

Index D400-300 Series FSB Superstructure Package

Design Criteria

AASHTO LRFD Bridge Design Specifications; Structures Design Guidelines (SDG); Structures Detailing Manual (SDM)

Design Assumptions and Limitations

The use of these Developmental Design Standards will typically be restricted by the SDO to off-system bridges with a low Average Daily Traffic (ADT) and Average Daily Truck Traffic (ADTT).

When using these Developmental Design Standards, the designer must request the following Developmental Specifications from the District Specifications Office for inclusion in the Contract Documents:

- ***Developmental Specification*** Dev400Tining which includes provisions that allow tining in lieu of grooving for decks and approach slabs of bridges on unpaved roadways

The ***Developmental Standard Plans (DSP)*** Index D400-300 Series, herein referred to as the ***DSP***, provides a standard set of superstructure plans utilizing the Florida Slab Beam (FSB) ***Standard Plans*** D450-450 Series.

The ***DSP*** does not provide a complete set of stand-alone Structure Plans for the Contract Documents. It is a standard set of superstructure plans that supplements other necessary components of the Structure Plans such as, but not limited to, the following: Summary of Structure Quantities, General Notes, Plan and Elevation, Bridge Hydraulic Recommendations, Construction Sequence, Report of Core Borings, Foundation Layout, Pile Data Table, Substructure Plans and Details, Riprap and/or Slope Protection Details, and Reinforcing Bar Lists for Approach Slabs and Substructures. Prepare the Structure Plans in accordance with the ***FDOT Design Manual (FDM)***. The Contractor will refer to the ***DSP*** for the information that would normally be located in the superstructure portion of the Structure Plans.

Clear Roadway Widths and Span Lengths

The ***DSP*** accommodates clear roadway widths between traffic railings of 15, 24, 28, 32 or 40 feet. Select the clear width between traffic railings according to the approved Typical Section Package.

The ***DSP*** Index numbers with their clear roadway widths, nominal span lengths and FSB thicknesses are tabulated below. The ***DSP*** provides individual nominal span lengths of 30, 40 and 50 feet for use in single or multiple span applications. For multiple span applications, different span lengths may be used within a single bridge; however, the use of unequal adjacent span lengths which have different FSB thicknesses will require intermediate bents with longitudinally stepped bearing elevations.

FSB Superstructure Package DDS Index List			
Developmental Design Standard Index No.	Clear Roadway Width Between Traffic Railings (feet)	Nominal Span Lengths (feet)	FSB Thickness (inches)
D400-300	Typical FSB Superstructure Package Details and Notes		
D400-315	15	30	12
		40	12
		50	15
D400-324	24	30	12
		40	12
		50	15
D400-328	28	30	12
		40	12
		50	15
D400-332	32	30	12
		40	12
		50	15
D400-340	40	30	12
		40	12
		50	15

Geometry Limitations

The following geometric limitations apply when utilizing the **DSP**:

- Tangent horizontal alignment (no horizontal curve within the bridge limits)
- Tangent profile grade (no vertical curve within the bridge limits)
- Geometric Control Line located at the bridge centerline
- Zero substructure skew with respect to the Geometric Control Line
- No superelevation transition within the bridge limits

Plan Content Requirements

In order to utilize the **DSP**, provide the following project specific superstructure information in the Structure Plans:

- Quantities
- General Notes and bid item notes

- Finish Grade Elevations
- Deck drainage details (if applicable)
- Approach Slabs

See also the instructions below for the Plan and Elevation Sheet.

Quantities

Complete and include in the Structure Plans a "Summary of Structure Quantities" box in accordance with the **SDM** Introduction. All superstructure quantities are tabulated per span for each **DSP** Index in the Design Aids section of these instructions, with the exception of the following project specific items:

- 36-inch Single-Slope Traffic Railing
- Poured Joint with Backer Rod Expansion Joint System
- Approach Slab Concrete and Reinforcing Steel

For multiple span applications, account for all spans in each superstructure pay item quantity.

For Long Bridges on paved roadways, include a quantity for bid item 400-7 Bridge Deck Grooving and 400-9 for Bridge Deck Planing. For Short Bridges, and for Long Bridges on unpaved roadways with or without paved approaches, include a quantity for bid item 400-7 Bridge Deck Grooving. See **SDG** Chapter 4 for definitions of Short Bridges and Long Bridges.

General Notes

Prepare the Structure Plans General Notes in accordance with **SDM** Chapter 5.

Specify the Topping Thickness in the Structure Plans General Notes. The **DSP** can only be used with a Topping Thickness of 6 inches or 6½ inches. For Long Bridges on paved roadways, the Topping Thickness is 6½ inches (before planing). For Short Bridges, and for Long Bridges on unpaved roadways with or without paved approaches, the Topping Thickness is 6 inches (no planing). See **SDG** Chapter 4 for definitions of Short Bridges and Long Bridges.

Include the following note in the Structure Plans General Notes to specify the Topping Thickness. Include either 6 or 6½ in the blank and reference the appropriate FSB Superstructure Package Index number:

C-I-P TOPPING THICKNESS:

C-I-P Topping Thickness = _____ inches. See Index D400-3_____

Include Future Wearing Surface Load of 15 psf for bridges with a 6-inch Topping Thickness under Design Loading on the Structure Plans General Notes.

The **DSP** does not account for utility loads on the bridge. Include the following note under Design Loading on the Structure Plans General Notes:

No allowance for utility loads has been included in the design.

In accordance with **SDG** Chapter 1, select the Concrete Class for the C-I-P Topping and Approach Slabs based on the Environmental classification and list them in the Structure Plans General Notes.

Plan and Elevation

Prepare the Plan and Elevation in accordance with Chapter 7 of the **SDM**.

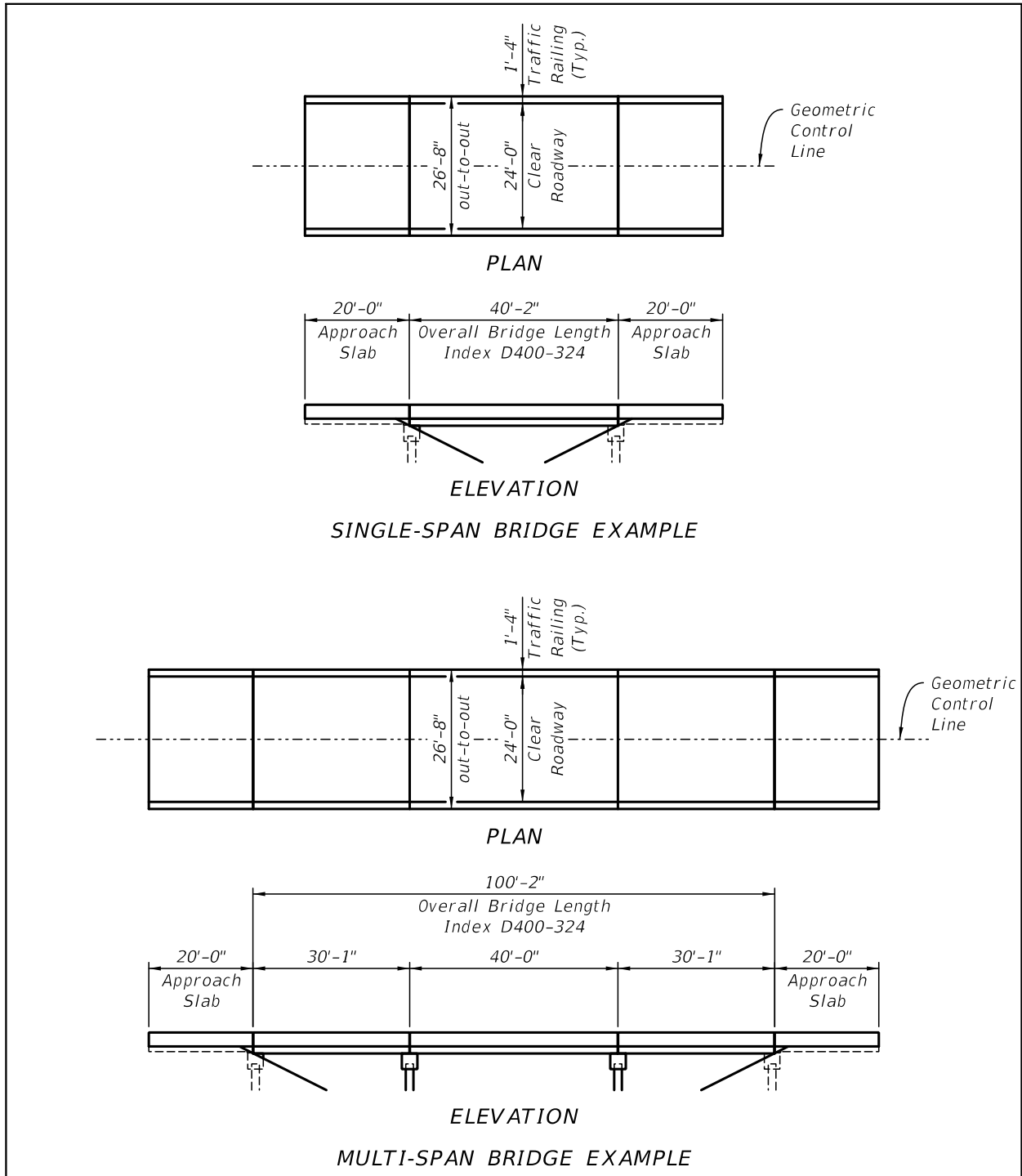
The working line for the **DSP** superstructure is the Geometric Control Line located at the centerline of the bridge. In the Plan View, include a stationing line at the centerline of the bridge labeled as "Geometric Control Line". Label all stations along the Geometric Control Line in the Plan View according to **SDM** Chapter 7. Dimension the transverse offset from the Baseline or Centerline of Construction if not coincident with the Geometric Control Line.

On the Elevation View, call out the **DSP** Index Number associated with the clear roadway width being used. See the figure below for examples on how to appropriately call out the **DDS** Index Number for single span and multiple span applications.

See the table below for the dimensions to be used on the Elevation View for each nominal span length.

Span dimension(s) to be shown on Elevation View of Plan and Elevation					
Nominal Span Length (feet)	Span measured between bearing centerlines	Length of C-I-P Topping	Span dimension(s) to be shown on Elevation View of Plan and Elevation		
			Single Span Bridge	Multiple Span Bridge	
				End Span	Intermediate Span
30	27'-9"	29'-10"	30'-2"	30'-1"	30'-0"
40	37'-9"	39'-10"	40'-2"	40'-1"	40'-0"
50	47'-9"	49'-10"	50'-2"	50'-1"	50'-0"

Example of Index Labeling on the Plan and Elevation



Finish Grade Elevations

Index D400-300 includes a Finish Grade Elevation sheet with schematic plan views and a typical section view. Tabulate finish grade elevations in the Structure Plans in accordance with **SDM** Chapter 14 for each approach slab and each bridge span at the intersection of the T-Lines and the following locations:

- Left Coping
- Left Gutter
- Geometric Control Line
- Right Gutter
- Right Coping

Deck Drainage Details

See the **SPI** 450-450 for information on the use of scuppers or deck drains if needed.

Approach Slabs

For off-system bridges, use an approach slab length of 20 feet unless project specific site conditions warrant the use of 30 feet long approach slabs. The minimum approach slab length of 30 feet per **SDG** Chapter 4 is intended for on-system bridges. For off-system bridges on unpaved roadways without paved approaches, specify approach slabs for rigid pavement approaches. See the **DSPI** Indexes D400-092 and D400-093 for plan content requirements.

Conduit Details

Specify number of conduits per traffic railing, Detail 'A' Expansion Fittings and type of Embedded Junction Box in the Structure Plans according to Index 630-010.

Load Rating

The FSB Superstructure Package includes a completed Load Rating Summary Sheet. Design load rating calculations (As-Bid) are available on the **DSP** website. In accordance with the FDOT **Bridge Load Rating Manual**, provide a signed and sealed FDOT Bridge Load Rating Summary Form and the design load rating calculations (As-Bid) with the 90% Structure Plans submittal. Include the following statement on the FDOT Bridge Load Rating Summary Form certifying that the information provided on the FSB Superstructure Package Load Rating Summary Sheet has been accurately transferred:

I hereby certify that the information provided on the FSB Superstructure Package Load Rating Summary Sheet has been accurately transferred to this form.

The following describes and summarizes post-design load rating responsibilities of the EOR when utilizing the FSB Superstructure Package **Developmental Design Standard**. In accordance with the FDOT **Construction Project Administration Manual (CPAM)** Chapter 10, if the EOR and Construction Engineering and Inspection

(CEI) personnel agree that the As-Bid load rating does not need to be changed because there were no significant modifications to the bridge during construction, then the EOR shall produce a signed and sealed letter stating that the As-Bid load rating represents the As-Built condition. If the EOR and CEI determine that the As-Bid load rating has changed based on the As-Built condition, then the EOR is responsible for revising the Bridge Load Rating Summary Sheet and the Bridge Load Rating Summary Form to reflect the As-Built load rating. These sheets shall be submitted to the District Structures Maintenance Engineer prior to putting the bridge into service.

Substructure Keeper Blocks and Dowels

Substructure Keeper Blocks to Limit Transverse Movement

See [SPI 450-450](#) to determine if substructure keeper blocks are required to limit potential transverse movement of the FSBs. If required, provide project specific details for the keeper blocks in the substructure plans. Example keeper block details are provided in [SPI 450-450](#).

Substructure Dowel Design to Limit Longitudinal Movement

See [SPI 450-450](#) to determine if the longitudinal bridge grade requires a project specific substructure dowel design to limit the FSBs from sliding longitudinally. See [SPI 450-450](#) for additional information on design and detailing requirements for the dowels.

Design Aids

Vertical Reactions

Unfactored vertical dead load and live load reactions are tabulated below for use in designing substructures and foundations. The FSBs are assumed to act as simple spans under both dead load and live load.

The dead load reactions are per beam and per span. The dead load reactions provided are directly applicable to end bents. For intermediate bents or piers, include the dead load reactions for each adjacent span being supported.

DC reactions are provided separately for topping thicknesses of 6 inches and 6½ inches. For Long Bridges to be planed, it is assumed that a minimum of ¼ inch of the topping will be planed off in accordance with Specification 400; therefore, the topping thickness for permanent load calculations is 6¼ inches.

The DW reactions are a Future Wearing Surface allowance for bridges not being planed. The Future Wearing Surface is applied over the width between traffic railings and distributed equally to all beams. Do not include the DW reactions for Long Bridges to be planed.

Dead Load Reactions				
Nominal Span (feet)	Clear Roadway Width Between Bridge Railings (feet)	DC		DW (For bridges not being planed)
		6" C-I-P Topping w/ Future Wearing Surface (For bridges not being planed) (kips)	6½" C-I-P Topping w/ ½" Sacrificial Thickness (Long Bridge to be planed per Specification 400) (kips)	
30	15	18.1	18.3	0.9
	24	17.2	17.4	0.9
	28	16.6	16.8	0.9
	32	18.6	18.8	1.1
	40	17.5	17.7	1.0
40	15	24.2	24.5	1.2
	24	22.9	23.2	1.2
	28	22.2	22.5	1.2
	32	24.8	25.1	1.4
	40	23.3	23.6	1.4
50	15	34.4	34.7	1.4
	24	32.8	33.1	1.5
	28	31.9	32.2	1.5
	32	35.6	36.0	1.8
	40	33.5	33.9	1.7

All live load reactions are per lane and do not include Dynamic Load Allowance or Multiple Presence Factor.

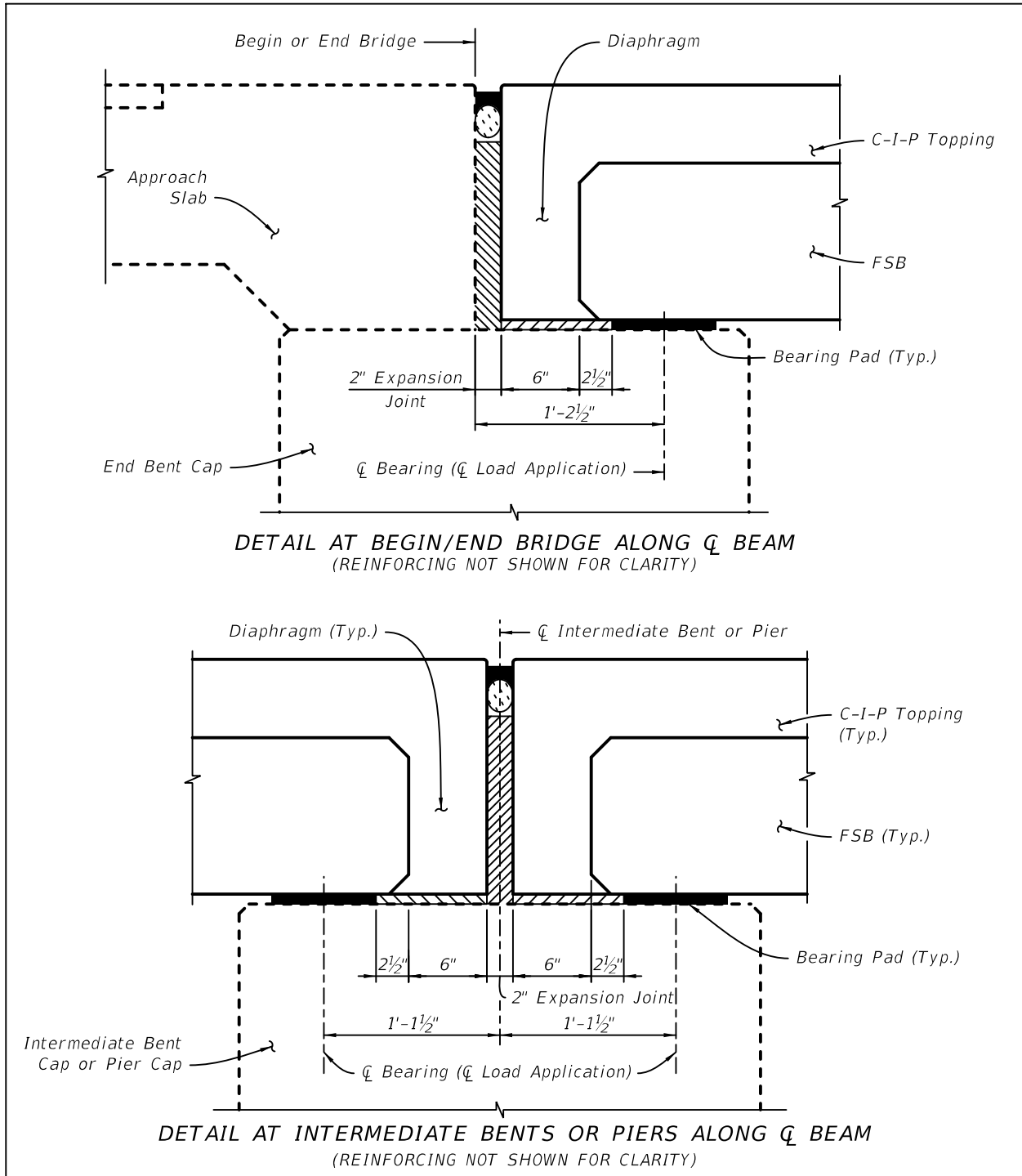
Maximum Live Load Reactions at End Bents		
Nominal Span (feet)	Truck/Tandem (kips)	Lane (kips)
30	47.8	9.6
40	54.2	12.8
50	58.0	16.0

Spans A and B in the table below are the adjacent standard span lengths being supported by a particular intermediate bent or pier.

Maximum Live Load Reactions at Intermediate Bents or Piers					
All reactions are in kips			Nominal Span B (feet)		
			30	40	50
Nominal Span A (feet)	30	Truck/Tandem	53.5	57.4	59.7
		Lane	19.2	22.4	25.6
	40	Truck/Tandem	57.4	58.4	60.7
		Lane	22.4	25.6	28.8
	50	Truck/Tandem	59.7	60.7	61.2
		Lane	25.6	28.8	32.0

The figure below indicates the centerline of load application with respect to the begin/end bridge or the centerline of intermediate bent or pier. It's assumed that the maximum live load reactions at intermediate bents or piers provided in the table above are evenly distributed to the two bearing centerlines.

Centerline of load application for substructure and foundation design



Superstructure Thickness for Establishing Bearing Elevations

Establish bearing elevations according to **SDG** Chapter 4 using the superstructure thicknesses tabulated below. Superstructure thicknesses are measured vertically and include the bearing pad, FSB, C-I-P topping and net camber build-up.

Superstructure Thickness for Establishing Bearing Elevations		
Nominal Span Length (feet)	6" C-I-P Topping (feet)	6½" C-I-P Topping (feet)
30	1.609	1.650
40	1.609	1.650
50	1.860	1.902

Quantities

Index D400-315: 15'-0" Clear Roadway Widths

Index D400-315: 30'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½" C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	13.4	14.2
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	50	N/A
0400-9	Bridge Deck Planing	SY	N/A	50
0400-148	Plain Neoprene Bearing Pads	CF	1.5	
0415-1-4	Reinforcing Steel - Superstructure	LB	3,326	
0450-8-12	Prestressed Beam: Florida Slab Beam	LF	115	

Index D400-315: 40'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½" C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	18.2	19.3
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	66	N/A
0400-9	Bridge Deck Planing	SY	N/A	66
0400-148	Plain Neoprene Bearing Pads	CF	1.5	
0415-1-4	Reinforcing Steel - Superstructure	LB	4,403	
0450-8-12	Prestressed Beam: Florida Slab Beam	LF	155	

Index D400-315: 50'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½" C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	25.1	26.4
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	83	N/A
0400-9	Bridge Deck Planing	SY	N/A	83
0400-148	Plain Neoprene Bearing Pads	CF	1.5	
0415-1-4	Reinforcing Steel - Superstructure	LB	5,651	
0450-8-22	Prestressed Beam: Florida Slab Beam	LF	195	

Index D400-324: 24'-0" Clear Roadway Widths

Index D400-324: 30'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½" C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	20.0	21.2
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	80	N/A
0400-9	Bridge Deck Planing	SY	N/A	80
0400-148	Plain Neoprene Bearing Pads	CF	2.3	
0415-1-4	Reinforcing Steel - Superstructure	LB	5,085	
0450-8-12	Prestressed Beam: Florida Slab Beam	LF	173	

Index D400-324: 40'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½" C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	27.2	28.8
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	106	N/A
0400-9	Bridge Deck Planing	SY	N/A	106
0400-148	Plain Neoprene Bearing Pads	CF	2.3	
0415-1-4	Reinforcing Steel - Superstructure	LB	6,732	
0450-8-12	Prestressed Beam: Florida Slab Beam	LF	233	

Index D400-324: 50'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½" C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	37.3	39.3
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	133	N/A
0400-9	Bridge Deck Planing	SY	N/A	133
0400-148	Plain Neoprene Bearing Pads	CF	2.3	
0415-1-4	Reinforcing Steel - Superstructure	LB	8,641	
0450-8-22	Prestressed Beam: Florida Slab Beam	LF	293	

Index D400-328: 28'-0" Clear Roadway Widths

Index D400-328: 30'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	23.2	24.5
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	93	N/A
0400-9	Bridge Deck Planing	SY	N/A	93
0400-148	Plain Neoprene Bearing Pads	CF	2.6	
0415-1-4	Reinforcing Steel - Superstructure	LB	5,932	
0450-8-12	Prestressed Beam: Florida Slab Beam	LF	202	

Index D400-328: 40'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	31.5	33.4
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	124	N/A
0400-9	Bridge Deck Planing	SY	N/A	124
0400-148	Plain Neoprene Bearing Pads	CF	2.6	
0415-1-4	Reinforcing Steel - Superstructure	LB	7,854	
0450-8-12	Prestressed Beam: Florida Slab Beam	LF	272	

Index D400-328: 50'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	43.3	45.6
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	155	N/A
0400-9	Bridge Deck Planing	SY	N/A	155
0400-148	Plain Neoprene Bearing Pads	CF	2.6	
0415-1-4	Reinforcing Steel - Superstructure	LB	10,083	
0450-8-22	Prestressed Beam: Florida Slab Beam	LF	342	

Index D400-332: 32'-0" Clear Roadway Widths

Index D400-332: 30'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	25.5	27.0
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	106	N/A
0400-9	Bridge Deck Planing	SY	N/A	106
0400-148	Plain Neoprene Bearing Pads	CF	3.0	
0415-1-4	Reinforcing Steel - Superstructure	LB	6,361	
0450-8-14	Prestressed Beam: Florida Slab Beam	LF	202	

Index D400-332: 40'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	34.4	36.4
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	142	N/A
0400-9	Bridge Deck Planing	SY	N/A	142
0400-148	Plain Neoprene Bearing Pads	CF	3.0	
0415-1-4	Reinforcing Steel - Superstructure	LB	8,418	
0450-8-14	Prestressed Beam: Florida Slab Beam	LF	272	

Index D400-332: 50'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	47.1	49.7
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	177	N/A
0400-9	Bridge Deck Planing	SY	N/A	177
0400-148	Plain Neoprene Bearing Pads	CF	3.0	
0415-1-4	Reinforcing Steel - Superstructure	LB	10,785	
0450-8-24	Prestressed Beam: Florida Slab Beam	LF	342	

Index D400-340: 40'-0" Clear Roadway Widths

Index D400-340: 30'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	31.8	33.7
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	133	N/A
0400-9	Bridge Deck Planing	SY	N/A	133
0400-148	Plain Neoprene Bearing Pads	CF	3.7	
0415-1-4	Reinforcing Steel - Superstructure	LB	8,022	
0450-8-13	Prestressed Beam: Florida Slab Beam	LF	260	

Index D400-340: 40'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	43.1	45.6
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	177	N/A
0400-9	Bridge Deck Planing	SY	N/A	177
0400-148	Plain Neoprene Bearing Pads	CF	3.7	
0415-1-4	Reinforcing Steel - Superstructure	LB	10,617	
0450-8-13	Prestressed Beam: Florida Slab Beam	LF	350	

Index D400-340: 50'-0" Span				
Pay Item No.	Pay Item Description	Unit	Quantity	
			6" C-I-P Topping	6½ " C-I-P Topping
0400-2-47	Concrete Class II, C-I-P Topping with Shrinkage Reducing Admixture	CY	59.1	62.3
0400-4-47	Concrete Class IV, C-I-P Topping with Shrinkage Reducing Admixture			
0400-7	Bridge Deck Grooving	SY	221	N/A
0400-9	Bridge Deck Planing	SY	N/A	221
0400-148	Plain Neoprene Bearing Pads	CF	3.7	
0415-1-4	Reinforcing Steel - Superstructure	LB	13,614	
0450-8-23	Prestressed Beam: Florida Slab Beam	LF	440	