THE BRIDGE INTERMEDIATE BENT GRAPHICS COMPUTER PROGRAM

USER'S MANUAL

PRESENTED BY THE

GEORGIA DEPARTMENT OF TRANSPORTATION

OFFICE OF BRIDGE DESIGN

G. C. LEWIS, P.E.

STATE HIGHWAY BRIDGE ENGINEER

PROGRAM WRITTEN BY : EDWIN H. GRATTON, P.E.

DATE: 2-1-88

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1.0 DESCRIPTION OF PROGRAM BRIBNT

The "Intermediate Bent Graphics" program generates the following sections:

A. Plan view of cap
B. Elevation view of bent
C. Side elevation view of footing (If requested)
D. Cross section views of cap
E. Cross section view of column
F. Pile layout (If required)
G. Quantities table
H. Elevation Table (If required)

2.0 INPUT DESCRIPTION OF PROGRAM BRIBNT

The input file should be created in node CCC.
The input data cards MUST be in the following order:

1) "0" - data - comments/description
2) "1" - data - cap dimension data
3) "2" - data - cap step distances
4) "3" - data - cap step elevations
5) "4" - data - centerline beam distances
6) "5" - data - column data
7) "6" - data - footing data
8) "7" - data - bottom of footing elevations

A. INDENTIFICATION (0 in cc 1)

1.) IDENTIFICATIONS AND COMMENTS (cc 3-79)

The identification consists of one line of input data containing pertinent identifying remarks.

B. CAP DIMENSION DATA (1 in cc 1)

The number one (1) in card column one is for identification of the cap dimension data.

1.) SCA (cc 4) Form: x

Enter the scale of the drawing. Choose from the following (No Default) :

TYPE	SCALE SIZE
1	1/2 IN/FT
2	3/8 IN/FT
3	1/4 IN/FT

2.) NB (cc 5-6) Form: xx

Enter the number of bents that this program will represent. All the bents represented MUST have the identical structural dimensions. Only the elevations for the cap and the footings may vary from bent to bent (No Default).

3.) SYM (cc 8) Form: x

Enter the number 1 if the bent is unsymmetrical. The default is that the bent is symmetrical. If the bent is unsymmetrical then the program will place the cap steel across the entire cap length.

4.) LA (cc 10) Form: x

Enter the number 1 if the plot will be looking back at the bent. The default is that the plot will be looking ahead.

B. CAP DIMENSION DATA CONT.

5.) BRG (cc 12) Form: x

Enter the number 1 if there is to be a dowel bar hole at the center of bearing. Enter the number 2 if there are to be two anchor bolt holes at the center of bearing. The default is that no holes will be placed in the beam bearing area.

6.) BRDIST (cc 13-17) Form: xx.xxx feet

Enter the distance from the center of the bent to the center of the bearing in feet (No Default). The distance is measured perpendicular to the centerline of cap.

7.) BCAP (cc 18-22) Form: xx.xxx feet

Enter the width of the cap in feet (No Default).

8.) DCAP (cc 23-27) Form: xx.xxx feet

Enter the depth of the cap in feet (No Default).

9.) LCAP 1 ....6 (cc 28-32, 33-37, 38-42, 43-47, 48-52, 53-57)
Form: xx.xxx feet

Enter the lengths of the cantilever/cap portions of the bent in feet. The length is from the centerline of the adjacent column to the end of the cantilever or centerline of the other adjacent column (No Default).

C. CAP STEP DISTANCES (2 in cc 1)

The number two (2) in card column one is for identification of the Cap Step Distance Data. There are two lines of input for this data. The first line of data is for the back part of the bent and the second line of data is for the front part of the bent.

1.) P (cc 3) Form: x

Enter the number 1 in the second line of data if the ahead cap step distances are to be the same as the back cap step distances. This input is not used in the first line of data.

2.) NS (cc 4-5) Form: xx

Enter the number of steps (No Default).

3.) CDIST 1 .....14 (cc 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, 61-65, 66-70, 71-75)
Form: xx.xxx feet

Enter the Cap Step Distances for each step in feet. For example CDIST 1 is the distance from the left edge of the cap to beginning of the second step. CDIST 2 is the distance from where DIST 1 ends to where CDIST 3 begins.

D. CAP STEP ELEVATIONS (3 in cc 1)

The number three (3) in card column one is for identification of the Cap Step Elevation Data. There are two lines of input for each Intermediate bent that is to be represented. The first line of data is for the back part of the bent and the second line of data is for the front part of the bent.

1.) BN (cc 3-4) Form: xx

Enter the bent number for which the cap elevations are to be entered. This input is only needed for the first line of data for each bent (No Default). This input controls the middle digit of the bar numbers.

2.) P (cc 5) Form: x

For each bent represented enter the number 1 in the second line of the Cap Step Elevation data if the ahead cap step elevations are to be the same as the back cap step distances. This input is not used in the first line of data (No Default).

3.) LEFT (cc 6-11) Form: xxxx.xx

For each bent represented enter the elevation of the left bottom corner of the cap in the first line of the Cap Step Elevation data.

4.) RIGHT (cc 12-17) Form: xxxx.xx

For each bent represented enter the elevation of the right bottom corner of the cap in the first line of the Cap Step Elevation data.

5.) STEP 1 .....10 (cc 18-23, 24-29, 30-35, 36-41, 42-47, 48-53, 54-59, 60-65, 66-71, 72-77)
STEP 11 .....14 (cc 18-23, 24-29, 30-35, 36-41)
Form: xxxx.xx

For each bent represented enter the Cap Step Elevations. If there are more than 10 steps then an additional line of input is required with the BN, P, LEFT and RIGHT codes left blank.

E. BEARING DISTANCES (4 in cc 1)

The number four (4) in card column one is for identification of the Cap Bearing Distance Data. There are two lines of input for this data. The first line of data is for the back part of the bent and the second line of data is for the front part of the bent.

1.) P (cc 3) Form: x

Enter the number 1 in the second line of data if the ahead cap bearing distances are to be the same as the back bearing step distances. This input is not used in the first line of data.

2.) ANG (cc 4-6) Form: xxx Degrees

Enter the angle that closely represents the skew of the beams to the bent. The angle is measured counterclockwise from the center line of the cap to the center line of the beams. The angle will start on the left side of the bearing for the back part of the bent and on the right side of the bearing for the front part of the bent. The default is 90 degrees for both the back of the bent and the front of the bent. See the bent illustration on page 10 for further explanation.

3.) BDIST 1 .....14 (cc 7-11, 12-16, 17-21, 22-26, 27-31, 32-36, 37-41, 42-46, 47-51, 52-56, 57-61, 62-66, 67-71, 72-76)
Form: xx.xxx feet

Enter the Cap Bearing Distances for each Bearing in feet measured along the centerline of the cap. For example BDIST 1 is the distance from the left edge of the cap to the first bearing. BDIST 2 is the distance from the first bearing to the second bearing (No Default).

F. COLUMN DATA (5 in cc 1)

The number five (5) in card column one is for identification of the Column Data.

1.) NCOL (cc 3-4) Form: xx

Enter the number of columns in the intermediate bent (No Default).

2.) B FACE (cc 5-9) Form: xx.xxx feet

Enter the width of the column perpendicular to the pier in feet (No Default).

3.) D FACE (cc 10-14) Form: xx.xxx feet

Enter the width of the column parallel to the pier in feet (No Default).

F. COLUMN DATA CONT.

4.) BAR (cc 15-16) Form: xx
Enter the main reinforcing bar size in the column (No Default).

5.) NB (cc 17-18) Form: xx
Enter the number of reinforcing bars in the B face of the columns INCLUDING the corner bars.

6.) ND (cc 19-20) Form: xx
Enter the number of reinforcing bars in the D face of the columns EXCLUDING the corner bars.

G. FOOTING DATA (6 in cc 1)
The number six (6) in card column one is for identification of the Footing Data.

1.) S (cc 3) Form: x
Enter the number 1 if a side view of the footing is to be drawn. The default is that no side view will be drawn.

2.) BF (cc 4-8) Form: xx.xxx feet
Enter the width perpendicular to the pier of the footings in feet (No Default).

3.) DF (cc 9-13) Form: xx.xxx feet
Enter the width parallel to the pier of the footings in feet (No Default).

4.) TF (cc 14-18) Form: xx.xxx feet
Enter the thickness of the footings in feet (No Default).

5.) TRANS BAR (cc 19-20) Form: xx
Enter the Transverse Reinforcement Bar size in the footing (No Default).

6.) TRANS NUM (cc 21-22) Form: xx
Enter the number of Transverse Reinforcment bars in the footing (No Default).

7.) LONG BAR (cc 23-24) Form: xx
Enter the Longitudinal Reinforcement bar size in the footing (No Default).

G. FOOTING DATA CONT.

8.) LONG NUM (cc 25-26) Form: xx

Enter the number of Longitudinal Reinforcement bars in the footing (No Default).

9.) LONG T (cc 27) Form: x

Enter the number 1 if longitudinal bars are on top of the transverse bars in the footing while looking at the front of the bent. The default is that the transverse bars are on top of the longitudinal bars in the footing.

10.) P (cc 28-29) Form: xx

P is the pile footing option. Enter the type of pile as follows.

TYPE	PILE	TYPE	PILE
1	10 BP 42	5	14 IN. SQ. PSC
2	12 BP 53	6	16 IN. SQ. PSC
3	14 BP 73	7	14 IN. Metal Shell
4	12 IN. SQ. PSC	8	16 IN. Metal Shell

The default is that there are no piles in the footing. If there are no piles in the footing then go to the next line of input.

11.) NP (cc 30-31) Form: xx

Enter the number of piles per footing (No Default). No input is required if the pile footing option is not selected.

12.) BP (cc 32-36) Form: xx.xxx feet

BP is the pile spacing parameter measured parallel to the footing dimension BF. The pile layouts are shown on pages 11 and 12 to illustrate the positioning of the piles. Input BP in feet (No Default). No input is required if the pile footing option is not selected.

13.) DP (cc 37-41) Form: xx.xxx feet

DP is the pile spacing parameter mesured parallel to the footing dimension DF. The pile layouts are shown on pages 11 and 12 to illustrate the positioning of the piles. Input DP in feet (No Default). No input is required if the pile footing option is not selected.

H. BOTTOM OF FOOTING ELEVATION DATA (7 in cc 1)

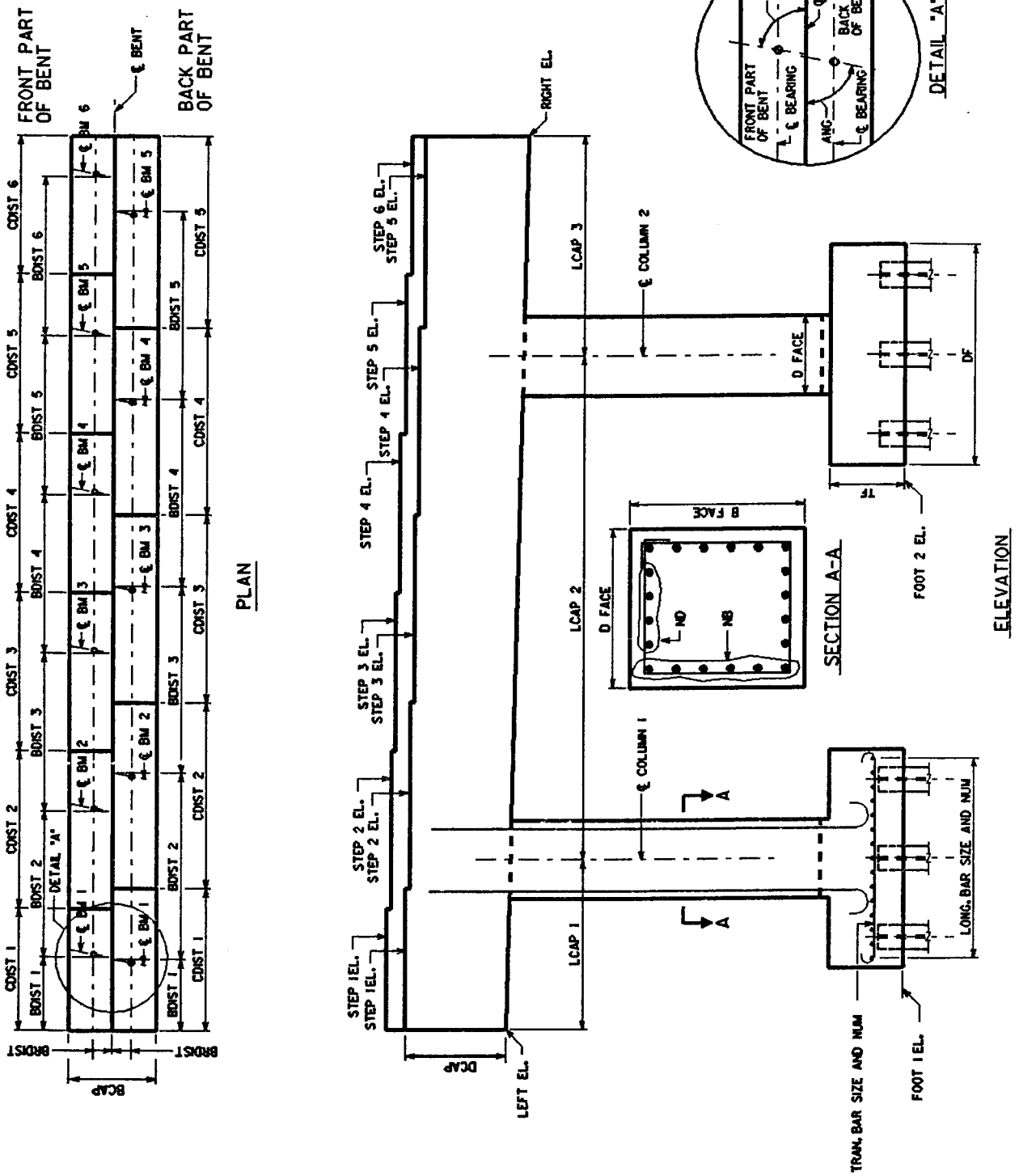
The number seven (7) in card column one is for identification of the Bottom of Footing Elevation Data. There is one line of input for each Intermediate bent that is to be represented.

1.) FOOT 1 ..... 5 (cc 3-8, 9-14, 15-20, 21-26, 27-32)

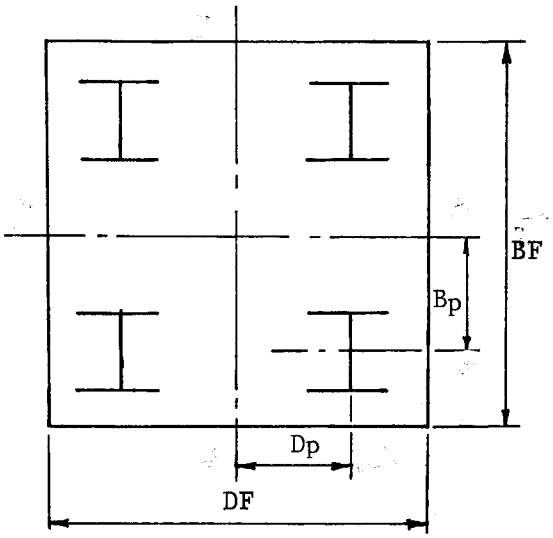
Form: xxxx.xx

Enter the bottom of footing elevations for each bent that is to be represented by the plot. If all footing elevations for a bent are the same, then only the elevation for FOOT 1 has to be entered.

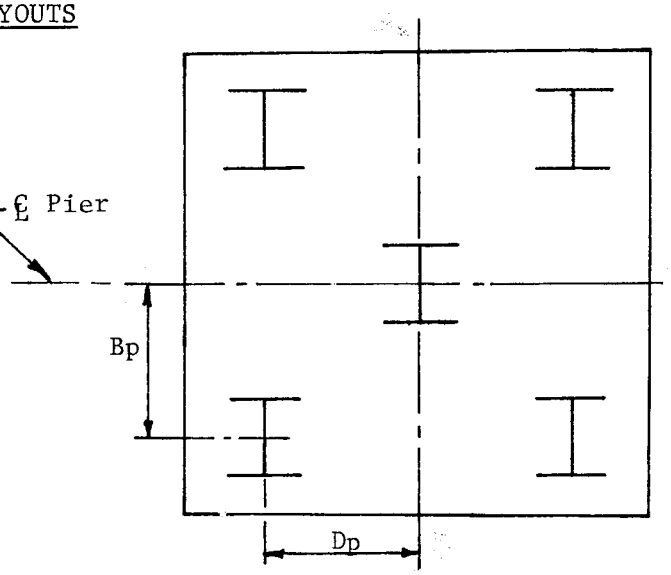
BENT DIAGRAM



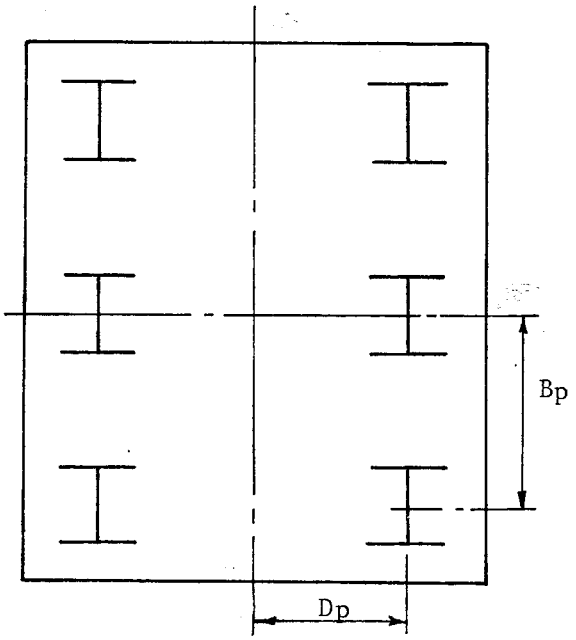
PILE LAYOUTS



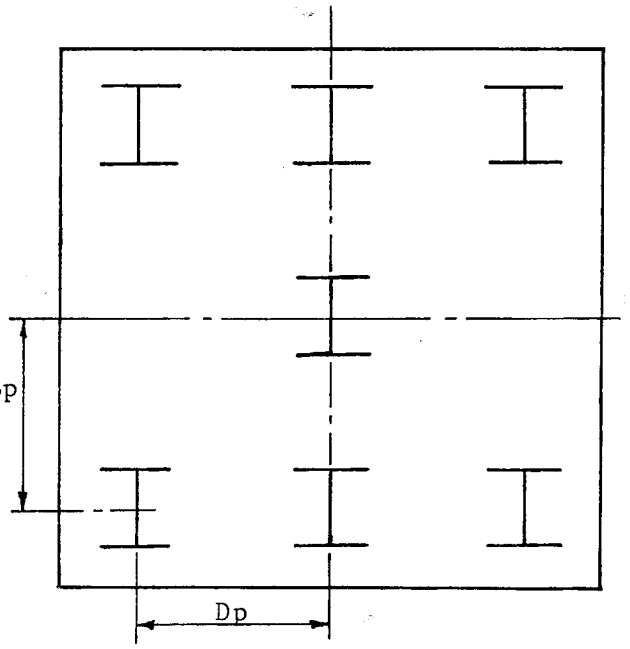
4 Piles



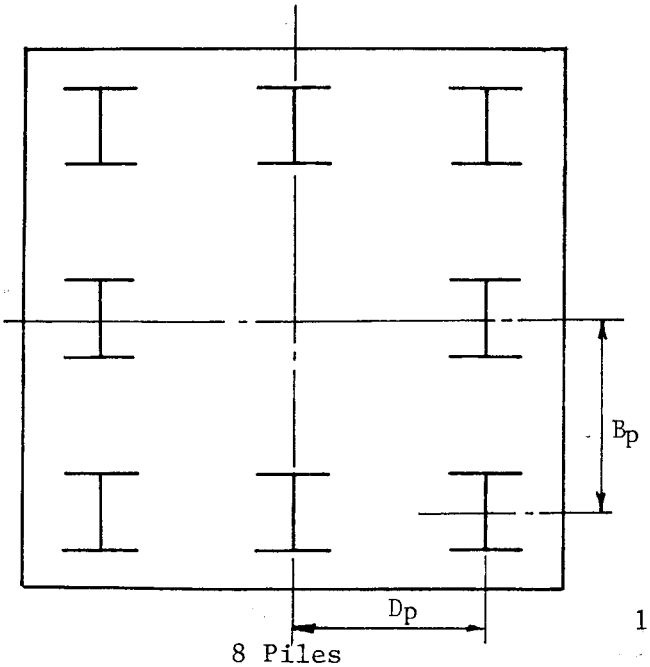
5 Piles



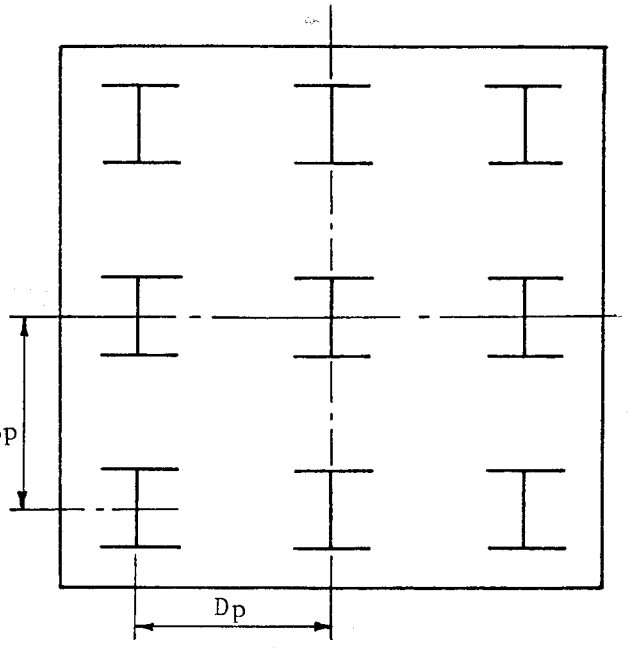
6 Piles



7 Piles

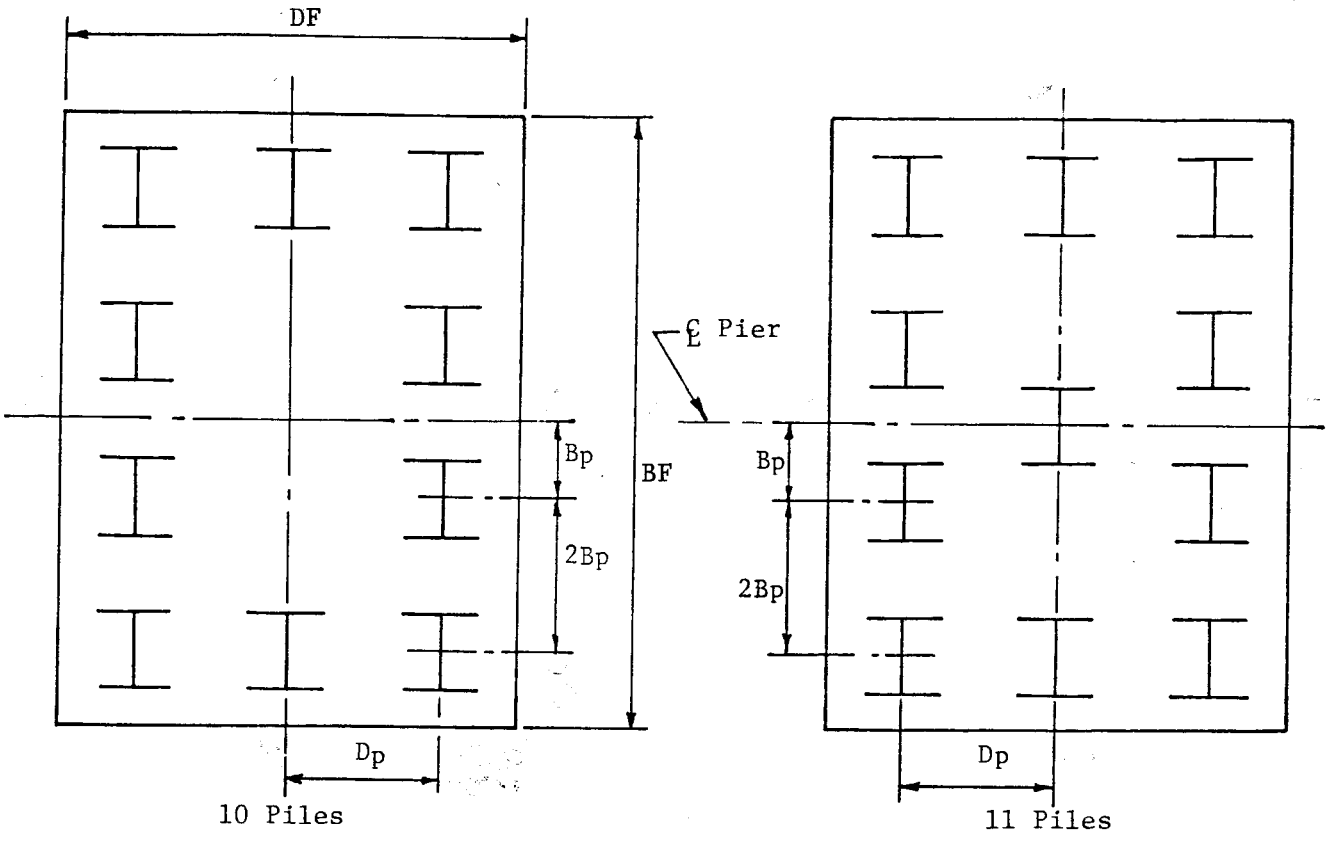


8 Piles



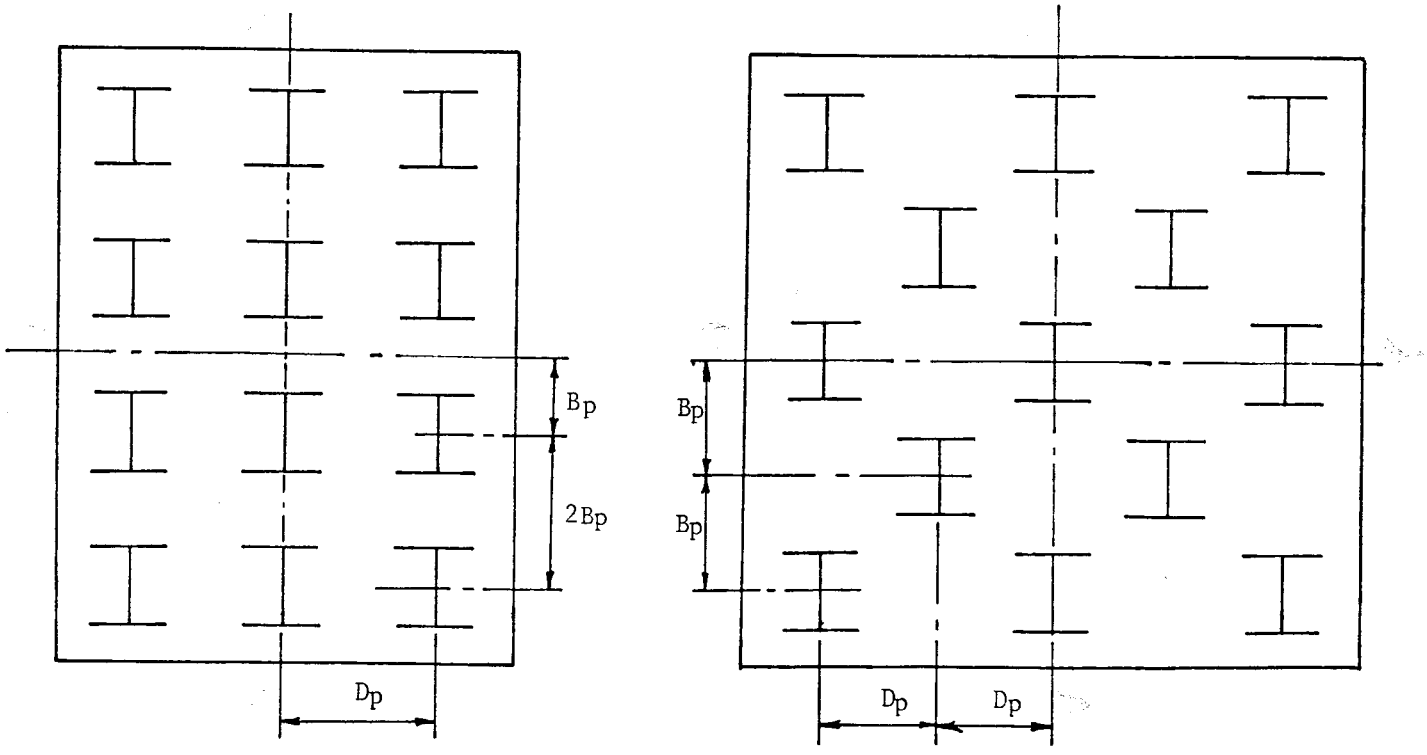
9 Piles

PILE LAYOUTS



10 Piles

11 Piles



12 Piles

13 Piles

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BRIDGE INTERMEDIATE BENT GRAPHICS PROGRAM (BRIBNT)

PROJECT NO., COUNTY, NAME, DATE, REMARKS, ETC.

0

CAP DATA

	SCA	NB	SYM	LA	BRG	BRDIST (FT)	BCAP (FT)	DCAP (FT)	LENGTH OF CAP SEGMENTS (FT) LCAP 1	LCAP 2	LCAP 3	LCAP 4	LCAP 5	LCAP 6
1														

	P	NS	CAP STEP DISTANCES (FT) CDIST 1	CDIST 2	CDIST 3	CDIST 4	CDIST 5	CDIST 6	CDIST 7	CDIST 8	CDIST 9	CDIST 10
2												
2												

DETAIL OPTIONS - FOR CAP

SCALE
1 = 1/2"/FT.
2 = 3/8"/FT.
3 = 1/4"/FT.

SYM
0 = SYMMETRICAL (DEF.)
1 = UNSYMMETRICAL

LA
0 = LOOKING AHEAD (DEF.)
1 = LOOKING BACK

BRG
1 = DOWEL BAR
2 = ANCHOR BOLTS

	BN	P	CAP STEP ELEVATIONS LEFT	RIGHT	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8	STEP 9	STEP 10
3														
3														
3														
3														
3														
3														
3														
3														
3														
3														
3														
3														

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CAP DATA

	P	ANG	BEARING DISTANCES (FT)									
			BDIST 1	BDIST 2	BDIST 3	BDIST 4	BDIST 5	BDIST 6	BDIST 7	BDIST 8	BDIST 9	BDIST 10
4												
4												

COLUMN DATA

	NCOL	DIMENSIONS (FT)		REINF.		
		B FACE	D FACE	BAR	NB	ND
5						

FOOTING DATA

	S	DIMENSIONS (FT)			REINF.					PILE DATA			
					TRANS		LONG						
		BF	DF	TF	BAR	NUM	BAR	NUM	T	P	NP	BP (FT)	DP (FT)
6													

	BOTTOM OF FOOTING ELEVATIONS				
	FOOT 1	FOOT 2	FOOT 3	FOOT 4	FOOT 5
7					
7					
7					
7					
7					
7					
7					
7					
7					
7					
7					
7					
7					
7					

DETAIL OPTIONS - FOR FOOTING

S - SIDE VIEW OF FOOTING

0 = NO (DEF.)

1 = YES

T- LONGITUDINAL TOP

0 = ON BOTTOM (DEF.)

1 = ON TOP

P - PILE TYPE

BLANK = NO PILES

1 = 10BP42

2 = 12BP53

3 = 14BP73

4 = 12 IN. SQ. PSC

5 = 14 IN. SQ. PSC

6 = 16 IN. SQ. PSC

7 = 14 IN. O.D. METAL SHELL

8 = 16 IN. O.D. METAL SHELL

6.0 HOW TO RUN BRIBNT

Before you attempt to run the program, insure that the input file has been created in node CCC as required. The program BRIBNT will run only in node CCC.

- To run the program (BRIBNT) in node CCC the user must be out of the graphics mode.

- When the user is in the dollar prompt mode, he may start the deck section program by typing

  BRIBNT

  - The program will prompt

    Enter Input File:
    Enter Intergraph Output File:__.INT
    Enter Output Name For Concrete Quantities:
    Enter Output Name For Rebar Quantities:

    - The Intergraph Output File must have the INT trailer so that the graphics conversion program can be run.

    - The Concrete quantities will be per intermediate bent.

    - The Output for the Rebar quantities is actually the input for the RBAR Quantities Program (BRRBAR). See the Quantity Discussion on page 16.

  - When the program is completed the dollar prompt will appear.

- Run the conversion program that takes the INT File and creates the Graphics Design File (DGN) by typing

  GATRANS

  - The program will prompt

    Enter INT file for graphics translation : filename.INT

    This is a batch job and will take some time to create a graphics file called filename.DGN.

    To check on the completion of the GATRANS program, type SH QUE to see if the batch job is completed.

7.0 QUANTITY DISCUSSION

A.) Concrete Quantities

The Concrete Quantity output will include the following:

- A listing of the input data.
- A listing of the Concrete Quantities per bent, broken down with the following data:
  - Cap
  - Columns
  - Footings
- A summary of the quantities per bent with a quantity summary.

B.) Steel Quantities

The output file for the steel quantities is actually the input for the Rebar Quantities Program (BRRBAR). This file can be edited or it can be used as is for the BRRBAR program. Since this file is in Node CCC the user must NET over the file to Node BBB so that BRRBAR can be run. The steel quantities are listed per bent.

The steel quantities will be incomplete for the cap portion of the intermediate bent. See Special Considerations on page 17 for further discussion.

8.0 SPECIAL CONSIDERATIONS

When running BRIBNT, the following special considerations need to be addressed :

1.) A bent with short columns or a graphics file created with 1/4 in/ft scale may have overlapping text.

2.) The steel is incomplete for the cap portion of the bent. The main reinforcement in the cap will have to be placed in the elevation view and in the cap sections. No bar numbers have been assigned to the main reinforcement or in the rebar quantities output file. The stirrup bars are given bar numbers in the cap sections but these bar numbers are not placed in the elevation view. The stirrup bars are listed in the rebar quantities output file but the total number of bars is not given.

3.) If the elevations for the back portion and the ahead portion of a bent at the first step varies by more than 8 inches then additional cap reinforcement will be placed in the highest portion. Two number 4 bars will be place in the top corners and number 4 bar stirrups will be spaced at 12 inches along the bent.

4.) No provisions are made in the program for octagonal stirrup bars in the column or for double stirrups bars in the bent cap. These additional bars will have to be placed in the elevation view and the pertinent sections if they are required in the design.

5.) No more than 14 beams or 14 cap steps can run on this program. If more steps are needed the user can conform the input to give a close representation of the structure.

6.) The End Bent Graphics Program (BREBNT) should be used if a pile intermediate bent is required.

9.0 EXAMPLE PROBLEMS

The example problems consists of the following options:

1.) Example Problem 1 ..... page 19
- 1 column bent
- symmetrical
- rectanglar spread footing
- side elevation view of footing
- elevations for 1 bent
- steps are identical for front and back of bent
- bearing at center of cap for continuous beams
- anchor bolt holes
- looking ahead
- output listing of input and quantities

2.) Example Problem 2 ..... page 25
- 2 column bent
- unsymmetrical
- square pile footings
- elevations for 2 bents
- steps different for front and back of bent
- dowel bar hole
- looking back
- output listing of input and quantities

3.) Example Problem 3 ..... page 31
- 3 column bent
- symmetrical
- square spread footings
- elevations for 4 bents
- steps different for front and back of bent
- 13 beams on front and back part of bent
- dowel bar hole
- looking back
- output listing of input and quantities

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PROJECT NO., COUNTY, NAME, DATE, REMARKS, ETC.

0	EXAMPLE PROBLEM 2, 2 COLUMN BENT, SPREAD FOOTING

CAP DATA

	SCA	NB	SYM	LA	BRG	BRDIST (FT)	BCAP (FT)	DCAP (FT)	LENGTH OF CAP SEGMENTS (FT) LCAP 1	LCAP 2	LCAP 3	LCAP 4	LCAP 5	LCAP 6
1	2	1			2		3.900	4.000	7.750	7.750				

CAP STEP DISTANCES (FT)

	P	NS	CDIST 1	CDIST 2	CDIST 3	CDIST 4	CDIST 5	CDIST 6	CDIST 7	CDIST 8	CDIST 9	CDIST 10
2		3	5.167	5.167								
2		1										

DETAIL OPTIONS - FOR CAP

SCALE
1 = 1/2"/FT.
2 = 3/8"/FT.
3 = 1/4"/FT.

SYM
0 = SYMMETRICAL (DEF.)
1 = UNSYMMETRICAL

LA
0 = LOOKING AHEAD (DEF.)
1 = LOOKING BACK

BRG
1 = DOWEL BAR
2 = ANCHOR BOLTS

CAP STEP ELEVATIONS

	BN	P	LEFT	RIGHT	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8	STEP 9	STEP 10
3	2		1027.11	1027.11	1031.51	1031.31	1031.11							
3	1													
3														
3														
3														
3														
3														
3														
3														
3														
3														
3														
3														

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CAP DATA

		P	ANG	BEARING DISTANCES (FT) BDIST 1	BDIST 2	BDIST 3	BDIST 4	BDIST 5	BDIST 6	BDIST 7	BDIST 8	BDIST 9	BDIST 10
4	X	X	70	16.72	6.078	6.078							
4	X	1											

COLUMN DATA

		NCOL	DIMENSIONS (FT) B FACE	D FACE	REINF. BAR	NB	ND
5	X	1	3.000	5.000	11	4	4

FOOTING DATA

		S	DIMENSIONS (FT) BF	DF	TF	REINF. TRANS BAR	TRANS NUM	LONG BAR	LONG NUM	T	PILE DATA P	NP	BP (FT)	DP (FT)
6	X	1	12.500	15.000	2.000	8	25	8	30					

		BOTTOM OF FOOTING ELEVATIONS FOOT 1	FOOT 2	FOOT 3	FOOT 4	FOOT 5
7	X	1.008.00				
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					

DETAIL OPTIONS - FOR FOOTING

S - SIDE VIEW OF FOOTING

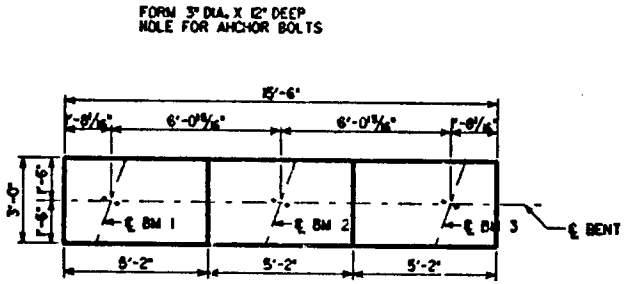
0 = NO (DEF.)
1 = YES

T- LONGITUDINAL TOP

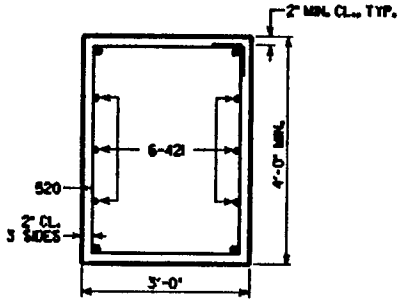
0 = ON BOTTOM (DEF.)
1 = ON TOP

P - PILE TYPE

BLANK = NO PILES
1 = 10BP42
2 = 12BP53
3 = 14BP73
4 = 12 IN. SQ. PSC
5 = 14 IN. SQ. PSC
6 = 16 IN. SQ. PSC
7 = 14 IN. O.D. METAL SHELL
8 = 16 IN. O.D. METAL SHELL



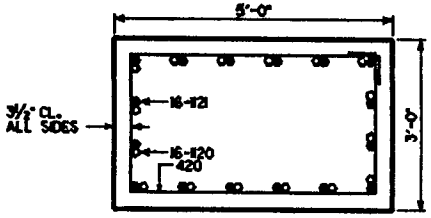
PLAN



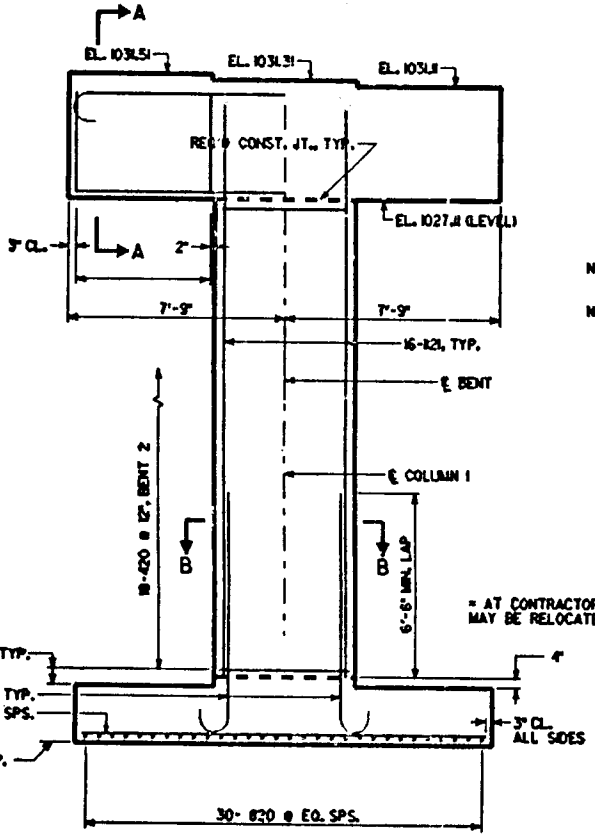
SECTION A-A

BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY

BUNDLING DETAIL



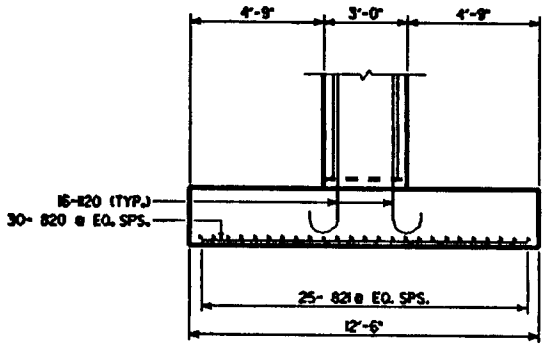
SECTION B-B



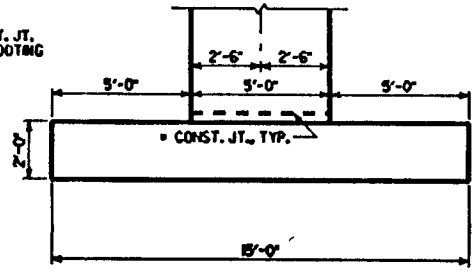
ELEVATION
(LOOKING AHEAD)

NOTE: MAINTAIN 2" CL. ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED

NOTE: BENT CAP IS SYMMETRICAL ABOUT CENTERLINE OF BENT



SIDE ELEVATION



FRONT ELEVATION

SUBSTRUCTURE QUANTITIES	
ITEM	BENT 2
CU YD CLASS A CONCRETE	30.63
LB BAR REINFORCEMENT STEEL	

SPREAD FOOTINGS ARE DESIGNED FOR A BEARING PRESSURE OF XX TONS PER SQ. FT.

EXAMPLE PROBLEM 1, 1 COLUMN BENT, SPREAD FOOTINGS

CAP DATA

SCALE	# OF BENTS	SYM	LA	BREARING TYPE	BREARING DIST	BCAP (FT)	DCAP (FT)	LENGTH OF CAP SEGMENTS (FT) LCAP1	LCAP2	LCAP3	LCAP4	LCAP5	LCAP6
2	1	0	0	2	0.000	3.000	4.000	7.750	7.750	0.000	0.000	0.000	0.000

CAP STEP DISTANCES (FT)

PREV	NS	DIST1	DIST2	DIST3	DIST4	DIST5	DIST6	DIST7	DIST8	DIST9	DIST10	DIST11	DIST12	DIST13	DIST 14
1	3	5.167	5.167	5.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

BENT	PREV	BOTTOM CAP ELEV. LEFT	RIGHT	CAP STEP ELEVATIONS STEP1	STEP2	STEP3	STEP4	STEP5	STEP6	STEP7	STEP8	STEP9	STEP10
2	1	1027.11	1027.11	1031.51	1031.31	1031.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PREV	BEARING ANGLE	BEARING DISTANCES (FT) DIST1	DIST2	DIST3	DIST4	DIST5	DIST6	DIST7	DIST8	DIST9	DIST10	DIST11	DIST12	DIST13	DIST14
1	70	1.672	6.078	6.078											

COLUMN DATA

# OF COLUMNS	DIMENSIONS (FT) B FACE	D FACE	REINFORCEMENT SIZE	NB	ND
1	3.000	5.000	11	4	4

FOOTING DATA

FOOTING STEEL

SIDE	DIMENSIONS (FT) BF	DF	TF	TRANS. SIZE	NUM	LONG. SIZE	NUM	TL	P	# OF PILES	PILE DATA BP (FT)	DP (FT)	AREA(FT SQ)
1	12.500	15.000	2.000	8	25	8	30	0	0	0	0.000	0.000	1.560

FOOTING ELEVATIONS

BENT	FOOT1	FOOT2	FOOT3	FOOT4	FOOT5
2	1008.00				

QUANTITIES FOR BENT NUMBER 2

CONCRETE QUANTITY IN CAP	=	7.23 CU YD
CONCRETE QUANTITY IN COLUMN 1	=	9.51 CU YD
CONCRETE QUANTITY IN FOOTINGS	=	13.89 CU YD
TOTAL CONCRETE QUANTITY IN BENT	=	30.63 CU YD

```
*B06    1000 EXAMPLE PROBLEM 1, 1 COLUMN BENT, SPREAD FOOTINGS
UBENT  2          11000
S 420        18      2544 2 5   4 5
S 421  15 2   6       1
K 2
S 520                2544 3 8   2 8
K 2
S 820  12 0  30       1
S 821  14 6  25       1
K 2
S1120        16       92  8 5
 1121  20 3  16       1
K 2
Z
```

GEORGIA DEPARTMENT OF TRANSPORTATION - OFFICE OF BRIDGE DESIGN

BRIDGE INTERMEDIATE BENT GRAPHICS PROGRAM (BRIBNT)

PROJECT NO., COUNTY, NAME, DATE, REMARKS, ETC.

0	EXAMPLE PROBLEM 2, 2 COLUMN BENTS, PILE FOOTINGS

CAP DATA

	SCA	NB	SYM	LA	BRG	BRDIST (FT)	BCAP (FT)	DCAP (FT)	LENGTH OF CAP SEGMENTS (FT) LCAP 1	LCAP 2	LCAP 3	LCAP 4	LCAP 5	LCAP 6
1	2	2	1	1	1	.750	3.500	4.000	7.000	2.050	9.950			

CAP STEP DISTANCES (FT)

	P	NS	CDIST 1	CDIST 2	CDIST 3	CDIST 4	CDIST 5	CDIST 6	CDIST 7	CDIST 8	CDIST 9	CDIST 10
2		5	5.750	8.500	8.500	8.500	5.750					
2		6	5.500	6.500	6.500	6.500	6.500	5.500				

DETAIL OPTIONS - FOR CAP

SCALE
1 = 1/2"/FT.
2 = 3/8"/FT.
3 = 1/4"/FT.

SYM
0 = SYMMETRICAL (DEF.)
1 = UNSYMMETRICAL

LA
0 = LOOKING AHEAD (DEF.)
1 = LOOKING BACK

BRG
1 = DOWEL BAR
2 = ANCHOR BOLTS

CAP STEP ELEVATIONS

	BN	P	LEFT	RIGHT	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8	STEP 9	STEP 10
3	2		219.00	218.18	223.03	222.87	222.71	222.55	222.33					
3					223.78	223.62	223.46	223.30	223.09	222.88				
3	5		218.54	217.72	222.57	222.41	222.25	222.09	221.87					
3					223.31	223.14	222.98	222.82	222.61	222.40				
3														
3														
3														
3														
3														
3														
3														
3														
3														
3														

BRIDGE INTERMEDIATE BENT GRAPHICS PROGRAM (BRIBNT)

CAP DATA

		P	ANG	BEARING DISTANCES (FT) BDIST 1	BDIST 2	BDIST 3	BDIST 4	BDIST 5	BDIST 6	BDIST 7	BDIST 8	BDIST 9	BDIST 10
4	X	X	1,1,0	1,2,5,0	8,5,0,0	8,5,0,0	8,5,0,0	8,5,0,0					
4	X		1,1,0	2,5,0,0	6,5,0,0	6,5,0,0	6,5,0,0	6,5,0,0	6,5,0,0				

COLUMN DATA

		NCOL	DIMENSIONS (FT) B FACE	D FACE	REINF. BAR	NB	ND
5	X	2	3,5,00	3,2,5,0	1,1	6	4

FOOTING DATA

		S	DIMENSIONS (FT) BF	DF	TF	REINF. TRANS BAR	TRANS NUM	LONG BAR	LONG NUM	T	PILE DATA P	NP	BP (FT)	DP (FT)
6	X		9,0,0,0	9,0,0,0	3,0,0,0	9	15	9	15	1	4	7	3,2,5,0	3,2,5,0

		BOTTOM OF FOOTING ELEVATIONS FOOT 1	FOOT 2	FOOT 3	FOOT 4	FOOT 5
7	X	1,9,9,0,0	1,9,9,0,0			
7	X	1,9,8,5,0	1,9,8,5,0			
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					

DETAIL OPTIONS - FOR FOOTING

S - SIDE VIEW OF FOOTING

0 = NO (DEF.)

1 = YES

T- LONGITUDINAL TOP

0 = ON BOTTOM (DEF.)

1 = ON TOP

P - PILE TYPE

BLANK = NO PILES

1 = 10BP42

2 = 12BP53

3 = 14BP73

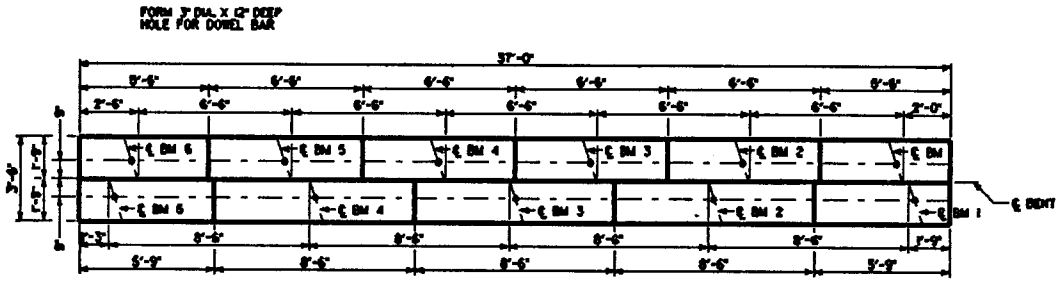
4 = 12 IN. SQ. PSC

5 = 14 IN. SQ. PSC

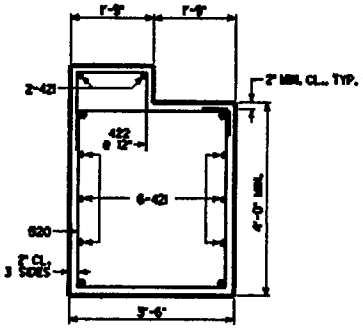
6 = 16 IN. SQ. PSC

7 = 14 IN. O.D. METAL SHELL

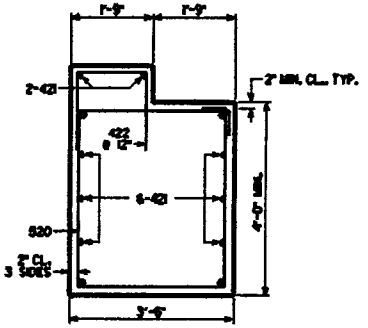
8 = 16 IN. O.D. METAL SHELL



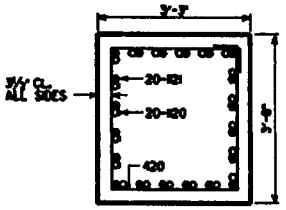
PLAN



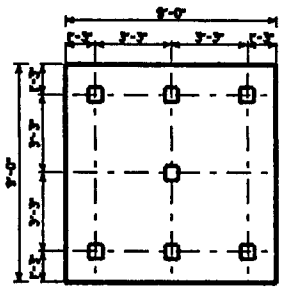
SECTION A-A



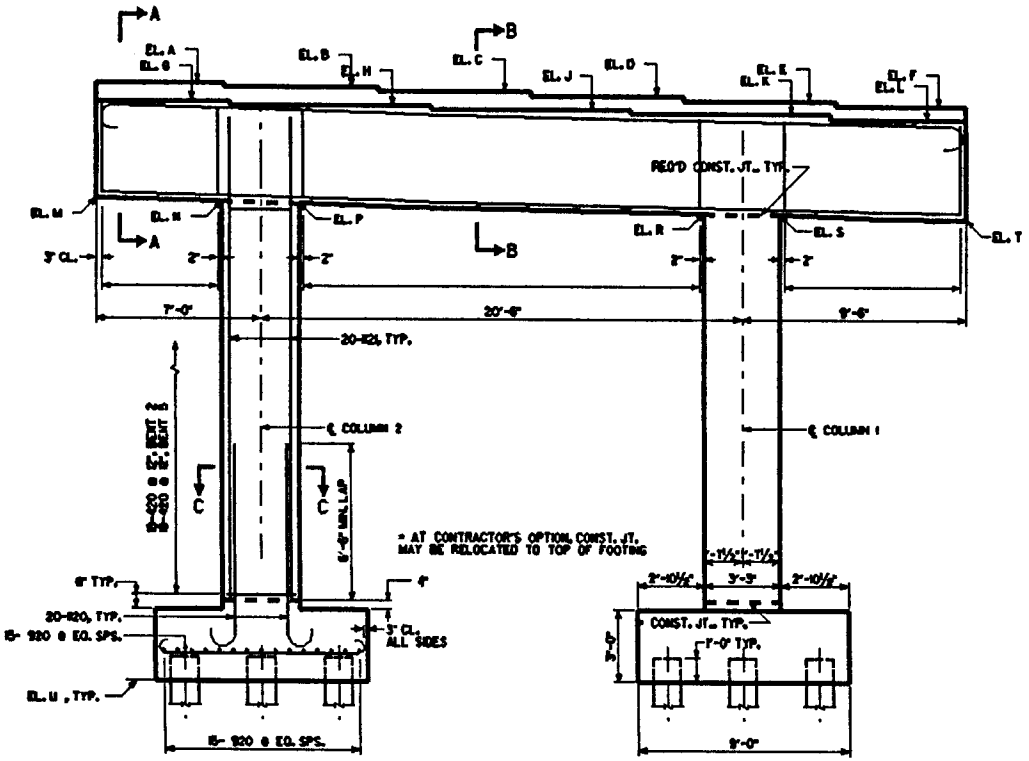
SECTION B-B



SECTION C-C



PILE LAYOUT



ELEVATION
LOOKING BACK

NOTE: MAINTAIN 2" CL. ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED

BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY

BUNDLING DETAIL

ALL PILES SHALL BE 12 IN. SQ. PSC

PLAN DRIVING OBJECTIVE

ALL PILES SHALL BE DRIVEN TO A DRIVING RESISTANCE OF XX TONS AFTER A MINIMUM TIP ELEVATION OF XX IS ACHEVED.

TABLE OF ELEVATIONS

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U
BENT 2	223.78	223.62	223.46	223.30	223.09	222.88	223.03	222.87	222.71	222.55	222.33	29.00	28.88	28.81	28.43	28.35	28.18	199.00
BENT 5	223.31	223.14	222.98	222.82	222.61	222.40	222.57	222.4	222.25	222.09	221.87	28.54	28.42	28.35	217.97	217.89	217.72	198.50

SUBSTRUCTURE QUANTITIES

ITEM	BENT 2	BENT 5
CU YD CLASS A CONCRETE	52.78	52.75
LB BAR REINFORCEMENT STEEL		

EXAMPLE PROBLEM 2, 2 COLUMN BENT, PILE FOOTINGS

CAP DATA

SCALE	# OF BENTS	SYM	LA	BREARING TYPE	BREARING DIST	BCAP (FT)	DCAP (FT)	LENGTH OF CAP SEGMENTS (FT) LCAP1	LCAP2	LCAP3	LCAP4	LCAP5	LCAP6
2	2	1	1	1	0.750	3.500	4.000	7.000	20.500	9.500	0.000	0.000	0.000

CAP STEP DISTANCES (FT)

PREV	NS	DIST1	DIST2	DIST3	DIST4	DIST5	DIST6	DIST7	DIST8	DIST9	DIST10	DIST11	DIST12	DIST13	DIST 14
	5	5.750	8.500	8.500	8.500	5.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6	5.500	6.500	6.500	6.500	6.500	5.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

BENT	PREV	BOTTOM CAP ELEV. LEFT	RIGHT	CAP STEP ELEVATIONS STEP1	STEP2	STEP3	STEP4	STEP5	STEP6	STEP7	STEP8	STEP9	STEP10
2		219.00	218.18	223.03	222.87	222.71	222.55	222.33	0.00	0.00	0.00	0.00	0.00
				223.78	223.62	223.46	223.30	223.09	222.88	0.00	0.00	0.00	0.00
5		218.54	217.72	222.57	222.41	222.25	222.09	221.87	0.00	0.00	0.00	0.00	0.00
				223.31	223.14	222.98	222.82	222.61	222.40	0.00	0.00	0.00	0.00

PREV	BEARING ANGLE	BEARING DISTANCES (FT) DIST1	DIST2	DIST3	DIST4	DIST5	DIST6	DIST7	DIST8	DIST9	DIST10	DIST11	DIST12	DIST13	DIST14
	110	1.250	8.500	8.500	8.500	8.500									
	110	2.500	6.500	6.500	6.500	6.500	6.500								

COLUMN DATA

# OF COLUMNS	DIMENSIONS (FT) B FACE	D FACE	REINFORCEMENT SIZE	NB	ND
2	3.500	3.250	11	6	4

FOOTING DATA

FOOTING STEEL

SIDE	DIMENSIONS (FT) BF	DF	TF	TRANS. SIZE	NUM	LONG. SIZE	NUM	TL	P	# OF PILES	PILE DATA BP (FT)	DP (FT)	AREA(FT SQ)
0	9.000	9.000	3.000	9	15	9	15	1	4	7	3.250	3.250	1.000

FOOTING ELEVATIONS

BENT	FOOT1	FOOT2	FOOT3	FOOT4	FOOT5
2	199.00	199.00			
5	198.50	198.50			

QUANTITIES FOR BENT NUMBER 2

CONCRETE QUANTITY IN CAP	=	21.29 CU YD
CONCRETE QUANTITY IN COLUMN 1	=	7.10 CU YD
CONCRETE QUANTITY IN COLUMN 2	=	6.91 CU YD
CONCRETE QUANTITY IN FOOTINGS	=	17.48 CU YD
TOTAL CONCRETE QUANTITY IN BENT	=	52.78 CU YD

QUANTITIES FOR BENT NUMBER 5

CONCRETE QUANTITY IN CAP	=	21.24 CU YD
CONCRETE QUANTITY IN COLUMN 1	=	7.11 CU YD
CONCRETE QUANTITY IN COLUMN 2	=	6.92 CU YD
CONCRETE QUANTITY IN FOOTINGS	=	17.48 CU YD
TOTAL CONCRETE QUANTITY IN BENT	=	52.75 CU YD

```
*B06    1000 EXAMPLE PROBLEM 2, 2 COLUMN BENT, PILE FOOTINGS
UBENT  2          11000
S 420         36      2544 211   2 8
S 421  36 8    8       1
S 422         38       2   1 5   1 6   1 6
K 2
S 520                  2544 3 8   3 2
K 2
S 920         60       1022 8 6
K 2
S1120         40        92  8 7
 1121  19 6  40        1
K 2
UBENT  5          11000
R 420         36
R 421          8
R 422         38
K 2
R 520
K 2
R 920         60
K 2
R1120         40
 1121  19 7  40        1
K 2
Z
```

GEORGIA DEPARTMENT OF TRANSPORTATION - OFFICE OF BRIDGE DESIGN

BRIDGE INTERMEDIATE BENT GRAPHICS PROGRAM (BRIBNT)

PROJECT NO., COUNTY, NAME, DATE, REMARKS, ETC.

0	EXAMPLE PROBLEM 3, 3 COLUMN BENT, SPREAD FOOTINGS, 13 BEAMS

CAP DATA

	SCA	NB	SYM	LA	BRG	BRDIST (FT)	BCAP (FT)	DCAP (FT)	LENGTH OF CAP SEGMENTS (FT) LCAP 1	LCAP 2	LCAP 3	LCAP 4	LCAP 5	LCAP 6
1	2	4			1	7.50	3.500	4.000	7.000	18.500	18.500	7.000		

DETAIL OPTIONS - FOR CAP

SCALE
- 1 = 1/2"/FT.
- 2 = 3/8"/FT.
- 3 = 1/4"/FT.

SYM
- 0 = SYMMETRICAL (DEF.)
- 1 = UNSYMMETRICAL

LA
- 0 = LOOKING AHEAD (DEF.)
- 1 = LOOKING BACK

BRG
- 1 = DOWEL BAR
- 2 = ANCHOR BOLTS

CAP STEP DISTANCES (FT)

	P	NS	CDIST 1	CDIST 2	CDIST 3	CDIST 4	CDIST 5	CDIST 6	CDIST 7	CDIST 8	CDIST 9	CDIST 10
2		13	3.500	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
2		1										

CDIST 11: 4.000 | CDIST 12: 4.000 | CDIST 13: 3.500

CAP STEP ELEVATIONS

	BN	P	LEFT	RIGHT	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8	STEP 9	STEP 10
3	2		218.80	221.40	223.00	223.20	223.40	223.60	223.80	224.00	224.20	224.40	224.60	224.80
3					225.00	225.20	225.40							
3		1												
3	3		219.30	221.90	223.50	223.70	223.90	224.10	224.30	224.50	224.70	224.90	225.10	225.30
3					225.50	225.70	225.90							
3		1												
3	4		219.80	222.40	224.00	224.20	224.40	224.60	224.80	225.00	225.20	225.40	225.60	225.80
3					226.00	226.20	226.40							
3		1												
3	5		220.30	222.90	224.50	224.70	224.90	225.10	225.30	225.50	225.70	225.90	226.10	226.30
3					226.50	226.70	226.90							

3 1

GEORGIA DEPARTMENT OF TRANSPORTATION - OFFICE OF BRIDGE DESIGN

BRIDGE INTERMEDIATE BENT GRAPHICS PROGRAM (BRIBNT)

CAP DATA

		P	ANG	BEARING DISTANCES (FT) BDIST 1	BDIST 2	BDIST 3	BDIST 4	BDIST 5	BDIST 6	BDIST 7	BDIST 8	BDIST 9	BDIST 10	BDIST 11	BDIST 12	BDIST 13
4	X	X	90	150.00	400.00	400.00	490.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
4	X	1															

COLUMN DATA

		NCOL	DIMENSIONS (FT) B FACE	D FACE	REINF. BAR	NB	ND
5	X	3	35.00	40.000	11	7	4

FOOTING DATA

		S	DIMENSIONS (FT) BF	DF	TF	REINF. TRANS BAR	TRANS NUM	LONG BAR	LONG NUM	T	PILE DATA P	NP	BP (FT)	DP (FT)
6	X		90.00	90.00	20.00	9	15	9	15					

BOTTOM OF FOOTING ELEVATIONS

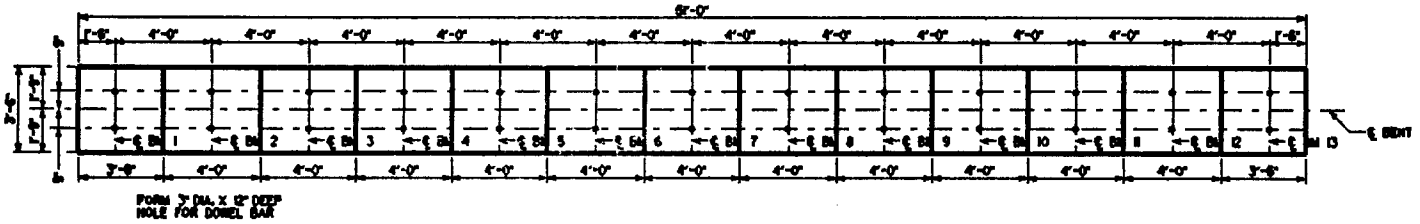
		FOOT 1	FOOT 2	FOOT 3	FOOT 4	FOOT 5
7	X	199.00	199.00	198.00		
7	X	199.50	199.50	198.50		
7	X	200.00	201.00	199.00		
7	X	200.50	200.50	200.50		
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					
7	X					

DETAIL OPTIONS - FOR FOOTING

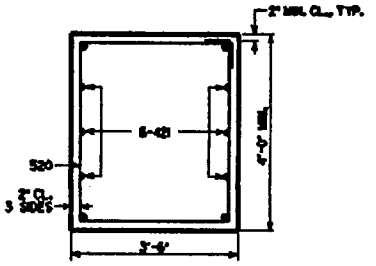
S - SIDE VIEW OF FOOTING
- 0 = NO (DEF.)
- 1 = YES

T- LONGITUDINAL TOP
- 0 = ON BOTTOM (DEF.)
- 1 = ON TOP

P - PILE TYPE
- BLANK = NO PILES
- 1 = 10BP42
- 2 = 12BP53
- 3 = 14BP73
- 4 = 12 IN. SQ. PSC
- 5 = 14 IN. SQ. PSC
- 6 = 16 IN. SQ. PSC
- 7 = 14 IN. O.D. METAL SHELL
- 8 = 16 IN. O.D. METAL SHELL

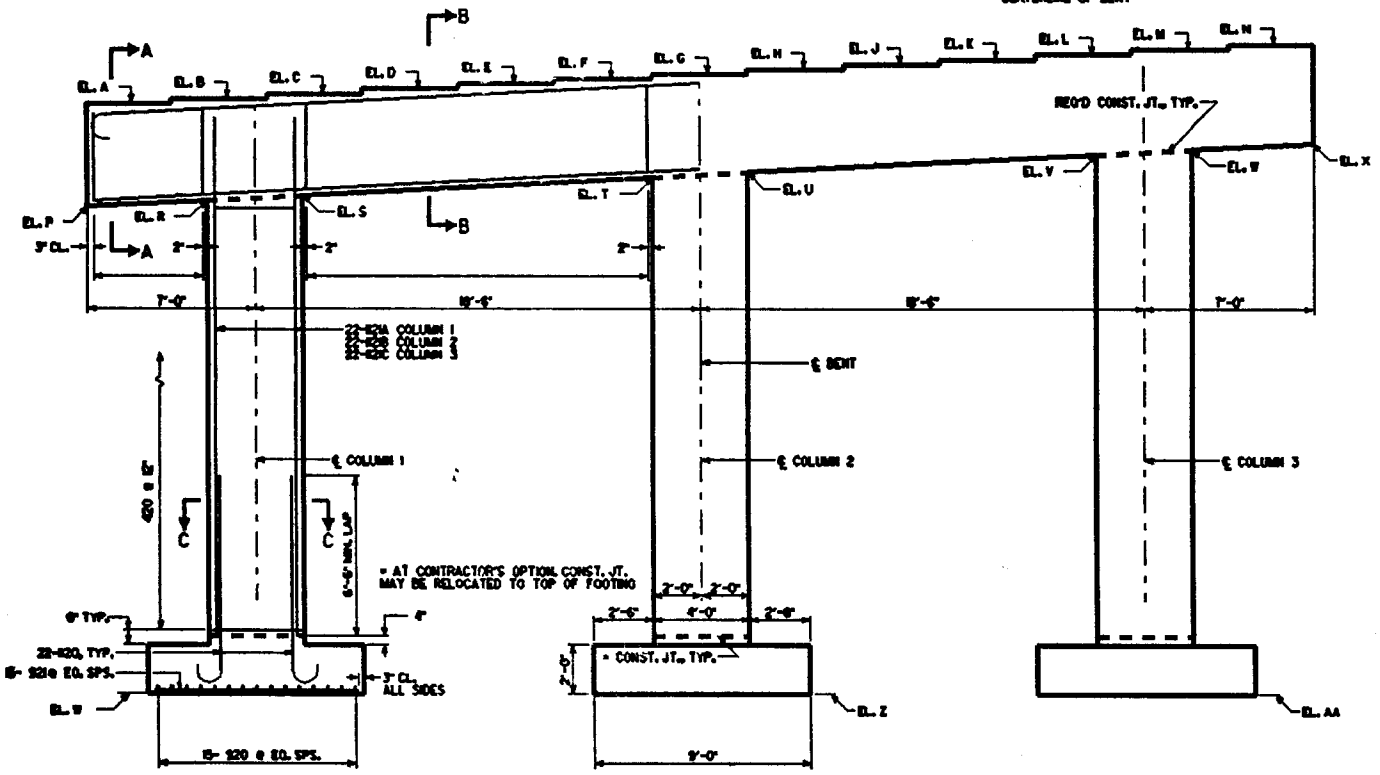


PLAN

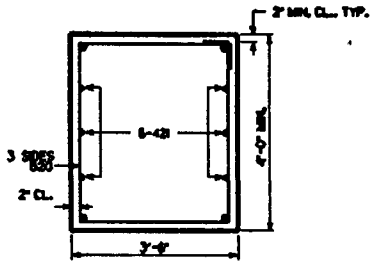


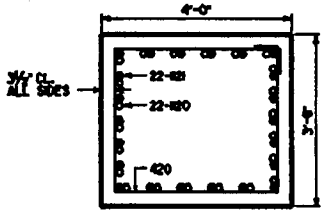
NOTE: MAINTAIN 2" CL. ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED

NOTE: BENT CAP IS SYMMETRICAL ABOUT CENTERLINE OF BENT



ELEVATION
(LOOKING AHEAD)





SUBSTRUCTURE QUANTITIES				
ITEM	BENT 2	BENT 3	BENT 4	BENT 5
CU YD CLASS A CONCRETE	75.33	76.37	74.61	75.07
LB BAR REINFORCEMENT STEEL				

TABLE OF ELEVATIONS																								
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z	AA
BENT 2	223.00	223.20	223.40	223.60	223.80	224.00	224.20	224.40	224.60	224.80	225.00	225.20	225.40	218.80	219.05	219.26	220.00	220.20	220.94	221.15	221.40	199.00	198.00	198.00
BENT 3	223.50	223.70	223.90	224.10	224.30	224.50	224.70	224.90	225.10	225.30	225.50	225.70	225.90	218.30	219.55	219.76	220.50	220.70	221.44	221.65	221.90	198.50	198.50	198.50
BENT 4	224.00	224.20	224.40	224.60	224.80	225.00	225.20	225.40	225.60	225.80	226.00	226.20	226.40	219.80	220.05	220.26	221.00	221.20	221.94	222.15	222.40	200.00	200.00	200.00
BENT 5	224.50	224.70	224.90	225.10	225.30	225.50	225.70	225.90	226.10	226.30	226.50	226.70	226.90	220.30	220.55	220.76	221.50	221.70	222.44	222.65	222.90	200.50	200.50	200.00

BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY

BUNDLING DETAIL

SPREAD FOOTINGS ARE DESIGNED FOR A BEARING PRESSURE OF XX TONS PER SQ. FT.

EXAMPLE PROBLEM 3, 3 COLUMN BENT, SPREAD FOOTINGS

CAP DATA

SCALE	# OF BENTS	SYM	LA	BREARING TYPE	BREARING DIST	BCAP (FT)	DCAP (FT)	LENGTH OF CAP SEGMENTS (FT) LCAP1	LCAP2	LCAP3	LCAP4	LCAP5	LCAP6
2	4	0	0	1	0.750	3.500	4.000	7.000	18.500	18.500	7.000	0.000	0.000

CAP STEP DISTANCES (FT)

PREV	NS	DIST1	DIST2	DIST3	DIST4	DIST5	DIST6	DIST7	DIST8	DIST9	DIST10	DIST11	DIST12	DIST13	DIST 14
	13	3.500	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	3.500	0.000
1															

BENT	PREV	BOTTOM CAP ELEV. LEFT	RIGHT	CAP STEP ELEVATIONS STEP1	STEP2	STEP3	STEP4	STEP5	STEP6	STEP7	STEP8	STEP9	STEP10
				STEP11	STEP12	STEP13	STEP14						
2		218.80	221.40	223.00	223.20	223.40	223.60	223.80	224.00	224.20	224.40	224.60	224.80
				225.00	225.20	225.40							
	1												
3		219.30	221.90	223.50	223.70	223.90	224.10	224.30	224.50	224.70	224.90	225.10	225.30
				225.50	225.70	225.90							
	1												
4		219.80	222.40	224.00	224.20	224.40	224.60	224.80	225.00	225.20	225.40	225.60	225.80
				226.00	226.20	226.40							
	1												
5		220.30	222.90	224.50	224.70	224.90	225.10	225.30	225.50	225.70	225.90	226.10	226.30
				226.50	226.70	226.90							
	1												

PREV	BEARING ANGLE	BEARING DISTANCES (FT) DIST1	DIST2	DIST3	DIST4	DIST5	DIST6	DIST7	DIST8	DIST9	DIST10	DIST11	DIST12	DIST13	DIST14
	90	1.500	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	
1															

COLUMN DATA

# OF COLUMNS	DIMENSIONS (FT) B FACE	D FACE	REINFORCEMENT SIZE	NB	ND
3	3.500	4.000	11	7	4

FOOTING DATA

SIDE	DIMENSIONS (FT) BF	DF	TF	FOOTING STEEL TRANS. SIZE	NUM	LONG. SIZE	NUM	TL	P	PILE DATA # OF PILES	BP (FT)	DP (FT)	AREA(FT SQ)
0	9.000	9.000	2.000	9	15	9	15	1	0	0	0.000	0.000	1.560

FOOTING ELEVATIONS

BENT	FOOT1	FOOT2	FOOT3	FOOT4	FOOT5
2	199.00	199.00	198.00		
3	198.50	198.50	198.50		
4	200.00	200.00	200.00		
5	200.50	200.50	200.00		

QUANTITIES FOR BENT NUMBER 2

CONCRETE QUANTITY IN CAP	=	27.11 CU YD
CONCRETE QUANTITY IN COLUMN 1	=	9.41 CU YD
CONCRETE QUANTITY IN COLUMN 2	=	9.90 CU YD
CONCRETE QUANTITY IN COLUMN 3	=	10.91 CU YD
CONCRETE QUANTITY IN FOOTINGS	=	18.00 CU YD
TOTAL CONCRETE QUANTITY IN BENT	=	75.33 CU YD

QUANTITIES FOR BENT NUMBER 3

CONCRETE QUANTITY IN CAP	=	27.11 CU YD
CONCRETE QUANTITY IN COLUMN 1	=	9.93 CU YD
CONCRETE QUANTITY IN COLUMN 2	=	10.42 CU YD
CONCRETE QUANTITY IN COLUMN 3	=	10.91 CU YD
CONCRETE QUANTITY IN FOOTINGS	=	18.00 CU YD
TOTAL CONCRETE QUANTITY IN BENT	=	76.37 CU YD

QUANTITIES FOR BENT NUMBER 4

CONCRETE QUANTITY IN CAP	=	27.11 CU YD
CONCRETE QUANTITY IN COLUMN 1	=	9.41 CU YD
CONCRETE QUANTITY IN COLUMN 2	=	9.90 CU YD
CONCRETE QUANTITY IN COLUMN 3	=	10.39 CU YD
CONCRETE QUANTITY IN FOOTINGS	=	18.00 CU YD
TOTAL CONCRETE QUANTITY IN BENT	=	74.81 CU YD

QUANTITIES FOR BENT NUMBER 5

CONCRETE QUANTITY IN CAP	=	27.11 CU YD
CONCRETE QUANTITY IN COLUMN 1	=	9.41 CU YD
CONCRETE QUANTITY IN COLUMN 2	=	9.90 CU YD
CONCRETE QUANTITY IN COLUMN 3	=	10.65 CU YD
CONCRETE QUANTITY IN FOOTINGS	=	18.00 CU YD
TOTAL CONCRETE QUANTITY IN BENT	=	75.07 CU YD

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*B06    1000 EXAMPLE PROBLEM 3, 3 COLUMN BENT, SPREAD FOOTINGS
UBENT  2          11000
S 420         61      2544 211   3 5
S 421  50 8    6       1
K 2
S 520                 2544 3 8   3 2
K 2
S 920   8 6   90       1
K 2
S1120         66       92  8 5
 1121A 21 3   22       1
 1121B 22 3   22       1
 1121C 24 2   22       1
K 2
UBENT  3          11000
R 420         63
R 421          6
K 2
R 520
K 2
R 920         90
K 2
R1120         66
 1121A 22 3   22       1
 1121B 23 3   22       1
 1121C 24 2   22       1
K 2
UBENT  4          11000
R 420         60
R 421          6
K 2
R 520
K 2
R 920         90
K 2
R1120         66
 1121A 21 3   22       1
 1121B 22 3   22       1
 1121C 23 2   22       1
K 2
UBENT  5          11000
R 420         60
R 421          6
K 2
R 520
K 2
R 920         90
K 2
R1120         66
 1121A 21 3   22       1
 1121B 22 3   22       1
 1121C 23 8   22       1
K 2
Z
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