APPENDIX K

Cross-Section Forces in W-Beam Rail

Computed at the nearest splice connection downstream and upstream of the impact point, at the upstream anchor and at a downstream location outside the impact zone (shown schematically below)

-Finite Element Analysis Results-
Figure K.1: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:
- Curb Type: AASHTO B Curb
- Impact Speed: 70 km/hr
- Offset Distance: 0.0 m.

Figure K.2: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:
- Curb Type: AASHTO C Curb
- Impact Speed: 70 km/hr
- Offset Distance: 0.0 m.
Figure K.3: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

Curb Type – AASHTO D Curb
Impact Speed – 70 km/hr
Offset Distance – 0.0 m.

Figure K.4: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

Curb Type – AASHTO G Curb
Impact Speed – 70 km/hr
Offset Distance – 0.0 m.
Figure K.5: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:
- Curb Type: New York Curb (100 mm)
- Impact Speed: 70 km/hr
- Offset Distance: 0.0 m.

Figure K.6: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:
- Curb Type: AASHTO B Curb
- Impact Speed: 85 km/hr
- Offset Distance: 0.0 m.
Figure K.7: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO C Curb
- Impact Speed: 85 km/hr
- Offset Distance: 0.0 m.

Figure K.8: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO B Curb
- Impact Speed: 100 km/hr
- Offset Distance: 0.0 m.
Figure K.9: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:
- Curb Type: AASHTO C Curb
- Impact Speed: 100 km/hr
- Offset Distance: 0.0 m.

Figure K.10: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:
- Curb Type: AASHTO D Curb
- Impact Speed: 100 km/hr
- Offset Distance: 0.0 m.
Figure K.11: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO G Curb
- Impact Speed: 100 km/hr
- Offset Distance: 0.0 m

Figure K.12: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: New York Curb (100 mm)
- Impact Speed: 100 km/hr
- Offset Distance: 0.0 m
Figure K.13: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- **Curb Type**: AASHTO B Curb
- **Impact Speed**: 70 km/hr
- **Offset Distance**: 2.5 m.

Figure K.14: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- **Curb Type**: AASHTO C Curb
- **Impact Speed**: 70 km/hr
- **Offset Distance**: 2.5 m.
Figure K.15: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type — AASHTO D Curb
- Impact Speed — 70 km/hr
- Offset Distance — 2.5 m.

Figure K.16: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type — AASHTO G Curb
- Impact Speed — 70 km/hr
- Offset Distance — 2.5 m.
Figure K.17: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

Curb Type – New York Curb (100 mm)
Impact Speed – 70 km/hr
Offset Distance – 2.5 m.

Figure K.18: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

Curb Type – AASHTO B Curb
Impact Speed – 85 km/hr
Offset Distance – 2.5 m.
Figure K.19: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO C Curb
- Impact Speed: 85 km/hr
- Offset Distance: 2.5 m

Figure K.20: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO B Curb
- Impact Speed: 70 km/hr
- Offset Distance: 4.0 m
Figure K.21: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO C Curb
- Impact Speed: 70 km/hr
- Offset Distance: 4.0 m.

Figure K.22: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO D Curb
- Impact Speed: 70 km/hr
- Offset Distance: 4.0 m.
Figure K.23: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO G Curb
- Impact Speed: 70 km/hr
- Offset Distance: 4.0 m

Figure K.24: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO B Curb
- Impact Speed: 85 km/hr
- Offset Distance: 4.0 m
Figure K.25: Cross-section forces in the w-beam rail in the impact region, upstream anchor and at a location downstream of the impact point:

- Curb Type: AASHTO C Curb
- Impact Speed: 85 km/hr
- Offset Distance: 4.0 m.