

SECTION 2 - LOADS & RATINGS**2.1 - DESIGN LOADS ON STRUCTURES****2.1.1 - DESIGN LIVE LOADS**

All new structures, bridge replacements, and superstructure replacements, shall be designed for MS23 live loading. All rehabilitation projects shall be designed for MS23 live loading if economically feasible. If the existing structure does not have the capacity for MS23 live loading, the structure shall be designed for MS18 live loading and so noted on the plans. Structure components may be designed by either the working stress or load factor method. Load and Resistance Factor Design (LRFD) will be considered on a case by case basis by the DSD.

2.1.2 - DESIGN DEAD LOADS

Design dead loads shall be determined from the details presented in this manual. They shall be applied using acceptable engineering principles and practices. Dead loads shall include the weight of all superstructure components placed prior to or in conjunction with the deck concrete. All new structures, bridge replacements, and superstructure replacements, shall be designed using the appropriate new deck section as described in Section 3 – Deck Systems. 50 mm minimum concrete haunches shall be included over the main stringers in the calculation of dead loads for these structures. For the rehabilitation of existing structures, the dead loads shall be calculated based on the existing deck cross section. The designer should have the existing deck cored in several places to determine the actual deck thickness. The designer should also field verify whether or not the existing

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superstructure contains concrete haunches.

2.1.3 - DESIGN AND FUTURE SUPERIMPOSED DEAD LOADS

Design and future superimposed dead loads shall be determined from the details presented in this manual. They shall be applied using acceptable engineering principles and practices. For all new structures, bridge replacements, and superstructure replacements, the future superimposed dead loads will include a future additional wearing course as described in Section 3. For the rehabilitation of existing structures, the inclusion of this future additional wearing course shall only be included in the design if the load does not reduce the live load capacity below MS18. If the future additional wearing course is not included, this fact must be stated clearly, directly under the Controlling Load Rating Table on the Contract Plans Title Sheet.

SECTION 2**LOADS & RATINGS****2.1.4 - DESIGN LOAD TABLE**

A Design Load Table similar to that shown below shall appear on the plans for each structure. If the design loads vary from girder to girder, a table is required for each design load case.

DESIGN LOAD TABLE/GIRDER		
	UNIT	LOAD/m
DEAD LOAD	Slab	kN/m
	Haunch	kN/m
	Girder	kN/m
	S.I.P. Forms *	kN/m
	Diaphragms	kN/m
	Utilities **	kN/m
	TOTAL	kN/m
SDL	Safetywalks or Sidewalks **	kN/m
	Railing or Parapet & Screening	kN/m
	Separate Wearing Surface **	kN/m
	Future Wearing Surface ***	kN/m
	TOTAL	kN/m
LL	MS _____ _____ MTON	

TABLE 2.1.4

* If Applicable, Assume 0.192 kN/m² (kPa)

** If Applicable

*** Assume 1.2 kN/m² (kPa), for 50 mm asphalt overlay.

- Notes: 1. If different girder configurations are required by design because of geometry or utilities, additional tables may be required.
2. The values in the above table shall be given to the nearest whole kilonewton.

SECTION 2**LOADS & RATINGS****2.1.5 - MOMENT AND SHEAR TABLES ON CONTRACT PLANS**

A Moment & Shear Table similar to that shown below shall appear on the plans for straight simple spans which are less than 15.0 m in length. Quarter points shall be included for spans between 15 and 30 m in length. Tenth points shall be shown for simple spans in excess of 30.0 m. If values for moment and shear vary from girder to girder, separate tables shall be shown for each girder.

MOMENT AND SHEAR TABLE		CL OF BEARINGS	MIDSPAN
FASCIA GIRDERS	DL	MOMENT	
		SHEAR	
	SDL	MOMENT	
		SHEAR	
	LL(+)	MOMENT	
		SHEAR	
INTERIOR GIRDERS	DL	MOMENT	
		SHEAR	
	SDL	MOMENT	
		SHEAR	
	LL(+)	MOMENT	
		SHEAR	

TABLE 2.1.5(a)

- NOTES:
1. LL moments and shears include impact.
 2. Moments are expressed as kilonewton meters.
 3. Shears are expressed as kilonewtons.

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A Moment & Shear Table similar to that shown below shall appear on the plans for all curved or continuous girder bridges. If values for moment and shear vary from girder to girder, separate tables shall be shown for each girder.

MOMENT AND SHEAR TABLE		CL BRG ABUT	.1L	.2L	.3L	.4L	.5L	.6L	.7L	.8L	.9L	CL BRG PIER
GIRDER X	DL	MOMENT										
		SHEAR										
	SDL	MOMENT										
		SHEAR										
	LL(+)	MOMENT										
		SHEAR										
	LL(-)	MOMENT										
		SHEAR										

TABLE 2.1.5(b)

Notes:

1. LL moments and shears include impact.
2. Moments are expressed as kilonewton meters.
3. Shears are expressed as kilonewtons.

The above table shows intermediate values at 10th points. As an alternative, the designer may provide intermediate values at diaphragm locations. In either case, the interval shall be between 3.0 and 7.0 meters. Intermediate values shall coincide with locations shown on the Haunch Table, as discussed in Section 7.4.

2.2 – LOAD RATING OF STRUCTURES

The Title Sheet shall have a Controlling Load Rating Table for each structure (see sample below).

The table shall indicate the design method, controlling member(s), and the design live load. Load rating values shall be rounded down to the nearest whole number.

MP XXX.XX LOAD RATING TABLE (WORKING STRESS DESIGN)				
CONTROLLING MEMBER	INVENTORY LOAD RATING		OPERATING LOAD RATING	
	MS	MTON	MS	MTON
SPAN 1 – FASCIA STRINGER	26	47	45	82
SPAN 2 – INTERIOR STRINGER	26	48	45	83

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-INCLUDES FUTURE WEARING COURSE

TABLE 2.2(a)

The class and design strength of all concrete, as well as all grades and yield strengths of structural steel and reinforcing steel used, shall be indicated on the General Notes sheet(s).

With the development of shallower superstructures used to increase vertical underclearance, the designs of some of these structures will be limited by allowable live load deflection instead of stress. The Thruway Authority requires a maximum live load deflection of $L/1000$ on all new structures, bridge replacements, and superstructure replacements. Although the safe load carrying capacity of these structures shall still clearly be defined by induced stress, the Controlling Load Rating Table shall also indicate the design live loading limitation imposed by live load deflection.

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Below is an example of a Load Rating Table that includes the live load deflection load rating.

MP XXX.XX LOAD RATING TABLE (LOAD FACTOR DESIGN)					
CONTROLLING MEMBER	INVENTORY LOAD RATING			OPERATING LOAD RATING	
	CONTROLLING MODE	MS	MTON	MS	MTON
SPAN 1 – INTERIOR STRINGER	LIVE LOAD DEFLECTION	23	40	50	89
SPAN 2 – FASCIA STRINGER	BENDING STRESS	26	48	45	83

-MS23 LIVE LOADING
-INCLUDES FUTURE WEARING COURSE
TABLE 2.2(b)