LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Office of Engineering
Project Development Division
Bridge Design Section
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John Bel Edwards, Governor
Shawn D. Wilson., Ph.D., Secretary

MEMORANDUM

TO: ALL CONSULTANTS
ALL BRIDGE DESIGNERS

FROM: PAUL FOSSIER, P.E.
BRIDGE DESIGN ENGINEER ADMINISTRATOR

SUBJECT: BRIDGE DESIGN TECHNICAL MEMORANDUM NO. 61 (BDTM.61)
BRIDGE DESIGN AND EVALUATION MANUAL (BDEM) REVISION NO. 4

DATE: May 2, 2016

The following pages in BDEM have been revised. The BDEM posted on Bridge Design Section Website has been updated to include these pages. The revised pages (with changes in red) are also attached for reference.

Page No.	Revision Description
Revision History-i	Updated the page to document revisions
II.V1-Ch9-i	Added new page II.V1-Ch9-2a
II.V1-Ch9-1, 2, and 2a	Made minor editorial changes in the first paragraph of 9.7.1.1. Added maximum overall deck thickness for movable bridge spans in the second paragraph of 9.7.1.1. Added a new deck thickness table at the end of 9.7.1.1. Moved 9.7.2 and 9.7.3 to new page 2a.
II.V1-Ch9-3	Added a statement at the end of the first paragraph of 9.7.3.1 on singly reinforced section design requirement.
III.Ch2-1, 2 and 9	Updated the design assumptions and limitations in 2.1 and 2.2
III.Ch2-3 to 8 and 10-15	Revised deck design tables in accordance with the updated design assumptions and limitations. Removed stay-in-place form weight from deck design.
III.Ch2-16 to 18	Revised the deck design example in accordance with the updated design assumptions and limitations. Removed stay-in-place form weight from the deck design.

Refer to BDTM.50 for implementation policy on revisions to BDEM.

This technical memorandum is posted on the LA DOTD Website under *Inside La DOTD* > *Divisions - Engineering* > *Bridge Design* > *Technical Memoranda – BDTMs.*

Please contact Ms. Zhengzheng "Jenny" Fu (225-379-1321, zhengzheng.fu@la.gov) if you have questions or comments.

PF/zzf

Attachment

Cc: Janice Williams (Chief Engineer)
Chad Winchester (Chief, Project Development Division)

Edward Wedge (Deputy Engineer Administrator)
Kirk Gallien (Assistant Secretary of Operations)
David Miller (Chief Maintenance Administrator)
Michael Vosburg (Chief Construction Division Engineer)
Jeff Burst (Project Management Director)
Jeff Lambert (Pavement and Geotechnical Engineer Administrator)
Simone Ardoin (Road Design Engineer Administrator)
Art Aguirre (FHWA)
District Administrators, ADA Engineering, ADA Operations, and District Area Engineers

CHAPTER 9 – DECKS AND DECK SYSTEMS

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9.4—GENERAL DESIGN REQUIREMENTS

9.4.2—Deck Drainage

The following shall supplement *A9.4.2*.

Refer to *D2.3.2.2.4* and *D2.6.6* for additional requirements on cross and longitudinal slopes of deck surface and deck drainage.

9.5—LIMIT STATES

9.5.5—Extreme Event Limit States

The following shall supplement *A9.5.5*.

Approved crash tested concrete bridge railing reinforcement details for the barrier and deck reinforcement may be used for the deck overhang design, if the design fits the crash tested variables.

9.6—ANALYSIS

9.6.1—Methods of Analysis

The following shall replace *A9.6.1*.

Approximate elastic methods of analysis specified in *A4.6.2.1*, refined methods specified in *A4.6.3.2*, or the traditional design method specified in *A9.7.3* may be used for various limit states as permitted in *A9.5*.

The empirical design method for bridge decks in *A9.7.2* is not allowed.

9.7—CONCRETE DECK SLABS

9.7.1—General

9.7.1.1—Minimum Depth and Cover

The following shall replace *A9.7.1.1*.

For all bridge spans except movable bridge spans, the minimum and maximum overall deck thickness shall be 8.0 inches and 9.5 inches, respectively, and shall vary in 0.5 inch increments. The overall deck thickness shall include a 0.5 inch sacrificial thickness, which shall be included in the weight calculations and excluded from the design thickness. The design thickness equals to the overall

C9.7.1.1

The following shall replace *AC9.7.1.1*.

The 0.5 inch sacrificial thickness is provided to account for the construction tolerance surface texturing, grinding, and the expected future wearing of the bridge deck surface due to applied live loads. Sacrificial concrete must be accounted for as an added dead load but cannot be utilized in the calculations of composite section properties.

deck thickness less 0.5 inch sacrificial thickness. The top and bottom concrete covers shall be 2.5 inches (2.0 inches design cover + 0.5 inch sacrificial) and 1.5 inches, respectively.

For movable bridge spans, the minimum and maximum overall deck thickness shall be 7.0 inches and 7.5 inches with top and bottom concrete covers of 2.0 inches (1.5 inches design cover + 0.5 inch sacrificial) and 1.5 inches, respectively.

Unless required by design and approved by the Bridge Design Engineer Administrator, the deck thickness shall conform to the following table.

Bridge Type	**Overall Deck Thickness (in)**	**Girder Spacing, S (ft) (Top Flange Width < 48")**	**Girder Spacing, S (ft) (Top Flange Width ≥ 48")**
Movable Bridges	7 or 7 ½	All	
Fixed Bridges	8	S ≤ 8	S ≤ 9
	8 ½	8 < S ≤ 9.5	9 < S ≤11
	9	9.5 < S ≤11	11 < S ≤13
	9 ½	11 < S ≤ 12.5	13 < S ≤15

9.7.1.3—Skewed Decks

The following shall supplement *A9.7.1.3*.

Deck skew angle shall not exceed 60 degrees unless approved by the Bridge Design Engineer Administrator.

For decks with primary reinforcement placed perpendicular to the main supporting components, minimum three No. 5 bars at 6 inches spacing shall be placed at top mat and parallel to the skew at each end of deck.

9.7.1.5—Design of Cantilever Slabs

Deck cantilevers, for all prestressed girder spans, shall be designed using the deck thickness (excluding the haunch).

C9.7.1.5

Typically, the deck cantilever thickness is equal to the deck thickness plus the haunch. However, the haunch thickness varies along the girder due to possible camber remaining in girders, thus the deck cantilever thickness will vary along the span as well. To account for this, it is conservative to ignore the haunch and use the deck thickness for cantilever design.

9.7.2—Empirical Design

9.7.2.1—General

The following shall replace *A9.7.2.1*.

The empirical design method is not allowed.

9.7.3—Traditional Design

9.7.3.1—General

The following shall supplement *A9.7.3.1*.

All bridge decks shall be designed using the traditional deck design methods and shall use concrete with a minimum design strength f'_c of 4 ksi. All reinforcing steel shall be Grade 60 bars.

Minimum reinforcement bar size shall be No. 4. Reinforcement spacing in both transverse and longitudinal directions in the deck shall not exceed seven (7) inches on centers to minimize cracking width. Concrete deck shall be designed as singly reinforced section, i.e. neglecting compression reinforcement contribution.

LADOTD Deck design tables presented in Part III, Ch 2 may be used to determine the deck reinforcement requirements in the interior regions of the deck, provided that the stated limitations are met.

Deck overhang and the adjacent region to the overhang shall be designed for vehicle collision provisions in accordance with *A13* in addition to wheel load. Refer to *D9.5.5* for deck overhang reinforcement requirement when approved crash tested railings are used.

For bridges composed of simple span precast girders made continuous, additional longitudinal continuity reinforcement shall be provided at the top of deck over continuity diaphragm locations in accordance with *D5.14.1.4*. Refer to *A6.10.1.7* for additional deck reinforcement requirements in negative flexure moment region of continuous steel girder bridges.

A deck placement sequence shall be provided on the bridge plans for all continuous multiple span bridges with a cast in place concrete deck. Refer to *Bridge Design Special Details - Miscellaneous Span Details* and *D6.7.2* for requirements on deck placement sequences for continuous multi-span prestressed girder and steel girder bridges.

9.7.3.2—Distribution Reinforcement

The following shall supplement *A9.7.3.2.*

Steel reinforcement shall also be placed in the secondary direction in the top of slabs as a percentage of the primary reinforcement for negative moment using the same equations as for the bottom distribution reinforcement.

C9.7.3.2

The following shall supplement *AC9.7.3.2.*

It has been observed that many new bridges with increased girder spacing exhibited deck cracking due to the decrease of deck mass and hence high vibration. In addition the thermal effects, which are generally ignored in the design, could be significant and lead to excessive cracking. Increasing the top longitudinal reinforcement will help limit the potential for cracking and reduce crack width which in turn should improve long-term durability.

CHAPTER 2 – LADOTD DECK DESIGN TABLES

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2.1—LADOTD DECK DESIGN TABLES, GIRDER TOP FLANGE ≥ 48 INCHES

The tables in this section are developed for concrete cast-in-place deck supported by concrete I-girders with flange width ≥ 48 inches.

These tables may be used in lieu of detailed analysis. The following assumptions and limitations are used in developing this table and must be considered when using the listed values.

- The equivalent strip method is used and all limit states are satisfied.
- Reinforcements shown are for interior regions of the deck only and cannot be applied to deck overhang and its adjacent regions of the deck that need to be designed for vehicle collision provisions in accordance with *AASHTO LRFD Bridge Design Specifications* (hereinafter referred to as "LRFD" in this chapter) *Section 13,* in addition to the wheel load.
- This table is applicable to decks supported on at least four girders. The maximum total overhang length from the center of exterior girder to the edge of deck shall equal to the smaller of 0.625 times the girder spacing and 6'-0". The minimum overhang length shall equal to half of the girder top flange width plus 6.0 inches.
- Maximum live load moment from *LRFD Appendix A4 Table A4-1* is used. Design section for the negative moment is determined in accordance with *LRFD Section 4.6.2.1.6* assuming a 48 inch top flange width for the girder.
- Flexural moments due to dead load effects are assumed to be $M=c*w*L^2$, where w is the uniformly distributed load in kip/ft and L is the girder spacing. For positive flexural moment c=0.08; for negative flexural moment c=0.10.
- The compressive strength of concrete, f'_c=4000 psi. The yield strength of the reinforcing bars, f_y=60 ksi.
- The deck thickness shown includes ½" sacrificial thickness that was not included in the structural calculation, but considered in the dead load calculations.
- For overall deck thickness ≥ 8 inches, the clear concrete cover at top and bottom of the slab equals to 2 ½ inches (including ½" sacrificial thickness) and 1 ½ inches, respectively. For overall deck thickness of 7 and 7 ½ inch, the clear concrete cover equals to 2 inches (including 1/2" sacrificial thickness) and 1 ½ inches, respectively. Overall deck thickness less than 8 inches can only be used for movable bridge spans.
- The weight of the railing equals to 520.5 lb/ft (TL-5). The bottom width of the railing from the edge of the deck to the gutter line equals to 1'-8". The weight of railing is evenly distributed along the deck in transverse direction (perpendicular to traffic).
- Concrete density is 150 pcf.
- Future wearing surface of 25 psf is included.
- The girder spacing is the distance between the centers of the girders.
- Minimum and maximum bar spacings are limited to 5 inches and 7 inches, respectively, with increments of 0.5 inch. This limitation applies to both transverse and longitudinal directions.
- Reinforcing bars are limited to #4, #5, and #6.
- Exposure factor for crack control calculations is assumed to be 1.0.

- Effective span length "S" for the distribution reinforcement calculation is in accordance with *LRFD Section 9.7.2.3*, assuming 48 inch top flange width and 7 inch web thickness for the girder.
- All tables in this chapter were developed using singly reinforced section, i.e., neglecting compression reinforcement contribution.
- The deck thicknesses in shaded cells shall only be used when required by design and approved by the Bridge Design Engineer Administrator. Refer to Part II Volume 1 Section 9.7.1.1 for more information.

2.1.1—LADOTD Deck Design Table, Overall Deck Thickness = 7.0 in. (for movable bridge span only)

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
5’-0”	#4@5.5”	#4@7”	#4@7”	#4@7”
5’-3”	#4@5.5”	#4@7”	#4@7”	#4@7”
5’-6”	#4@5”	#4@7”	#4@7”	#4@7”
5’-9”	#4@5”	#4@7”	#4@7”	#4@7”
6’-0”	#4@5”	#4@7”	#4@7”	#4@7”
6’-3”	#4@5”	#4@7”	#4@7”	#4@7”
6’-6”	#5@7”	#4@7”	#4@6.5”	#4@7”
6’-9”	#5@7”	#4@7”	#4@6.5”	#4@7”
7’-0”	#5@7”	#4@7”	#4@6.5”	#4@7”
7’-3”	#5@7”	#4@7”	#4@6.5”	#4@7”
7’-6”	#5@6.5”	#4@7”	#4@6”	#4@7”
7’-9”	#5@6.5”	#4@7”	#4@6”	#4@7”
8’-0”	#5@6”	#4@7”	#4@5.5”	#4@7”
8’-3”	#5@6”	#4@7”	#4@5.5”	#4@7”
8’-6”	#5@6”	#4@6.5”	#4@5.5”	#4@7”
8’-9”	#5@5.5”	#4@6”	#4@5”	#4@7”
9’-0”	#5@5.5”	#4@6”	#4@5”	#4@7”
9’-3”	#5@5.5”	#4@5.5”	#4@5”	#4@7”
9’-6”	#5@5”	#4@5.5”	#5@7”	#4@7”
9’-9”	#5@5”	#4@5”	#5@7”	#4@7”
10’-0”	#5@5”	#5@7”	#5@7”	#4@6.5”
10’-3”	#6@6.5”	#5@7”	#5@6.5”	#4@6.5”
10’-6”	#6@6.5”	#5@6.5”	#5@6.5”	#4@6”
10’-9”	#6@6.5”	#5@6”	#5@6.5”	#4@5.5”
11’-0”	#6@6”	#5@6”	#5@6”	#4@5.5”
11’-3”	#6@6”	#5@5.5”	#5@6”	#4@5”
11’-6”	#6@6”	#5@5.5”	#5@6”	#4@5”
11’-9”	#6@5.5”	#5@5”	#5@5.5”	#5@7”
12’-0”	#6@5.5”	#5@5”	#5@5.5”	#5@7”
12’-3”	#6@5.5”	#6@6.5”	#5@6”	#5@7”

2.1.2—LADOTD Deck Design Table, Overall Deck Thickness = 7.5 in. (for movable bridge span only)

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
5’-0”	#4@6”	#4@7”	#4@7”	#4@7”
5’-3”	#4@6”	#4@7”	#4@7”	#4@7”
5’-6”	#4@6”	#4@7”	#4@7”	#4@7”
5’-9”	#4@5.5”	#4@7”	#4@7”	#4@7”
6’-0”	#4@5.5”	#4@7”	#4@7”	#4@7”
6’-3”	#4@5.5”	#4@7”	#4@7”	#4@7”
6’-6”	#4@5.5”	#4@7”	#4@7”	#4@7”
6’-9”	#4@5”	#4@7”	#4@7”	#4@7”
7’-0”	#4@5”	#4@7”	#4@7”	#4@7”
7’-3”	#4@5”	#4@7”	#4@7”	#4@7”
7’-6”	#4@5”	#4@7”	#4@7”	#4@7”
7’-9”	#5@7”	#4@7”	#4@6.5”	#4@7”
8’-0”	#5@7”	#4@7”	#4@6.5”	#4@7”
8’-3”	#5@7”	#4@7”	#4@6.5”	#4@7”
8’-6”	#5@6.5”	#4@7”	#4@6”	#4@7”
8’-9”	#5@6.5”	#4@7”	#4@6”	#4@7”
9’-0”	#5@6”	#4@6.5”	#4@5.5”	#4@7”
9’-3”	#5@6”	#4@6.5”	#4@5.5”	#4@7”
9’-6”	#5@6”	#4@6”	#4@5.5”	#4@7”
9’-9”	#5@5.5”	#4@5.5”	#4@5”	#4@7”
10’-0”	#5@5.5”	#4@5.5”	#4@5”	#4@7”
10’-3”	#5@5.5”	#4@5”	#4@5”	#4@7”
10’-6”	#5@5”	#5@7”	#5@7”	#4@6.5”
10’-9”	#5@5”	#5@7”	#5@7”	#4@6.5”
11’-0”	#5@5”	#5@6.5”	#5@7”	#4@6”
11’-3”	#5@5”	#5@6.5”	#5@7”	#4@6”
11’-6”	#6@6.5”	#5@6”	#5@6.5”	#4@5.5”
11’-9”	#6@6.5”	#5@6”	#5@6.5”	#4@5.5”
12’-0”	#6@6.5”	#5@5.5”	#5@7”	#4@5”
12’-3”	#6@6”	#5@5.5”	#5@6.5”	#5@7”
12’-6”	#6@6”	#5@5”	#5@6.5”	#5@7”
12’-9”	#6@6”	#5@5”	#5@6.5”	#5@7”
13’-0”	#6@6”	#6@6.5”	#5@6.5”	#5@7”
13’-3”	#6@5.5”	#6@6.5”	#5@6”	#5@7”
13’-6”	#6@5.5”	#6@6”	#5@6”	#5@6.5”
13’-9”	#6@5.5”	#6@6”	#5@6”	#5@6.5”
14’-0”	#6@5.5”	#6@6”	#5@6”	#5@7”
14’-3”	#6@5”	#6@5.5”	#5@5.5”	#5@6.5”
14’-6”	#6@5”	#6@5.5”	#5@5.5”	#5@6.5”
14’-9”	#6@5”	#6@5”	#5@6”	#5@6”
15’-0”	#6@5”	#6@5”	#5@6”	#5@6”

2.1.3—LADOTD Deck Design Table, Overall Deck Thickness = 8.0 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@6”	#4@7”	#4@7”	#4@7”
6’-3”	#4@6”	#4@7”	#4@7”	#4@7”
6’-6”	#4@6”	#4@7”	#4@7”	#4@7”
6’-9”	#4@6”	#4@7”	#4@7”	#4@7”
7’-0”	#4@5.5”	#4@7”	#4@7”	#4@7”
7’-3”	#4@5.5”	#4@7”	#4@7”	#4@7”
7’-6”	#4@5.5”	#4@7”	#4@7”	#4@7”
7’-9”	#4@5”	#4@7”	#4@7”	#4@7”
8’-0”	#4@5”	#4@7”	#4@7”	#4@7”
8’-3”	#4@5”	#4@7”	#4@7”	#4@7”
8’-6”	#5@7”	#4@7”	#4@6.5”	#4@7”
8’-9”	#5@7”	#4@7”	#4@6.5”	#4@7”
9’-0”	#5@7”	#4@6.5”	#4@6.5”	#4@7”
9’-3”	#5@6.5”	#4@6.5”	#4@6”	#4@7”
9’-6”	#5@6.5”	#4@6”	#4@6”	#4@7”
9’-9”	#5@6.5”	#4@5.5”	#4@6”	#4@7”
10’-0”	#5@6”	#4@5.5”	#4@5.5”	#4@7”
10’-3”	#5@6”	#4@5”	#4@5.5”	#4@7”
10’-6”	#5@6”	#5@7”	#4@5.5”	#4@6.5”
10’-9”	#5@5.5”	#5@7”	#4@5”	#4@6.5”
11’-0”	#5@5.5”	#5@6.5”	#4@5”	#4@6”
11’-3”	#5@5.5”	#5@6.5”	#4@5”	#4@6”
11’-6”	#5@5.5”	#5@6”	#5@7”	#4@5.5”
11’-9”	#5@5”	#5@5.5”	#5@7”	#4@5”
12’-0”	#5@5”	#5@5.5”	#5@7”	#4@5”
12’-3”	#5@5”	#5@5.5”	#5@7”	#5@7”
12’-6”	#5@5”	#5@5”	#5@7”	#5@7”
12’-9”	#6@6.5”	#5@5”	#5@7”	#5@7”
13’-0”	#6@6.5”	#6@6.5”	#5@7”	#5@7”
13’-3”	#6@6.5”	#6@6.5”	#5@7”	#5@7”
13’-6”	#6@6.5”	#6@6”	#5@7”	#5@6.5”
13’-9”	#6@6”	#6@6”	#5@6.5”	#5@6.5”
14’-0”	#6@6”	#6@5.5”	#5@7”	#5@6”
14’-3”	#6@6”	#6@5.5”	#5@7”	#5@6.5”
14’-6”	#6@6”	#6@5.5”	#5@7”	#5@6.5”
14’-9”	#6@5.5”	#6@5”	#5@6.5”	#5@6”
15’-0”	#6@5.5”	#6@5”	#5@6.5”	#5@6”

2.1.4—LADOTD Deck Design Table, Overall Deck Thickness = 8.5 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@7”	#4@7”	#4@7”	#4@7”
6’-3”	#4@6.5”	#4@7”	#4@7”	#4@7”
6’-6”	#4@6.5”	#4@7”	#4@7”	#4@7”
6’-9”	#4@6.5”	#4@7”	#4@7”	#4@7”
7’-0”	#4@6”	#4@7”	#4@7”	#4@7”
7’-3”	#4@6”	#4@7”	#4@7”	#4@7”
7’-6”	#4@6”	#4@7”	#4@7”	#4@7”
7’-9”	#4@5.5”	#4@7”	#4@7”	#4@7”
8’-0”	#4@5.5”	#4@7”	#4@7”	#4@7”
8’-3”	#4@5.5”	#4@7”	#4@7”	#4@7”
8’-6”	#4@5”	#4@7”	#4@7”	#4@7”
8’-9”	#4@5”	#4@7”	#4@7”	#4@7”
9’-0”	#4@5”	#4@7”	#4@7”	#4@7”
9’-3”	#5@7”	#4@7”	#4@6.5”	#4@7”
9’-6”	#5@7”	#4@6.5”	#4@6.5”	#4@7”
9’-9”	#5@7”	#4@6”	#4@6.5”	#4@7”
10’-0”	#5@7”	#4@6”	#4@6.5”	#4@7”
10’-3”	#5@6.5”	#4@5.5”	#4@6”	#4@7”
10’-6”	#5@6.5”	#4@5”	#4@6”	#4@7”
10’-9”	#5@6.5”	#4@5”	#4@6”	#4@7”
11’-0”	#5@6”	#5@7”	#4@5.5”	#4@6.5”
11’-3”	#5@6”	#5@7”	#4@5.5”	#4@6.5”
11’-6”	#5@6”	#5@6.5”	#4@5.5”	#4@6”
11’-9”	#5@5.5”	#5@6.5”	#4@5”	#4@6”
12’-0”	#5@5.5”	#5@6”	#4@5”	#4@5.5”
12’-3”	#5@5.5”	#5@6”	#4@5.5”	#4@6”
12’-6”	#5@5.5”	#5@5.5”	#4@5.5”	#4@5.5”
12’-9”	#5@5”	#5@5.5”	#5@7”	#4@5.5”
13’-0”	#5@5”	#5@5”	#5@7”	#5@7”
13’-3”	#5@5”	#5@5”	#5@7”	#5@7”
13’-6”	#5@5”	#6@7”	#5@7”	#5@7”
13’-9”	#6@7”	#6@6.5”	#5@7”	#5@7”
14’-0”	#6@6.5”	#6@6.5”	#5@7”	#5@7”
14’-3”	#6@6.5”	#6@6”	#5@7”	#5@7”
14’-6”	#6@6.5”	#6@6”	#5@7”	#5@7”
14’-9”	#6@6.5”	#6@6”	#5@7”	#5@7”
15’-0”	#6@6”	#6@5.5”	#5@7”	#5@6.5”

2.1.5—LADOTD Deck Design Table, Overall Deck Thickness = 9.0 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@7”	#4@7”	#4@7”	#4@7”
6’-3”	#4@7”	#4@7”	#4@7”	#4@7”
6’-6”	#4@7”	#4@7”	#4@7”	#4@7”
6’-9”	#4@7”	#4@7”	#4@7”	#4@7”
7’-0”	#4@6.5”	#4@7”	#4@7”	#4@7”
7’-3”	#4@6.5”	#4@7”	#4@7”	#4@7”
7’-6”	#4@6.5”	#4@7”	#4@7”	#4@7”
7’-9”	#4@6”	#4@7”	#4@7”	#4@7”
8’-0”	#4@6”	#4@7”	#4@7”	#4@7”
8’-3”	#4@6”	#4@7”	#4@7”	#4@7”
8’-6”	#4@5.5”	#4@7”	#4@7”	#4@7”
8’-9”	#4@5.5”	#4@7”	#4@7”	#4@7”
9’-0”	#4@5.5”	#4@7”	#4@7”	#4@7”
9’-3”	#4@5”	#4@7”	#4@7”	#4@7”
9’-6”	#4@5”	#4@7”	#4@7”	#4@7”
9’-9”	#4@5”	#4@7”	#4@7”	#4@7”
10’-0”	#5@7”	#4@6.5”	#4@6.5”	#4@7”
10’-3”	#5@7”	#4@6”	#4@6.5”	#4@7”
10’-6”	#5@7”	#4@5.5”	#4@6.5”	#4@7”
10’-9”	#5@7”	#4@5.5”	#4@6.5”	#4@7”
11’-0”	#5@6.5”	#4@5”	#4@6”	#4@7”
11’-3”	#5@6.5”	#4@5”	#4@6”	#4@7”
11’-6”	#5@6.5”	#5@7”	#4@6”	#4@6.5”
11’-9”	#5@6”	#5@7”	#4@5.5”	#4@6.5”
12’-0”	#5@6”	#5@6.5”	#4@5.5”	#4@6”
12’-3”	#5@6”	#5@6.5”	#4@6”	#4@6.5”
12’-6”	#5@6”	#5@6”	#4@6”	#4@6”
12’-9”	#5@5.5”	#5@6”	#4@5”	#4@6”
13’-0”	#5@5.5”	#5@5.5”	#4@5.5”	#4@5.5”
13’-3”	#5@5.5”	#5@5.5”	#4@5.5”	#4@5.5”
13’-6”	#5@5.5”	#5@5.5”	#4@5.5”	#5@7”
13’-9”	#5@5.5”	#5@5”	#5@7”	#5@7”
14’-0”	#5@5”	#5@5”	#5@7”	#5@7”
14’-3”	#5@5”	#6@7”	#5@7”	#5@7”
14’-6”	#5@5”	#6@6.5”	#5@7”	#5@7”
14’-9”	#5@5”	#6@6.5”	#5@7”	#5@7”
15’-0”	#6@7”	#6@6.5”	#5@7”	#5@7”

2.1.6—LADOTD Deck Design Table, Overall Deck Thickness = 9.5 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@7”	#4@7”	#4@7”	#4@7”
6’-3”	#4@7”	#4@7”	#4@7”	#4@7”
6’-6”	#4@7”	#4@7”	#4@7”	#4@7”
6’-9”	#4@7”	#4@7”	#4@7”	#4@7”
7’-0”	#4@7”	#4@7”	#4@7”	#4@7”
7’-3”	#4@7”	#4@7”	#4@7”	#4@7”
7’-6”	#4@7”	#4@7”	#4@7”	#4@7”
7’-9”	#4@6.5”	#4@7”	#4@7”	#4@7”
8’-0”	#4@6.5”	#4@7”	#4@7”	#4@7”
8’-3”	#4@6.5”	#4@7”	#4@7”	#4@7”
8’-6”	#4@6”	#4@7”	#4@7”	#4@7”
8’-9”	#4@6”	#4@7”	#4@7”	#4@7”
9’-0”	#4@5.5”	#4@7”	#4@7”	#4@7”
9’-3”	#4@5.5”	#4@7”	#4@7”	#4@7”
9’-6”	#4@5.5”	#4@7”	#4@7”	#4@7”
9’-9”	#4@5.5”	#4@7”	#4@7”	#4@7”
10’-0”	#4@5”	#4@7”	#4@7”	#4@7”
10’-3”	#4@5”	#4@6.5”	#4@7”	#4@7”
10’-6”	#4@5”	#4@6”	#4@7”	#4@7”
10’-9”	#5@7”	#4@6”	#4@6.5”	#4@7”
11’-0”	#5@7”	#4@5.5”	#4@6.5”	#4@7”
11’-3”	#5@7”	#4@5.5”	#4@6.5”	#4@7”
11’-6”	#5@7”	#4@5”	#4@6.5”	#4@7”
11’-9”	#5@6.5”	#4@5”	#4@6”	#4@7”
12’-0”	#5@6.5”	#5@7”	#4@6”	#4@6.5”
12’-3”	#5@6.5”	#5@7”	#4@6.5”	#4@7”
12’-6”	#5@6.5”	#5@6.5”	#4@6.5”	#4@6.5”
12’-9”	#5@6”	#5@6.5”	#4@6”	#4@6.5”
13’-0”	#5@6”	#5@6”	#4@6”	#4@6”
13’-3”	#5@6”	#5@6”	#4@6”	#4@6”
13’-6”	#5@6”	#5@6”	#4@6”	#4@6”
13’-9”	#5@5.5”	#5@5.5”	#4@5.5”	#4@5.5”
14’-0”	#5@5.5”	#5@5.5”	#4@5.5”	#4@5.5”
14’-3”	#5@5.5”	#5@5.5”	#4@5.5”	#4@5.5”
14’-6”	#5@5.5”	#5@5”	#4@6”	#4@5”
14’-9”	#5@5.5”	#5@5”	#4@6”	#4@5.5”
15’-0”	#5@5”	#6@7”	#4@5.5”	#5@7”

2.2—LADOTD DECK DESIGN TABLES, GIRDER TOP FLANGE < 48 INCHES

The tables in this section are developed for concrete cast-in-place deck supported by concrete or steel I-girders with flange width < 48 inches.

These tables may be used in lieu of detailed analysis. Refer to Section 2.1 for assumptions and limitations used. In addition, the following assumptions were used as exceptions to those cases listed in Section 2.1 in order to develop these tables and must be considered when using the listed values.

- Maximum live load moment from *LRFD Appendix A4 Table A4-1* is used. Design section for the negative moment is determined in accordance with *LRFD Section 4.6.2.1*.6, assuming a 12 inch top flange width for the girder.
- Effective span length "S" for the distribution reinforcement calculation is in accordance with *LRFD Section 9.7.2.3*, assuming a 12'' top flange and 5/8'' web for the girder.

2.2.1—LADOTD Deck Design Table, Overall Deck Thickness = 7.0 in. (for movable bridge span only)

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
5’-0”	#4@5.5”	#4@7”	#4@7”	#4@7”
5’-3”	#4@5.5”	#4@7”	#4@7”	#4@7”
5’-6”	#4@5”	#4@6.5”	#4@7”	#4@7”
5’-9”	#4@5”	#4@6”	#4@7”	#4@7”
6’-0”	#4@5”	#4@5.5”	#4@7”	#4@7”
6’-3”	#4@5”	#4@5.5”	#4@7”	#4@7”
6’-6”	#4@5”	#4@5”	#4@7”	#4@7”
6’-9”	#5@7”	#4@5”	#4@6.5”	#4@7”
7’-0”	#5@7”	#5@7”	#4@6.5”	#4@6.5”
7’-3”	#5@7”	#5@6.5”	#4@6.5”	#4@6”
7’-6”	#5@6.5”	#5@6.5”	#4@6”	#4@6”
7’-9”	#5@6.5”	#5@6.5”	#4@6”	#4@6”
8’-0”	#5@6”	#5@6”	#4@5.5”	#4@5.5”
8’-3”	#5@6”	#5@6”	#4@5.5”	#4@5.5”
8’-6”	#5@6”	#5@6”	#4@5.5”	#4@5.5”
8’-9”	#5@5.5”	#5@5.5”	#4@5”	#4@5”
9’-0”	#5@5.5”	#5@5.5”	#4@5”	#4@5”
9’-3”	#5@5.5”	#5@5.5”	#4@5”	#4@5”
9’-6”	#5@5”	#5@5”	#5@7”	#5@7”
9’-9”	#5@5”	#5@5”	#5@7”	#5@7”
10’-0”	#5@5”	#6@6.5”	#5@7”	#5@6.5”
10’-3”	#6@6.5”	#6@6”	#5@6.5”	#5@6”
10’-6”	#6@6.5”	#6@6”	#5@6.5”	#5@6”
10’-9”	#6@6.5”	#6@5.5”	#5@6.5”	#5@5.5”

2.2.2—LADOTD Deck Design Table, Overall Deck Thickness = 7.5 in. (for movable bridge span only)

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
5’-0”	#4@6”	#4@7”	#4@7”	#4@7”
5’-3”	#4@6”	#4@7”	#4@7”	#4@7”
5’-6”	#4@6”	#4@7”	#4@7”	#4@7”
5’-9”	#4@5.5”	#4@7”	#4@7”	#4@7”
6’-0”	#4@5.5”	#4@6.5”	#4@7”	#4@7”
6’-3”	#4@5.5”	#4@6”	#4@7”	#4@7”
6’-6”	#4@5.5”	#4@5.5”	#4@7”	#4@7”
6’-9”	#4@5”	#4@5.5”	#4@7”	#4@7”
7’-0”	#4@5”	#4@5”	#4@7”	#4@7”
7’-3”	#4@5”	#4@5”	#4@7”	#4@7”
7’-6”	#4@5”	#5@7”	#4@7”	#4@6.5”
7’-9”	#5@7”	#5@7”	#4@6.5”	#4@6.5”
8’-0”	#5@7”	#5@7”	#4@6.5”	#4@6.5”
8’-3”	#5@7”	#5@6.5”	#4@6.5”	#4@6”
8’-6”	#5@6.5”	#5@6.5”	#4@6”	#4@6”
8’-9”	#5@6.5”	#5@6.5”	#4@6”	#4@6”
9’-0”	#5@6”	#5@6.5”	#4@5.5”	#4@6”
9’-3”	#5@6”	#5@6”	#4@5.5”	#4@5.5”
9’-6”	#5@6”	#5@6”	#4@5.5”	#4@5.5”
9’-9”	#5@5.5”	#5@5.5”	#4@5”	#4@5”
10’-0”	#5@5.5”	#5@5.5”	#4@5”	#4@5”
10’-3”	#5@5.5”	#5@5”	#4@5”	#5@7”
10’-6”	#5@5”	#6@6.5”	#5@7”	#5@6.5”
10’-9”	#5@5”	#6@6.5”	#5@7”	#5@6.5”
11’-0”	#5@5”	#6@6”	#5@7”	#5@6”
11’-3”	#5@5”	#6@6”	#5@7”	#5@6”
11’-6”	#6@6.5”	#6@5.5”	#5@6.5”	#5@5.5”
11’-9”	#6@6.5”	#6@5.5”	#5@6.5”	#5@5.5”
12’-0”	#6@6.5”	#6@5”	#5@6.5”	#5@5”
12’-3”	#6@6”	#6@5”	#5@6.5”	#5@5”
12’-6”	#6@6”	#6@5”	#5@6.5”	#5@5”

2.2.3—LADOTD Deck Design Table, Overall Deck Thickness = 8.0 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@6”	#4@6.5”	#4@7”	#4@7”
6’-3”	#4@6”	#4@6”	#4@7”	#4@7”
6’-6”	#4@6”	#4@5.5”	#4@7”	#4@7”
6’-9”	#4@6”	#4@5.5”	#4@7”	#4@7”
7’-0”	#4@5.5”	#4@5”	#4@7”	#4@7”
7’-3”	#4@5.5”	#4@5”	#4@7”	#4@7”
7’-6”	#4@5.5”	#5@7”	#4@7”	#4@6.5”
7’-9”	#4@5”	#5@7”	#4@7”	#4@6.5”
8’-0”	#4@5”	#5@7”	#4@7”	#4@6.5”
8’-3”	#4@5”	#5@6.5”	#4@7”	#4@6”
8’-6”	#5@7”	#5@6.5”	#4@6.5”	#4@6”
8’-9”	#5@7”	#5@6.5”	#4@6.5”	#4@6”
9’-0”	#5@7”	#5@6.5”	#4@6.5”	#4@6”
9’-3”	#5@6.5”	#5@6”	#4@6”	#4@5.5”
9’-6”	#5@6.5”	#5@6”	#4@6”	#4@5.5”
9’-9”	#5@6.5”	#5@5.5”	#4@6”	#4@5”
10’-0”	#5@6”	#5@5”	#4@5.5”	#5@7”
10’-3”	#5@6”	#5@5”	#4@5.5”	#5@7”
10’-6”	#5@6”	#6@6.5”	#4@5.5”	#5@6.5”
10’-9”	#5@5.5”	#6@6.5”	#4@5”	#5@6.5”
11’-0”	#5@5.5”	#6@6”	#4@5”	#5@6”
11’-3”	#5@5.5”	#6@6”	#4@5”	#5@6”
11’-6”	#5@5.5”	#6@5.5”	#4@5”	#5@5.5”
11’-9”	#5@5”	#6@5.5”	#5@7”	#5@5.5”
12’-0”	#5@5”	#6@5”	#5@7”	#5@5.5”
12’-3”	#5@5”	#6@5”	#5@7”	#5@5.5”

2.2.4—LADOTD Deck Design Table, Overall Deck Thickness = 8.5 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@7”	#4@7”	#4@7”	#4@7”
6’-3”	#4@6.5”	#4@6.5”	#4@7”	#4@7”
6’-6”	#4@6.5”	#4@6.5”	#4@7”	#4@7”
6’-9”	#4@6.5”	#4@6”	#4@7”	#4@7”
7’-0”	#4@6”	#4@5.5”	#4@7”	#4@7”
7’-3”	#4@6”	#4@5.5”	#4@7”	#4@7”
7’-6”	#4@6”	#4@5”	#4@7”	#4@7”
7’-9”	#4@5.5”	#4@5”	#4@7”	#4@7”
8’-0”	#4@5.5”	#4@5”	#4@7”	#4@7”
8’-3”	#4@5.5”	#4@5”	#4@7”	#4@7”
8’-6”	#4@5”	#5@7”	#4@7”	#4@6.5”
8’-9”	#4@5”	#5@7”	#4@7”	#4@6.5”
9’-0”	#4@5”	#5@7”	#4@7”	#4@6.5”
9’-3”	#5@7”	#5@7”	#4@6.5”	#4@6.5”
9’-6”	#5@7”	#5@6.5”	#4@6.5”	#4@6”
9’-9”	#5@7”	#5@6”	#4@6.5”	#4@5.5”
10’-0”	#5@7”	#5@6”	#4@6.5”	#4@5.5”
10’-3”	#5@6.5”	#5@5.5”	#4@6”	#4@5”
10’-6”	#5@6.5”	#5@5.5”	#4@6”	#4@5”
10’-9”	#5@6.5”	#5@5”	#4@6”	#5@7”
11’-0”	#5@6”	#5@5”	#4@5.5”	#5@7”
11’-3”	#5@6”	#6@6.5”	#4@5.5”	#5@6.5”
11’-6”	#5@6”	#6@6.5”	#4@5.5”	#5@6.5”
11’-9”	#5@5.5”	#6@6”	#4@5.5”	#5@6”
12’-0”	#5@5.5”	#6@6”	#4@5”	#5@6”
12’-3”	#5@5.5”	#6@5.5”	#4@5”	#5@6”
12’-6”	#5@5.5”	#6@5.5”	#4@5”	#5@6”
12’-9”	#5@5”	#6@5.5”	#4@5”	#5@5.5”
13’-0”	#5@5”	#6@5”	#4@5”	#5@5.5”
13’-3”	#5@5”	#6@5”	#4@5”	#5@5.5”

2.2.5—LADOTD Deck Design Table, Overall Deck Thickness = 9.0 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@7”	#4@7”	#4@7”	#4@7”
6’-3”	#4@7”	#4@7”	#4@7”	#4@7”
6’-6”	#4@7”	#4@7”	#4@7”	#4@7”
6’-9”	#4@7”	#4@6.5”	#4@7”	#4@7”
7’-0”	#4@6.5”	#4@6”	#4@7”	#4@7”
7’-3”	#4@6.5”	#4@6”	#4@7”	#4@7”
7’-6”	#4@6.5”	#4@5.5”	#4@7”	#4@7”
7’-9”	#4@6”	#4@5.5”	#4@7”	#4@7”
8’-0”	#4@6”	#4@5.5”	#4@7”	#4@7”
8’-3”	#4@6”	#4@5.5”	#4@7”	#4@7”
8’-6”	#4@5.5”	#4@5”	#4@7”	#4@7”
8’-9”	#4@5.5”	#4@5”	#4@7”	#4@7”
9’-0”	#4@5.5”	#4@5”	#4@7”	#4@7”
9’-3”	#4@5”	#4@5”	#4@7”	#4@7”
9’-6”	#4@5”	#5@7”	#4@7”	#4@6.5”
9’-9”	#4@5”	#5@7”	#4@7”	#4@6.5”
10’-0”	#5@7”	#5@6.5”	#4@6.5”	#4@6”
10’-3”	#5@7”	#5@6”	#4@6.5”	#4@5.5”
10’-6”	#5@7”	#5@6”	#4@6.5”	#4@5.5”
10’-9”	#5@7”	#5@5.5”	#4@6.5”	#4@5”
11’-0”	#5@6.5”	#5@5.5”	#4@6”	#4@5”
11’-3”	#5@6.5”	#5@5”	#4@6”	#5@7”
11’-6”	#5@6.5”	#5@5”	#4@6”	#5@7”
11’-9”	#5@6”	#6@6.5”	#4@5.5”	#5@6.5”
12’-0”	#5@6”	#6@6.5”	#4@5.5”	#5@6.5”
12’-3”	#5@6”	#6@6.5”	#4@6”	#5@7”
12’-6”	#5@6”	#6@6”	#4@5.5”	#5@6.5”
12’-9”	#5@5.5”	#6@6”	#4@5.5”	#5@6.5”
13’-0”	#5@5.5”	#6@5.5”	#4@5.5”	#5@6”
13’-3”	#5@5.5”	#6@5.5”	#4@5.5”	#5@6”
13’-6”	#5@5.5”	#6@5.5”	#4@5.5”	#5@6”
13’-9”	#5@5.5”	#6@5”	#4@5.5”	#5@5.5”
14’-0”	#5@5”	#6@5”	#4@5”	#5@5.5”
14’-3”	#5@5”	#6@5”	#4@5.5”	#5@5.5”

2.2.6—LADOTD Deck Design Table, Overall Deck Thickness = 9.5 in.

Girder Spacing (ft)	Transverse Reinforcement		Longitudinal Reinforcement	
	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)	Bottom (Bar No. @ Spacing)	Top (Bar No. @ Spacing)
6’-0”	#4@7”	#4@7”	#4@7”	#4@7”
6’-3”	#4@7”	#4@7”	#4@7”	#4@7”
6’-6”	#4@7”	#4@7”	#4@7”	#4@7”
6’-9”	#4@7”	#4@7”	#4@7”	#4@7”
7’-0”	#4@7”	#4@6.5”	#4@7”	#4@7”
7’-3”	#4@7”	#4@6.5”	#4@7”	#4@7”
7’-6”	#4@7”	#4@6”	#4@7”	#4@7”
7’-9”	#4@6.5”	#4@6”	#4@7”	#4@7”
8’-0”	#4@6.5”	#4@6”	#4@7”	#4@7”
8’-3”	#4@6.5”	#4@5.5”	#4@7”	#4@7”
8’-6”	#4@6”	#4@5.5”	#4@7”	#4@7”
8’-9”	#4@6”	#4@5.5”	#4@7”	#4@7”
9’-0”	#4@5.5”	#4@5.5”	#4@7”	#4@7”
9’-3”	#4@5.5”	#4@5.5”	#4@7”	#4@7”
9’-6”	#4@5.5”	#4@5”	#4@7”	#4@7”
9’-9”	#4@5.5”	#5@7”	#4@7”	#4@6.5”
10’-0”	#4@5”	#5@7”	#4@7”	#4@6.5”
10’-3”	#4@5”	#5@6.5”	#4@7”	#4@6”
10’-6”	#4@5”	#5@6.5”	#4@7”	#4@6”
10’-9”	#5@7”	#5@6”	#4@6.5”	#4@5.5”
11’-0”	#5@7”	#5@6”	#4@6.5”	#4@5.5”
11’-3”	#5@7”	#5@5.5”	#4@6.5”	#4@5”
11’-6”	#5@7”	#5@5.5”	#4@6.5”	#4@5”
11’-9”	#5@6.5”	#5@5”	#4@6”	#5@7”
12’-0”	#5@6.5”	#5@5”	#4@6”	#5@7”
12’-3”	#5@6.5”	#5@5”	#4@6”	#5@7”
12’-6”	#5@6.5”	#6@6.5”	#4@6.5”	#5@7”
12’-9”	#5@6”	#6@6.5”	#4@6”	#5@7”
13’-0”	#5@6”	#6@6”	#4@6”	#5@6.5”
13’-3”	#5@6”	#6@6”	#4@6”	#5@6.5”
13’-6”	#5@6”	#6@6”	#4@6”	#5@6.5”
13’-9”	#5@5.5”	#6@5.5”	#4@5.5”	#5@6.5”
14’-0”	#5@5.5”	#6@5.5”	#4@5.5”	#5@6.5”
14’-3”	#5@5.5”	#6@5.5”	#4@5.5”	#5@6.5”
14’-6”	#5@5.5”	#6@5.5”	#4@5.5”	#5@6.5”
14’-9”	#5@5.5”	#6@5”	#4@6”	#5@6”
15’-0”	#5@5”	#6@5”	#4@5.5”	#5@6”

2.3—DECK DESIGN EXAMPLE (GIRDER TOP FLANGE = 48", OVERALL DECK THICKNESS = 8.5", GIRDER SPACING = 10'-6")

This example is to demonstrate the development of deck design tables in the previous sections. The design is in accordance with the *AASHTO LRFD Bridge Design Specifications (7th Edition)*, *BDEM*, and assumptions and limitations listed in 2.1 and 2.2.

1. Design Information:

f'_c =	4,000	psi	*Concrete compressive strength, β_1 = 0.85*
f_y =	60,000	psi	*Steel yield strength*
w_c=	0.15	kcf	*Weight of concrete*
S =	10.50	ft	*Beam spacing*
t_{slab}=	8.50	in	*Total thickness of deck*
$t_{Structural}$=	8.00	in	*Structural thickness of deck*
Top clear cover=	2.0	in	*Does not include the 0.5" sacrificial surface*
Bottom clear cover=	1.5	in	
Min. bridge width =	36.50	ft	*3×girder spacing + min. overhangs*
Barrier unit weight, w_b=	0.029	klf	*2×0.520 k/ft /Min. bridge width*
Slab unit weight, $w_s=w_ct_{slab}$=	0.106	klf	*Per unit width*
Wearing surface unit weight, w_{ws}=	0.025	klf	*Per unit width*

2. Design Moment

	(Positive)		(Negative)		
$M_{DC}=c(w_s+w_b)S^2$	1.19	k-ft/ft	-1.49	k-ft/ft	*c = 0.08 for positive moment and 1.0 for negative moment*
$M_{DW}=c(w_{ws})S^2$	0.22	k-ft/ft	-0.28	k-ft/ft	
M_{LL}=	7.17	k-ft/ft	-4.75	k-ft/ft	*LRFD Appendix A4 Table A4-1. Distance from center of girder to design section for negative moment is 15 in*
M_u=	14.36	k-ft/ft	-10.58	k-ft/ft	*$1.25M_{DC}+1.5M_{DW}+1.75M_{LL}$*

3. Select Deck Reinforcement

	Bottom	Top	
Transverse reinforcement	#5@6.5in	#4@5in	
$A_{s,\ provided}$ (transverse)=	0.572 in^2/ft	0.480 in^2/ft	
Longitudinal reinforcement	#4@6in	#4@7in	*Both the top and bottom longitudinal reinforcements are taken as a percentage of the primary reinforcement. See D9.7.3.2 for details.*
$A_{s,\ provided}$ (longitudinal)=	0.400 in^2/ft	0.343 in^2/ft	

4. Check Transverse Reinforcement

	Positive Moment (Bottom Reinf.)		Negative Moment (Top Reinf.)		
$A_{s\_provided}$=	0.572	in^2/ft	0.480	in^2/ft	*Area of provided reinforcement per ft*
b=	12.00	in	12.00	in	*Analysis is based on a one-foot strip*
a=	0.84	in	0.71	in	$a=A_sf_y/(0.85f'_cb)$
d=	6.19	in	5.75	in	*Deck structural thickness minus cover to centerline of rebar*
ε_s=	0.016		0.018		$\varepsilon_s=0.003(d-a/0.85)/(a/0.85)$
ϕ =	0.9		0.9		$\phi=0.9$ *if* $\varepsilon_s>0.005$
M_n=	16.50	k-ft/ft	12.95	k-ft/ft	$M_n=A_sf_y(d-a/2)$
$\phi\ M_n$=	14.85	k-ft/ft	11.66	k-ft/ft	*Check for positive moment:* $\phi M_n=14.85$ *k-ft* $>M_u=14.36$ *k-ft, OK* *Check for negative moment:* $\phi M_n=11.66$ *k-ft* $>M_u=10.58$ *k-ft, OK*

5. Check Longitudinal (Distribution) Reinforcement (*LRFD Section 9.7.3.2* and *D9.7.3.2)*

$S_{effective}$=	9.92	ft	*Girder spacing - Girder web thickness 7"*
220/sqrt.($S_{effective}$)=	69.86	%	
Percentage=	67.00	%	*Lesser of* $220/\sqrt{S}$ *or 67%*
$A_{s,dist.}$ (bottom)=	0.38	in^2/ft	*Percentage× transverse bottom reinforcement* $<A_{s,\ provided}=0.400\ in^2/ft$ *at bottom, OK*
$A_{s,dist.}$ (top)=	0.32	in^2/ft	*Percentage× transverse top reinforcement* $<A_{s,\ provided}=0.343\ in^2/ft$ *at top, OK*

6. Check Crack Control (*LRFD Section 5.7.3.4*)

	Positive Moment (Bottom Reinf.)		Negative Moment (Top Reinf.)		
b=	12.00	in	12.00	in	*Analysis is based on a one-foot strip*
ρ=	0.008		0.007		*Reinforcement ratio=$A_s/(bd)$*
n=	8		8		*E_s/E_c*
k=	0.29		0.28		$k=-\rho n+\sqrt{(\rho n)^2+2\rho n}$
j=	0.90		0.91		*j=1-k/3*
$M_{service}$=	8.58	k-ft/ft	-6.51	k-ft/ft	*$1.0M_{DC}+1.0M_{DW}+1.0M_{LL}$*
f_s=	32.24	ksi	31.25	ksi	*$f_s=M_s/A_s(jd)$*
β_s=	1.42		1.56		*LRFD Eq. 5.7.3.4-1*
γ_e=	1.00		1.00		*LRFD Eq. 5.7.3.4-1*
s_{max}=	11.68	in	9.87	in	*Check for positive moment:* s_{max} *=11.68 in.>6.5 in., OK* *Check for negative moment:* s_{max} *=9.87 in.>5.0 in., OK*

7. Check for Temperature and Shrinkage (*LRFD Section 5.10.8*)

$A_s\geq$	0.052	in^2/ft	*LRFD Eq. 5.10.8-1*
$A_s\geq$	0.11	in^2/ft	*LRFD Eq. 5.10.8-2*
$A_s\leq$	0.60	in^2/ft	*LRFD Eq. 5.10.8-2*
Controlling A_s=	0.11	in^2/ft	*Less than provided reinforcement at each direction and each face, OK*