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1                            THE ANALYSIS AND DESIGN OF PIERS FOR BRIDGES - V 4.2.07 - AASHTO SPECS 1984 INTERIM
0PROBLEM NO. 0001 INPUT DATA           I75/I575 NW CORRIDOR - BRIDGE NO.5 LT WIDENING - BENT 2 HAMMER HEAD
0                                                DESIGN DATA
  DESIGN NO. NO. NO. SKEW ANG  F'C   FC    N   FY     FS     EC    ES    CONC.   Z   *  *  * CAP REINFORCING STEEL  *  *  *  CAP
 OPTIONS CAN COL LLC  D  M  S  PSI   PSI       PSI    PSI    KSI   KSI   STRAIN FACT MAIN STR MAX  MAX  MIN  MIN  TOP   MIN DEPTH BOT
                                                                                SIZE SIZ TOP  BOT SIZE  NO.  CL.  S.SP INCR. CL.
 D D D L  2   1   7   0-00-00 3500. 1400.  9. 60000. 24000. 3409. 29000. 0.0030 170.  11    5   9    9   11    2  2.00  4.00 3.00 2.00
0COLUMN REINFORCING STEEL   R    KL    OC    OF   CM  BD1  BD2 IMPACT SOIL WT ALL.S.P.  MIN   MAX  EDGE  PILE  REBAR ALL.PILE ALL.PILE I
 MIN.P MAX.P CL.SP. CLEAR MODE COEF                              %      KCF      KSF    PL SP PL SP DIST  DEPTH CLEAR CAPACITY  UPLIFT  P
  1.00  8.00  2.25  2.500   1  2.00 0.00 0.90 1.00 1.00 0.00 24.20  0.120    0.000  2.50  5.00  1.250 1.000 3.000 192.000    0.000
0                                               CAP DATA
0CN  C     L       A       DE       BC       BE       DH       LH       XB1      XB2      XB3      XB4      XB5      XB6      XB7      XB8
011  C   6.625   0.000   3.000    3.000    0.000    0.000    0.000    4.646    3.146
012  2 SAME AS CANTILEVER  1
0                                              COLUMN DATA
0CN P I T S   HT     A      DT      BT      DB      BB      DL     FLEX  ND NB SZ ND NB SZ ND NB SZ ND NB SZ  SLOPE     EP      AP
021 1 C T   25.000  0.000  3.000   3.000   0.000   0.000  0.000  0.000    2  4 11  0  0  0 99 99 11  0  0  0  0.000  0.000  0.000
0                                              FOOTING DATA
0CN S/P   B       D       T       DEL.B   DEL.D   DEL.T  R.B/D  R.D/B   S.HT.  NP  SYM.   BP      DP      SET.
031  P   5.000   5.000   3.250   0.250   0.250   0.250  1.000  1.000   3.000   0    3    0.000   0.000   0.000
1                                            GROUP II WIND
 SUPERSTRUCTURE AREA*STD.        WIND ON SUPERSTRUCTURE INTENSITIES       * WIND FORCE ARM  * WIND ON PIER
   TRANS.     LONG.  WIND FT1 FL1   FT2 FL2   FT3 FL3   FT4 FL4   FT5 FL5    APT     APL       PT      PL
0     34.        17.   1    50   0    44   6    41  12    33  16    17  19    5.167   1.833    1.596   2.826
0                                                GROUP III WIND
 STD. *   WIND ON SUPERSTRUCTURE INTENSITIES     *  STD. *      WIND ON LIVE LOAD INTENSITIES       *  LENGTHS OF LL * WIND ON LL ARMS
 WIND FT1 FL1   FT2 FL2   FT3 FL3   FT4 FL4   FT5 FL5  WIND FT1 FL1   FT2 FL2   FT3 FL3   FT4 FL4   FT5 FL5    TRANS.  LONGI.   APT     APL
0  1   50   0    44   6    41  12    33  16    17  19    1   100   0    88  12    82  24    66  32    34  38     61.5     61.5  11.833  11.833
0                                  MISCELLANEOUS FORCES
 CENTRI.  TRACTION FORCE AND ARMS   EXPANSION    SHRINKAGE      STREAM FLOW
   FT        FL      APT     APL    COEFFICIENT COEFFICIENT     PT       PL
0 0.000    2.868   0.000   1.833     0.00018000  0.00044000   0.000   0.000
0                                   DEAD LOAD SUPERSTRUCTURE AND LIVE LOAD CASES
0I.D.  NL     P1        P2        P3        P4        P5        P6        P7        P8        P9        P10       P11       P12
0D.L.   0   64.219    0.000    68.019    0.000    68.019
0LL 1   1   30.749    0.000    28.749    0.000    21.649
0LL 2   2   30.749    0.000    28.749    0.000    48.701
0LL 4   2    0.000    0.000    24.382    0.000    33.099
0LL 5   1   26.199    0.000    28.749    0.000    26.199
0LL 6   2   26.199    0.000    28.749    0.000    49.407
0LL 7   2   40.574    0.000    33.115    0.000     7.458
0LL 8   2   30.749    0.000    28.749    0.000    21.649
1                                     COLUMN MOMENTS(KIP-FEET), SHEARS(KIPS), REACTIONS(KIPS)
0                                               TRANSVERSE                          *                    LONGITUDINAL
0       LOAD          COL      PC         MT         V         MB         RF         ML         MR         MT          V         MB          MF
0UNIT F.AT CL.CAP      1     0.000      0.000     1.000     25.000     0.000      0.000      0.000      0.000      1.000     25.000     25.000
0DEAD LOAD TOTAL       1   218.145     17.655     0.000    -17.655   251.895    327.988   -345.642     0.000      0.000      0.000      0.000
                           251.895
0TRAC. FORCE 1 LN      1     0.000      0.000     0.000      0.000     0.000      0.000      0.000     -5.257     -2.868    -76.957    -76.957
0WIND ON SUBSTR.       1     0.000      0.000     1.596     39.900     0.000      0.000      0.000      0.000     -2.826    -70.650    -70.650
0GROUP 2 WIND 1 1      1     0.000     -8.784     3.296     91.184     0.000      0.000      0.000      0.000     -2.826    -70.650    -70.650
0GROUP 2 WIND 1 2      1     0.000     -8.784     3.296     91.184     0.000      0.000      0.000      0.000      2.826     70.650     70.650
0GROUP 2 WIND 2 1      1     0.000     -7.730     3.092     85.030     0.000      0.000      0.000     -0.187     -2.928    -73.387    -73.387
0GROUP 2 WIND 2 2      1     0.000     -7.730     3.092     85.030     0.000      0.000      0.000      0.187      2.928     73.387     73.387
0GROUP 2 WIND 3 1      1     0.000     -7.203     2.990     81.953     0.000      0.000      0.000     -0.374     -3.030    -76.124    -76.124
0GROUP 2 WIND 3 2      1     0.000     -7.203     2.990     81.953     0.000      0.000      0.000      0.374      3.030     76.124     76.124
0GROUP 2 WIND 4 1      1     0.000     -5.797     2.718     73.747     0.000      0.000      0.000     -0.499     -3.098    -77.949    -77.949
0GROUP 2 WIND 4 2      1     0.000     -5.797     2.718     73.747     0.000      0.000      0.000      0.499      3.098     77.949     77.949
0GROUP 2 WIND 5 1      1     0.000     -2.987     2.174     57.337     0.000      0.000      0.000     -0.592     -3.149    -79.317    -79.317
0GROUP 2 WIND 5 2      1     0.000     -2.987     2.174     57.337     0.000      0.000      0.000      0.592      3.149     79.317     79.317
0GROUP 3 WIND 1 1      1     0.000    -75.408     7.139    253.878     0.000      0.000      0.000      0.000     -0.848    -21.195    -21.195
0GROUP 3 WIND 1 2      1     0.000    -75.408     7.139    253.878     0.000      0.000      0.000      0.000      0.848     21.195     21.195
0GROUP 3 WIND 2 1      1     0.000    -66.359     6.340    224.849     0.000      0.000      0.000     -8.789     -1.616    -49.199    -49.199
0GROUP 3 WIND 2 2      1     0.000    -66.359     6.340    224.849     0.000      0.000      0.000      8.789      1.616     49.199     49.199
0GROUP 3 WIND 3 1      1     0.000    -61.835     5.940    210.335     0.000      0.000      0.000    -17.578     -2.385    -77.203    -77.203
0GROUP 3 WIND 3 2      1     0.000    -61.835     5.940    210.335     0.000      0.000      0.000     17.578      2.385     77.203     77.203
0GROUP 3 WIND 4 1      1     0.000    -49.769     4.874    171.629     0.000      0.000      0.000    -23.437     -2.897    -95.872    -95.872
0GROUP 3 WIND 4 2      1     0.000    -49.769     4.874    171.629     0.000      0.000      0.000     23.437      2.897     95.872     95.872
0GROUP 3 WIND 5 1      1     0.000    -25.639     2.743     94.219     0.000      0.000      0.000    -27.831     -3.282   -109.874   -109.874
0GROUP 3 WIND 5 2      1     0.000    -25.639     2.743     94.219     0.000      0.000      0.000     27.831      3.282    109.874    109.874
0LIVE LOAD LL 1        1    81.147    -42.279     0.000     42.279    81.147    142.860   -100.581     0.000      0.000      0.000      0.000
0LIVE LOAD LL 2        1   108.199     83.405     0.000    -83.405   108.199    142.860   -226.265     0.000      0.000      0.000      0.000
1                                     COLUMN MOMENTS(KIP-FEET), SHEARS(KIPS), REACTIONS(KIPS)
0                                               TRANSVERSE                          *                    LONGITUDINAL
0       LOAD          COL      PC         MT         V         MB         RF         ML         MR         MT          V         MB          MF
0LIVE LOAD LL 4        1    57.481    153.778     0.000   -153.778    57.481      0.000   -153.778     0.000      0.000      0.000      0.000
0LIVE LOAD LL 5        1    81.147      0.000     0.000      0.000    81.147    121.721   -121.721     0.000      0.000      0.000      0.000
0LIVE LOAD LL 6        1   104.355    107.824     0.000   -107.824   104.355    121.721   -229.545     0.000      0.000      0.000      0.000
0LIVE LOAD LL 7        1    81.147   -153.857     0.000    153.857    81.147    188.507    -34.650     0.000      0.000      0.000      0.000
0LIVE LOAD LL 8        1    81.147    -42.279     0.000     42.279    81.147    142.860   -100.581     0.000      0.000      0.000      0.000
1                                            CAP ANALYSIS AND DESIGN DATA
0                                               CAP MOMENTS AND SHEARS
0                             MOMENTS(KIP-FEET)                               **                   SHEARS(KIPS)
0POINT    D.L.TOT.  G1 MAX.+  G1 MAX.-  G2 MAX.+  G2 MAX.-  G3 MAX.+  G3 MAX.-     DL T.LT  DL T.RT  G1 + LT  G1 + RT  G1 - LT  G1 - RT
0P 1        -3.437    -3.437    -3.437    -3.437    -3.437    -3.437    -3.437      -3.473  -86.958   -3.473  -86.958   -3.473 -175.044
0P 2      -285.691  -285.691  -562.810  -285.691  -285.691  -285.691  -451.630     -92.479  -92.479  -92.479  -92.479 -180.565 -180.565
0C 1L     -426.384  -426.384  -835.632  -426.384  -426.384  -426.384  -671.443     -95.112           -95.112          -183.198
0C 1R     -449.335  -449.335  -947.677  -449.335  -449.335  -449.335  -747.744              100.052           207.314           100.052
0P 4      -301.232  -301.232  -638.680  -301.232  -301.232  -301.232  -503.297      97.419   97.419  204.682  204.682   97.419   97.419
0P 5        -3.437    -3.437    -3.437    -3.437    -3.437    -3.437    -3.437      91.898    3.473  199.160    3.473   91.898    3.473
0                                                CAP DESIGN DATA
 PT.    M+ UNF.   M- UNF.  TOP REINFORCE.  BOT.REINFORCE.     LEFT STIRRUPS         RIGHT STIRRUPS       D      FC     PS    FS/FF  FS/FZ
          K-FT.     K-FT.     AS  NO.SIZE     AS  NO.SIZE   M.SP. AV/IN BAR&SPAC  M.SP. AV/IN BAR&SPAC   IN.    PSI     %    RATIO  RATIO
0P 1    -2.644    -2.644    3.12  2 # 11    3.12  2 # 11     0.00 0.000 #5@ 0.00  16.33 0.034 #5@16.33  36.00          0.27  0.000  0.014
0P 2  -219.762  -347.408    3.96  3 # 11    3.12  2 # 11    16.33 0.037 #5@16.33  16.33 0.037 #5@16.33  36.00          0.34  0.631  1.116
0C 1  -327.988  -575.187    6.85  5 # 11    3.12  2 # 11    16.33 0.039 #5@15.91  16.33 0.053 #5@11.60  36.00          0.68  0.723  0.952
0P 4  -231.717  -387.151    4.52  3 # 11    3.12  2 # 11    16.33 0.052 #5@11.96  16.33 0.052 #5@11.96  36.00          0.38  0.784  1.244
0P 5    -2.644    -2.644    3.12  2 # 11    3.12  2 # 11    16.33 0.049 #5@12.77   0.00 0.000 #5@ 0.00  36.00          0.27  0.000  0.014
0NOTE: *** FS/FZ RATIO EXCEEDS 1.0! ***
1                                        COLUMN ANALYSIS AND DESIGN OUTPUT
0                                             CRITICAL COLUMN LOADS
     T                          E  C  S
 CN  B   GR  LLC  WC   R   S  F  F     PF     MTF     MLF     PM      MTM     MLM      PU      MTU     MLU   PU/PM    B      D
 0 1  T    1 LL 4 0.0                 408.4   356.8    0.0   408.4   416.5   141.6  1581.4  1612.8   548.2  3.873  36.00  36.00
 0 1  B    3 LL 4 3.1  R              402.2  -496.3  300.5   402.2   568.0   341.0  1043.2  1472.2   883.9  2.592  36.00  36.00
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0 COLUMN DESIGN DATA

CN	T	B FACE 1 NO.SIZE	B FACE 2 NO.SIZE	D FACE 3 NO.SIZE	D FACE 4 NO.SIZE	AS	PS	BD12	BD	SUMPU	SUMPC	DEL.T	DEL.L	CM	R	PHIC
0 1	T	6 # 11	6 # 11	4 # 11	4 # 11	31.20	2.407	1.00	0.064	430.	3004.	1.167	1.156	1.000	1	0.70
0 1	B	6 # 11	6 # 11	4 # 11	4 # 11	31.20	2.407	1.00	0.061	380.	3014.	1.144	1.135	1.000	1	0.70

1

0 FOOTING 1 DESIGN LOADS

OF G	LLID	WC	ES	C	S	P	MT	VT	ML	VL	P4	P3	P2	P1	MTF	VBF	VPF	LOAD
01 3	LL 6	3.1R				335.916	-314.805	-5.940	231.117	8.121	82.546	18.168	101.696	166.073	19.300	0.000	-0.459	MAX.P1
01 3	LL 6	1.1R				436.691	-465.852	-9.280	227.642	8.559	89.688	25.823	149.826	213.691	26.276	0.000	-0.597	MAX.MT
01 3	LL 4	1.1R				387.628	-513.952	-9.280	227.642	8.559	71.410	7.545	143.573	207.438	25.314	0.000	-0.635	MAX.VT
01 3	LL 2	1.1R				440.715	-440.293	-9.280	227.642	8.559	93.889	30.024	147.637	211.502	25.939	0.000	-0.594	MAX.VP
01 3	LL 6	4.1R				436.691	-358.929	-6.337	324.722	11.223	117.466	27.167	122.048	212.347	23.683	0.000	-0.597	MAX.ML
01 3	LL 4	1.1R				387.628	-513.952	-9.280	227.642	8.559	71.410	7.545	143.573	207.438	19.763	0.000	-0.635	MAX.VL
01 3	LL 4	3.1R				298.175	-351.804	-5.940	231.117	8.121	68.486	4.108	96.885	161.263	18.560	0.000	-0.489	MAX.P3

0 FOOTING 1 ANALYSIS/DESIGN RESULTS

0	FOOTING SIZE B	D	T	P1/PA	* BAR REINFORCEMENT STEEL AS	NO.SIZE	SPAC.	PLACEMENT	* MT.	SECTION CAPACITIES * VB	VP	DS	FC
0	6.500	6.500	3.250	0.692	0.30	10 # 4	@ 7.750	TOP LONG	31.834	28.060	56.120	23.250	0.000
0					0.33	11 # 4	@ 7.000	BOT.TRAN	35.740	28.663	57.327	23.750	0.000

0NUMBER OF PILES = 4 BP = 2.000 DP = 2.000