

**Drafting and Design Presentation Standards
Volume 3: Structural Drafting Standards**

Chapter 4: Computer Preparation of Steel Schedules

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1	-	First issue	Manager (Structural Drafting)	Apr 2011
2	-	Document name change	Manager (Structural Drafting)	Nov 2011
	4.16	Add section Further Assistance with the Steel Schedule Program		
	4.17	Add section Mass of Reinforcement		
3	4.16	Contact Name change in Further Assistance with the Steel Schedule Program	Team Leader (Structural Drafting)	May 2013

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4 Computer Preparation of Steel Schedules

4.1 Glossary of terms

For a complete glossary of terms refer Chapter 1-*Introduction*.

4.2 Figures and examples shown in this volume

The figures and examples shown in this volume are for presentation purposes only, and may contain some details that are now superseded. These details have been included for ease of reference, to illustrate typical solutions, and to show the required standard of drafting presentation. The details are not to be used without an engineering check and certification by a Structural RPEQ to confirm that the details are appropriate for the specific project.

4.3 Scope

This instruction covers the use of the TMR steel schedule computer program used for the production of steel reinforcement schedules and is read in conjunction with TMR Standard Drawings 1043 Standard Bar Shapes and 1044 Standard Hook, Lap and Bend Details and General Steel Reinforcing Information.

Other steel schedule programs may be used if they produce the following output as a minimum:

- individual bar shape dimensions
- quantity, cutting length and mass for each individual bar
- individual bar shape location in the structure
- mass of reinforcement in each element of the bridge i.e. abutments, piers and deck
- diagram of non-standard bar shapes.

When using the TMR steel schedule computer program, input data is entered into a Microsoft Word file in the format shown in Appendix A - *Example of Input Data*. An example of the format of the word file is shown in Appendix C - *Example of Steel Schedule Input*.

The computer compiles the data and produces an output containing information that is required for the cutting and bending process, total mass for each bar mark and subtotal masses for minor elements of the project. At the end of the schedule a steel summary for each grade and diameter of bar is produced, plus a summary of masses for individual sections of the job as defined by subtotal controls on the input sheet.

4.4 General

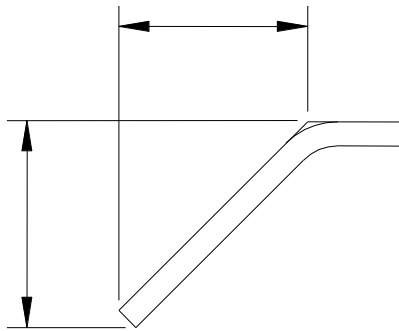
The steel program uses standard bar shapes shown on TMR Standard Drawing 1043 and details bars as per TMR Standard Drawing 1044. Bar shapes must be identical to that shown on TMR Standard Drawing 1043 including the position of hooks on applicable bars otherwise they will become non-standard. Refer 4.12 Non-standard Bars.

Except for some dimensions for variable bars (refer 4.11 Variable Bars), the computer will not calculate data for bar shapes other than those on TMR Standard Drawing 1043.

Note: Using tabs when entering text or entering data in the wrong columns will prevent the program from running correctly.

4.5 Dimensions

Dimensions are taken from the extremities of bars. Refer below:



When the angle for a bar shape can be either acute or obtuse, for example bar shape U, the computer calculates the angle and dimension C.

For a given bar shape, all dimensions shown on TMR Standard Drawing 1043, excluding those calculated automatically by the computer, must be given in the data sheet. A zero dimension is not allowable. Pin diameters must be given on the input data forms for all bars where P (pin diameter) is indicated on bar shape.

4.6 Titles

The first three lines of the input data sheet will be reproduced as a title on the top of every output page.

This title is divided into two sections; the General Title and the Job Number.

The General Title may occupy Columns 1 to 64 and the Job Number columns 65 to 80.

The computer will output the General Title centrally, and the Job Number in the top right hand corner of the page.

If the title does not require three lines the symbol “-” should be inserted in Column 1 of the remaining lines so that the first three lines on the input data sheet contain text. Alternatively the lines may be left blank.

4.7 Control of input and output

Control of input and output is afforded by control letters and numerals placed in Columns 1 to 4 as shown on the example input data sheet. Refer Appendix A - Example of Input Data.

Control letters and their purpose are as follows:

S - Leaves a blank line in the output. It shall be on a line by itself.

Blank (nothing is entered in the first line) - The rest of the line contains information about a reinforcing bar

C - This is used for any special comments or for extending the location description. The comment is printed on the same line as “C” and may occupy any location from Column 2 to 80. Input comment information is then listed on the output.

H - This is used for obtaining sub headings in the printout and for dividing the steel schedule into major elements, for example: H Abutment A

Note: “H” controls may only be preceded by controls “R”, “\$” and “P” or the title of the job. The use of any other control or text on the preceding line will cause the program to malfunction.

P - This is used to divide major elements, for example Abutment A, into a number of minor elements and to obtain a sub total for these minor elements, for example: P Subtotal Footings

\$R 1 - See ‘W’ on Appendix A - *Example of Input Data*, Page 1. Data for major elements including “P” lines are copied into files which can be recalled in total or in part to duplicate steel for other similar sections of the job. The \$R control should be on a line by itself preceding the major element to be copied. A total of nine files can be created and identified by numerals 1 to 9 in Column 4 of the input data sheet.

RT 1 - See ‘X’ on Appendix A - *Example of Input Data*, Page 2. Except for subheading, this control repeats all data stored in the file \$R1. This control must be followed by control “H” and a new subheading.

RP 1 - See “Y” on Appendix A - *Example of Input Data*, Page 2. This control should be used when only part of the data stored in the file \$R1 is required to duplicate steel for another similar section of the job. This control must be followed by control “H” and a new major element subheading, followed by “P” controls for minor elements conforming to those in the \$R file which are to be duplicated. This process should incorporate variations as required for individual cases as described in items following. There is to be an equal number of minor elements in the new major element as there was in the \$R file.

- if all of the stored data in a minor element is required to be duplicated, the previous “H” or “P” control line shall be followed by the relevant “P”
- if the whole of the minor element is to be overwritten, the new data is written before the appropriate “P” control
- if some of the old minor element is to be altered, proceed as follows:
 - control “+” followed on subsequent lines by details of bars to be added for this section of the steel schedule
 - control “-” and on the same line, bar mark only. This process deletes bars that are not required for this section.

V - Linear Variable Bar. Refer Section 4.11 Variable Bars - Linear Variable.

VF - Fanned Variable Bar. Refer 4.11 Variable Bars

M - Reinforcing mesh. Refer 4.13 Reinforcing Mesh

E - End of this job, but there is another job to follow. A steel summary will be printed and the data on the next three lines will be taken as title. Control “E” is on a line by itself

F – Finish. There is no more input data. Control “F” is on a line by itself.

4.8 Subtotals and summaries

The total mass for individual bar marks and mesh sheets is printed at the right hand side of the output sheet.

Subtotals are printed out at the end of minor elements where controls “P” are input on the coding sheet.

Summaries of steel by location and also by diameter, grade and mesh type are printed out at the end of the steel schedule.

Summaries by diameter and grade give lengths and masses for the various bar diameters as well as a total mass of the various grades for the whole job.

Summaries of mesh give area in square metres and masses for various mesh types as well as a total mass of mesh for the whole job.

Summaries by location give subtotals for minor elements as well as total mass for major elements.

4.9 Details of individual bars

Column 1, Control Letter

A blank in Column 1 indicates the rest of the data on that line refers to an individual bar.

Columns 2-3, Bar size

This is the bar size in millimetres. If there is only one figure this has to be in the right hand column (Column 3). Sizes of bars that can be processed by the computer program are as follows: 10 mm diameter to 36 mm diameter, 6.3 mm and 8 mm hard drawn wire and bars 20 mm, 25 mm and 28 mm square. Wire 6.3 mm diameter should be entered on the input data sheet as 6 mm.

Columns 4-5, Bar shape

This is the letter representing a bar shape as shown on TMR Standard Drawing 1043. If there is only one letter this has to be in the left hand column (Column 4). Bars with shape letters different from TMR Standard Drawing 1043 will be assumed to be non-standard.

Columns 6-9, Bar sequence number

Except with variable bars this is of no interest to the computer and is merely reproduced in the output.

Column 10, Steel grade and type

This is the grade and type of steel used in the bar. If this column is left blank, steel grade and type will be assumed to be D500N. Other grades and types of reinforcing steel are:

- **R** - Grade R250N (round bars)
- **N** or blank - Grade D500N (deformed bars)
- **W** - Plain hard drawn wire
- **Q** - Square bars.

Columns 11-28, Location of bar

A description of the location of the bar is written here. The location is reproduced in the output and may be continued onto the next line by control letter 'C'.

Note: Bar details shall be entered in Columns 29-80 in free format, that is, each data entry separated by a space. Refer Appendix C - Example of Steel Schedule Input.

Columns 29-69

These contain the dimensions of bars corresponding to those shown on TMR Standard Drawing 1043. Dimensions must be given to the nearest millimetre. Dimensions are to be as far right in each section as possible. Columns 59 to 63 refer Section 4.10 *Pin Diameters*.

Columns 70-71 Laps

These contain the number of laps for a length of bar that exceeds the maximum allowable length of 12 m. 12 m is the maximum allowed for ease of transport.

Use Column 71 for 1-9 laps, Columns 70 and 71 for 10+ laps.

Column 72

Lap type as follows:

- **S** denotes straight lap
- **H** denotes hooked lap.

Columns 73-76

Length of lap(s).

Columns 77-80, Number required

This is the number of bars required and is written as far to the right as possible.

4.10 *Pin diameters*

Pin diameters must be given for all bars where "P" is indicated on TMR Standard Drawing 1043. Refer to TMR Standard Drawing 1044 for details of minimum bends. Minimum pin diameter for galvanised bars is to be five x diameter for bars bent prior to galvanising and eight x diameter for bars bent after galvanising.

4.11 *Variable bars*

The steel schedule programme will calculate two types of variable bar.

- linear variable which is most commonly used
- fanned variable which is used mostly in super T-girders.

Linear variable

A set of variable bars is represented by the first bar and the last bar of the set which are written on two consecutive lines of the data sheets.

The letter V is placed in Column 1 of the first bar.

Every bar in the set is assumed to have the same shape, diameter, steel grade and type, location description, lap details, and number required as this bar.

The sequence number and dimensions corresponding to the last bar are written on the next line.

The computer will then print out a set of bars starting from the first bar with sequence numbers increasing in steps of one until the sequence number corresponding to the last bar is reached.

When any particular dimensions given for the two extreme bars are the same they are the same for all the intermediate bars.

When any particular dimensions differ there is a linear change from the dimension given for the first bar to that for the last bar.

Dimensions of intermediate bars shown in the output are rounded to the nearest millimetre. The variable bar control will work for both standard and non-standard bars.

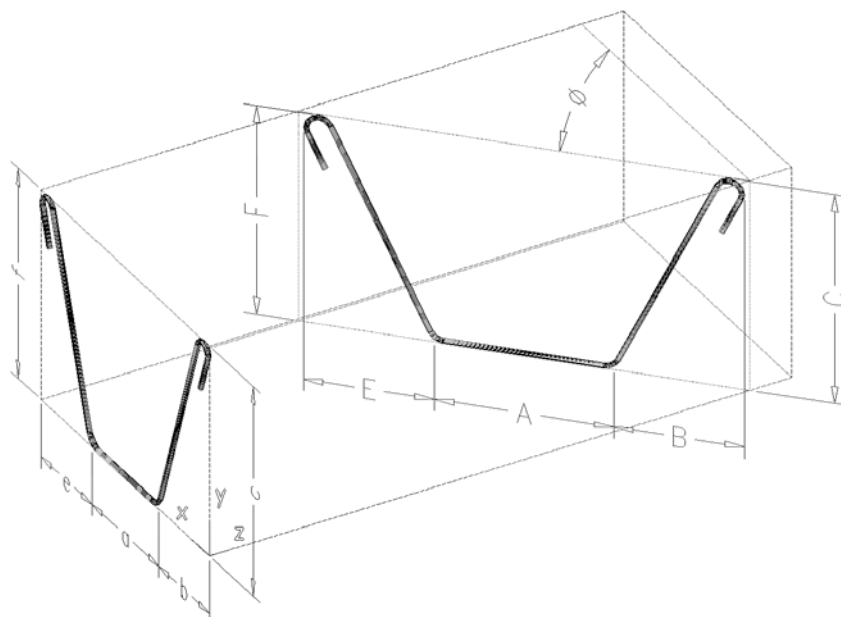
Fanned variable

The steel schedule program can calculate the varying dimension of bars placed on varying skew angles in a reinforced concrete section. This applies particularly to the skewed ends of super T- girders or headstocks where the general run of transverse reinforcement is placed square to the section while the end few transverse bars are splayed in a fan formation to ensure that the end bar is parallel to the skewed end of the section.

A linear variation of bar lengths is not appropriate as the difference from bar to bar is quite small where the bar is nearly square to the concrete section but can become quite large where the bar is at a considerable angle to the section. The actual variation has to be a function of the cosine of the skew angle of each individual bar.

A VE bar shape is used to demonstrate how the program is set up, however, the program works equally well for any shape you choose. Refer Figure 4.11-1 Fanned Variable VE Shaped Bar.

Figure 4.11-1 - Fanned Variable VE Shaped Bar



VE bar with dimensions on square section parallel to x and y.

Consider that the VE shaped bar, which has dimensions A, B, C, E and F, is to be placed at a skew angle \emptyset to the axis of the concrete member and that the projection on the concrete cross section of the bar dimensions are a, b, c, e and f. The program is set up to read in the projected dimensions a, b, c, e and f and the angle \emptyset and calculates the bar dimensions A, B, D, E and F using the following formulas:

- $A = a/\cos \emptyset$
- $*B = b/\cos \emptyset$ $C = c$
- $*E = e/\cos \emptyset$ $F = f$

* The skewed dimensions B and E are automatically adjusted in the program to accommodate the constant pin diameter of the hook so that uniform cover is maintained between the bar and the sloping side formwork.

For a series of skewed bars, where the skew changes from bar to bar in a fanned arrangement, the skew angles of the first and last bars in the set \emptyset_1 and \emptyset_2 are read in and the program calculates the skew angles of all the intervening bars.

Note that c and f are "vertical" dimensions not affected by the value of \emptyset , a, b and e are "horizontal" dimensions.

The program is general and works for any shape that is defined by a combination of "horizontal" and "vertical" dimensions. Therefore it must be told each time which dimensions are to be considered variable and which are constant. This is done by encoding the word VARIABLE, followed by the names of the "horizontal" dimensions in the location field of the input data sheets, for example for VE bars, VARIABLE ABE shows that a, b and e are to be divided by $\cos \emptyset$ while c and f are not.

The required data is a three line set similar to the V type linear variable bar sets:

Line 1	Columns 1, 2	VF	
Line 2	Columns 1	[blank]	
	Columns 2, 3	Bar diameter	
	Columns 4, 5	Shape	
	Columns 6-9	Bar number of 1 st bar in set	
	Columns 10	Grade	
	Columns 11-28	Location	
	Column 29	a b c e f pin dia No	Leaving out values for letters that are not required
Line 3	Column 1	[blank]	
	Columns 2, 3	Bar diameter	
	Columns 4, 5	Shape	
	Columns 6-9	Bar number of last bar in set	
	Column 10	Grade	
	Columns 11-28	VARIABLE ABE	Indicates that dimensions A, B and E vary with the skew, C and F are constant
	Columns 29-80	\emptyset_1 \emptyset_2	The skew angle in degrees of first and last bar in set

If the bar number in line three is coded the same as the bar number in line two, then only one bar is generated and \emptyset_1 and \emptyset_2 should be entered with the same value. This is useful if all transverse bars in a section are parallel but skewed.

The following input data example shows a 16VE bar varying in skew by 45°. There are sixteen different bars with bar marks from 16VE62 to 16VEF77. There is two of each bar mark:

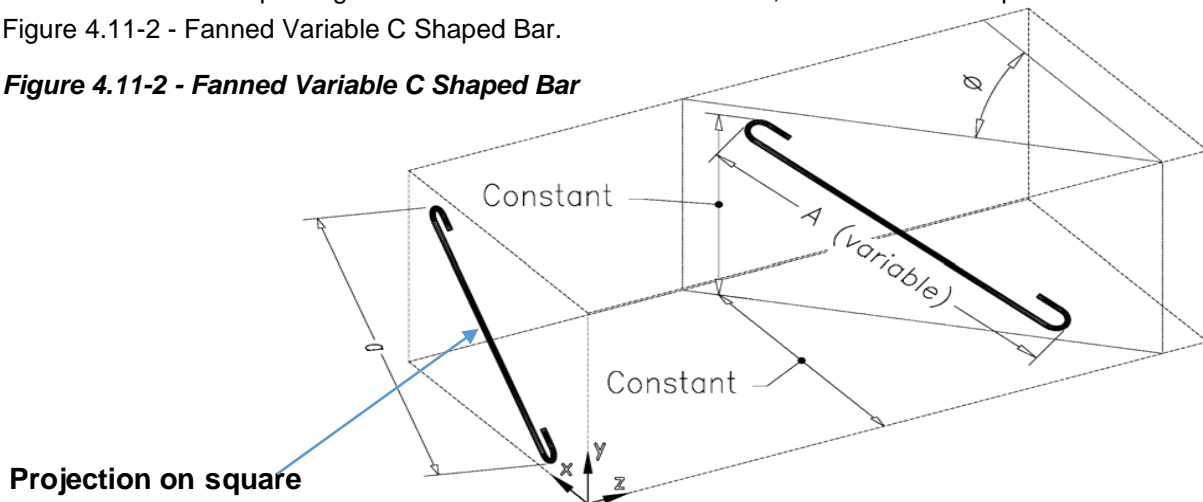
VF

16VE 62 RADIAL BARS 265 200 1400 200 1400 60 2

16VE 77 VARIABLE ABE 0 45.

The only bar shape for which the fanned variable command does not work is one in which the required bar dimension is a slope length rather than horizontal and vertical, such as the C shaped bar. Refer Figure 4.11-2 - Fanned Variable C Shaped Bar.

Figure 4.11-2 - Fanned Variable C Shaped Bar



C bar without dimensions parallel to x and y axis cannot be solved by the steel program

4.12 Non-standard bars

Bars with shapes that differ from those shown on TMR Standard Drawing 1043 are non-standard bars. These bars are to be given a shape letter or pair of letters different to those shown on TMR Standard Drawing 1043 and will be detailed as shown in 'Z' on Appendix A - *Example of Input Data*, Sheet one and the example in Appendix B - *Example of Steel Schedule Appendix*. The Appendix for non-standard bars shall be placed at the end of the reinforcing steel schedule.

The cutting length for these bars is calculated manually and must be entered in Column L of the input data sheets. The computer transfers this to the appropriate column for output and adds the relevant quantity to the steel summary.

The other dimensions of the bar should be written in the columns corresponding to the lettered dimensions shown on the drawing of the non-standard bar. These dimensions together with the length of bar in Column L will be reproduced in the output.

The number of bars required should be entered in the columns 77 to 80 of the data sheet.

4.13 Reinforcing mesh

Details should be entered in the steel schedule by use of control M. Input information format is as follows:

- M in Column 1
- fabric Type/Size in Columns 2-6
- description/location in Columns 11-28
- length of sheet in the A Columns 29-34
- width of sheet in the B Columns 35-40
- number of sheets required in Columns 77-80.

If the mesh is not a full standard sheet (6m x 2.4 m) it may be necessary to add a diagram to the output sheet to define the orientation of the different wire sizes and cutting details. The steel program processes all types of mesh as listed below:

RL1218	RL1018	RL818
SL102	SL92	SL82
SL81 SL72	SL62	
L12TM	L11TM	L8TM.

The following input data example shows full sheets of SL81 mesh and four half sheets of RL1218 mesh:

<i>MSL81</i>	<i>MESH</i>	<i>6000</i>	<i>2400</i>	<i>2</i>
<i>MRL1218</i>	<i>MESH</i>	<i>3000</i>	<i>2400</i>	<i>4.</i>

4.14 Tolerances for scheduling reinforcement

The correct application of tolerances will assist in avoiding the problem of reinforcement being theoretically correct, but incorrect in practice due to construction tolerances. Cover to reinforcement is liable to variation on account of the cumulative effect of small errors in the dimensions of formwork and the cutting, bending, and fixing of the reinforcement (constructions tolerances).

Except where they are used as fitment bars, the following tolerances shall be added to the overall length of straight A shaped bars:

- 25 mm for bar lengths up to 600 mm
- 40 mm for bar lengths over 600 mm.

Tolerance shall not be applied to fitment bars because adequate construction tolerances are allowed for in the following TMR Standard Specifications:

PSC deck units and girders

- Formwork for girders and deck units shall in accordance with MRTS73 *Manufacture of Prestressed Concrete Members and Stressing Units*, 7.3.5 Out of Square
- Cover to reinforcement shall be in accordance with MRTS73 *Manufacture of Prestressed Concrete Members and Stressing Units*, 7.3.3 Location of Tendons and Reinforcing Steel

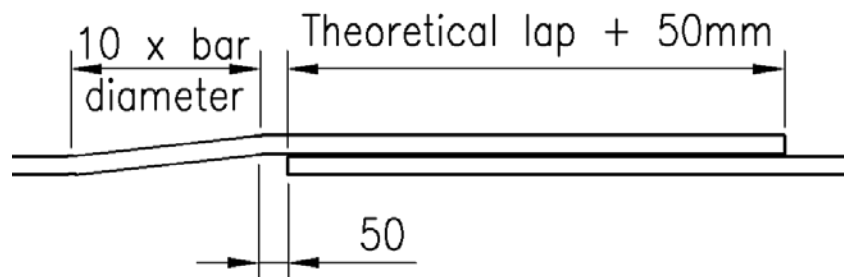
- Reinforcement is bent in accordance with the tolerances shown in MRTS71 *Reinforcing Steel*, 7 Cutting and Bending.

Cast insitu concrete

- Concrete cross sectional dimensions and cover to reinforcement shall be in accordance with MRTS70 *Concrete*, Table 22.2 - Dimensional Tolerance
- Reinforcement is bent in accordance with the tolerances shown in MRTS71 *Reinforcing Steel*, 7 Cutting and Bending.

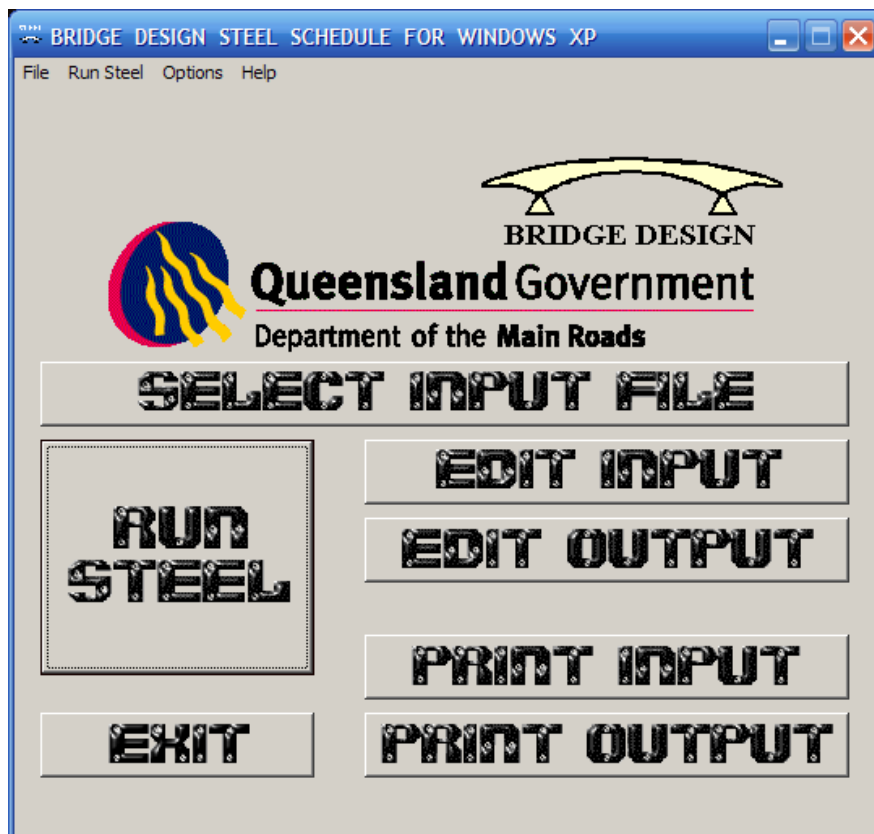
50 mm of tolerance shall be added to the lap of cranked bars. Refer Figure 4.14-1 - Cranked Bars.

Figure 4.14-1 - Cranked Bars



4.15 Printing steel schedule output

The steel schedule program is written to print output to Hewlett Packard printers. In the menu hit the 'PRINT OUTPUT' button after hitting the 'RUN STEEL' button.



To print output on other printers hit the 'RUN STEEL' button then the 'EDIT OUTPUT' button.

In Microsoft Word, set the page to landscape then highlight all the text and make sure it is eight points high, plain text and courier new font. Delete the first page as it is not relevant, then print the steel schedule. Refer Appendix D - Example of Steel Schedule Output.

4.16 Further assistance with the steel schedule program

For further assistance with the steel scheduling program, contact Sean Flanagan (TMR Bridge and Marine Engineering Section) on 07 3066 6377 or sean.m.flanagan@tmr.qld.gov.au

4.17 Mass of reinforcement

The steel scheduling program uses the following details to calculate the mass of reinforcement:

Deformed reinforcement

- 10 mm diameter bar - 0.632 kg/m
- 12 mm diameter bar - 0.910 kg/m
- 16 mm diameter bar - 1.619 kg/m
- 20 mm diameter bar - 2.528 kg/m
- 24 mm diameter bar - 3.640 kg/m
- 25 mm diameter reidbar - 3.854 kg/m
- 28 mm diameter bar - 4.955 kg/m
- 32 mm diameter bar - 6.471 kg/m
- 36 mm diameter bar - 8.190 kg/m
- 40 mm diameter bar - 10.112 kg/m.

Round bar reinforcement

- 6 mm diameter bar - 0.222 kg/m
- 10 mm diameter bar - 0.617 kg/m
- 12 mm diameter bar - 0.888 kg/m
- 16 mm diameter bar - 1.578 kg/m
- 20 mm diameter bar - 2.466 kg/m
- 24 mm diameter bar - 3.551 kg/m
- 28 mm diameter bar - 4.834 kg/m
- 32 mm diameter bar - 6.313 kg/m
- 36 mm diameter bar - 7.990 kg/m
- 40 mm diameter bar - 9.864 kg/m.

Rectangular mesh (6m x 2.4m sheet)

- RL718 – 67 kg/sheet
- RL818 – 79 kg/sheet
- RL918 – 93 kg/sheet
- RL1018 – 109 kg/sheet
- RL1118 – 1300 kg/sheet
- RL1218 – 157 kg/sheet.

Square mesh (6m x 2.4m sheet)

- SL52 – 20 kg/sheet
- SL62 – 33 kg/sheet
- SL72 – 41 kg/sheet
- SL82 – 52 kg/sheet
- SL92 – 66 kg/sheet
- SL102 – 80 kg/sheet
- SL81 – 105 kg/sheet.

Trench mesh (6m long)

- L8TM200 (200 mm wide strip) – 7 kg/sheet
- L8TM300 (300 mm wide strip) - 9.1 kg/sheet
- L8TM400 (400 mm wide strip) - 11.2 kg/sheet
- L11TM200 (200 mm wide strip) - 13.5 kg/sheet
- L11TM300 (300 mm wide strip) -17.8 kg/sheet
- L11TM400 (400 mm wide strip) – 22 kg/sheet
- L12TM200 (200 mm wide strip) - 16.8 kg/sheet
- L12TM300 (300 mm wide strip) - 22.1 kg/sheet
- L12TM400 (400 mm wide strip) - 27.3 kg/sheet.

Appendix A - Example of Input Data – Sheet 1

FORM 16 SHV (12/73)

PAGE 1 of 4

CONTROL	BAR SIZE	SHAPE	BAR NO.	GRADE	LOCATION	DIMENSIONS (mm)										LAPS		No. REQ'D		
						A	B	C	E	F	P	L	No.	Type	Length					
1	NEBO	CREEK	BRIDGE																	
2	NEBO	SHIRE	SUTTOR DEVELOPMENTAL ROAD (NEBO MIT C/O LON)																	
3	T44	LOADING	MULTI AXLE VEHICLE																	
4	H		ABUTMENT A (DRG No. 279 000)																	
5	28E	1	FOOTING																	
6	24S	2	FOOTING																	
7	20XX	3	FOOTING																	
8	G																			
9	P																			
10	V16D	4	FRONT WALL																	
11	16D	25	FRONT WALL																	
12	P																			
13	24E	26	HEADSTOCK																	
14	16S	27	HEADSTOCK																	
15	10D	28R	HEADSTOCK																	
16	C		BAR'S MARKED 20D28-Y TO BE HOT DIP GALVANISED																	
17	S		Leaves a blank line in the output																	
18	P																			
19	W \$ R 1		Places the following major element data in File 1																	
20	H		PIER 1 (Dir. No. - -)																	
21	12P	29	CYLINDERS US & DS 1050																	
22	S		Welded lap details for 'P' bars are printed automatically in the output																	
23	S																			
24	30		CYLINDERS US & DS 3600																	
25																				
26																				
27																				
28																				
29																				
30																				
31																				
32																				
33																				
34																				
35																				
36																				

Leave column 10 blank for grade 410y bars. All other grades of bars are to be designated in column 10.

Appendix A - Example of Input Data – Sheet 2

FORM 634V (12/73)

PAGE 2 OF 4

CONTROL	BAR SIZE	SHAPE	BAR NO.	GRADE	LOCATION	DIMENSIONS (mm)						LAPS		No. REQ'D	
						A	B	C	E	F	P	L	No.		LENGTH
1	28A	31	12	CYLINDERS US & DS	2900										6
2	16S	32	13	CYLINDERS US & DS	500	400				48					4
P									CYLINDERS SUB - TOTAL						
3	28A	33	14	COLUMNS US & DS	2500										12
4	12S	34	15	COLUMNS US & DS	600	400				36					8
5	12SX	35	16	COLUMNS US & DS	300	200				36					8
P									COLUMNS SUB - TOTAL						
6	28D	36	17	HEADSTOCK	5000	600				140					8
7	28ND	37	18	HEADSTOCK	5000	1000	280			600					8
8	16S	38	19	HEADSTOCK	650	600				48					20
P									HEADSTOCK SUB - TOTAL						
X	RT 1														
H					PIER 2 (Drig No. - - -)										
Y	RP 1														
H															
+															
28A	39				CYLINDERS US & DS	4500									36
-28A	31														
-16S	32														
P															
24E	50				COLUMNS	7050	500	500			120				11
28E	51				COLUMNS	7050	500	500			140				6
28A	52				COLUMNS	7000									5
16S	53				COLUMNS	1800	700				48				24

Deletes bars 28A31-Y & 16S32Y, but repeats details of bars 12P29-Y & 28A30-Y

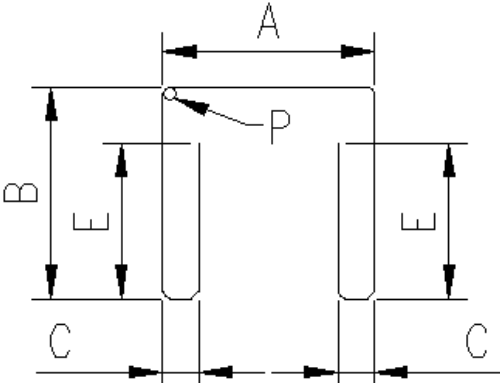
CYLINDERS SUB - TOTAL

Replaces bars 33,34 & 35 with bars 50-53

Appendix A - Example of Input Data – Sheet 3

CONTROL	BAR SIZE	SHAPE	BAR NO.	GRADE	LOCATION		DIMENSIONS (mm)						LAPS		No. REQD	
					A	B	C	E	F	P	L	No.	TYPE	LENGTH		
P	28D	41	HEADSTOCK													
P	32D	43	FOOTING													
P	32D	43	FOOTING													
P	32D	43	FOOTING													
R	P	1	PIER 4 (Dirg No - - -)													
H	32E	41	FOOTING													
H	16S	42	FOOTING													
H	32D	43	FOOTING													
Note: Cylinder bars automatically deleted as control P & description CYLINDERS SUB-TOTAL is not entered on the data sheet																
R	P	1	PIER 5 (Dirg No - - -)													
H	28D	36	HEADSTOCK													
H	28D	41	HEADSTOCK													
Inserts 28D41-Y in the position previously occupied by 28D36-Y Replaces bars 28ND37-Y & 16S38-Y																
P	HEADSTOCK SUB-TOTAL															

Appendix B - Example of Steel Schedule Appendix

<p>GILBERT RIVER BRIDGE CARPENTARIA SHIRE SM1600 and HLP400 LOADING</p>	<p>APPENDIX</p>
	<p>JOB NUMBER 31/89B/30</p>
	
<p>PIN DIA = 64 mm CUTTING LENGTH = 4350 mm</p>	
<p><u>16XE2 BAR</u></p>	
<p>STEEL SCHEDULE APPENDIX_A.DWG</p>	

Appendix C - Example of Steel Schedule Input

GILBERT RIVER BRIDGE PRECAST HEADSTOCKS			JOB NUMBER
MT ISA CITY BARKLY HIGHWAY (CAMOOWEAL-BORDER) SM1600 LOADING			13/212/16
H	ABUTMENT HEADSTOCK (DRG NO 376311)		
C	NUMBER OF BARS SHOWN IS FOR ONE HEADSTOCK ONLY		
C	ABUTMENT HEADSTOCK NO OFF = 2		
S			
16S	1	HEADSTOCK	570 880 64 60
16XE	2	HEADSTOCK	880 880 140 800 64 4350 15
32E	3	HEADSTOCK	9280 700 700 160 8
P		ABUTMENT HEADSTOCK SUB-TOTAL	
F			

Appendix D - Example of Steel Schedule Output – Sheet 1

DEPARTMENT OF MAIN ROADS QUEENSLAND										STEEL SCHEDULE (Ver. 14.01)		SHEET NO. 1 OF 3		DATE 26 OCT 2011	
OUTPUT	GILBERT RIVER BRIDGE PRECAST HEADSTOCKS										JOB NUMBER				
CHECK	MT ISA CITY BARKLY HIGHWAY (CAMOOWEAL-BORDER)										13/212/16				
	SM1600 LOADING														
	Datafile = J:\Drafting\Steel\MANUAL.txt														
DIA	SHAPE	GRADE	A	B	C	E	F	FIN DIA	L	LAPS	BAR NO	TOTAL MASS	DIAGRAM		
SEQ NO	LOCATION	MM	MM	MM	MM	MM	MM	P MM	MM	NO LGTH	LENGTH REQD	(KG)			

* ABUTMENT HEADSTOCK (DRG NO 376311) *															

NUMBER OF BARS SHOWN IS FOR ONE HEADSTOCK ONLY															
ABUTMENT HEADSTOCK NO OFF = 2															
16 S	1	HEADSTOCK	570		880			64			3280	60	318.6		
16 XE	2	HEADSTOCK	880		880	140	800	64			4350	15	105.6 See Appendix		
32 E	3	HEADSTOCK	9280	700	700			160			10533	8	545.3		
-----												ABUTMENT HEADSTOCK SUB-TOTAL		970 KGS	
-----												GRADE D500N BARS			

NOTES: 1. FOR FURTHER DETAILS SEE DRAWINGS 1043 AND 1044.
 2. LAP TYPE: "S"-STRAIGHT LAP, "H"-HOOKED LAP.
 3. ALL REINF. STEEL TO BE ACRS CERTIFIED, GRADE D500N OR R250N TO AS/NZS 4671 [D500N Grade "Blank", R250N Grade "R"]

Appendix D – Example of Steel Schedule Output – Sheet 2

DEPARTMENT OF MAIN ROADS QUEENSLAND STEEL SCHEDULE (Ver 14.01) SHEET NO. 2 OF 3 DATE 26 OCT 2011
 GILBERT RIVER BRIDGE PRECAST HEADSTOCKS JOB NUMBER
 MT ISA CITY BARKLY HIGHWAY (CAMOOWEAL-BORDER) 13/212/16
 SM1600 LOADING

STEEL SUMMARY BY LOCATION

 * ABUTMENT HEADSTOCK (DRG NO 376311) *

 ABUTMENT HEADSTOCK SUB-TOTAL GRADE D500N BARS 970 KGS

TOTAL . . . BARS 970 KGS

DEPARTMENT OF MAIN ROADS QUEENSLAND STEEL SCHEDULE (Ver 14.01) SHEET NO. 3 OF 3 DATE 26 OCT 2011
 GILBERT RIVER BRIDGE PRECAST HEADSTOCKS J OB NUMBER
 MT ISA CITY BARKLY HIGHWAY (CAMOOWEAL-BORDER) 1 3/212/16
 SM1600 LOADING

STEEL SUMMARY BY DIAMETER AND GRADE

GRADE D500N BARS	10	12	16	20	24	25	28	32	36	40
MASS/METRE	0.632	0.910	1.619	2.528	3.640	3.854	4.955	6.471	8.190	10.112
LENGTH (METRE)	0.000	0.000	2.620	0.000	0.000	0.000	0.000	84.000	0.000	0.000
MASS (KG)	0.00	0.00	424.26	0.00	0.00	0.00	0.00	545.27	0.00	0.00
TOTAL MASS	969.53 KG			0.970 TONNE						

GRAND TOTAL MASS 969.53 KG 0.970 TONNE

