,000	$3,909,000	$1,750,000	$7,423,000	$11,946,000
61.0	$31,000	$160,000	$303,000	$1,260,000	$4,217,000	$1,750,000	$7,721,000	$12,426,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	530	1120	10670	39.9	760
22.9	3610	1070	64200	640	1220	10670	48.3	760
30.5	3610	1450	99200	790	1320	10670	62.7	760
38.1	3610	1980	147400	970	1420	10670	79.0	760
45.7	3610	3020	211800	1170	1520	10670	98.8	760
53.3	3610	2570	293700	1320	1600	10670	121.0	910
61.0	3610	3610	382200	1570	1680	10670	143.2	990

TYPE I - TWO COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-97

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$2,010,000	$4,108,000	$1,750,000	$8,417,000	$13,546,000
22.9	$31,000	$193,000	$264,000	$1,754,000	$3,999,000	$1,750,000	$7,991,000	$12,860,000
30.5	$31,000	$180,000	$255,000	$1,568,000	$3,944,000	$1,750,000	$7,728,000	$12,437,000
38.1	$31,000	$172,000	$305,000	$1,453,000	$4,010,000	$1,750,000	$7,721,000	$12,426,000
45.7	$31,000	$167,000	$285,000	$1,399,000	$4,287,000	$1,750,000	$7,919,000	$12,744,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	640	1190	10670	47.1	760
22.9	2790	2130	142500	790	1320	10670	62.7	760
30.5	2790	2130	189900	940	1400	10670	77.4	760
38.1	2790	2240	246400	1070	1470	10670	95.3	910
45.7	2790	2440	328300	1240	1570	10670	117.1	840
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-98

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,951,000	$3,339,000	$1,750,000	$7,589,000	$12,213,000
22.9	$31,000	$193,000	$264,000	$1,668,000	$3,252,000	$1,750,000	$7,158,000	$11,520,000
30.5	$31,000	$180,000	$255,000	$1,536,000	$3,446,000	$1,750,000	$7,198,000	$11,584,000
38.1	$31,000	$172,000	$254,000	$1,451,000	$3,804,000	$1,750,000	$7,462,000	$12,009,000
45.7	$31,000	$167,000	$285,000	$1,395,000	$4,065,000	$1,750,000	$7,693,000	$12,381,000
53.3	$31,000	$163,000	$377,000	$1,376,000	$4,532,000	$1,750,000	$8,229,000	$13,243,000
61.0	$31,000	$160,000	$385,000	$1,366,000	$4,834,000	$1,750,000	$8,526,000	$13,721,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	580	1170	10670	47.1	760
22.9	3510	1140	64300	710	1270	10670	57.1	760
30.5	3510	1700	103800	890	1370	10670	74.2	760
38.1	3510	1910	165300	1090	1470	10670	93.6	760
45.7	3510	2740	229200	1300	1570	10670	115.1	840
53.3	3510	3070	328800	1550	1700	10670	144.9	990
61.0	3510	3660	421400	1780	1830	10670	169.5	1070

TYPE III - TWO COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-99

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,894,000	$3,560,000	$1,750,000	$7,709,000	$12,406,000
22.9	$31,000	$193,000	$230,000	$1,626,000	$3,451,000	$1,750,000	$7,281,000	$11,718,000
30.5	$31,000	$180,000	$226,000	$1,571,000	$3,768,000	$1,750,000	$7,526,000	$12,112,000
38.1	$31,000	$172,000	$228,000	$1,480,000	$4,199,000	$1,750,000	$7,860,000	$12,650,000
45.7	$31,000	$167,000	$363,000	$1,470,000	$4,920,000	$1,750,000	$8,701,000	$14,003,000
53.3	$31,000	$163,000	$346,000	$1,376,000	$5,478,000	$1,750,000	$9,144,000	$14,716,000
61.0	$31,000	$160,000	$447,000	$1,337,000	$6,297,000	$1,750,000	$10,022,000	$16,129,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	580	1140	10670	42.4	760
22.9	3510	1070	75800	710	1240	10670	54.6	760
30.5	3510	1350	123600	860	1400	10670	71.3	760
38.1	3510	1980	189700	1090	1500	10670	90.3	760
45.7	3510	2240	295100	1320	1650	10670	121.0	1070
53.3	3510	2490	405200	1550	1700	10670	147.4	990
61.0	3510	3530	563800	1850	1800	10670	188.4	1140

TYPE IV - TWO COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-100

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$2,194,000	$4,344,000	$1,750,000	$8,884,000	$14,298,000
22.9	$31,000	$193,000	$301,000	$1,889,000	$4,235,000	$1,750,000	$8,399,000	$13,517,000
30.5	$31,000	$180,000	$285,000	$1,741,000	$4,476,000	$1,750,000	$8,463,000	$13,620,000
38.1	$31,000	$172,000	$342,000	$1,620,000	$4,966,000	$1,750,000	$8,881,000	$14,293,000
45.7	$31,000	$167,000	$404,000	$1,536,000	$5,334,000	$1,750,000	$9,222,000	$14,842,000
53.3	$31,000	$163,000	$510,000	$1,475,000	$5,880,000	$1,750,000	$9,809,000	$15,786,000
61.0	$31,000	$160,000	$593,000	$1,451,000	$6,468,000	$1,750,000	$10,453,000	$16,823,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	660	1270	10670	53.3	760
22.9	4320	1070	97800	810	1400	10670	71.3	760
30.5	4320	1550	152000	1020	1520	10670	90.3	760
38.1	4320	1470	237400	1220	1630	10670	119.0	840
45.7	4320	2110	327400	1470	1730	10670	145.3	990
53.3	4320	3020	453500	1730	1830	10670	183.6	1140
61.0	4320	3070	605500	1910	1960	10670	223.6	1220

TYPE V - TWO COLUMN - COLUMN DEFL H/750
COST COMPARISON CHART

TABLE 3-101

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$2,456,000	$3,012,000	$1,750,000	$7,814,000	$12,575,000
22.9	$31,000	$193,000	$301,000	$1,585,000	$2,903,000	$1,750,000	$6,763,000	$10,884,000
30.5	$31,000	$180,000	$285,000	$1,502,000	$3,035,000	$1,750,000	$6,783,000	$10,916,000
38.1	$31,000	$172,000	$282,000	$1,379,000	$3,260,000	$1,750,000	$6,874,000	$11,062,000
45.7	$31,000	$167,000	$313,000	$1,343,000	$3,620,000	$1,750,000	$7,224,000	$11,626,000
53.3	$31,000	$163,000	$378,000	$1,284,000	$3,987,000	$1,750,000	$7,593,000	$12,220,000
61.0	$31,000	$160,000	$483,000	$1,259,000	$4,599,000	$1,750,000	$8,282,000	$13,328,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	690	1370	10670	55.9	760
22.9	3610	1070	64200	840	1220	10670	71.3	760
30.5	3610	1450	99200	1040	1350	10670	90.3	760
38.1	3610	1980	147400	1300	1420	10670	111.5	760
45.7	3610	3230	218600	1650	1550	10670	136.9	840
53.3	3610	2820	303600	1910	1630	10670	169.5	910
61.0	3610	3200	437700	2290	1750	10670	215.9	1070

TYPE I - TWO COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-102

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$451,000	$2,070,000	$4,108,000	$1,750,000	$8,630,000	$13,888,000
22.9	$31,000	$193,000	$381,000	$1,798,000	$3,999,000	$1,750,000	$8,152,000	$13,119,000
30.5	$31,000	$180,000	$352,000	$1,572,000	$3,944,000	$1,750,000	$7,829,000	$12,599,000
38.1	$31,000	$172,000	$409,000	$1,443,000	$4,158,000	$1,750,000	$7,963,000	$12,815,000
45.7	$31,000	$167,000	$440,000	$1,377,000	$4,526,000	$1,750,000	$8,291,000	$13,343,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	860	1220	10670	69.9	760
22.9	2790	2130	142500	1070	1350	10670	90.3	760
30.5	2790	2130	189900	1270	1420	10670	109.6	760
38.1	2790	2390	259900	1520	1500	10670	134.9	910
45.7	2790	2540	354400	1830	1600	10670	167.2	910
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - ZONE 4 SEISMIC
COST COMPARISON CHART

TABLE 3-103

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$396,000	$1,951,000	$3,339,000	$1,750,000	$7,687,000	$12,371,000
22.9	$31,000	$193,000	$339,000	$1,708,000	$3,252,000	$1,750,000	$7,273,000	$11,705,000
30.5	$31,000	$180,000	$352,000	$1,543,000	$3,446,000	$1,750,000	$7,302,000	$11,751,000
38.1	$31,000	$172,000	$341,000	$1,445,000	$3,842,000	$1,750,000	$7,581,000	$12,200,000
45.7	$31,000	$167,000	$406,000	$1,377,000	$4,157,000	$1,750,000	$7,888,000	$12,695,000
53.3	$31,000	$163,000	$477,000	$1,361,000	$4,695,000	$1,750,000	$8,477,000	$13,642,000
61.0	$31,000	$160,000	$595,000	$1,274,000	$5,492,000	$1,750,000	$9,302,000	$14,970,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	740	1170	10670	62.7	760
22.9	3510	1140	64300	940	1300	10670	80.5	760
30.5	3510	1700	103800	1190	1400	10670	105.9	760
38.1	3510	2030	168800	1500	1500	10670	128.8	760
45.7	3510	2740	239200	1830	1600	10670	160.5	910
53.3	3510	3610	349600	2240	1750	10670	200.7	990
61.0	3510	3580	517100	2620	1830	10670	253.6	1140

TYPE III - TWO COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-104

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$396,000	$1,951,000	$3,560,000	$1,750,000	$7,908,000	$12,727,000
22.9	$31,000	$193,000	$339,000	$1,358,000	$3,451,000	$1,750,000	$7,122,000	$11,462,000
30.5	$31,000	$180,000	$318,000	$1,509,000	$3,768,000	$1,750,000	$7,556,000	$12,160,000
38.1	$31,000	$172,000	$341,000	$1,447,000	$4,263,000	$1,750,000	$8,004,000	$12,881,000
45.7	$31,000	$167,000	$440,000	$1,422,000	$5,200,000	$1,750,000	$9,010,000	$14,500,000
53.3	$31,000	$163,000	$553,000	$1,327,000	$5,863,000	$1,750,000	$9,687,000	$15,590,000
61.0	$31,000	$160,000	$677,000	$1,284,000	$6,721,000	$1,750,000	$10,623,000	$17,096,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	740	1170	10670	61.3	760
22.9	3510	1070	75800	910	1070	10670	77.4	760
30.5	3510	1350	123600	1170	1370	10670	100.6	760
38.1	3510	1910	194500	1470	1500	10670	130.8	760
45.7	3510	2620	320600	1910	1650	10670	174.2	910
53.3	3510	2970	446000	2290	1730	10670	218.5	1070
61.0	3510	3730	615200	2690	1850	10670	267.8	1220

TYPE IV - TWO COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-105

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$509,000	$2,257,000	$4,344,000	$1,750,000	$9,111,000	$14,663,000
22.9	$31,000	$193,000	$424,000	$1,913,000	$4,235,000	$1,750,000	$8,546,000	$13,754,000
30.5	$31,000	$180,000	$426,000	$1,699,000	$4,476,000	$1,750,000	$8,562,000	$13,779,000
38.1	$31,000	$172,000	$529,000	$1,599,000	$4,997,000	$1,750,000	$9,078,000	$14,610,000
45.7	$31,000	$167,000	$599,000	$1,526,000	$5,459,000	$1,750,000	$9,532,000	$15,341,000
53.3	$31,000	$163,000	$726,000	$1,453,000	$6,168,000	$1,750,000	$10,291,000	$16,562,000
61.0	$31,000	$160,000	$866,000	$1,438,000	$7,115,000	$1,750,000	$11,360,000	$18,282,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	860	1300	10670	77.4	760
22.9	4320	1070	97800	1090	1420	10670	100.6	760
30.5	4320	1550	152000	1400	1520	10670	128.8	760
38.1	4320	1520	240300	1730	1650	10670	167.2	910
45.7	4320	2310	341000	2110	1780	10670	210.7	990
53.3	4320	2570	490200	2440	1880	10670	259.2	1140
61.0	4320	3200	699700	2840	2030	10670	322.2	1300

TYPE V - TWO COLUMN - ZONE 4 SEISMIC COST COMPARISON CHART

TABLE 3-106

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$176,000	$1,434,000	$3,012,000	$1,750,000	$6,623,000	$10,658,000
22.9	$31,000	$193,000	$199,000	$1,289,000	$2,903,000	$1,750,000	$6,365,000	$10,243,000
30.5	$31,000	$180,000	$198,000	$1,200,000	$3,035,000	$1,750,000	$6,394,000	$10,290,000
38.1	$31,000	$172,000	$204,000	$1,171,000	$3,502,000	$1,750,000	$6,830,000	$10,992,000
45.7	$31,000	$167,000	$233,000	$1,130,000	$3,503,000	$1,750,000	$6,814,000	$10,966,000
53.3	$31,000	$163,000	$266,000	$1,103,000	$3,870,000	$1,750,000	$7,183,000	$11,560,000
61.0	$31,000	$160,000	$326,000	$1,064,000	$4,154,000	$1,750,000	$7,485,000	$12,046,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	530	910	10670	35.3	760
22.9	3610	1070	64200	640	1020	10670	48.3	760
30.5	3610	1450	99200	790	1090	10670	61.3	760
38.1	3610	1570	169400	970	1190	10670	82.1	760
45.7	3610	2840	205800	1140	1270	10670	95.3	840
53.3	3610	2440	288700	1320	1350	10670	119.0	910
61.0	3610	3400	373100	1550	1400	10670	141.0	1070

TYPE I - TWO COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-107

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,576,000	$4,108,000	$1,750,000	$7,983,000	$12,847,000
22.9	$31,000	$193,000	$264,000	$1,394,000	$3,999,000	$1,750,000	$7,631,000	$12,281,000
30.5	$31,000	$180,000	$255,000	$1,282,000	$3,944,000	$1,750,000	$7,442,000	$11,977,000
38.1	$31,000	$172,000	$228,000	$1,213,000	$4,010,000	$1,750,000	$7,404,000	$11,915,000
45.7	$31,000	$167,000	$282,000	$1,167,000	$4,230,000	$1,750,000	$7,627,000	$12,274,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	640	990	10670	45.9	760
22.9	2790	2130	142500	790	1090	10670	61.3	760
30.5	2790	2130	189900	940	1170	10670	75.8	760
38.1	2790	2240	246400	1070	1240	10670	90.3	760
45.7	2790	2390	322100	1240	1320	10670	111.5	910
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-108

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,527,000	$3,339,000	$1,750,000	$7,165,000	$11,531,000
22.9	$31,000	$193,000	$230,000	$1,358,000	$3,252,000	$1,750,000	$6,814,000	$10,966,000
30.5	$31,000	$180,000	$226,000	$1,255,000	$3,445,000	$1,750,000	$6,887,000	$11,084,000
38.1	$31,000	$172,000	$280,000	$1,212,000	$3,789,000	$1,750,000	$7,234,000	$11,642,000
45.7	$31,000	$167,000	$282,000	$1,164,000	$4,026,000	$1,750,000	$7,420,000	$11,941,000
53.3	$31,000	$163,000	$373,000	$1,147,000	$4,532,000	$1,750,000	$7,996,000	$12,868,000
61.0	$31,000	$160,000	$413,000	$1,121,000	$4,798,000	$1,750,000	$8,273,000	$13,314,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	580	970	10670	45.9	760
22.9	3510	1140	64300	710	1070	10670	54.6	760
30.5	3510	1600	103700	890	1140	10670	71.3	760
38.1	3510	1850	163900	1090	1240	10670	93.6	840
45.7	3510	2620	225000	1300	1320	10670	111.5	910
53.3	3510	3070	328800	1550	1420	10670	143.2	1070
61.0	3510	3660	416200	1750	1500	10670	169.5	1140

TYPE III - TWO COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-109

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$213,000	$1,527,000	$3,560,000	$1,750,000	$7,301,000	$11,750,000
22.9	$31,000	$193,000	$230,000	$1,323,000	$3,451,000	$1,750,000	$6,978,000	$11,230,000
30.5	$31,000	$180,000	$226,000	$1,284,000	$3,694,000	$1,750,000	$7,165,000	$11,531,000
38.1	$31,000	$172,000	$228,000	$1,238,000	$4,124,000	$1,750,000	$7,543,000	$12,139,000
45.7	$31,000	$167,000	$282,000	$1,207,000	$4,845,000	$1,750,000	$8,282,000	$13,329,000
53.3	$31,000	$163,000	$373,000	$1,168,000	$5,336,000	$1,750,000	$8,821,000	$14,196,000
61.0	$31,000	$160,000	$476,000	$1,116,000	$6,135,000	$1,750,000	$9,668,000	$15,559,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	560	970	10670	38.8	760
22.9	3510	1070	75800	690	1040	10670	53.3	760
30.5	3510	1240	119200	860	1170	10670	69.9	760
38.1	3510	1880	184000	1070	1270	10670	90.3	760
45.7	3510	2130	288300	1300	1370	10670	115.2	910
53.3	3510	2310	390100	1520	1450	10670	147.4	1070
61.0	3510	3330	544100	1850	1500	10670	186.0	1220

TYPE IV - TWO COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-110

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,677,000	$4,344,000	$1,750,000	$8,367,000	$13,466,000
22.9	$31,000	$193,000	$301,000	$1,506,000	$4,235,000	$1,750,000	$8,016,000	$12,901,000
30.5	$31,000	$180,000	$285,000	$1,397,000	$4,461,000	$1,750,000	$8,104,000	$13,042,000
38.1	$31,000	$172,000	$373,000	$1,304,000	$4,935,000	$1,750,000	$8,565,000	$13,784,000
45.7	$31,000	$167,000	$435,000	$1,263,000	$5,318,000	$1,750,000	$8,964,000	$14,426,000
53.3	$31,000	$163,000	$510,000	$1,213,000	$5,848,000	$1,750,000	$9,515,000	$15,313,000
61.0	$31,000	$160,000	$630,000	$1,176,000	$6,390,000	$1,750,000	$10,137,000	$16,314,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	660	1040	10670	53.3	760
22.9	4320	1070	97800	810	1170	10670	69.9	760
30.5	4320	1520	150800	1020	1270	10670	90.3	760
38.1	4320	1420	234600	1220	1350	10670	117.1	910
45.7	4320	2080	325700	1450	1450	10670	145.3	1070
53.3	4320	2970	449500	1750	1520	10670	181.2	1140
61.0	4320	2950	594200	2010	1600	10670	223.6	1300

TYPE V - TWO COLUMN - 55158 kPa GIRDER CONCRETE COST COMPARISON CHART

TABLE 3-111

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,480,000	$3,201,000	$1,750,000	$6,936,000	$11,163,000
22.9	$31,000	$193,000	$230,000	$1,289,000	$3,092,000	$1,750,000	$6,585,000	$10,598,000
30.5	$31,000	$180,000	$198,000	$1,200,000	$3,037,000	$1,750,000	$6,396,000	$10,294,000
38.1	$31,000	$172,000	$204,000	$1,171,000	$3,348,000	$1,750,000	$6,676,000	$10,744,000
45.7	$31,000	$167,000	$209,000	$1,114,000	$3,326,000	$1,750,000	$6,597,000	$10,617,000
53.3	$31,000	$163,000	$266,000	$1,085,000	$3,866,000	$1,750,000	$7,161,000	$11,525,000
61.0	$31,000	$160,000	$355,000	$1,094,000	$4,693,000	$1,750,000	$8,083,000	$13,009,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2490	62000	580	940	10670	37.9	760
22.9	2790	2490	93000	690	1020	10670	50.7	760
30.5	2790	2490	124000	810	1090	10670	61.3	760
38.1	2790	2490	186200	970	1190	10670	79.0	760
45.7	2790	2490	223400	1070	1240	10670	90.3	840
53.3	2790	2740	331400	1300	1320	10670	117.1	910
61.0	2790	3280	500700	1630	1450	10670	156.1	1070

TYPE VI - TWO COLUMN - BASE CASE
COST COMPARISON CHART

TABLE 3-112

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$254,000	$1,626,000	$3,012,000	$1,750,000	$6,893,000	$11,093,000
22.9	$31,000	$193,000	$230,000	$1,468,000	$2,955,000	$1,750,000	$6,627,000	$10,665,000
30.5	$31,000	$180,000	$226,000	$1,374,000	$3,137,000	$1,750,000	$6,698,000	$10,780,000
38.1	$31,000	$172,000	$251,000	$1,263,000	$3,416,000	$1,750,000	$6,883,000	$11,077,000
45.7	$31,000	$167,000	$282,000	$1,209,000	$3,893,000	$1,750,000	$7,332,000	$11,800,000
53.3	$31,000	$163,000	$341,000	$1,150,000	$4,150,000	$1,750,000	$7,585,000	$12,207,000
61.0	$31,000	$160,000	$413,000	$1,104,000	$4,684,000	$1,750,000	$8,142,000	$13,103,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	560	1020	10670	40.1	760
22.9	3610	1240	67000	710	1140	10670	54.6	760
30.5	3610	1780	106600	890	1240	10670	69.9	760
38.1	3610	2490	161600	1070	1300	10670	88.6	840
45.7	3610	2460	248300	1270	1370	10670	111.5	910
53.3	3610	3350	324500	1500	1420	10670	134.9	1070
61.0	3610	3480	450200	1750	1470	10670	167.2	1140

TYPE I - TWO COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-113

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,677,000	$4,108,000	$1,750,000	$8,131,000	$13,086,000
22.9	$31,000	$193,000	$301,000	$1,468,000	$3,999,000	$1,750,000	$7,742,000	$12,460,000
30.5	$31,000	$180,000	$255,000	$1,368,000	$3,944,000	$1,750,000	$7,528,000	$12,115,000
38.1	$31,000	$172,000	$280,000	$1,258,000	$4,091,000	$1,750,000	$7,582,000	$12,202,000
45.7	$31,000	$167,000	$370,000	$1,204,000	$4,520,000	$1,750,000	$8,042,000	$12,943,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	690	1040	10670	50.7	760
22.9	2790	2130	142500	840	1140	10670	66.9	760
30.5	2790	2130	189900	990	1240	10670	80.5	760
38.1	2790	2130	253700	1140	1300	10670	98.8	840
45.7	2790	2340	353700	1350	1370	10670	126.7	990
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-114

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,626,000	$3,339,000	$1,750,000	$7,264,000	$11,690,000
22.9	$31,000	$193,000	$264,000	$1,468,000	$3,310,000	$1,750,000	$7,016,000	$11,291,000
30.5	$31,000	$180,000	$255,000	$1,370,000	$3,539,000	$1,750,000	$7,125,000	$11,467,000
38.1	$31,000	$172,000	$280,000	$1,257,000	$3,949,000	$1,750,000	$7,439,000	$11,972,000
45.7	$31,000	$167,000	$370,000	$1,201,000	$4,248,000	$1,750,000	$7,767,000	$12,500,000
53.3	$31,000	$163,000	$435,000	$1,159,000	$4,779,000	$1,750,000	$8,317,000	$13,385,000
61.0	$31,000	$160,000	$546,000	$1,127,000	$5,314,000	$1,750,000	$8,928,000	$14,368,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	610	1020	10670	45.9	760
22.9	3510	1220	67500	790	1140	10670	61.3	760
30.5	3510	1750	110600	970	1240	10670	79.0	760
38.1	3510	2030	178400	1190	1300	10670	100.6	840
45.7	3510	2640	249200	1400	1370	10670	126.7	990
53.3	3510	3330	360200	1680	1450	10670	158.3	1140
61.0	3510	3660	491300	1960	1520	10670	195.7	1300

TYPE III - TWO COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-115

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,626,000	$3,560,000	$1,750,000	$7,485,000	$12,046,000
22.9	$31,000	$193,000	$264,000	$1,468,000	$3,653,000	$1,750,000	$7,359,000	$11,843,000
30.5	$31,000	$180,000	$255,000	$1,370,000	$3,971,000	$1,750,000	$7,557,000	$12,162,000
38.1	$31,000	$172,000	$280,000	$1,255,000	$4,506,000	$1,750,000	$7,994,000	$12,865,000
45.7	$31,000	$167,000	$398,000	$1,217,000	$5,406,000	$1,750,000	$8,969,000	$14,434,000
53.3	$31,000	$163,000	$472,000	$1,175,000	$5,844,000	$1,750,000	$9,435,000	$15,184,000
61.0	$31,000	$160,000	$546,000	$1,140,000	$6,665,000	$1,750,000	$10,292,000	$16,564,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	610	1020	10670	44.7	760
22.9	3510	1350	85000	790	1140	10670	59.9	760
30.5	3510	1630	136000	970	1240	10670	77.4	760
38.1	3510	2240	213000	1190	1300	10670	100.6	840
45.7	3510	2900	339300	1500	1400	10670	134.9	1070
53.3	3510	3150	444000	1730	1470	10670	164.9	1140
61.0	3510	3560	608400	2030	1550	10670	203.2	1300

TYPE IV - TWO COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-116

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,677,000	$4,344,000	$1,750,000	$8,367,000	$13,466,000
22.9	$31,000	$193,000	$339,000	$1,506,000	$4,235,000	$1,750,000	$8,054,000	$12,962,000
30.5	$31,000	$180,000	$350,000	$1,391,000	$4,617,000	$1,750,000	$8,319,000	$13,388,000
38.1	$31,000	$172,000	$443,000	$1,325,000	$5,075,000	$1,750,000	$8,796,000	$14,156,000
45.7	$31,000	$167,000	$507,000	$1,256,000	$5,521,000	$1,750,000	$9,232,000	$14,858,000
53.3	$31,000	$163,000	$624,000	$1,226,000	$6,184,000	$1,750,000	$9,978,000	$16,058,000
61.0	$31,000	$160,000	$753,000	$1,182,000	$6,765,000	$1,750,000	$10,641,000	$17,125,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	690	1040	10670	54.6	760
22.9	4320	1070	97800	860	1170	10670	74.2	760
30.5	4320	1780	162200	1090	1270	10670	97.1	840
38.1	4320	1650	247300	1300	1370	10670	126.7	990
45.7	4320	2410	347800	1570	1450	10670	158.3	1140
53.3	4320	2590	492100	1850	1550	10670	198.2	1300
61.0	4320	3560	648600	2210	1630	10670	242.5	1450

TYPE V - TWO COLUMN - FREIGHT = 1.27 t/M
COST COMPARISON CHART

TABLE 3-117

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,783,000	$3,012,000	$1,750,000	$7,094,000	$11,417,000
22.9	$31,000	$193,000	$264,000	$1,545,000	$2,985,000	$1,750,000	$6,768,000	$10,892,000
30.5	$31,000	$180,000	$255,000	$1,435,000	$3,215,000	$1,750,000	$6,866,000	$11,050,000
38.1	$31,000	$172,000	$280,000	$1,334,000	$3,814,000	$1,750,000	$7,381,000	$11,879,000
45.7	$31,000	$167,000	$337,000	$1,271,000	$3,963,000	$1,750,000	$7,519,000	$12,101,000
53.3	$31,000	$163,000	$435,000	$1,201,000	$4,564,000	$1,750,000	$8,144,000	$13,107,000
61.0	$31,000	$160,000	$546,000	$1,146,000	$5,230,000	$1,750,000	$8,863,000	$14,264,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3610	1070	42800	580	1090	10670	43.5	760
22.9	3610	1350	68700	740	1190	10670	58.5	760
30.5	3610	2030	112300	940	1300	10670	74.2	760
38.1	3610	2130	197700	1170	1370	10670	98.8	840
45.7	3610	2690	256000	1350	1450	10670	121.0	990
53.3	3610	3050	377000	1630	1500	10670	153.8	1140
61.0	3610	3610	529600	1930	1550	10670	193.1	1300

TYPE I - TWO COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-118

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$345,000	$1,783,000	$4,108,000	$1,750,000	$8,237,000	$13,256,000
22.9	$31,000	$193,000	$301,000	$1,585,000	$3,999,000	$1,750,000	$7,859,000	$12,648,000
30.5	$31,000	$180,000	$285,000	$1,429,000	$3,944,000	$1,750,000	$7,619,000	$12,262,000
38.1	$31,000	$172,000	$338,000	$1,331,000	$4,283,000	$1,750,000	$7,905,000	$12,722,000
45.7	$31,000	$167,000	$435,000	$1,259,000	$4,910,000	$1,750,000	$8,552,000	$13,763,000
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	2790	2130	95000	710	1090	10670	52.0	760
22.9	2790	2130	142500	860	1220	10670	68.4	760
30.5	2790	2130	189900	1020	1300	10670	85.3	760
38.1	2790	2390	271200	1220	1370	10670	107.8	910
45.7	2790	3100	396200	1520	1450	10670	141.0	1070
53.3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
61.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

TYPE II - TWO COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-119

#N/A-Due to vehicle and shipping constraints, girder could not be sized for this span

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,783,000	$3,339,000	$1,750,000	$7,421,000	$11,943,000
22.9	$31,000	$193,000	$301,000	$1,585,000	$3,366,000	$1,750,000	$7,226,000	$11,629,000
30.5	$31,000	$180,000	$285,000	$1,427,000	$3,601,000	$1,750,000	$7,274,000	$11,707,000
38.1	$31,000	$172,000	$338,000	$1,327,000	$4,029,000	$1,750,000	$7,647,000	$12,307,000
45.7	$31,000	$167,000	$370,000	$1,261,000	$4,365,000	$1,750,000	$7,944,000	$12,785,000
53.3	$31,000	$163,000	$472,000	$1,193,000	$4,919,000	$1,750,000	$8,528,000	$13,725,000
61.0	$31,000	$160,000	$587,000	$1,154,000	$5,593,000	$1,750,000	$9,275,000	$14,927,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	42000	660	1090	10670	47.1	760
22.9	3510	1520	70500	840	1220	10670	65.4	760
30.5	3510	1960	115100	1040	1300	10670	83.6	760
38.1	3510	2590	185700	1270	1370	10670	107.8	910
45.7	3510	3020	261900	1500	1450	10670	132.9	990
53.3	3510	3280	378000	1750	1500	10670	167.2	1140
61.0	3510	3910	531800	2080	1570	10670	208.1	1300

TYPE III - TWO COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-120

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$298,000	$1,783,000	$3,560,000	$1,750,000	$7,642,000	$12,299,000
22.9	$31,000	$193,000	$301,000	$1,585,000	$3,783,000	$1,750,000	$7,643,000	$12,300,000
30.5	$31,000	$180,000	$285,000	$1,429,000	$4,008,000	$1,750,000	$7,683,000	$12,365,000
38.1	$31,000	$172,000	$338,000	$1,325,000	$4,787,000	$1,750,000	$8,403,000	$13,524,000
45.7	$31,000	$167,000	$435,000	$1,258,000	$5,621,000	$1,750,000	$9,262,000	$14,906,000
53.3	$31,000	$163,000	$545,000	$1,188,000	$6,247,000	$1,750,000	$9,924,000	$15,971,000
61.0	$31,000	$160,000	$704,000	$1,164,000	$7,489,000	$1,750,000	$11,298,000	$18,182,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	3510	1070	50600	640	1090	10670	45.9	760
22.9	3510	1520	90900	840	1220	10670	65.4	760
30.5	3510	1680	138200	1020	1300	10670	83.6	760
38.1	3510	2620	234200	1300	1370	10670	109.6	910
45.7	3510	2460	358900	1550	1450	10670	145.3	1070
53.3	3510	2970	486700	1830	1500	10670	181.2	1220
61.0	3510	3510	708200	2210	1600	10670	234.4	1450

TYPE IV - TWO COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-121

COST OF STRUCTURE PER KILOMETER								
SPAN (M)	CONSTRUCTION FACILITIES	SITE PREP & FINISHING	FOUNDATION	COLUMN & T-BEAM	GIRDER	GIRDER INSTALLLATION	COST/KILOMETER	COST/MILE
15.2	$31,000	$220,000	$396,000	$1,783,000	$4,344,000	$1,750,000	$8,524,000	$13,718,000
22.9	$31,000	$193,000	$339,000	$1,585,000	$4,235,000	$1,750,000	$8,133,000	$13,089,000
30.5	$31,000	$180,000	$423,000	$1,419,000	$4,710,000	$1,750,000	$8,513,000	$13,701,000
38.1	$31,000	$172,000	$443,000	$1,320,000	$5,153,000	$1,750,000	$8,869,000	$14,273,000
45.7	$31,000	$167,000	$551,000	$1,272,000	$5,677,000	$1,750,000	$9,448,000	$15,205,000
53.3	$31,000	$163,000	$671,000	$1,240,000	$6,340,000	$1,750,000	$10,195,000	$16,407,000
61.0	$31,000	$160,000	$847,000	$1,193,000	$7,162,000	$1,750,000	$11,143,000	$17,933,000

SUMMARY OF CRITICAL DIMENSIONS								
	PRECAST CONCRETE			CAST-IN-PLACE CONCRETE				
	GIRDER DIMENSIONS			T-BEAM/ COLUMN DIMENSIONS			MAT FOUNDATION	
SPAN (M)	TOP WIDTH (mm)	DEPTH (mm)	WEIGHT (kg)	T-BM DEPTH (mm)	COL DIA (mm)	COL HT (mm)	AREA (M^2)	THICKNESS (mm)
15.2	4320	1070	65200	710	1090	10670	58.5	760
22.9	4320	1070	97800	890	1220	10670	75.8	760
30.5	4320	1930	169000	1140	1300	10670	105.9	910
38.1	4320	1780	254400	1370	1370	10670	130.8	990
45.7	4320	2670	364900	1680	1470	10670	167.2	1140
53.3	4320	2840	512000	1960	1570	10670	210.7	1300
61.0	4320	3280	706500	2310	1650	10670	262.1	1520

TYPE V - TWO COLUMN - FREIGHT = 1.90 t/M
COST COMPARISON CHART

TABLE 3-122

Guideway Structural Design and Power/Propulsion/Braking in Relation to Guideways, Appendix A, Final Report, Babcock & Wilcox, 1993 -11-Advanced Systems