

# MEMORANDUM

DEPARTMENT OF TRANSPORTATION  
Staff Bridge Design  
4201 E. Arkansas Avenue, Room 330  
Denver, Colorado 80222  
(303) 757-9309 FAX (303) 757-9197



**DATE:** February 2, 1999  
**TO:** All CDOT Design, Consultant Design, and Construction Personnel  
**FROM:** S. W. Horton  
**SUBJECT:** TECHNICAL MEMORANDUM #25 - REINFORCING STEEL

Technical Memorandum 19 requiring bar lists has been replaced by Technical Memorandum 25, which does not require bar lists. Effective with this memo, new projects will not require bar lists. Implementation of this memorandum will not change the provisions of Section 602.03 of the Standard Specification requiring the contractor to be responsible for the accuracy of the bar lists and for furnishing and placing all reinforcing steel in accordance with the details shown on the plans. Fabricator are to provide cut sheets.

Projects that are completed will not be revised. For projects currently in production, providing a bar list will be optional. Revisions to projects in progress should not be made if it has an adverse impact on the schedule.

The following procedure regarding reinforcing steel details and reinforcing steel quantities will apply to all structure projects.

The accuracy shown on the plan sheets regarding reinforcing bar size, length, shape, spacing, location, number of bars, clearance, splice lengths, and quantities is very important. If changes to the plans are made, it is important that these changes be carried through to the reinforcing bar quantity forms and to the Summary of Quantities. Delays of weeks can occur to a project if the contractor is required to go back to the supplier for additional reinforcing bars.

When detailing reinforcing steel on the plans the following general criteria should be used:

1. Separate bar lists and bending diagrams will not be required.
2. The stock length used for all reinforcing shall be 60'-0" or 18.288 meters. Splice lengths shall be calculated when determining reinforcing quantities. Estimates, or using a percentage of the quantities, to account for splices will not be acceptable.
3. Enough information shall be shown on each sheet so that the dimensions and shape of the bars detailed may be readily determined without referring to other detail sheets.
4. Unless otherwise noted, standard hooks of 90°, 135°, or 180° will be in accordance with the Specifications and need not be dimensioned on the plans. Non-standard hooks will need to be dimensioned on the plans.

5. Splices for column reinforcing, main longitudinal girder and cap reinforcing, and stirrup splices shall be detailed on the plans. Other nominal bars may be indicated as "continuous" without detailing the splice length or location.
6. All reinforcing steel shall have a clear coverage of 2 inches unless otherwise noted in the detail notes.
7. The projection length of dowels shall be shown on the plans.

Examples of proper detailing procedure:

1. Straight bars where the length is controlled by concrete dimensions and end clearances may be called out as #4 @ 1'-0", #4 Cont., or #4 (Tot. 5).
2. Straight bars where the length is not controlled by concrete dimensions shall be called out as #6 x 22'-6" or #11 x 60'-0" and the bar shall be located with a dimension to it's end from something that can be easily measured to at the time of bar placement.
3. Bent bars shall be called out with a bending diagram giving dimensions for fabrication in accordance with the above i.e.:



4. A bar series is required when the concrete has varying dimensions, i.e.:



The attached Microsoft Excel spreadsheet should be used to tabulate reinforcing steel quantities, simultaneously with the detailing of the structural elements.

The spreadsheets B602bl.xls for English and C602bl.xls for Metric along with AutoCAD bending diagrams B602bb.dwg and C602bb.dwg are available on the CDOT web page along with the Bridge Standard Worksheets.

Two independent sets of quantities shall be calculated. One set will be prepared by the detailer and one set by the design / detail checker. After differences are resolved, totals from the record set shall be shown on the plans. Extended totals for both sets of quantities shall be within one percent of each other. Quantities from the two independent sets are not to be averaged. The field package will include copies of the spreadsheet and the bending diagrams in the quantity calculations.

Technical Memorandum #25 - Reinforcing Steel  
February 2, 1999  
Page 3

The attachment to this memorandum contains instructions for using the above-mentioned spreadsheet, for reinforcing steel take-offs and quantities.

Attachment

Distribution:

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[www.dot.state.co.us/business/design/bridge](http://www.dot.state.co.us/business/design/bridge)

Instructions for using B602bl.xls

The bar bending diagrams, B602bb.dwg is available on the CDOT web page along with the Bridge Standard Worksheets.

Fill in the "Project No.", "Str. No.", and "Prepared By".

If you fill in this information on the first form "Reinf Superstr." It will be copied to the other forms for you.

To insert or delete rows, move the cursor on top of a row number, hold down the left mouse button to highlight the number of rows you want to insert or delete. Next move the cursor to the highlighted area and click the insert to insert rows or delete to delete rows.

On the form you will find two different reinforcing bar call outs. One for calling out a bar description on a single row, and a three row call out for reinforcing which uses the B.E.I. "By Equal Increments" call out.

You will need to copy these rows as many times as needed. You must copy the entire row, or rows for the B.E.I. call out, in order to copy the formulas which calculate the total length and weight for each of the bar call outs.

To copy a single row, move the cursor on top of the first row number, click on the left mouse button to highlight the row, move the cursor to the highlighted area and click on the right mouse button, this will bring up a pop-up menu, click on copy. Move the cursor on top of the row number where you want to paste the new row and click the left mouse button to highlight the row, then press the Enter key to paste.

To copy three rows, for the B.E.I. formula move the cursor on the top of the first row number, click on the left mouse button and drag the mouse down to highlight all three rows. Move the cursor to the highlighted area and click on the right mouse button, to bring up the pop-up menu, click on copy. Move the cursor on top of the row number where you want to start pasting the new rows and click the left mouse button to highlight the first row, then press the Enter key to paste. Make sure that you have three empty rows to paste into or you will overwrite rows, which already have data in them. If this happens you can use the undo icon (a backward arrow) on the tool bar to backup one step at a time, then insert rows and try again.

Fill in the rows of information for each different size and type of reinforcing bar. You will need to fill in A, B, C, and Length for each bar. The spreadsheet will calculate the total length and total weight for each bar and keep a running total at the bottom. Remember to place a "E" in column B to designate Epoxy reinforcing and the spreadsheet will separate the black and epoxy reinforcing.

Each of the individual summary sheets is call a worksheet. To delete a worksheet pick Edit from the tool bar, then pick Delete Sheet. To Insert a worksheet open up the worksheet to the right of where you want to insert the new worksheet. Pick Insert from the tool bar, then pick Worksheet. To rename the new worksheet or any existing worksheets, pick Format from the tool bar, then Sheet, and Rename.

If you have questions, need assistance, or if I can be of any help, please contact Ken Sharpley.

# MEMORANDUM

DEPARTMENT OF TRANSPORTATION  
Staff Bridge Design  
4201 E. Arkansas Avenue, Room 330  
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**DATE:** February 9, 1999  
**TO:** All CDOT Design, Consultant Design, and Construction Personnel  
**FROM:** S. W. Horton  
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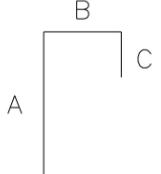
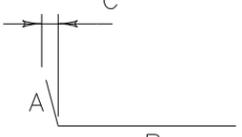
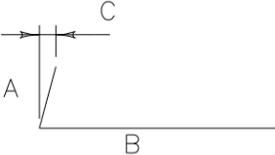
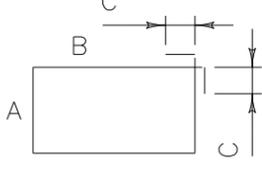
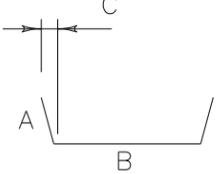
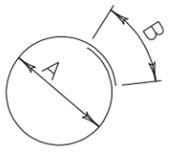
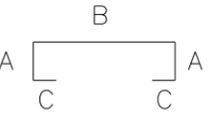
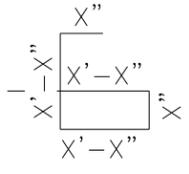
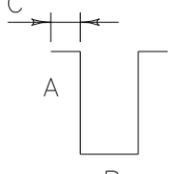
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Project No.  
 Structure No.  
 Prepared By

BENDING DIAGRAMS  
 Dimensions are out to out of bars.

 <p>Type I</p>	 <p>Type II</p>	 <p>Type III</p>	 <p>Type IV</p>
 <p>Type V</p>	 <p>Type VI</p>	 <p>Type VII</p>	 <p>Type VIII</p>
 <p>Type IX</p>	 <p>Type X</p>	 <p>Type XI</p>	 <p>Type XII</p>
 <p>Type XIII</p>			

Project No.												
Str. No.												
Prepared by												
<b>BAR LIST - SUPERSTRUCTURE</b>				4	5	6	7	8	9	10	11	
				0.668	1.043	1.502	2.044	2.670	3.400	4.303	5.313	
			No.						Epoxy	Black	Epoxy	Black
Description	Bar Size	No. Req'd	B.E.I	Length	Type	A	B	C	Total Length	Total Length	Total Weight	Total Weight
Daiph (Stirrups)	E 4	60		16'-8"	XIII	5'-11"	4'-1"	4 1/2"	1,000.00	-	668	-
Slab (Top & Bott Trans)	E 6	4 Ea.	33	2'-3" B.E.I. 41'-6"	Str.				2,887.50	-	4,337	-
<b>BAR SUMMARY - SUPERSTRUCTURE</b>												
<b>EPOXY COATED</b>						<b>NON-EPOXY COATED</b>						
				Number of Lin. Ft.	Bar Size	Lbs. / Lin. Ft.	Weight		Number of Lin. Ft.	Bar Size	Lbs. / Lin. Ft.	Weight
				1,000.00	#4	0.668	668		-	#4	0.668	-
				-	#5	1.043	-		-	#5	1.043	-
				2,887.50	#6	1.502	4,337		-	#6	1.502	-
				-	#7	2.044	-		-	#7	2.044	-
				-	#8	2.670	-		-	#8	2.670	-
				-	#9	3.400	-		-	#9	3.400	-
				-	#10	4.303	-		-	#10	4.303	-
				-	#11	5.313	-		-	#11	5.313	-
					Total =		5,005			Total =		-



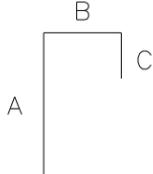
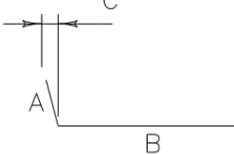
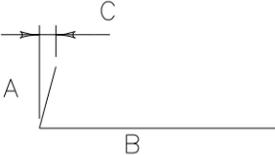
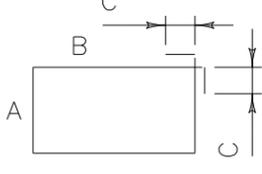
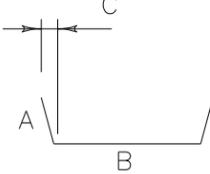
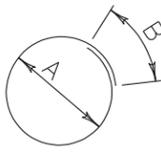
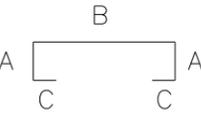
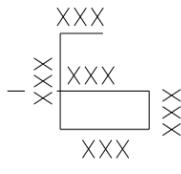
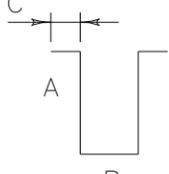


Project No.	Str. No.	Prepared by											
<b>BAR LIST - ABUTMENT 3</b>						4	5	6	7	8	9	10	11
						0.668	1.043	1.502	2.044	2.670	3.400	4.303	5.313
Description	Bar Size	No. Req'd	No. B.E.I.	Length	Type	Dimensions			Epoxy Total	Black Total	Epoxy Total	Black Total	
						A	B	C	Length	Length	Weight	Weight	
Wingwall C (Stirrups)	E 4	1 Ea.	14	23'-2" B.E.I. 22'-6"	II	11'-3" B.E.I. 10'-11"	0'-8"		319.67	-	214	-	
Wingwall C (Stirrups)	E 4	1 Ea.	14	23'-2" B.E.I. 22'-6"	II	11'-3" B.E.I. 10'-11"	0'-8"		319.67	-	214	-	
Abut. (Trans)	E 11	10		51'-0"	Str.				510.00	-	2,710	-	
<b>BAR SUMMARY - ABUTMENT 3</b>													
<b>EPOXY COATED</b>						<b>NON-EPOXY COATED</b>							
				Number of Lin. Ft.	Bar Size	Lbs. / Lin. Ft.	Weight		Number of Lin. Ft.	Bar Size	Lbs. / Lin. Ft.	Weight	
				639.33	#4	0.668	427		-	#4	0.668	-	
				-	#5	1.043	-		-	#5	1.043	-	
				-	#6	1.502	-		-	#6	1.502	-	
				-	#7	2.044	-		-	#7	2.044	-	
				-	#8	2.670	-		-	#8	2.670	-	
				-	#9	3.400	-		-	#9	3.400	-	
				-	#10	4.303	-		-	#10	4.303	-	
				510.00	#11	5.313	2,710		-	#11	5.313	-	
						Total =	3,137				Total =	-	

Project No.												
Str. No.												
Prepared by												
<b>BAR LIST - APPROACH SLABS (BOTH)</b>				4	5	6	7	8	9	10	11	
				0.668	1.043	1.502	2.044	2.670	3.400	4.303	5.313	
			No.						Epoxy	Black	Epoxy	Black
Description	Bar Size	No. Req'd	B.E.I	Length	Type	A	B	C	Total Length	Total Length	Total Weight	Total Weight
Slab (Top Trans)	E 6	4 Ea.	33	2'-3" B.E.I. 41'-6"	Str.				2,887.50	-	4,337	-
Slab (Bott Long)	E 6	176		14'-3"	Str.				2,508.00	-	3,767	-
<b>BAR SUMMARY - APPROACH SLABS (BOTH)</b>												
<b>EPOXY COATED</b>						<b>NON-EPOXY COATED</b>						
				Number of Lin. Ft.	Bar Size	Lbs. / Lin. Ft.	Weight		Number of Lin. Ft.	Bar Size	Lbs. / Lin. Ft.	Weight
				-	#4	0.668	-		-	#4	0.668	-
				-	#5	1.043	-		-	#5	1.043	-
				5,395.50	#6	1.502	8,104		-	#6	1.502	-
				-	#7	2.044	-		-	#7	2.044	-
				-	#8	2.670	-		-	#8	2.670	-
				-	#9	3.400	-		-	#9	3.400	-
				-	#10	4.303	-		-	#10	4.303	-
				-	#11	5.313	-		-	#11	5.313	-
						Total =	8,104				Total =	-

Project No.  
 Structure No.  
 Prepared By

BENDING DIAGRAMS  
 Dimensions are out to out of bars.

 <p>Type I</p>	 <p>Type II</p>	 <p>Type III</p>	 <p>Type IV</p>
 <p>Type V</p>	 <p>Type VI</p>	 <p>Type VII</p>	 <p>Type VIII</p>
 <p>Type IX</p>	 <p>Type X</p>	 <p>Type XI</p>	 <p>Type XII</p>
 <p>Type XIII</p>			









