WORK PLACE DDH's

# SURVEY CALCULATION SHEET

PAGE NO.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | | |
| S.T.A. | HIW 5 | HIW 5 | | | | | | |
| F.S. | DDH A 19 | DDH A 21 | | | | | | |
| MEAS. DISTANCE | | | | | | | | |
| VERT. ANGLE | | | | | | | | |
| SINE – V.A. | | | | | | | | |
| COSINE – V.A. | | | | | | | | |
| STA. ELEVATION | 4223.2 | 4223.2 | | | | | | |
| H.I. | | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| DISTANCE | | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | | | | | | | | |
| F.S. ELEVATION | | | | | | | | |
| AZ. B.S. TO STA. | | | | | | | | |
| ±180 - 00' - 00" | | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | | |
| HORZ. ANGLE | | | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 14° 01' 22" | 16° 59' 10" | | | | | | |
| BEARING | | | | | | | | |
| HORZ. DISTANCE | 1747.98 | 1922.07 | | | | | | |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | 35 403.38 | 35 403.38 | | | | | | |
| DIFF. | | | | | | | | |
| F.S. LAT. | 35 104.00 N | 35 246.33 N | N | | N | | N | |
| SINE BEARING | | | | | | | | |
| STA. DEP. | 24 541.58 | 24 541.58 | | | | | | |
| DIFF. | | | | | | | | |
| F.S. DEP. | 24 964.99 E | 25 102.95 E | E | | E | | E | |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | | P. M. | | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | | | | | | | | |

HIW 5 CO-ORDS IS FINAL, DDH's A-19 & A-21 ARE NOT & WILL SLIGHTLY BE ADJUSTED BUT NOT TO AFFECT DUE PURPOSE. MEANTIME DDH A-19 CAN BE ACCEPTED AS GOOD — ONLY VERY LITTLE ADJUSTMENT FROM THE FIRST SETS OF CO-ORDS TO THE FINAL H.I.W. CO-ORDS FURNISHED US BY THEM.

019159

WORK PLACE SURFACE

**SURVEY CALCULATION SHEET**

PAGE NO. 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | |
| S.T.A. | HIW4 | S 75-2 | HIW4 | S75-31 | S 75-31 | | |
| F.S. | S 75-2 | HIW5 | S75-31 | HIW5 | S 75-2 | HIW4 | |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | | | 4185.39 | 4223.2 | 4223.2 | 4308.00 | |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | CALC. | | |
| BEARING | | | | | N 60-50-08 W | | |
| HORZ. DISTANCE | | | | | 639.30 | | |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 35 459.63 | | 35 459.63 | | | | |
| DIFF. | | | 3 | | | | |
| F.S. LAT. | 33 823.09 N | 33 408.38 N | 33 511.53 N | 33 408.39 N | N | 35 459.63 N | N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 25 376.43 | | 25 376.43 | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 24 446.39 E | 24 541.58 E | 25 004.65 E | 24 541.58 E | E | 25 376.43 E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE MAIN ACCESS DECLINE

# SURVEY CALCULATION SHEET

PAGE NO.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | |
| S.T.A. | 0 + 00 | B.C. #1 | E.C. #1 | B.C. #2 | E.C. #2 | B.C. #3 | E.C. #3 |
| F.S. | B.C. #1 | E.C. #2 | B.C. #2 | E.C. #2 | B.C. #3 | E.C. #3 | A-19 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | | | | | | | |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 299 08 31 | 322 08 31 | 345 08 31 | 23 34 26 | 62 00 11 | 52 57 26 | 43 54 41 |
| BEARING | N 60 51 29 W | N 37 51 29 W | N 14 51 29 W | N 23 34 26 E | N 62 00 11 E | N 52 57 26 E | N 43 54 41 E |
| HORZ. DISTANCE | 904.86 | 93.78 | 340.0 | 124.31 | 773.70 | 62.89 | 268.16 |
| COSINE BEARING | .48697 | .78953 | .96656 | .91655 | .46993 | .60542 | .72242 |
| STA. LAT. | 33 552.86 | 33 993.26 | 34 067.30 | 34 395.93 | 34 509.87 | 34 873.07 | 34 910.96 |
| DIFF. | + 440.40 | + 74.04 | + 328.63 | + 113.94 | + 363.20 | + 37.89 | + 193.19 |
| F.S. LAT. | 33 993.26 N | 34 067.30 N | 34 395.93 N | 34 509.87 N | 34 873.07 N | 34 910.96 N | 34 104.15 N |
| SINE BEARING | .87342 | .61371 | .26643 | .39992 | .88297 | .79818 | .69354 |
| STA. DEP. | 24 930.76 | 24 140.87 | 24 083.32 | 23 996.13 | 24 045.84 | 24 728.99 | 24 779.19 |
| DIFF. | - 789.89 | - 57.55 | - 87.19 | + 49.71 | + 683.15 | + 50.20 | + 185.98 |
| F.S. DEP. | 24 140.87 E | 24 083.32 E | 23 996.13 E | 24 045.84 E | 24 728.99 E | 24 779.19 E | 24 965.17 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | " | " |
| CHECKED BY: | RW. | RW. | RW. | RW. | RW. | RW. | RW. |
| DATE | 13.08.75 | " | " | " | " | " | " |
| FIELD PAGE NO. | | | | | | | |

WORK PLACE ACCESS DECLINE -127

# SURVEY CALCULATION SHEET

PAGE NO.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | |
| S.T.A. | 0+00 | BC #1 | EC #1 | BC #2 | EC #2 | BC #3 | EC #3 |
| F.S. | BC+1 | EC #1 | BC #2 | EC #2 | BC #3 | EC #3 | A-19 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | 4187.35 | 4042.65 | 4027.24 | 3972.84 | 3951.38 | 3827.59 | 3817.49 |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | 144.70 | 15.41 | 54.40 | 21.46 | 123.79 | 10.10 | 42.90 |
| H.P. | | | | | | | |
| F.S. ELEVATION | 4042.65 | 4027.24 | 3972.84 | 3951.38 | 3827.59 | 3817.49 | 3774.59 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 299.08.31 | 322.08.31 | 345.08.31 | 23.34.26 | 62.00.11 | 52.57.26 | 43.54.41 |
| BEARING | N60.51.29W | N37-51-29W | N14.51.29W | N23.34.26E | N62.00.11E | N52.57.26E | N43.54.41E |
| HORZ. DISTANCE | 904.36 | 93.78 | 340.00 | 124.31 | 773.70 | 62.89 | 268.16 |
| COSINE BEARING | .48697 | .78953 | .96656 | .91655 | 0.46943 | .60242 | .72042 |
| STA. LAT. | ~~33552.86~~ | ~~33993.26~~ | ~~34067.30~~ | ~~34395.93~~ | ~~34509.87~~ | ~~34873.07~~ | ~~34910.96~~ |
| DIFF. | + 440.40 | 74.04 | 328.63 | + 113.94 | 363.20 | 37.89 | + 193.19 |
| F.S. LAT. | 33993.26 N | 34067.30 N | 34395.93 N | 34509.87 N | 34873.07 N | 34910.96 N | 35104.15 N |
| SINE BEARING | .87342 | .61371 | .25643 | .39993 | 0.88297 | .79819 | .69354 |
| STA. DEP. | 24930.76 | 24140.87 | 24083.32 | 23996.13 | 24045.84 | 24728.99 | 24779.19 |
| DIFF. | - 789.89 | - 57.55 | - 87.19 | + 49.71 | 683.15 | 50.20 | 185.98 |
| F.S. DEP. | 24140.87 E | 24083.32 E | 23996.13 E | 24045.84 E | 24728.99 E | 24779.19 E | 24965.17 E |
| ~~GRADE CALC~~ HD | 904.36 | 1000.70 | 1340.70 | 1474.85 | 2248.55 | 2311.70 | 2579.86 |
| SLOPE DIST | 915.86 | 1,013.43 | 1357.75 | 1493.61 | 2277.15 | 2341.10 | 2612.66 |
| V. DIST | 144.70 | 160.11 | 214.51 | 235.97 | 359.77 | 369.88 | 413.78 |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | RW | RW | RW | RW | RW | RW | RW |
| CHECKED BY: | ROA | " | " | " | " | " | ROA |
| DATE | 13.08.75 | " | " | " | " | " | " |

METRIC SYSTEM  TP 10-11 NOT DONE YET.

WORK PLACE SURFACE

**SURVEY CALCULATION SHEET**

PAGE NO. 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | |
| S.T.A. | HIW 4 | S 75-2 | HIW 4 | S 75-31 | S 75-31 | | |
| F.S. | S 75-2 | HIW 5 | S 75-31 | HIW 5 | S 75-2 | HIW 4 | |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | | | 1275.679 | 1287.23 | 1287.23 | 1313.08 | |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | | | | | CALC. N60 - 50 - 08 W | | |
| HORZ. DISTANCE | | | | | 194.86 | | |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 10 808.09 | | 10 808.09 | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 309.28 N | 10 182.87 N | 10 214.31 N | 10 182.88 N | N | 10 808.09 N | N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 7 734.74 | | 7 734.74 | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 451.26 E | 7 480.27 E | 7 621.42 E | 7 480.27 E | E | 7 734.74 E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROL | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | 05 08.75 | | | | | | |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | | HIW 4 | △ NN | TP1 | TP2 | TP3 | TP2 |
| S.T.A. | HIW 4 | △ NN | TP1 | TP2 | TP3 | TP4 | TP3 |
| F.S. | △ NN | TP1 | TP2 | TP3 | TP4 | A-11 | A-83 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1294.38 | | | 1294.57 | 1294.68 | 1292.05 | 1289.13 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | S 37 25 02 W | N 66 46 58 W | N 11 18 48 W | N 43 56 40 E | N 42 24 40 E | N 42 01 40 E | S 29 - 14 - 20 E |
| HORZ. DISTANCE | 400.84 | 24.23 | 119.57 | 69.77 | 13.26 | 27.43 | 66.75 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 10 [illegible] | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 489.73 N | 10 499.28 N | 10 616.53 N | 10 666.77 N | 10 676.56 N | 10 696.94 N | 10 608.52 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 7 734.74 | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 491.19 E | 7 468.92 E | 7 445.47 E | 7 493.89 E | 7 502.83 E | 7 521.19 E | 7 526.49 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | RDA | | | | | | RDA |
| CHECKED BY: | | | | | | | |
| DATE | 05.08.75 | | | | | | 05.08.75 |

WORK PLACE VENT / RSE – SURFACE SURVEY

**SURVEY CALCULATION SHEET**

PAGE NO. 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | | HIW4 | △ NN | TP1 | TP2 | TP3 | TP4 |
| S.T.A. | HIW4 | △ NN | TP1 | TP2 | TP3 | TP4 | TP3 |
| F.S. | △ NN | TP1 | TP2 | TP3 | TP4 | A-11 | A-83 |
| MEAS. DISTANCE | | 79.50 | 392.30 | 146.50 + 82.70 | 43.50 | 90 | 219.7 |
| VERT. ANGLE | | 0 | 0 | -03-38-00 0 | | 0 | -03-19-20 |
| SINE – V.A. | | | | .06337 | | | 0578 (TABLE |
| COSINE – V.A. | | | | .99799 | | | 9966 (#6 |
| STA. ELEVATION | | 4246.66 | | 146.22 | | 4247.64 | 4247.29 |
| H.I. | | | | + 82.70 | | + 4.80 | + 4.90 |
| INST. HEIGHT | | | | 228.92 | | 4252.44 | 4252.19 |
| DISTANCE | | | | | | 0.– | – 12.70 |
| DIFF. | | | | | By LEVEL | 4252.44 | 4239.49 |
| H.P. | | | | | | – 13.42 | – 10.06 |
| F.S. ELEVATION | (4246.66) | | | 4247.29 | 4247.64 | 4239.02 | 4229.43 |
| AZ. B.S. TO STA. | | 217 – 25 – 02 | 293 – 13 – 02 | 348 – 41 – 12 | 43 – 56 – 40 | 42 – 24 – 40 | 43 – 56 – 40 |
| ±180 - 00' - 00" | | 180 | 180 | 180 | 180 – | 180 | 180 |
| AZ. STA. TO B.S. | | 37 – 25 – 02 | 113 – 13 – 02 | 168 – 41 – 12 | 223 – 56 – 40 | 222 – 24 – 40 | 223 – 56 – 40 |
| HORZ. ANGLE | BY TRIANG. | 255 – 48 – 00 | 235 – 28 – 10 | 235 – 15 – 28 | 178 – 28 – 00 | 179 – 37 – 00 | 286 – 49 – 00 |
| - 360 - 00' - 00" | | 293 – 13 – 02 | 348 – 41 – 12 | 403 – 56 – 40 | 402 – 24 – 40 | 402 – 01 – 40 | 510 – 45 – 40 |
| AZ. STA. TO F.S. | | 293 – 13 – 02 | 348 – 41 – 12 | 43 – 56 – 40 | N 42 – 24 – 40 | 42 – 01 – 40 | 150 – 45 – 40 |
| BEARING | S 37 – 25 – 02 W | N 66 – 46 – 58 W | N 11 – 18 – 48 W | N 43 – 56 – 40 E | N 42 – 24 – 40 E | N 42 – 01 – 40 E | S 29 – 14 – 20 E |
| HORZ. DISTANCE | 1315.09 | 79.50 | 392.30 | 228.92 | 43.50 | 90.0 | 219.0 |
| COSINE BEARING | .79424 | .39422 | .98057 | .72001 | .73832 | .74282 | .87139 |
| STA. LAT. | 33 457.63 | 34 415.13 | 34 446.47 | 34 831.15 | 34 995.97 | 35 028.09 | 34 804.87 |
| DIFF. | – 1 044.50 | + 31.34 | + 384.68 | + 164.82 | + 32.12 | + 66.85 | – 191.10 |
| F.S. LAT. | 34 415.13 N | 34 446.47 N | 34 831.15 N | 34 995.97 N | 35 028.09 N | 35 094.94 N | 34 804.87 N |
| SINE BEARING | .60760 | .91900 | .19617 | .69396 | .67445 | .66949 | .48845 |
| STA. DEP. | 25 376.43 | 24 577.38 | 24 504.32 | 24 427.38 | 24 586.24 | 24 615.58 | 24 586.24 |
| DIFF. | – 799.05 | – 73.06 | – 76.96 | + 158.86 | + 29.34 | + 60.25 | + 106.97 |
| F.S. DEP. | 24 577.38 E | 24 504.32 E | 24 427.38 E | 24 586.24 E | 24 615.58 E | 24 675.83 E | 24 693.21 E |
| GRADE CALC. | | VOID | | GONE | GONE | | |
| | | PLS. SEE NEW CO-ORDS + | | | | | |
| F.S. GRADE ELV. | | ELEV. ON P-15 | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 18 JULY 75 | " | " | " | " | " | " |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 3

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 5 | HIW 5 | HIW 6 | HIW 6 | HIW 6 | S 75 - 33 | S 75 - 33 |
| S.T.A. | HIW 6 | HIW 6 | S 75 - 33 | S 75 - 33 | S 75 - 33 | HIW 4 | HIW 4 |
| F.S. | A-12 | A-87 | A-88 | A-89 | A-93 | A-90 | A-92 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1323.80 | 1315.61 | 1313.97 | 1315.20 | 1313.42 | 1312.76 | 1311.52 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N 01 01 06 E | N 36 57 41 E | S 86 55 49 E | N 14 03 26 W | N 02 21 06 W | N 33 09 41 W | N 00 18 18 W |
| HORZ. DISTANCE | 113.73 | 141.05 | 80.82 | 217.09 | 254.72 | 78.00 | 109.22 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 997.27 N | 10 996.26 N | 10 827.58 N | 11 042.50 N | 36 372.76 N | 10 873.40 N | 10 917.31 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 390.95 E | 7 473.74 E | 7 649.82 E | 7 516.39 E | 7 558.68 E | 7 692.07 E | 7 734.15 E |
| GRADE CALC. | | | | | | | |
| | PLS. SEE P-8 | | | | | | |
| | FOR AVE. CO-ORDS. | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | KOA | — | — | — | — | — | KOA |
| CHECKED BY: | | | | | | | |
| DATE | 05.08.75 | — | — | — | — | — | 05.08.75 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 3

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW5 | HIW5 | HIW6 | HIW6 | HIW6 | S75-33 | S75-33 |
| S.T.A. | HIW6 | HIW6 | S75-33 | S75-33 | S75-33 | HIW4 | HIW4 |
| F.S. | A-12 | A-87 | A-88 | A-89 | A-93 | A-90 | A-92 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | PRE-DETERMINE | | PLS. SEE P-14 FOR FINAL LOCN |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | FOR LOCN LAYOUT ONLY | | |
| H.I. | BY LEVEL | (COLLAR EL.) | | | | | |
| INST. HEIGHT | P-16 | P-16 | P-29 | P-29 | FOR EL. P-42 | P-29 | BY LEVEL P-42 |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 4341.86 | 4316.32 | 4310.92 | 4314.95 | 4309.12 | 4306.96 | 4302.90 |
| AZ. B.S. TO STA. | 352 - 34 - 21 | | 105 59 41 | | | 98 10 16 | |
| ±180 - 00' - 00" | 180 | | 180 | | | 180 | |
| AZ. STA. TO B.S. | 172 34 21 | 172 04 21 | 285 59 41 | 285 59 41 | 285 59 41 | 278 10 16 | 278 - 10 - 16 |
| HORZ. ANGLE | 188 26 45 | 224 23 20 | 167 04 30 | 59 56 53 | 71 39 13 | 48 40 03 | 81 - 31 - 26 |
| - 360 - 00' - 00" | 361 01 06 | 396 57 41 | 453 04 11 | 345 56 34 | 357 38 54 | 326 50 19 | 359 - 41 - 42 |
| AZ. STA. TO F.S. | 01 01 06 | 36 57 41 | 93 04 11 | 345 56 34 | 357 38 54 | 326 50 19 | 359 - 41 - 42 |
| BEARING | N 01 01 06 E | N 36 57 41 E | S 86 55 49 E | N 14 03 26 W | N 02 21 06 W | N 33 - 09 - 41 W | N 00 - 18 - 18 W |
| HORZ. DISTANCE | 373.12 | 462.75 | 265.15 | 712.24 | 835.71 | 255.92 | 358.32 |
| COSINE BEARING | .99984 | .79704 | .05355 | .97005 | .99916 | .83714 | .99999 |
| STA. LAT. | 36 080.27 N | 36 076.97 N | 35 537.75 N | 36 897.75 N | 36 537.75 N | 35 [illegible] N | 36 [illegible] N |
| DIFF. | + 373.06 | + 369.76 | - 14.20 | + 690.91 | + 835.01 | + 214.24 | + 358.32 |
| F.S. LAT. | 36 080.27 N | 36 076.97 N | 35 523.55 N | 36 228.66 N | 36 372.76 N | 35 673.87 N | 35 817.95 N |
| SINE BEARING | .01777 | 60127 | .99857 | .24289 | .04103 | 54700 | .00532 |
| STA. DEP. | 24 241.89 | 24 241.89 | 24 833.08 | 24 833.08 | 24 833.08 | 25 376.43 | 25 376.43 |
| DIFF. | + 6.63 | + 278.24 | + 264.77 | - 173.00 | - 34.26 | - 139.99 | - 1.91 |
| F.S. DEP. | 24 248.52 E | 24 520.13 E | 25 097.85 E | 24 660.08 E | 24 798.82 E | 25 236.44 E | 25 374.52 E |
| GRADE CALC. | | | | | | | |
| | PLS. SEE P-8 FOR AVE. CO-ORDS. | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 25.07.75 | 25.07.75 | 25.07.75 | 25.07.75 | 25.07.75 | 25.07.75 | 25.07.75 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 5 | HIW 5 | S 75-43 | S 75-43 | S 75-43 | HIW 7 | VG-8 |
| S.T.A. | HIW 6 | HIW 6 | HIW 7 | HIW 7 | HIW 7 | S 75-43 | HIW 7 |
| F.S. | A-32 | A-24 | A-91 | 8 N / 112 W | 12 N / 112 W | 10 N / 116 VIA TP | A-86 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1315.03 | 1314.47 | 1300.15 | 1306.84 | 1299.28 | 1305.73 1298.17 | 1301.36 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | S 00 55 06 E | S 67 19 16 E | N 28 12 43 E | N 18 01 37 E | N 32 09 43 E | N 20 50 13 E | N 62 51 52 E |
| HORZ. DISTANCE | 60.73 | 47.31 | 165.49 | 101.46 | 78.80 | 170.18 | 232.05 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 822.83 N | 10 865.31 N | 11 720.80 N | 11 671.44 N | 11 760.19 N | 11 640.56 N | 11 680.81 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 389.90 E | 7 432.58 E | 6 899.62 E | 6 852.80 E | 6 937.86 E | 6 806.98 E | 7 027.90 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | Rok | — | — | — | — | — | Rok |
| CHECKED BY: | | | | | | | |
| DATE | 05.08.75 | — | — | — | — | — | 05.08.75 |

WORK PLACE DDH's SURVEY

# SURVEY CALCULATION SHEET

PAGE NO. 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 5 | HIW 5 | S 75-43 | S 75-43 | S 75-43 | HIW 7 | VG 8 |
| S.T.A. | HIW 6 | HIW 6 | HIW 7 | HIW 7 | HIW 7 | S 75-43 | HIW 7 |
| F.S. | A-32 | A-24 | A-91 | 8N/112W | 12N/112W | 10N/116W VIA TP | A-86 |
| MEAS. DISTANCE | 200 | 156.5 | BY Δ —— | 334 | 720 | 295 / 265 | 763 |
| VERT. ANGLE | -03-29-00 | -05-13-00 | -01-40-48 | -03-27-40 | -03-07-00 | -02-58-00 / -03-18-00 | -02-42-00 |
| SINE – V.A. | .0606 | .0906 | .0294 | .0586 | .0543 | .0517 / .0575 | TABLE .0471 |
| COSINE – V.A. | .9963 | .9918 | .9992 | .9966 | .9970 | .9973 / .9967 | #6 .9978 |
| STA. ELEVATION | 4326.84 | 4326.84 | 4309.26 | 4309.26 | 4309.26 | 4303.11 / 4283.88 | 4309.26 |
| H.I. | + 4.68 | + 4.68 | + 4.50 | + 4.50 | + 4.50 | + 3.50 / + 4.70 | + 5.05 |
| INST. HEIGHT | 4331.52 | 4331.52 | 4313.76 | 4313.76 | 4313.76 | 4306.61 / 4288.58 | 4314.31 |
| DISTANCE | -12.12 | -14.18 | -17.19 | -19.57 | -39.10 | -15.25 / -15.24 | -35.94 |
| DIFF. | 4319.40 | 4317.34 | 4296.57 | 4294.19 | 4274.66 | 4291.36 / 4273.34 | 4278.37 |
| H.P. | -5.00 | -4.78 | -31.00 | -6.67 | -11.93 | -7.48 / -14.40 | -8.81 |
| F.S. ELEVATION | 4314.40 | 4312.56 | 4265.57 | 4287.52 | 4262.73 | 4283.88 / 4258.94 | 4269.56 |
| AZ. B.S. TO STA. | 352-34-14 | | 131-11-37 | 131-11-43 | 131 11 43 | 311-11-43 | 126 00 52 |
| ±180 - 00' - 00" | 180 + 07" | | 180 | 180 -06" | 180 | 180 | 180 +08" |
| AZ. STA. TO B.S. | 172-34-14 | | 311-11-37 | 311-11-43 | 311 11 43 | 131 11 43 | 306 00 52 |
| HORZ. ANGLE | 6-30-40 | | 77-00-40 | 66-49-54 | 80 58 00 | 249 38 30 | 116 51 00 |
| - 360 - 00' - 00" | 179-04-54 | | 388-12-17 | 378-01-37 | 392 09 43 | 380 50 13 | 422 51 52 |
| AZ. STA. TO F.S. | 179-04-54 | | 28-12-43 | 18-01-37 | 32 09 43 | 20 50 13 | 62 51 52 |
| BEARING | S 00-55-06 E | S 67-19-16 E | N 28-12-43 E | N 18-01-37 E | N 32 09 43 E | N 20 50 13 E | N 62 51 52 E |
| HORZ. DISTANCE | 199.26 | 155.22 | 542.94 | 332.86 | 717.84 | 558.32 | 761.32 |
| COSINE BEARING | .99987 | .38557 | .88128 | .95088 | .84655 | .93460 | .45617 |
| STA. LAT. | 35 707.21 | 35 [illegible] | 37 [illegible] | 37 [illegible] | 37 [illegible] | 38 [illegible] | 34 [illegible] |
| DIFF. | -199.23 | -59.85 | +478.44 | +316.51 | +607.69 | +521.81 | +347.25 |
| F.S. LAT. | 35 507.98 N | 35 647.36 N | 38 454.06 N | 38 292.13 N | 38 583.31 N | 38 712.64 N | 38 332.87 N |
| SINE BEARING | .01603 | .92268 | .47273 | .30956 | .53231 | .35571 | .88993 |
| STA. DEP. | 24 241.89 | 24 241.89 | 22 379.89 | 22 379.89 | 22 379.89 | 22 134.00 | 22 379.89 |
| DIFF. | + 3.19 | +143.22 | +256.66 | +103.04 | +382.11 | +198.60 | +677.52 |
| F.S. DEP. | 24 245.08 E | 24 385.11 E | 22 636.55 E | 22 482.93 E | 22 762.00 E | 22 332.60 E | 23 057.41 E |
| GRADE CALC. | | | -01-40-48 | | | 194.22 | |
| | | PLS. SEE P-7 FOR AVERAGE | Δ STA. 542.94 -17.19 ℄ MASK 131' FOR N.B. | FOR LOC'N LAYOUT ONLY SUBTRACT 06" ON EACH AZIMUTH. | | 764.54 558.32 | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | VG-8 | HIW 4 | HIW 4 | HIW 6 | HIW 6 | HIW 6 | HIW 6 |
| S.T.A. | HIW 7 | HIW 6 | HIW 6 | S 75-33 | S 75-33 | S 75-33 | S 75-33 |
| F.S. | S 75-43 | A-85 | A-84 | A-82 | A-53 | A-5 | A-9 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | 1313.46 | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1311.59 | 1318.71 | 1307.89 | 1312.30 | 1308.52 | 1303.85 | 1312.92 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N 48 48 23 W | N 31 26 07 E | S 24 32 33 E | N 16 14 41 E | S 46 01 41 W | S 46 41 41 W | N 44 31 41 E |
| HORZ. DISTANCE | 99.60 | 81.64 | 111.11 | 134.72 | 25.50 | 66.17 | 89.92 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 11 640.56 N | 10 953.21 N | 10 782.49 N | 10 961.25 N | 10 814.20 N | 10 786.52 N | 10 896.01 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 6 746.44 E | 7 431.51 E | 7 435.08 E | 7 606.81 E | 7 550.77 E | 7 520.97 E | 7 632.18 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROR | — | — | — | — | — | ROR |
| CHECKED BY: | | | | | | | |
| DATE | 05 08 75 | — | — | — | — | — | 05. 08. 75 |

WORK PLACE DDH's SURVEY

**SURVEY CALCULATION SHEET**



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | VG-8 | HIW4 | HIW4 | HIW6 | HIW6 | HIW6 | HIW6 |
| S.T.A. | HIW7 | HIW6 | HIW6 | S 75-33 | S 75-33 | S 75-33 | S 75-33 |
| F.S. | S 75-43 | A-85 | A-84 | A-82 | A-53 | A-5 | A-9 |
| MEAS. DISTANCE | 326.77 | 268 | 366 | 442 | 85.0 | 220 | 295 |
| VERT. ANGLE | 0 | + 01 25 10 | − 04 15 00 | + 00 09 00 | − 07 10 00 | −06 37 00 | 0 |
| SINE – V.A. | EL HIW7 = 4309.26 | .0250 | .0739 | .0026 | .1238 | .1144 | |
| COSINE – V.A. | | .9994 | .9946 | 1.0000 | .9844 | .9868 | |
| STA. ELEVATION | EL. S75-43 = 4303.11 | 4326.84 | 4326.84 | 4311.39 | 4311.39 | 4311.39 | 4311.39 |
| H.I. | + 11.20 | + 4.65 | + 4.75 | + 4.10 | + 3.60 | + 3.60 | + 3.60 |
| INST. HEIGHT | T @ HIW7 = 4314.31 | 4331.49 | 4331.59 | 4315.49 | 4314.99 | 4314.99 | 4314.99 |
| DISTANCE | − 5.05 | + 6.70 | − 27.05 | + 1.15 | − 10.52 | − 25.17 | 0 |
| ~~DIFF.~~ | ~~EL. HIW7 = 4309.26~~ | 4338.19 | 4304.54 | 4316.64 | 4304.47 | 4289.82 | 4314.99 |
| H.P. | | − 13.34 | − 13.57 | −11.21 | −11.43 | −12.10 | − 7.50 |
| F.S. ELEVATION | (4303.11) | 4324.85 | 4290.97 | 4305.43 | 4293.04 | 4277.72 | 4307.49 |
| AZ. B.S. TO STA. | 126 00 52 | 282 18 37 | 282 18 37 | 105 59 41 | 105 59 41 | 105 59 41 | 105 59 41 |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| AZ. STA. TO B.S. | 306 00 52 | 102 18 37 | 102 18 37 | 285 59 41 | 285 59 41 | 285 59 41 | 285 59 41 |
| HORZ. ANGLE | 5 10 45 | 289 07 30 | 53 08 50 | 90 15 00 | 300 02 00 | 300 42 00 | 118 32 00 |
| - 360 - 00' - 00" | 311 11 37 | 391 26 07 | 155 27 27 | 376 14 41 | 586 01 41 | 586 41 41 | 404 31 41 |
| AZ. STA. TO F.S. | 311 11 37 | 31 26 07 | 155 27 27 | 16 14 41 | 226 01 41 | 226 41 41 | 44 31 41 |
| BEARING | N48 48 23 W | N 31 26 07 E | S 24 32 33 E | N 16 14 41 E | S 46 01 41 W | S 46 41 41 W | N 44 31 41 E |
| HORZ. DISTANCE | 326.77 | 267.84 | (ADJ.) 364.52 | 442.0 | 83.67 | 217.10 | 295 |
| COSINE BEARING | .65861 | .85323 | .90966 | .96008 | .69431 | .68589 | .71491 |
| ~~STA. LAT.~~ | ~~35 707.62~~ | ~~35 707.62~~ | ~~35 707.21~~ | 35 537.75 | 35 537.75 | 35 537.75 | 35 537.75 |
| DIFF. | + 215.21 | + 228.53 | − 331.59 | + 424.36 | − 58.09 | − 148.91 | + 210.31 |
| F.S. LAT. | 38 190.83 N | 35 935.74 N | 35 375.62 N | 35 962.11 N | 35 479.66 N | 35 388.84 N | 35 748.06 N |
| SINE BEARING | .75249 | .57154 | .41536 | .27974 | .71968 | .72771 | .70125 |
| STA. DEP. | 22 379.89 | 24 241.89 | 24 241.89 | 24 833.08 | 24 833.08 | 24 833.08 | 24 833.08 |
| DIFF. | −245.89 | + 139.69 | + 151.41 | + 123.64 | − 60.22 | − 157.99 | + 206.87 |
| F.S. DEP. | 22 134.00 E | 24 381.58 E | 24 393.30 E | 24 956.72 E | 24 772.86 E | 24 675.09 E | 25 039.95 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | / | / | / | / | / | / | / |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| RECALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 20.07.75 | 20.07.75 | 20.07.75 | 20.07.75 | 20.07.75 | 20.07.75 | 20.07.75 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 5 | HIW 4 | HIW 4 | HIW 4 | HIW 4 | S75-43 HIW 7 | S75-43 HIW 7 |
| S.T.A. | HIW 4 | TP 5 | TP 5 | TP 5 | TP 5 | L 112/2+00 N | 6 N/112 W |
| F.S. | TP 5 | A-56 | A-21 | A-60 | A-19 | | |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | FOR LOC'N LAYOUT ONLY | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| ~~DIFF.~~ | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1312.73 | 1310.39 | 1301.68 | 1289.41 | 1295.52 | 1315.30 | 1308.44 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | S 84 04 46 W | S 35 23 46 W | S 40 41 46 W | S 42 29 46 W | S 42 05 46 W | S 73 40 43 W. | N 05 57 11 W. |
| HORZ. DISTANCE | 30.18 | 22.10 | 81.41 | 201.52 | 141.78 | 82.75 | 58.13 |
| ~~COSINE BEARING~~ | | | | | | | |
| ~~STA. LAT.~~ | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 804.98 N | 10 786.97 N | 10 743.26 N | 10 656.40 N | 10 699.78 N | 11 551.72 N | 11 632.79 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 704.72 E | 7 691.92 E | 7 651.64 E | 7 568.59 E | 7 609.68 E | 6 741.98 E | 6 815.36 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | — | — | — | — | — | RSZ |
| CHECKED BY: | | | | | | | |
| DATE | 06.09.75 | | — | — | — | — | 05.08.75 |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 5 | HIW 4 | HIW 4 | HIW 4 | HIW 4 | 75-43 HIW 7 | 75-43 HIW 7 |
| S.T.A. | HIW 4 | TP 5 | TP 5 | TP 5 | TP 5 | L 112 / 2+00 N | 6N / 112 W |
| F.S. | TP 5 | A-56 | A-21 | A-60 | A-19 | 272 | 191.0 |
| MEAS. DISTANCE | 99.0 | 72.5 | 272.0 | 670 | 472 | + 02 28 00 | - 02 10 00 |
| VERT. ANGLE | ø | ø | - 07 44 00 | - 06 36 40 | - 06 55 00 | .0430 | .0378 |
| SINE – V.A. | | | .1333 | .1142 | .1196 | .9981 | .9986 |
| COSINE – V.A. | | | .9819 | .9868 | .9855 | 4309.26 | 4309.26 |
| STA. ELEVATION | 4308.00 | 4306.85 | 4306.85 | 4306.85 | 4306.85 | + 4.70 | + 4.70 |
| H.I. | + 4.10 | + 5.00 | + 5.00 | + 5.00 | + 5.00 | 4313.96 | 4313.96 |
| INST. HEIGHT | 4312.10 | 4311.85 | 4311.85 | 4311.85 | 4311.85 | + 11.70 | - 7.22 |
| DISTANCE | ø | ø | - 36.26 | - 76.51 | - 56.45 | 4325.66 | 4306.74 |
| DIFF. | 4312.10 | 4311.95 | 4275.59 | 4235.34 | 4255.40 | - 10.36 | - 13.95 |
| H.P. | - 5.25 | - 12.66 | - 5.00 | - 5.00 | 5.00 | 4315.30 | 4292.79 |
| F.S. ELEVATION | 4306.85 | 4299.19 | 4270.59 | 4230.34 | 4250.40 | | |
| AZ. B.S. TO STA. | 22 08 46 | 264 04 46 | 264 04 46 | 264 04 46 | 264 04 46 | 131 11 43 | |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | 180 | 180 | |
| AZ. STA. TO B.S. | 202 08 46 | 84 04 46 | 84 04 46 | 84 04 46 | 84 04 46 | 311 11 43 | 311 11 43 |
| HORZ. ANGLE | 61 56 00 | 131 19 00 | 136 37 00 | 138 25 00 | 138 01 00 | 302 29 00 | 42 51 06 |
| - 360 - 00' - 00" | 264 04 46 | 215 23 46 | 220 41 46 | 222 29 46 | 222 05 46 | 613 40 43 | 354 02 49 |
| AZ. STA. TO F.S. | 264 04 46 | 215 23 46 | 220 41 46 | 222 29 46 | 222 05 46 | 253 40 43 | 354 02 49 |
| BEARING | S 84 04 46 W | S 35 23 46 W | S 40 41 46 W | S 42 29 46 W | S 42 05 46 W | S 73 40 43 W | N 5 57 11 W |
| HORZ. DISTANCE | 99.0 | 72.5 | 267.08 | 661.16 | 465.16 | 271.48 | 190.73 |
| COSINE BEARING | .10315 | .81517 | .75818 | .73732 | .74203 | .28103 | .99461 |
| STA. LAT. | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| DIFF. | - 10.21 | - 59.10 | - 202.49 | - 487.49 | - 345.16 | - 76.29 | + 189.70 |
| F.S. LAT. | 35 449.42 N | 35 390.32 N | 35 246.93 N | 34 961.93 N | 35 104.26 N | 37 899.33 N | 38 165.32 N |
| SINE BEARING | .99467 | .57922 | .65204 | .67554 | .67037 | .95970 | .10371 |
| STA. DEP. | 25 376.43 | 25 277.96 | 25 277.96 | 25 277.96 | 25 277.96 | 22 379.89 | 22 379.89 |
| DIFF. | - 98.47 | - 41.99 | - 174.15 | - 446.64 | - 311.83 | - 260.54 | - 19.78 |
| F.S. DEP. | 25 277.96 E | 25 235.97 E | 25 103.81 E | 24 831.32 E | 24 966.13 E | 22 119.35 E | 22 360.11 E |
| GRADE CALC. | | | TIED IN GOOD FOR A STADIA SURVEY PLS. SEE FRONT PAGE A-21 SURVEYED BY H.I.W. | | TIED IN GOOD W/. H.I.W. LEGAL SURVEYORS | FOR REF. ONLY | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| RECALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | M.07.75 | M.07.75 | M.07.75 | M.07.75 | M.07.75 | M.07.75 | M.07.75 |

WORK PLACE DDH's SURVEY / LOCATION

**SURVEY CALCULATION SHEET**

PAGE NO. 7

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 7 | HIW 7 | HIW 4 | HIW 4 | HIW 4 | HIW 4 | HIW 4 |
| S.T.A. | S 75-43 | S 75-43 | HIW 6 | HIW 6 | HIW 6 | HIW 6 | HIW 6 |
| F.S. | POST | 75-09 ANVIL MNG | A-26 | A-10 | A-35 | A-38 | A-22 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1309.04 | 1313.16 | 1314.46 | 1309.47 | 1313.70 | 1312.48 | 1322.15 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N 53 56 17 W | S 75 15 23 W | S 67 22 23 E | S 58 43 23 E | S 20 44 37 W | S 28 33 37 W | N 33 05 23 W |
| HORZ. DISTANCE | 20.12 | 126.74 | 47.15 | 109.85 | 112.96 | 170.28 | 78.80 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 11 652.41 N | 11 608.31 N | 10 865.42 N | 10 826.53 N | 10 777.92 N | 10 734.00 N | 10 949.58 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 6 730.18 E | 6 623.87 E | 7 432.45 E | 7 482.81 E | 7 348.92 E | 7 307.52 E | 7 345.91 E |
| GRADE CALC. | | | | | | | |
| | | EL. AV. | 1314.46 | | | | |
| | | AV. CO-ORDS | 10 865.37 N. | | | | |
| F.S. GRADE ELV. | | | 7 432.51 E. | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | — | — | — | — | — | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 26. 03. 75 | | | | | | |

WORK PLACE DDH's SURVEY / LOCATION

## SURVEY CALCULATION SHEET

PAGE NO. 7

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 7 | HIW 7 | HIW 4 | HIW 4 | HIW 4 | HIW 4 | HIW 4 |
| S.T.A. | 75 - 43 | 5 - 75 - 43 | HIW 6 | HIW 6 | HIW 6 | HIW 6 | HIW 6 |
| F.S. | Post | 75-09 ANVIL MNG | A-24 | A-10 | A-35 | A-38 | A-22 |
| MEAS. DISTANCE | 66 | 416 | 156 | 363 | 371 | 559 | 259 |
| VERT. ANGLE | 0 | + 01 11 00 | - 05 17 00 | - 04 52 00 | - 01 - 55 - 00 | - 01 23 00 | + 02 23 00 |
| SINE – V.A. | | .0206 | .0917 | .0845 | .0334 | .0241 | .0416 |
| COSINE – V.A. | | .9996 | .9916 | .9928 | .9989 | .9982 | .9982 |
| STA. ELEVATION | 4303.11 | 4303.11 | 4326.84 | 4326.84 | 4326.84 | 4326.84 | 4326.84 |
| H.I. | + 3.65 | + 3.65 | + 4.45 | + 4.45 | + 4.45 | + 4.45 | + 4.45 |
| INST. HEIGHT | 4306.76 | 4306.76 | 4331.29 | 4331.29 | 4331.29 | 4331.29 | 4331.29 |
| DISTANCE | 0 | + 8.57 | - 14.30 | - 30.67 | - 12.39 | - 13.47 | + 10.77 |
| DIFF. | 4306.76 | 4315.33 | 4316.99 | 4300.62 | 4318.90 | 4317.82 | 4342.06 |
| H.P. | - 12.00 | - 7.08 | - 4.45 | - 4.45 | - 8.85 | - 11.80 | - 4.30 |
| F.S. ELEVATION | 4294.76 | 4308.25 | 4312.54 | 4296.17 | 4310.05 | 4306.02 | 4337.76 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | 131 11 43 | 131 11 43 | 102 18 37 | 102 18 37 | 102 18 37 | 102 18 37 | 102 18 37 |
| HORZ. ANGLE | 174 52 00 | 124 03 40 | 10 19 00 | 18 58 00 | 98 26 00 | 106 15 00 | 224 36 00 |
| - 360 - 00' - 00" | 306 03 43 | 255 15 23 | 112 37 37 | 121 16 37 | 200 44 37 | 208 33 37 | 326 54 37 |
| AZ. STA. TO F.S. | 306 03 43 | 255 15 23 | 112 37 37 | 121 16 37 | 200 44 37 | 208 33 37 | 326 54 37 |
| BEARING | N 53 56 17 W | S 75 15 23 W | S 67 22 23 E | S 58 43 23 E | S 20 44 37 W | S 28 33 37 W | N 33 05 23 W |
| HORZ. DISTANCE | 66.0 | 415.83 | 154.69 | 360.39 | 370.59 | 558.66 | 258.53 |
| COSINE BEARING | .58866 | .25449 | .38473 | .51918 | .93518 | .87832 | .83740 |
| STA. LAT. | 38 190.83 | 38 190.83 | 35 707.21 | 35 707.21 | 35 707.21 | 35 707.21 | 35 707.21 |
| DIFF. | + 38.85 | - 105.82 | - 59.51 | - 187.11 | - 346.57 | - 490.68 | + 216.60 |
| F.S. LAT. | 38 229.68 N | 38 085.01 N | 35 647.70 N | 35 520.10 N | 35 360.64 N | 35 216.53 N | 35 923.81 N |
| SINE BEARING | .80838 | .96707 | .92303 | .85467 | .35418 | .47808 | .54595 |
| STA. DEP. | 22 134.00 | 22 134.00 | 24 241.89 | 24 241.89 | 24 241.89 | 24 241.89 | 24 241.89 |
| DIFF. | - 53.35 | - 402.13 | + 142.78 | + 308.01 | - 131.26 | - 267.08 | - 141.14 |
| F.S. DEP. | 22 080.65 E | 21 731.87 E | 24 384.67 E | 24 549.90 E | 24 110.63 E | 23 974.81 E | 24 100.75 E |
| GRADE CALC. | | | 35 647.36 | | | | |
| | | | .70 | EL AV. = 4312.55 | | | |
| | | Av. | 35 647.53 | | | | |
| F.S. GRADE ELV. | | | 24 385.11 | | | | |
| GRADE CHAIN | | | 4.67 | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS Av. | L. 24 389.89 R | P. M. | L. R. | P. M. | L. R. |
| RE CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 22 JULY 75 | 22.07.75 | 22.07.75 | 22.07.75 | 22.07.75 | 22-07-75 | 22.07.75 |

WORK PLACE DDH's' SURVEY / LOCATION

## SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | H1W4 | H1W6 | H1W6 | H1W6 | H1W6 | H1W6 | LOC'N. LAYOUT |
| S.T.A. | H1W6 | S 75-36 | S 75-36 | S 75-36 | H1W4 | H1W4 | BL / 68 W |
| F.S. | S 75-36 | A-12 | A-20 | A-27 | LOC'N 8N / 72 W | LOC'N 6N / 70 W | BL / 84 W |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | PLS. SEE P-16 | | | | | |
| COSINE – V.A. | | FOR LEVEL SHOT | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | FOR LOC'N. LAYOUT ONLY | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1322.52 | 1323.37 | 1321.72 | 1314.27 | 1313.54 | 1303.62 | |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N 13 41 37 E | N 52 50 28 W | N 18 57 37 E | S 42 45 58 E | N 02 - 20 - 11 E | S 02 24 46 E | N 46 08 40 W. |
| HORZ. DISTANCE | 100.85 | 27.28 | 60.66 | 94.92 | 53.05 | 62.77 | 287.65 |
| ~~COSINE BEARING~~ | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 981.54 N | 10 998.02 N | 11 038.90 N | 10 911.85 N | 10 831.13 N | 10 745.18 N | 10 906.71 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 412.80 E | 7 391.06 E | 7 432.51 E | 7 477.25 E | 7 735.67 E | 7 737.39 E | 7 302.99 E |
| GRADE CALC. | | | | | | | |
| | Av. Co-ord 10 997.64 N | | | | | | |
| | " " 7391.02 E | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | | | | | | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 06.08.75 | | | | | | 06.08.75 |

WORK PLACE DDH's SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW4 | HIW6 | HIW6 | HIW6 | HIW6 | HIW6 | LOC'N LAYOUT |
| S.T.A. | HIW6 | S75-36 | S75-36 | S75-36 | HIW4 | HIW4 | BL/68 W |
| F.S. | S75-36 | A-12 | A-20 | A-27 | LOC'N. 8N/72W | LOC'N. 6N/70W | BL/84 W |
| MEAS. DISTANCE | 332 | 89.5 | 199.0 | 314 | 75.62 | 208.5 | 1600. |
| VERT. ANGLE | +03 21 00 | ⌀ | ⌀ | -05-11-00 | ⌀ | -05-30-00 | |
| SINE – V.A. | .0583 | PLS. SEE P.16 FOR | | .0900 | | .0954 | |
| COSINE – V.A. | .9966 | LEVEL SHOT (ELEV.) | | .9918 | | .9908 | |
| STA. ELEVATION | 4326.84 | 4338.99 | 4338.99 | 4338.99 | 4308.00 | 4308.00 | |
| H.I. | +4.45 | +4.75 | +4.75 | +4.75 | +3.90 | +3.90 | |
| INST. HEIGHT | 4331.29 | 4343.74 | 4343.74 | 4343.74 | 4311.90 | 4311.90 | |
| DISTANCE | +19.36 | ⌀ | ⌀ | -28.26 | ⌀ | -19.89 | |
| DIFF. | 4350.65 | 4343.74 | 4343.74 | 4315.48 | 4311.90 | 4292.01 | |
| H.P. | -11.66 | -2.13 | -7.40 | -3.57 | -2.40 | -15.04 | |
| F.S. ELEVATION | 4338.99 | 4341.61 | 4336.34 | 4311.91 | 4309.50 | 4276.97 | |
| AZ. B.S. TO STA. | | 13 41 37 | | | | | |
| ±180 - 00' - 00" | | 180 | | | | | |
| AZ. STA. TO B.S. | 102 18 37 | 193 41 37 | 193 41 37 | 193 41 37 | 282 18 37 | 282 18 37 | PRE-DETERMINE |
| HORZ. ANGLE | 271 23 00 | 113 28 00 | 185 16 00 | 303 32 25 | 80 01 34 | 255 16 37 | LOC'N. LAYOUT |
| - 360 - 00' - 00" | 373 41 37 | 307 09 37 | 378 57 37 | 497 14 02 | 362 20 11 | 537 35 14 | |
| AZ. STA. TO F.S. | 13 41 37 | 307 09 37 | 18 57 37 | 137 14 02 | 02 20 11 | 177 35 14 | BL BEARING ? |
| BEARING | N 13 41 37 E | N 52 50 23 W | N 18 57 37 E | S 42 45 58 E | N 02 20 11 E | S 02 24 46 E | N 46 08 40 W |
| HORZ. DISTANCE | 330.87 | 89.5 | 199.0 | 311.42 | 75.62 | 206.58 | 1600 |
| COSINE BEARING | .97157 | .60405 | .94575 | .73414 | .99977 | .99911 | .69280 |
| STA. LAT. | 36 751.21 | 36 028.67 | 36 216.87 | 36 028.67 | 35 459.63 | 35 459.63 | 35 789.72 |
| DIFF. | +321.46 | +54.06 | +188.20 | -228.63 | +75.56 | -206.40 | +1 108.54 |
| F.S. LAT. | 36 028.67 N | 36 082.73 N | 36 216.87 N | 35 800.04 N | 35 535.19 N | 35 253.23 N | 35 789.72 N |
| SINE BEARING | .23672 | .79695 | .32491 | .67900 | .04076 | .04210 | .71409 |
| STA. DEP. | 24 241.89 | 24 320.21 | 24 320.21 | 24 320.21 | 25 376.43 | 25 376.43 | 25 113.68 |
| DIFF. | +78.32 | -71.33 | +64.66 | +211.45 | +3.08 | +8.70 | -1 153.74 |
| F.S. DEP. | 24 320.21 E | 24 248.88 E | 24 384.87 E | 24 531.66 E | 25 379.51 E | 25 385.13 E | 23 959.94 E |
| GRADE CALC. | | 36 080.27 | 24 248.52 | | (KERR) | | |
| | | 36 082.73 | 24 248.88 | | THEY MOVED IT | FOR LOC'N LAYOUT | |
| | AVE. | 36 081.50 | 24 248.75 | | 10' SOUTH | ONLY | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | LEVEL | AV. = 4341.73 | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 23.07.75 | 23.07.75 | 23.07.75 | 23-07-75 | 23.07.75 | 23.07.75 | 23.07.75 |

WORK PLACE DDHs toc'N Layout

SURVEY CALCULATION SHEET

PAGE NO. 9

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | | |
| S.T.A. | BL/84 W | | | | | | | |
| F.S. | 8N/84 W | | | | | | | |
| MEAS. DISTANCE | | | | | | | | |
| VERT. ANGLE | GROUND ELEV. | A-19 = 11 038.91 − 7 432.51 | | | | | | |
| SINE – V.A. | ON 8N/84 W | 8N/84 W = 11084.54 − 7 471.93 | | | | | | |
| COSINE – V.A. | IS 5FT. LESS | 45.63 − 39.42 | | | | | | |
| STA. ELEVATION | THAN A-20, | | | | | | | |
| H.I. | COLLAR EL. TO | 39.42 = | 0.86406 | | | | | |
| INST. HEIGHT | PICK UP LATER | 45.63 = | 40° 49' 44" | | | | | |
| DISTANCE | AFTER DRILLED | 39.42 | 43° 51' 20" | | | | | |
| DIFF. | OF 1320.19 | .65380 | Diff = 03° 01' 36" | | | | | |
| H.P. | | = 60.29 | | | | | | |
| F.S. ELEVATION | | | | | | | | |
| AZ. B.S. TO STA. | | A-12 = 10 998.02 − 7 391.06 | | | | | | |
| ±180 - 00' - 00" | | A-20 = 11 038.91 − 7 432.51 | | | | | | |
| AZ. STA. TO B.S. | | | | | | | | |
| HORZ. ANGLE | | 41.447 = | 1.01364 | | | | | |
| - 360 - 00' - 00" | | 40.889 = | 45° 23' 17" | | | | | |
| AZ. STA. TO F.S. | | .71188 | 58.22 | | | | | |
| BEARING | N 43 51 20 E | | | | S 46 08 40 E | | | |
| HORZ. DISTANCE | 243.84 | ∴ | 45° 23' 17" | | 121.58 | | | |
| COSINE BEARING | | | 43° 51' 20" | | .69284 | | | |
| STA. LAT. | | | 01° 31' 57" | | 11 [illegible] 44 | | | |
| DIFF. | | | | | − 84.24 | | | |
| F.S. LAT. | 11 084.54 N | N | toc'N. | N | 11 328.20 N | N | N | N |
| SINE BEARING | | | 8N/84W | 5.3°/s | .7109 | | | |
| STA. DEP. | | | | | 6 778.71 | | | |
| DIFF. | | | | | 87.67 | | | |
| F.S. DEP. | 7 471.93 E | E | A-20 | E | 6 866.38 E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | A-12 | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROL | | | | ROL | | | |
| CHECKED BY: | | | | | | | | |
| DATE | 06.08.75 | | | | 06.08.75 | | | |

WORK PLACE DDHs Loc'n. Layout

**SURVEY CALCULATION SHEET**

PAGE NO. 9

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | | |
| S.T.A. | BL/84W | | | BL/108W | | | | |
| F.S. | Loc'n 8N/84W | | | BL/104W | | | | |
| MEAS. DISTANCE | | | | | | | | |
| VERT. ANGLE | GROUND ELEV. | A-19 = 36 376.89 − 24 384.86 | | | | | | |
| SINE – V.A. | ON 8N/84W IS | 8N/84W = 36 366.59 − 24 514.21 | | | | | | |
| COSINE – V.A. | 5 FT. LESS THAN | ⊕ 149.70 ⊕ 129.35 | | | | | | |
| STA. ELEVATION | A-20. COLLAR | | | | | | | |
| H.I. | EL. TO PICK UP | 129.35 = | 0.864061 | | | | | |
| INST. HEIGHT | LATER AFTER | 149.70 = | 40° 49' 44" | | | | | |
| DISTANCE | DRILLED OFF. | 129.35 | 43° 51' 20" | | | | | |
| DIFF. | | .65380 DIFF = | 03° 01' 36" | | | | | |
| H.P. | 4331.34 | − 197.84' | | | | | | |
| F.S. ELEVATION | | | | | | | | |
| AZ. B.S. TO STA. | | A-12 = 36 082.74 | − 24 248.88 | | | | | |
| ±180 - 00' - 00" | | A-20 = 36 376.89 | − 24 384.86 | | | | | |
| AZ. STA. TO B.S. | | ⊕ 134.15 | ⊕ 135.98 | | | | | |
| HORZ. ANGLE | | | | | | | | |
| - 360 - 00' - 00" | | 135.98 | 1.013641 | | | | | |
| AZ. STA. TO F.S. | NORMAL TO B.L. | 134.15 = | = 45° 23' 17" | | | | | |
| BEARING | N 43 51 20 E | .71188 = | 191.01' | S 46 - 08 - 40 E | | | | |
| HORZ. DISTANCE | 800 | | | 398.90 | | | | |
| COSINE BEARING | .71709 | | ∴ 45° 23' 17" | .69284 | | | | |
| STA. LAT. | 36 981.17 | | 43° 51' 20" | 37 442.40 | | | | |
| DIFF. | + 576.87 | | 01° 31' 57" | − 276.37 | | | | |
| F.S. LAT. | 36 366.59 N | N | N | 37 166.03 N | N | N | N | N |
| SINE BEARING | .69284 | | | .72109 | | | | |
| STA. DEP. | 23 959.94 | | Loc'n 8N/84W | 22 239.87 | | | | |
| DIFF. | + 554.27 | | 5.3 | 287.64 | | | | |
| F.S. DEP. | 24 514.21 E | E | E | 22 527.51 E | E | E | E | E |
| GRADE CALC. | | | 197.84' | | | | | |
| | | | A-20 | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | A-12 | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | ROA | ROA | ROA | ROA | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | 19.07.75 | 19.07.75 | 19.07.75 | 19.07.75 | | | | |

WORK PLACE DDHs Loc'n ORIGIN

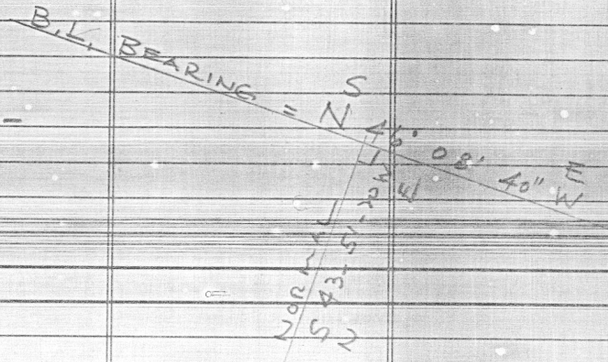
REVISED – PLS SEE NEW CALC.

**SURVEY CALCULATION SHEET**

PAGE NO. 10

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | |
| S.T.A. | BL/ 108W | BL/ 104 W | BL/ 100 W | BL/ 96 W | BL/ 92 W | BL/ 88 W | BL/ 84 W |
| F.S. | BL/ 104W | BL/ 100 W | BL/ 96 W | BL/ 92 W | BL/ 88W | BL/ 84 W | BL/ 80 W |
| MEAS. DISTANCE | | | | TIE IN | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | N. B. | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | | | | | | | |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | S 46 - 08 - 40 E | S 46 - 08 - 40 E | S 46 - 08 - 40 E | S 46 - 08 - 40 E | S 46 - 08 - 40 E | S 46 - 08 - 40 E | S 46 - 08 - 40 E |
| HORZ. DISTANCE | 398.90 | 398.90 | 398.90 | 398.90 | 398.30 | 398.30 | 398.30 |
| COSINE BEARING | .69284 | .69284 | .69284 | .69284 | .69284 | .69284 | .69284 |
| STA. LAT. | 37 434.76 | 37 165.85 | 36 889.48 | 36 613.11 | 36 336.97 | 36 060.60 | 35 784.26 |
| DIFF. | – 276.37 | – 276.37 | – 276.37 | – 276.37 | – 275.96 | – 275.96 | – 275.96 |
| F.S. LAT. | 37 165.85 N | 36 889.48 N | 36 613.11 N | 36 336.74 N | 36 061.01 N | 35 785.05 N | 35 509.09 N |
| SINE BEARING | .71409 | .71409 | .71409 | .71409 | .71409 | .71409 | .71409 |
| STA. DEP. | 22 239.87 | 22 526.86 | 22 814.50 | 23 102.24 | 23 390.43 | 23 677.64 | 23 964.85 |
| DIFF. | + 287.64 | + 287.64 | + 287.64 | + 287.64 | + 287.21 | + 287.21 | + 287.21 |
| F.S. DEP. | 22 526.86 E | 22 814.50 E | 23 102.24 E | 23 390.43 E | 23 677.64 E | 23 964.85 E | 24 252.06 E |
| GRADE CALC. | | | | TIE .69 O.K. | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| RECALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | RIA |
| CHECKED BY: | | | | | | | |
| DATE | 19 JUL 75 | 19.07.75 | 19.07.75 | 19.07.75 | 19.07.75 | 19.07.75 | 19.07.75 |

SUBSEQUENT LAYOUTS LOC'N WILL START IN ANY ONE OF THIS CO-COND LINE – AND THAT IS NORMAL TO THIS LINE ALSO.



WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 11

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | | |
| S.T.A. | BL / 80W | BL / 76W | BL / 72W | | | | | |
| F.S. | BL / 76 W | BL / 72 W | BL / 68 W | | | | | |
| MEAS. DISTANCE | | | TIE-IN | | | | | |
| VERT. ANGLE | | | | | | | | |
| SINE – V.A. | | | | | | | | |
| COSINE – V.A. | | | | | | | | |
| STA. ELEVATION | | | | | | | | |
| H.I. | | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| DISTANCE | | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | | | | | | | | |
| F.S. ELEVATION | | | | | | | | |
| AZ. B.S. TO STA. | | | | | | | | |
| ±180 - 00' - 00" | | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | | |
| HORZ. ANGLE | | | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | | |
| BEARING | S 46-08-40 E | S 46-08-40 E | S 46-08-40E | | | | | |
| HORZ. DISTANCE | 398.30 | 398.30 | | | | | | |
| COSINE BEARING | .69284 | .69284 | .69284 | | | | | |
| STA. LAT. | 35 509 09 | 35 233.03 | 34 957.07 | | | | | |
| DIFF. | - 275.96 | - 275.96 | - 275.96 | | | | | |
| F.S. LAT. | 35 233.03 N | 34 957.07 N | 34 681 41 N | N | N | N | N | N |
| SINE BEARING | .7209 | .7209 | .7209 | | | | | |
| STA. DEP. | 24 552.06 | 24 539.57 | 24 826.48 | | | | | |
| DIFF. | + 287.21 | + 287.21 | + 287.21 85 | | | | | |
| F.S. DEP. | 24 539.27 E | 24 826.48 E | 25 113.69 E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | O.C. +.07 -.01 | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | ROA | ROA | ROA | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | | | | | | | | |

WORK PLACE DDH's SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | S 75-43 | HIW 7 | VG-8 | TP6 | VENT/RSE SURVEY | TP3 OLD | VG-5 | VG-6 |
| S.T.A. | HIW 7 | VG-8 | TP6 | TP7 | | TP4 OLD | VG-6 | S 75-40 |
| F.S. | A-94 | TP6 | TP7 | 16 N/12 W LAYOUT LOC'N ONLY | STA. | A-4 | S 75-40 | A-18 |
| MEAS. DISTANCE | By Δ 346.62 | | | | | | | |
| VERT. ANGLE | | | | | | | | |
| SINE – V.A. | | | | | | | | |
| COSINE – V.A. | | | | | | | | |
| STA. ELEVATION | | | | | | | | |
| H.I. | | | | | | | | |
| INST. HEIGHT | | CANCELLED STA. ARE GONE. | | | | | | |
| DISTANCE | | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | | | | | | | | |
| F.S. ELEVATION | 1309.63 | 1295.58 | 1310.47 | 1307.57 | 1297.38 | OLD SURVEY 1320.49 | | 1320.34 |
| AZ. B.S. TO STA. | | | | | | | | |
| ±180 - 00' - 00" | | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | | |
| HORZ. ANGLE | | | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | | |
| BEARING | N 56 51 25 E | N 28 04 38 E | N 28 04 38 E | N 28 04 38 E | N 33 00 40 W | N 80 52 16 W | | S 44 52 24 W |
| HORZ. DISTANCE | 346.62 | 137.72 | 199.94 | 76.18 | 51.00 | 124.10 | | 11.12 |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | | | | | | | | |
| DIFF. | | | | | | | | |
| F.S. LAT. | 11 764.48 N | 11 942.97 N | 12 119.38 N | 12 186.60 N | 10 719.32 N | 11 126.43 N | | 11 118.54 N |
| SINE BEARING | | | | | | | | |
| STA. DEP. | | | | | | | | |
| DIFF. | | | | | | | | |
| F.S. DEP. | 7 111.62 E | 6 547.14 E | 6 641.24 E | 6 677.10 E | 7 475.03 E | 7 179.28 E | | 7 171.43 E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | RDA | — | — | — | — | — | RDA | |
| CHECKED BY: | | | | | | | | |
| DATE | | | | | | | | |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET

PAGE NO. 12

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | S75-43 | HIW 7 | VG-8 | TP6 | VEUT/RSE { TP3 OLD | VG-5 | VG-6 |
| S.T.A. | HIW 7 | VG-8 | TP6 | TP7 | TP4 OLD | VG-6 | S75-40 |
| F.S. | DDH A-94 | TP6 | TP7 | 16N/16W DDH A LAYOUT LOCN | SURVEY STA. A-4 | S75-40 | A-18 |
| MEAS. DISTANCE | By ∆. 1137.22 | 452 | 660 | 250 | 168.5 | | 36.5 |
| VERT. ANGLE | +00-41-40 | -01-08-40 | +04-26-35 | -00-46-20 | +04-45-20 | | 0 |
| SINE – V.A. | | .0201 | .0772 | .0134 | .0825 | | |
| COSINE – V.A. | PLS. SEE OVER FOR CALC. | .9996 | .9939 | .9998 | .9931 | | |
| STA. ELEVATION | 4309.26 | 4262.62 | 4250.59 | 4299.44 | 4247.64 | | 4332.32 |
| H.I. | +4.65 | +4.30 | +5.00 | +5.10 | +4.80 | | +4.40 |
| INST. HEIGHT | 4313.91 | 4266.92 | 4255.59 | 4304.54 | 4252.44 | | 4336.72 |
| DISTANCE | +13.78 | -9.08 | +50.95 | -3.35 | +13.90 | | 0 |
| DIFF. | 4327.69 | 4257.84 | 4306.54 | 4301.19 | 4266.34 | | 4336.72 |
| H.P. | -31.00 | -7.25 | -7.10 | -11.25 | -9.84 | OLD SURVEY | -4.89 |
| F.S. ELEVATION | 4296.69 | 4250.59 | 4299.44 | 4289.94 | 4256.50 | 4332.32 | 4331.83 |
| AZ. B.S. TO STA. | 131 11 43 | 306 00 52 | 28 04 38 | | 42 24 40 | 290 41 44 | 279 07 44 |
| ±180 - 00' - 00" | 180 | 180 | 180 | | 180 | 180 | 180 |
| AZ. STA. TO B.S. | 311 11 43 | 126 00 52 | 208 04 38 | | 222 24 40 | 110 41 44 | 99 07 44 |
| HORZ. ANGLE | 105-39-42 | 262 03 46 | 180 00 00 | | 104 34 40 | 168 26 00 | 125 44 40 |
| -360 - 00' - 00" | 416-51-25 | 388 04 38 | 388 04 38 | | 326 59 20 | 279 07 44 | 224 52 24 |
| AZ. STA. TO F.S. | 56 51 25 | 28 04 38 | 28 04 38 | | 326 59 20 | 279 07 44 | 224 52 24 |
| BEARING | N56 51 25 E | N28 04 38 E | N28 04 38 E | N28 04 38 E | N33 00 40 W | N80 52 16 W | S44 52 24 W |
| HORZ. DISTANCE | 1137.22 | 451.82 | 655.97 | 249.95 | 167.34 | 407.16 | 36.5 |
| COSINE BEARING | .54673 | .88231 | .88231 | .88231 | .83856 | .15866 | .70859 |
| STA. LAT. | 22 [illegible] | 38 [illegible] | 39 [illegible] | 39 [illegible] | 35 [illegible] | 36 [illegible] | 36 [illegible] |
| DIFF. | +621.75 | +398.64 | +578.77 | +220.53 | +140.32 | +64.60 | -25.87 |
| F.S. LAT. | 38 597.37 N | 39 182.98 N | 39 761.75 N | 39 982.28 N | 35 168.38 N | 36 504.02 N | 36 478.15 N |
| SINE BEARING | .83730 | .47067 | .47067 | .47067 | .54480 | .98734 | .70524 |
| STA. DEP. | 22 379.89 | 21 267.45 | 21 480.11 | 21 788.85 | 24 615.56 | 23 956.07 | 23 554.06 |
| DIFF. | +952.19 | +212.66 | +308.74 | +117.64 | -91.17 | -402.01 | -25.74 |
| F.S. DEP. | 23 332.08 E | 21 480.11 E | 21 788.85 E | 21 906.49 E | 24 524.39 E | 23 554.06 E | 23 528.32 E |
| GRADE CALC. | | CANCELLED | | STA. MLE GONE | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 23.07.75 | 23.07.75 | 23.07.75 | 23.07.75 | 24.07.75 | 24.07.75 | 24.07.75 |

WORK PLACE _____

# SURVEY CALCULATION SHEET

PAGE NO. 13

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | HIW 4 | HIW 4 | HIW | HIW 4 | HIW 4 | HIW 4 |
| S.T.A. | S 75-31 | S 75-31 | S 75-31 | S 75-31 | S 75-31 | S 75-31 | S 75-31 |
| F.S. | A-63 | DDH 164 | 65/60W | 45/58W | 25/60W | 45/62W | A-42 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1271.27 | 1270.66 | 1270.06 | 1269.36 | 1273.28 | 1273.20 | 1264.70 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N 50 48 16 E | N 51 44 36 E | N 55 56 21 E | N 71 11 38 E | N 49 16 50 E | N 29 37 44 E | S 60 57 44 E |
| HORZ. DISTANCE | 158.43 | 143.16 | 99.29 | 178.45 | 220.37 | 163.36 | 145.59 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 314.44 N | 10 302.95 N | 10 269.92 N | 10 271.84 N | 10 358.08 N | 10 356.31 N | 10 143.65 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 744.20 E | 7 733.83 E | 7 703.67 E | 7 790.34 E | 7 788.44 E | 7 702.18 E | 7 748.70 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | Rol | — | — | — | — | — | Rol. |
| CHECKED BY: | | | | | | | |
| DATE | 06.08.75 | — | — | — | — | — | 06.08.75 |

WORK PLACE DDHs SURVEY/LAYOUT

**SURVEY CALCULATION SHEET**

PAGE NO. 13

| B.S. | HIW4 | HIW4 | HIW4 | HIW4 | HIW4 | HIW4 | HIW4 |
|---|---|---|---|---|---|---|---|
| S.T.A. | S75-31 | S75-31 | S75-31 | S75-31 | S75-31 | S75-31 | S75-31 |
| F.S. | A-63 | DDH-164 | 65/60W | 45/58W | 25/60W | 45/62W | A-42 |
| MEAS. DISTANCE | 520 | 470 | 326.0 | 586 | 723 | 536 | 480 |
| VERT. ANGLE | -01-11-20 | -01-34-20 | -01-41-00 | -01-43-20 | -00-14-20 | -00-27-20 | -04-00-00 |
| SINE – V.A. | .0205 | .0278 | .0294 | .0300 | .0042 | .0079 | .0696 |
| COSINE – V.A. | .9996 | .9993 | .9992 | .9991 | 1.0000 | .9999 | .9951 |
| STA. ELEVATION | 4185.39 | 4185.39 | 4185.39 | 4185.39 | 4185.39 | 4185.39 | 4185.39 |
| H.I. | + 4.70 | + 4.70 | + 4.70 | + 4.70 | + 4.70 | + 4.70 | + 4.70 |
| INST. HEIGHT | 4190.09 | 4190.09 | 4190.09 | 4190.09 | 4190.09 | 4190.09 | 4190.09 |
| DISTANCE | -10.66 | -12.92 | - 9.58 | -17.58 | - 3.04 | - 4.23 | -33.41 |
| DIFF. | 4179.43 | 4177.17 | 4180.51 | 4172.51 | 4187.05 | 4185.86 | 4156.68 |
| H.P. | -8.60 | - 8.35 | - 13.63 | - 7.94 | - 9.61 | - 8.69 | - 7.40 |
| F.S. ELEVATION | 4170.83 | 4168.82 | 4166.88 | 4164.57 | 4177.44 | 4177.17 | 4149.28 |
| AZ. B.S. TO STA. | 190-48-16 | | | | | | |
| ±180 - 00' - 00" | 180 | | | | | | |
| AZ. STA. TO B.S. | 10-48-16 | 10-48-16 | 10-48-16 | 10-48-16 | 10-48-16 | 10-48-16 | 10-48-16 |
| HORZ. ANGLE | 40-00-00 | 40-56-20 | 45-08-05 | 60-23-22 | 38-28-34 | 18-48-38 | 108-14-00 |
| - 360 - 00' - 00" | 50-48-16 | 51-44-36 | 55-56-21 | 71-11-38 | 49-16-50 | 29-37-44 | 119-02-16 |
| AZ. STA. TO F.S. | 50-48-16 | 51-44-36 | | | | | 477.65 |
| BEARING | N 50-48-16 E | N 51-44-36 E | N 55-56-21 E | N 71-11-38 E | N 49-16-50 E | N 29-37-44 E | S 60-57-44 E |
| HORZ. DISTANCE | 519.79 | 469.67 | 325.74 | 585.47 | 723.00 | 535.95 | 477.65 |
| COSINE BEARING | .63197 | .61979 | .56608 | .32237 | .65236 | .86925 | .48538 |
| STA. LAT. | 33 511.53 | 33 511.53 | 33 511.53 | 33 511.53 | 33 511.53 | 33 511.53 | 33 511.53 |
| DIFF. | + 328.49 | + 290.81 | + 182.44 | + 188.74 | + 471.66 | + 465.87 | - 231.84 |
| F.S. LAT. | 33 840.02 N | 33 802.34 N | 33 693.97 N | 33 700.27 N | 33 983.19 N | 33 977.40 N | 33 279.69 N |
| SINE BEARING | .77500 | .78525 | .82844 | .94662 | .75791 | .49438 | .87430 |
| STA. DEP. | 25 004.65 | 25 004.65 | 25 004.65 | 25 004.65 | 25 004.65 | 25 004.65 | 25 004.65 |
| DIFF. | + 402.84 | + 368.81 | + 269.86 | + 554.22 | + 547.97 | + 264.96 | + 417.61 |
| F.S. DEP. | 25 407.49 E | 25 373.46 E | 25 274.51 E | 25 558.87 E | 25 552.62 E | 25 269.61 E | 25 422.26 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 27.07.75 | 27.07.75 | 27.07.75 | 27.07.75 | 27.07.75 | 27.07.75 | 27.07.75 |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 6 | HIW 6 | HIW 6 | S 75-33 | S 75-33 | | |
| S.T.A. | S 75-33 | S 75-33 | S 75-33 | TP 8 | TP 8 | | |
| F.S. | A-89 | A-93 | TP 8 | A-90 | A-92 | | |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1315.36 | 1313.38 | 1312.73 | 1312.73 | 1311.54 | | |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N 14 - 05 - 19 W | N 02 - 19 - 59 W | N 72 41 01 E | N 61 53 19 W | N 41 01 01 E | | |
| HORZ. DISTANCE | 221.22 | 253.59 | 133.20 | 4.39 | 58.52 | | |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 11 046.47 N | 11 085.29 N | 10 872.29 N | 10 874.36 N | 10 916.45 N | N | N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 515.27 E | 7 558.80 E | 7 696.05 E | 7 692.18 E | 7 734.46 E | E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | RDA | — | — | — | RDA | | |
| CHECKED BY: | | | | | | | |
| DATE | 06.08.75 | — | — | — | 06.03.75 | | |

WORK PLACE DDH's SURVEY

**SURVEY CALCULATION SHEET**

PAGE NO. 14

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| B.S. | HIW 6 | HIW 6 | HIW 6 | S75-33 | S75-33 | | | | | |
| S.T.A. | S75-33 | S75-33 | S75-33 | TP-8 | TP8 | | | | | |
| F.S. | A-89 | A-93 | TP8 | A-90 | A-92 | | | | | |
| MEAS. DISTANCE | 726 | 832 | 437 | 14.4 | 192 | | | | | |
| VERT. ANGLE | +00 -56-00 | 0 | -00-10-00 | 0 | 0 | | | | | |
| SINE – V.A. | .0163 | | .0029 | | | | | | | |
| COSINE – V.A. | .9997 | | 1.000 | | | | | | | |
| STA. ELEVATION | 43 11.39 | 4311.39 | 4311.39 | 4306.84 | 4306.84 | | | | | |
| H.I. | +3.90 | +3.90 | +3.90 | +5.00 | +5.00 | | | | | |
| INST. HEIGHT | 4315.29 | 4315.29 | 4315.29 | 4311.84 | 4311.84 | | | | | |
| DISTANCE | +11.83 | 0 | -1.27 | 0 | 0 | | | | | |
| DIFF. | 4327.12 | 1315.29 | 4314.02 | 4311.84 | 4311.84 | | | | | |
| H.P. | -11.63 | -6.30 | -7.18 | -5.00 | -8.90 | | | | | |
| F.S. ELEVATION | 4315.49 | 4308.99 | 4306.84 | 4306.84 | 4302.94 | | | | | |
| AZ. B.S. TO STA. | | | | 72-21-01 | | | | | | |
| ±180 - 00' - 00" | | | | 180 | | | | | | |
| AZ. STA. TO B.S. | 285 59 41 | 285 59 41 | 285 59 41 | 252 21 01 | 252 21 01 | | | | | |
| HORZ. ANGLE | 59-55-00 | 71 40 20 | 146 21 20 | 45 45 40 | 148 40 00 | | | | | |
| -360 - 00' - 00" | 345-54-41 | 357 40 01 | 432 21 01 | 298 06 41 | 401 01 01 | | | | | |
| AZ. STA. TO F.S. | | | 72 21 01 | | 41 01 01 | | | | | |
| BEARING | N14-05-19W | N02 19 59W | N 72 21 01 E | N 61 53 19W | N 41 01 01E | | | | | |
| HORZ. DISTANCE | 725.78 | 832 | 437.0 | 14.4 | 192 | | | | | |
| COSINE BEARING | .9699 | .9991 | .3032 | .4718 | .7547 | | | | | |
| STA. LAT. | 35 537.78 | 35 537.78 | 35 537.78 | 35 610.25 | 35 610.25 | | | | | |
| DIFF. | +703.95 | +831.31 | +132.50 | +6.78 | +144.87 | | | | | |
| F.S. LAT. | 36 241.70 N | 36 369.06 N | 35 670.25 N | 35 677.03 N | 35 815.12 N | N | | | | N |
| SINE BEARING | .2434 | .0407 | .9529 | .8804 | .6562 | | | | | |
| STA. DEP. | 24 833.08 | 24 833.08 | 24 833.08 | 25 249.51 | 25 249.51 | | | | | |
| DIFF. | -176.68 | -33.87 | +416.43 | -12.70 | +126.01 | | | | | |
| F.S. DEP. | 24 656.40 E | 24 799.21 E | 25 249.51 E | 25 236.81 E | 25 375.52 E | E | | | | E |
| GRADE CALC. | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | | | |
| GRADE CHAIN | | | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | | L. R. | | |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | | | | | |
| CHECKED BY: | | | | | | | | | | |
| DATE | 29-07-75 | 29.07.75 | 29.07.75 | 29.07.75 | 29.07.75 | | | | | |

WORK PLACE VENT/RSE SITE SURVEY

## SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | NN | TP1 OLD | TP2 OLD | HIW 5 | HIW 5 | TP9 |
| S.T.A. | NN | TP1 OLD | TP2 OLD | TP9 | HIW 4 | HIW 4 | TP10 |
| F.S. | TP1 OLD | TP2 OLD | TP9 | TP10 | A-96 | A-95 | VENT/RSE B/T |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1294.92 | 1297.32 | 1302.78 | 1297.35 | 1303.59 | 1282.93 | 1289.67 ✓ |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N66 46 08 W | N 11 16 38 W | N22 53 18 W | N67 51 32 E | S 03 10 14 E | N02 43 06 E | S 43 07 28 E |
| HORZ. DISTANCE | 24.28 | 119.87 | 85.48 | 67.94 | 63.36 | 19.96 | 59.11 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 499.31 N | 10 616.86 N | 10 695.61 N | 10 721.21 N | 10 744.83 N | 10 828.04 N | 10 678.07 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 468.88 E | 7 445.43 E | 7 412.19 E | 7 475.12 E | 7 738.24 E | 7 735.68 E | 7515.52 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | — | — | — | — | — | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 06.08.75 | — | — | — | — | — | 06.08.75 |

WORK PLACE VENT/RSE SITE SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | NN | TP1 OLD | TP2 OLD | HIW 5 | HIW 5 | TP9 |
| S.T.A. | NN | TP1 OLD | TP2 OLD | TP9 | HIW 4 | HIW 4 | TP10 |
| F.S. | TP1 OLD | TP2 OLD | TP 9 | TP10 | A-96 | A-95 | VENT/RSE B/T |
| MEAS. DISTANCE | | | S.D. = 281 | S.D. = 224 | 210.0 | 65.5 | 196 |
| VERT. ANGLE | ⊖ | | + 03 - 24 - 20 | - 04 - 31 - 20 | - 05 - 45 - 00 | ⊖ | - 05 - 55 - 00 |
| SINE – V.A. | | EL. TP1 OLD = 4248.41 | .0584 | .0787 | .0997 | | .1025 |
| COSINE – V.A. | | B.S. + 12.90 | | | .9899 | | .9894 |
| STA. ELEVATION | 4246.66 | 4261.31 | 4256.31 | 4274.23 | 4308.00 | 4308.00 | 4256.40 |
| H.I. | + 4.70 | | + 4.92 | + 4.92 | + 3.85 | + 3.85 | + 4.88 |
| INST. HEIGHT | 4251.36 | 4261.31 | 4261.23 | 4279.15 | 4311.85 | 4311.85 | 4261.28 |
| DISTANCE | ⊖ | | + 16.41 | - 17.63 | - 20.94 | ⊖ | - 20.09 |
| DIFF. | 4251.36 | 4261.31 | 4277.64 | 4261.52 | 4290.91 | 4311.85 | 4241.19 |
| H.P. | - 2.95 | - 5.0 | - 3.41 | - 5.12 | - 14.05 | - 2.75 | - 9.98 |
| F.S. ELEVATION | 4248.41 | 4256.31 | 4274.23 | 4256.40 | 4276.86 | 4309.10 | 4231.21 |
| AZ. B.S. TO STA. | 217 - 25 - 02 | 293 - 13 - 52 | 348 - 43 - 22 | 337 - 06 - 42 | 22 08 46 | 22 08 46 | 67 - 51 - 32 |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| AZ. STA. TO B.S. | 37 - 25 - 02 | 113 - 13 - 52 | 168 43 22 | 157 06 42 | 202 08 46 | 202 08 46 | 247 - 51 - 32 |
| HORZ. ANGLE | 255 - 48 - 50 | 235 - 29 - 30 | 168 - 23 - 20 | 370 44 50 | 334 - 41 - 00 | 160 - 34 - 20 | 249 - 01 - 00 |
| - 360 - 00' - 00" | 293 - 13 - 52 | 348 - 43 - 22 | 337 - 06 - 42 | 127 51 32 | 536 - 49 - 46 | 362 - 43 - 06 | 496 - 52 - 32 |
| AZ. STA. TO F.S. | | | | 67 51 32 | 176 - 49 - 46 | 02 - 43 - 06 | 136 - 52 - 32 |
| BEARING | N66 - 46 - 08 W | N11 - 16 - 38 W | N22 - 53 - 18 W | N 67 51 32 E | S03 - 10 - 14 E | N02 - 43 - 06 E | S43 - 07 - 28 E |
| HORZ. DISTANCE | 79.65 | 393.27 | MEAS. = 280.43 | 222.89 | 207.88 | 65.5 | 193.92 |
| COSINE BEARING | .39442 | .98069 | .92126 | .37689 | .99847 | .99857 | .73737 |
| STA. LAT. | 34 446.55 | 34 832.23 | 35 090.58 | 35 174.58 | 35 252.07 | 35 525.06 | 35 033.04 |
| DIFF. | + 31.42 | + 385.68 | + 258.35 | + 84.00 | - 207.56 | + 65.43 | - 141.54 |
| F.S. LAT. | 34 446.55 N | 34 832.23 N | 35 090.58 N | 35 174.58 N | 35 252.07 N | 35 525.06 N | 35 033.04 N |
| SINE BEARING | .91893 | .19556 | .38894 | .92625 | .05531 | .04743 | .68358 |
| STA. DEP. | 24 577.38 | 24 504.19 | 24 427.28 | 24 318.21 | 25 376.43 | 25 376.43 | 24 524.66 |
| DIFF. | - 73.19 | - 76.91 | - 109.07 | + 206.45 | + 11.50 | + 3.11 | + 132.56 |
| F.S. DEP. | 24 504.19 E | 24 427.28 E | 24 318.21 E | 24 524.66 E | 25 387.93 E | 25 379.54 E | 24 657.22 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | | | |
| CHECKED BY: | | | | | | | |
| DATE | 30.07.75 | 30.07.75 | 30.07.75 | 30.07.75 | 31.07.75 | 31.07.75 | |

WORK PLACE Rose Bft Topog

SURVEY CALCULATION SHEET

PAGE NO. 15-(1)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP 9 → | → | same | | | | |
| S.T.A. | TP 10 → | → | | same | | | |
| F.S. | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| MEAS. DISTANCE | 18.00 | 52.00 | 68.10 | 80.10 | 91.80 | 74.00 | 48.40 |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | 1297.35 | | | | | | |
| H.I. | + 1.405 | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | – 3.690 | – 3.260 | – 2.340 | – 2.400 | – 2.460 | – 3.370 | – 3.242 |
| F.S. ELEVATION | 1295.82 | 1294.134 | 1293.07 | 1291.89 | 1291.01 | 1291.56 | 1292.68 |
| AZ. B.S. TO STA. | 67 51 32 | 67 51 32 | 67 51 32 | 67 51 32 | 67 51 32 | 67 51 32 | 67 51 32 |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 135° 33 32 | 152° 36 32 | 150° 21 32 | 141° 12' 32" | 128° 17' 32" | 120 16 32 | 125° 18' 32" |
| BEARING | | | | | | | |
| HORZ. DISTANCE | 17.97 | 51.96 | 67.94 | 79.85 | 91.50 | 73.80 | 48.22 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 10,721.21 | | | | | | |
| DIFF. | | | | | | | -2649 |
| F.S. LAT. | 10,708.39 N | 10,675.09 N | 10,662.17 N | 10,658.98 N | 10,664.52 N | 10,684.01 N | 10,694.73 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 7,475.10 | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7,481.68 E | 7,499.00 E | 7,508.70 E | 7,525.12 E | 7,546.91 E | 7,538.83 E | 7,515.41 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | WB | WB | WB | WB | WB | WB | WB |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE Ice B/T Topog

# SURVEY CALCULATION SHEET

PAGE NO. 15-(2)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | | | | | | | | |
| S.T.A. | | | | | | | | |
| F.S. | (2) | | | | | | | |
| MEAS. DISTANCE | 40.40 | | | | | | | |
| VERT. ANGLE | | | | | | | | |
| SINE – V.A. | | | | | | | | |
| COSINE – V.A. | | | | | | | | |
| STA. ELEVATION | 1297.35 | | | | | | | |
| H.I. | +1.405 | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| DISTANCE | | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | - 2.20244 | | | | | | | |
| F.S. ELEVATION | 1293.94 | | | | | | | |
| AZ. B.S. TO STA. | 6T 51 32 | | | | | | | |
| ±180 - 00' - 00" | | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | | |
| HORZ. ANGLE | | | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 135° 26 32 | | | | | | | |
| BEARING | | | | | | | | |
| HORZ. DISTANCE | 40.23 | | | | | | | |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | | | | | | | | |
| DIFF. | | | | | | | | |
| F.S. LAT. | 10,712.55 N | N | N | N | N | N | N | N |
| SINE BEARING | | | | | | | | |
| STA. DEP. | | | | | | | | |
| DIFF. | | | | | | | | |
| F.S. DEP. | 7,503,33 E | E | E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | WLB | | | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | | | | | | | | |

WORK PLACE DDHs SURVEY

**SURVEY CALCULATION SHEET**

PAGE NO. 16

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 7 | VG-8 | TP11 | TP12 | TP12 | TP12 | TP12 |
| S.T.A. | VG-8 | TP11 | TP12 | TP13 | TP13 | TP13 | TP13 |
| F.S. | TP11 | TP12 | TP13 | TP14 | A-98 | A-97 | DDH 169 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | | | | | | | |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 1310.51 | 1313.63 | 1316.47 | 1318.76 | 1316.50 | 1315.77 | 1313.83 |
| BEARING | N 28 04 38 E | N 28 04 38 E | N 28 04 38 E | N 22 39 38 E | N 38 52 24 W | N 38 31 38 E | N 13 25 52 W. |
| HORZ. DISTANCE | 295.30 | 19.01 | 39.08 | 117.00 | 10.52 | 64.31 | 54.25 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 12 082.02 N | 12 096.79 N | 12 133.26 N | 12 241.23 N | 12 141.45 N | 12 183.58 N | 12 186.04 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 6 621.31 E | 6 630.26 E | 6 648.65 E | 6 693.72 E | 6 642.05 E | 6 688.71 E | 6 636.04 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | RDA | — | — | — | — | — | RDA |
| CHECKED BY: | | | | | | | |
| DATE | 06.08.75 | — | — | — | — | — | 06.08.75 |

WORK PLACE DDHs Survey

**SURVEY CALCULATION SHEET**

PAGE NO. 16

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 7 | VG-8 | TP11 | TP12 | TP12 | TP12 | TP12 |
| S.T.A. | VG-8 | TP11 | TP12 | TP13 | TP13 | TP13 | TP13 |
| F.S. | TP11 | TP12 | TP13 | TP14 | A-98 | A-97 | DDH-169 |
| MEAS. DISTANCE | 970 | 65.0 | 129 | 384 | 34.5 | 211 | 178 |
| VERT. ANGLE | + 02 - 00 - 00 | + 11 - 36 - 20 | + 04 - 33 - 00 | + 01 - 07 - 00 | 0 | 0 | 0 |
| SINE – V.A. | .0349 | .1972 | .0791 | .0195 | | | |
| COSINE – V.A. | .9988 | .9595 | .9938 | .9996 | | | |
| STA. ELEVATION | 4262.62 | 4299.57 | 4309.82 | 4319.13 | 4319.13 | 4319.13 | 4319.13 |
| H.I. | + 5.85 | + 2.75 | + 4.75 | + 4.95 | + 4.95 | + 4.95 | + 4.95 |
| INST. HEIGHT | 4268.47 | 4302.32 | 4314.57 | 4324.08 | 4324.08 | 4324.08 | 4324.08 |
| DISTANCE | + 33.85 | + 12.82 | + 10.20 | + 7.49 | 0 | 0 | 0 |
| DIFF. | 4302.32 | 4315.14 | 4324.77 | 4331.57 | 4324.08 | 4324.08 | 4324.08 |
| H.P. | - 2.75 | - 5.32 | - 5.64 | - 4.92 | - 5.85 | - 7.25 | - 13.60 |
| F.S. ELEVATION | 4299.57 | 4309.82 | 4319.13 | 4326.65 | 4318.23 | 4316.83 | 4310.48 |
| AZ. B.S. TO STA. | 306 00 52 | 28 - 04 - 38 | | 28 - 04 - 38 | | | |
| ±180 - 00' - 00" | 180 | 180 | | 180 | | | |
| AZ. STA. TO B.S. | 126 00 52 | 208 - 04 - 38 | | 208 - 04 - 38 | 208 04 38 | 208 04 38 | 208 04 38 |
| HORZ. ANGLE | 262 03 46 | 180 - 00 - 00 | | 174 - 35 - 00 | 113 03 00 | 190 27 00 | 138 - 29 - 00 |
| - 360 - 00' - 00" | 388 04 38 | 388 - 04 - 38 | | 382 - 39 - 38 | 321 07 38 | 398 31 38 | 346 33 38 |
| AZ. STA. TO F.S. | 28 04 38 | 28 - 04 - 38 | | 22 - 39 - 38 | | 38 31 38 | |
| BEARING | N 28 04 38 E | N 28 - 04 - 38 E | N 28 - 04 - 38 E | N 22 - 39 - 38 E | N 38 52 21 W | N 38 31 38 E | N 13 26 22 W |
| HORZ. DISTANCE | 968.84 | 62.37 | 128.20 | 383.85 | 34.5 | 211.0 | 178 |
| COSINE BEARING | .88231 | .88231 | .88231 | .92280 | .71855 | .78230 | .97582 |
| STA. LAT. | 38 784.30 | 39 639.16 | 39 694.19 | 39 807.30 | 39 807.30 | 39 807.30 | 39 807.30 |
| DIFF. | + 854.82 | + 55.03 | + 113.11 | + 354.22 | + 26.86 | + 165.06 | + 173.13 |
| F.S. LAT. | 39 639.16 N | 39 694.19 N | 39 807.30 N | 40 161.52 N | 39 834.16 N | 39 972.36 N | 39 980.43 N |
| SINE BEARING | .47067 | .47067 | .47067 | .38527 | .62759 | .62288 | .23142 |
| STA. DEP. | 21 267.45 | 21 723.45 | 21 752.81 | 21 813.15 | 21 813.15 | 21 813.15 | 21 813.15 |
| DIFF. | + 456.00 | + 29.36 | + 60.34 | + 147.89 | - 21.65 | + 131.43 | - 41.37 |
| F.S. DEP. | 21 723.45 E | 21 752.81 E | 21 813.15 E | 21 961.04 E | 21 791.50 E | 21 944.58 E | 21 771.78 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 |

WORK PLACE DDHs SURVEY

**SURVEY CALCULATION SHEET**



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP12 | TP12 | TP12 | TP12 | TP13 | TP13 | VG-8 |
| S.T.A. | TP13 | TP13 | TP13 | TP13 | TP14 | TP14 | TP12 |
| F.S. | DDH 168 | P-6 | DDH 170 | P-2 | P-5 | P-4 | DDH 173 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1312.51 | 1314.32 | 1316.24 | 1318.03 | 1317.56 | 1315.55 | 1314.89 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | N 25 30 38 W | N 16 13 38 E | N 72 30 38 E | N 42 16 38 E | N 81 06 38 E | N 65 47 22 W | N 25 17 22 W |
| HORZ. DISTANCE | 79.67 | 34.75 | 37.34 | 82.23 | 26.67 | 7.92 | 25.67 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 12 205.17 N | 12 166.63 N | 12 144.48 N | 12 194.11 N | 12 245.35 N | 12 244.48 N | 12 122.00 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 6 614.34 E | 6 658.36 E | 6 684.26 E | 6 703.97 E | 6 720.07 E | 6 686.50 E | 6 619.29 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | RoA | — | — | — | — | — | RoL |
| CHECKED BY: | | | | | | | |
| DATE | 06.08.75 | — | — | — | — | — | 06.08.75 |

WORK PLACE DDH's SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP12 | TP12 | TP12 | TP12 | TP13 | TP13 | VG-8 |
| S.T.A. | TP13 | TP13 | TP13 | TP13 | TP14 | TP14 | TP12 |
| F.S. | DDH 168 | P-6 | DDH 170 | P-2 | P-5 | P-4 | NO NUMBER DDH 173? |
| MEAS. DISTANCE | 262 | 114 | 122.5 | 270 | 87.5 | 26 | OUTPOST 84.5 |
| VERT. ANGLE | -02 - 46 - 00 | 0 | 0 | +01 - 36 - 00 | 0 | 0 | +03 - 15 - 00 |
| SINE – V.A. | .0482 | | | .0279 | | | .0566 |
| COSINE – V.A. | .9977 | | | .9992 | | | .9968 |
| STA. ELEVATION | 4319.13 | 4319.13 | 4319.13 | 4319.13 | 4326.65 | 4326.65 | 4309.82 |
| H.I. | +4.95 | +4.95 | +4.95 | +4.95 | +4.50 | +4.50 | +4.75 |
| INST. HEIGHT | 4324.08 | 4324.08 | 4324.08 | 4324.08 | 4331.15 | 4331.15 | 4314.57 |
| DISTANCE | -12.63 | 0 | 0 | +7.53 | 0 | 0 | +4.78 |
| DIFF. | 4311.45 | 4324.08 | 4324.08 | 4331.61 | 4331.15 | 4331.15 | 4319.35 |
| H.P. | -5.31 | -12.00 | -5.70 | -7.35 | -8.45 | -15.05 | -5.42 |
| F.S. ELEVATION | 4306.14 | 4312.08 | 4318.38 | 4324.26 | 4322.70 | 4316.10 | 4313.93 |
| AZ. B.S. TO STA. | | | | | 22 39 38 | | 28 04 38 |
| ±180 - 00' - 00" | | | | | 180 | | 180 |
| AZ. STA. TO B.S. | 208 04 38 | 208 04 38 | 208 04 38 | 208 04 38 | 202 39 38 | 202 39 38 | 208 04 38 |
| HORZ. ANGLE | 126 - 25 - 00 | 168 09 00 | 224 26 00 | 194 12 00 | 238 - 27 - 00 | 91 33 00 | 126 38 00 |
| - 360 - 00' - 00" | 334 29 38 | 376 13 38 | 432 30 38 | 402 16 38 | 441 - 06 38 | 294 12 38 | 334 42 38 |
| AZ. STA. TO F.S. | | 16 13 38 | 72 30 38 | 42 16 38 | 81 - 06 - 38 | | |
| BEARING | N 25 30 38 W | N 16 13 38 E | N 72 30 38 E | N 42 16 38 E | N 81 06 38 E | N 65 47 22 W | N 25 17 22 W |
| HORZ. DISTANCE | 261.40 | 114.0 | 122.5 | 269.78 | 87.5 | 26.0 | 84.23 |
| COSINE BEARING | .90252 | .96016 | .30053 | .73790 | .15453 | .41009 | .90417 |
| STA. LAT. | 39 807.30 | 39 807.30 | 39 807.30 | 39 851.36 | 40 761.52 | 40 761.52 | 39 694.11 |
| DIFF. | + 235.92 | + 109.46 | + 36.81 | + 199.61 | + 13.52 | + 10.66 | + 76.16 |
| F.S. LAT. | 40 043.22 N | 39 916.76 N | 39 844.11 N | 40 006.91 N | 40 175.04 N | 40 172.18 N | 39 770.35 N |
| SINE BEARING | .43064 | .27945 | .95378 | .67272 | .98799 | .91204 | .42719 |
| STA. DEP. | 21 813.15 | 21 813.15 | 21 813.15 | 21 813.15 | 21 961.04 | 21 961.04 | 21 752.81 |
| DIFF. | - 112.57 | + 31.66 | + 116.84 | + 181.49 | + 86.45 | - 23.71 | - 35.98 |
| F.S. DEP. | 21 700.58 E | 21 845.01 E | 21 929.99 E | 21 994.64 E | 22 047.49 E | 21 937.33 E | 21 716.83 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | → | → | → | → | → | → |
| DATE | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 | 04.08.75 |

WORK PLACE DDHs SURVEY

SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HW 4 | S75-31 | TP15 | TP16 | S75-31 | S75-31 | TP15 |
| S.T.A. | S75-31 | TP15 | TP16 | TP17 | TP15 | TP15 | TP16 |
| F.S. | TP15 | TP16 | TP17 | TP18 | A-39 | DDH163 | A-33 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1265.01 | 1269.40 | 1260.99 | 1266.82 | 1262.24 | 1262.24 | 1273.10 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | S61 22 44 E | N46 07 56 E | S40 24 44 E | N37 29 26 E | N42 05 16 E | N42 31 16 E | N32 38 26 E |
| HORZ. DISTANCE | 147.13 | 141.33 | 120.07 | 51.81 | 59.92 | 68.47 | 40.39 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 143.77 N | 10 241.72 N | 10 150.29 N | 10 191.40 N | 10 188.24 N | 10 194.24 N | 10 275.72 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 750.57 E | 7 852.46 E | 7 930.30 E | 7 961.83 E | 7 790.73 E | 7 796.85 E | 7 874.24 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | " | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 06.08.75 | " | " | " | " | " | 06.08.75 |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET



| B.S. | HIW4 | S75-31 | TP15 | TP16 | S75-31 | S75-31 | TP15 |
|---|---|---|---|---|---|---|---|
| S.T.A. | S75-31 | TP15 | TP16 | TP17 | TP15 | TP15 | TP16 |
| F.S. | TP15 | TP16 | TP17 | TP18 | 1-39 | 163 | A-33 |
| MEAS. DISTANCE | 485 | 464 | 395 | 171.5 | 197.0 | 225 | 134 |
| VERT. ANGLE | -03 - 56 - 30 | +01 35 20 | -02 57 30 | +05 23 50 | -02 39 00 | -02 19 00 | +06 04 40 |
| SINE – V.A. | .0686 | .0274 | .0516 | .0936 | .0462 | .0404 | .1051 |
| COSINE – V.A. | .9953 | .9993 | .9973 | .9911 | .9978 | .9984 | 9888 |
| STA. ELEVATION | 4185.39 | 4150.30 | 4164.69 | 4137.29 | 4150.30 | 4150.30 | 4164.69 |
| H.I. | +4.60 | +5.00 | +4.75 | +4.95 | +5.00 | +5.00 | +4.75 |
| INST. HEIGHT | 4189.99 | 4155.30 | 4169.44 | 4142.04 | 4155.30 | 4155.30 | 4169.44 |
| DISTANCE | -33.27 | +12.71 | -20.38 | +16.05 | -9.10 | -9.09 | +14.08 |
| DIFF. | 4156.72 | 4168.01 | 4149.06 | 4158.09 | 4146.20 | 4146.21 | 4183.52 |
| H.P. | -6.42 | -3.32 | -11.97 | -1.86 | -5.00 | -5.00 | -6.67 |
| F.S. ELEVATION | 4150.30 | 4164.69 | 4137.09 | 4156.23 | 4141.20 | 4141.21 | 4176.85 |
| AZ. B.S. TO STA. | 190 - 48 - 16 | 118 37 16 | 46 07 56 | 139 35 16 | 118 37 16 | | 46 07 56 |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | 180 | | 180 |
| AZ. STA. TO B.S. | 10 - 48 - 16 | 298 37 16 | 226 07 56 | 319 35 16 | 298 37 16 | 298 37 16 | 226 07 56 |
| HORZ. ANGLE | 107 - 49 - 00 | 107 30 40 | 273 - 27 - 20 | 77 54 10 | 103 28 00 | 103 54 00 | 166 30 30 |
| - 360 - 00' - 00" | 118 - 37 - 16 | 406 07 56 | 499 35 - 16 | 397 29 26 | 402 05 16 | 402 31 16 | 392 38 26 |
| AZ. STA. TO F.S. | | 46 07 56 | 139 35 16 | 37 29 26 | 42 05 16 | 42 31 16 | 32 38 26 |
| BEARING | S 61 - 22 - 44 E | N 46 07 56 E | S 40 24 44 E | N 37 29 26 E | N 42 05 16 E | N 42 31 16 E | N 32 38 26 E |
| HORZ. DISTANCE | 482.72 | 463.68 | 393.93 | 169.97 | 196.57 | 224.64 | 132.50 |
| COSINE BEARING | .47901 | .69300 | .76140 | .79346 | .74212 | .73703 | .84707 |
| STA. LAT. | 33 [illegible] | 33 280.10 | 33 601.43 | 33 301.49 | 33 280.10 | 33 280.10 | 33 601.43 |
| DIFF. | -231.23 | +321.33 | -299.94 | +134.86 | +145.88 | +165.57 | +111.57 |
| F.S. LAT. | 33 280.10 N | 33 601.43 N | 33 301.49 N | 33 436.35 N | 33 425.98 N | 33 445.67 N | 33 713.00 N |
| SINE BEARING | .87781 | .72094 | .64828 | .60863 | .67027 | .67586 | .53936 |
| STA. DEP. | 25 004.65 | 25 428.39 | 25 762.67 | 26 018.05 | 25 428.39 | 25 428.39 | 25 762.67 |
| DIFF. | +423.74 | +334.28 | +255.38 | +103.45 | +131.75 | +151.82 | +71.46 |
| F.S. DEP. | 25 428.39 E | 25 762.67 E | 26 018.05 E | 26 121.50 E | 25 560.14 E | 25 580.21 E | 25 834.13 E |
| GRADE CALC. | | | | | | TIED IN GOOD | |
| | 10-21-5, 253 N | | | | | WITH HIW | |
| | 762, 417 E | | | | | SURVEYOR. | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | — | — | — | — | — | |
| CHECKED BY: | | | | | | | ROA |
| DATE | | | | | | | |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP16 | TP16 | TP16 | TP16 | TP16 | TP17 | S75-31 |
| S.T.A. | TP17 | TP17 | TP17 | TP17 | TP17 | TP18 | TP15 |
| F.S. | A-54 | A-50 | DDH 161 | A-46 | DDH 166 | A-49 | A-37 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1259.68 | 1252.61 | 1249.99 | 1252.47 | 1254.29 | 1259.01 | 1266.44 |
| AZ. B.S. TO STA. | | | | | | | |
| ±180 - 00' - 00" | | | | | | | |
| AZ. STA. TO B.S. | | | | | | | |
| HORZ. ANGLE | | | | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | |
| BEARING | S 78 20 16 W | S 48 50 16 W | S 47 04 16 W | S 46 35 16 W | S 51 16 16 W | S 47 13 24 E | N 43 09 16 E |
| HORZ. DISTANCE | 10.21 | 69.50 | 96.38 | 130.44 | 141.17 | 121.90 | 121.62 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. LAT. | 10 148.23 N | 10 104.55 N | 10 084.65 N | 10 060.65 N | 10 065.02 N | 10 108.61 N | 10 232.49 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | | | | | | | |
| DIFF. | | | | | | | |
| F.S. DEP. | 7 920.30 E | 7 877.98 E | 7 859.73 E | 7 835.55 E | 7 820.17 E | 8 051.31 E | 7 833.75 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROL | " | " | " | " | " | ROL |
| CHECKED BY: | | | | | | | |
| DATE | 07.08.75 | " | " | " | " | " | " |

WORK PLACE DVHS SURVEY

# SURVEY CALCULATION SHEET

PAGE NO. 19

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP16 | TP16 | TP16 | TP16 | TP16 | TP17 | S75-31 |
| S.T.A. | TP17 | TP17 | TP17 | TP17 | TP17 | TP18 | TP15 |
| F.S. | A-54 | A-50 | 161 | A.46 | 166 | A-49 | A-37 |
| MEAS. DISTANCE | 33.5 | 230 | 320 | 430 | 464 | 401.5 | 399 |
| VERT. ANGLE | 0 | -05 20 00 | -06 13 00 | -03 58 20 | -02 25 30 | -03 36 10 | +00-23-00 |
| SINE – V.A. | | .0925 | .1076 | .0692 | .0422 | .0628 | .0067 |
| COSINE – V.A. | | .9914 | .9882 | .9952 | .9982 | .9961 | 1.0000 |
| STA. ELEVATION | 4137.09 | 4137.09 | 4137.09 | 4137.09 | 4137.09 | 4156.23 | 4150.30 |
| H.I. | +4.95 | +4.95 | +4.95 | +4.95 | +4.95 | +4.60 | +5.00 |
| INST. HEIGHT | 4142.04 | 4142.04 | 4142.04 | 4142.04 | 4142.04 | 4160.83 | 4155.30 |
| DISTANCE | 0 | -21.28 | -34.43 | -29.76 | -19.58 | -25.21 | +2.67 |
| DIFF. | 4142.04 | 4120.76 | 4107.61 | 4112.28 | 4122.46 | 4135.62 | 4157.97 |
| H.P. | -9.22 | -11.15 | -6.60 | -3.15 | -7.32 | -5.01 | -2.99 |
| F.S. ELEVATION | 4132.82 | 4109.61 | 4101.01 | 4109.13 | 4115.14 | 4130.61 | 4154.98 |
| AZ. B.S. TO STA. | 139 35 16 | | | | | 37 29 26 | |
| ±180 - 00' - 00" | 180 | | | | | 180 | |
| AZ. STA. TO B.S. | 319 35 16 | 319 35 16 | 319 35 16 | 319 35 16 | 319 35 16 | 217 29 26 | 298 37 16 |
| HORZ. ANGLE | 298 45 00 | 269 15 00 | 267 29 00 | 267 00 00 | 271 41 00 | 275 17 10 | 104-32-00 |
| -360 - 00' - 00" | 618 20 16 | 588 50 16 | 587 04 16 | 586 35 16 | 591 16 16 | 492 46 36 | 403 09 16 |
| AZ. STA. TO F.S. | 258 20 16 | 228 50 16 | 227 04 16 | 226 35 16 | 231 16 16 | 132 46 36 | 43 09 16 |
| BEARING | S 78 20 16 W | S 48 50 16 W | S 47 04 16 W | S 46 35 16 W | S 51 16 16 W | S 47 13 24 E | N 43 09 16 E |
| HORZ. DISTANCE | 33.5 | 228.07 | 316.22 | 427.94 | 463.16 | 399.93 | 399 |
| COSINE BEARING | .2014 | .6580 | .6810 | .6872 | .6264 | .6914 | .7299 |
| STA. LAT. | 33 301.49 | 33 301.49 | 33 301.49 | 33 301.49 | 33 301.49 | 33 136.35 | 33 280.10 |
| DIFF. | -6.77 | -150.08 | -215.37 | -294.10 | -289.77 | -271.61 | +291.07 |
| F.S. LAT. | 33 294.72 N | 33 151.41 N | 33 086.12 N | 33 007.39 N | 33 021.72 N | 33 164.74 N | 33 571.17 N |
| SINE BEARING | .97936 | .75285 | .73220 | .72643 | .78012 | .73401 | .68397 |
| STA. DEP. | 26 018.05 | 26 018.05 | 26 018.05 | 26 018.05 | 26 018.05 | 26 121.50 | 25 428.39 |
| DIFF. | -32.81 | -171.66 | -231.54 | -310.87 | -361.32 | +293.55 | +272.90 |
| F.S. DEP. | 25 985.24 E | 25 846.39 E | 25 786.51 E | 25 707.18 E | 25 656.73 E | 26 415.05 E | 25 701.29 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | — | — | — | — | — | ROA |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE DDHs SURVEY

**SURVEY CALCULATION SHEET**

PAGE NO. 20

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW5 | HIW4 | HIW4 | TP19 | TP20 | TP22 | HIW5 |
| S.T.A. | HIW4 | TP19 | TP19 | TP20 | TP22 | TP23 | HIW4 |
| F.S. | TP19 | TP20 | TP21 | TP22 | TP23 | TP24 | A-70 |
| MEAS. DISTANCE | 198 | 255 | 370 | 224 | 222 | 360 | 384.5 |
| VERT. ANGLE | −06 26 30 | −01 45 00 | −07 40 40 | −03 37 00 | +01 03 00 | −03 01 00 | −07 −04 −00 |
| SINE – V.A. | .1118 | .0305 | .1325 | .0630 | .0183 | .0526 | .1221 |
| COSINE – V.A. | .9874 | .9990 | .9821 | .9960 | .9997 | .9972 | .9848 |
| STA. ELEVATION | 4308.00 | 4281.02 | 4281.02 | 4266.01 | 4253.58 | 4250.23 | 4308.00 |
| H.I. | + 4.05 | +5.10 | +5.10 | +4.80 | +4.70 | +5.10 | +3.95 |
| INST. HEIGHT | 4312.05 | 4286.12 | 4286.12 | 4270.81 | 4258.28 | 4255.33 | 4311.95 |
| DISTANCE | −22.04 | −7.78 | −49.02 | −14.11 | +4.06 | −18.94 | −46.95 |
| DIFF. | 4280.01 | 4278.34 | 4237.10 | 4256.70 | 4262.34 | 4236.39 | 4265.00 |
| H.P. | −8.99 | −12.27 | −4.85 | −3.12 | −12.11 | −12.80 | −10.92 |
| F.S. ELEVATION | 4281.02 | 4266.01 | 4232.25 | 4253.58 | 4250.23 | 4223.59 | 4254.08 |
| AZ. B.S. TO STA. | 22 08 46 | 202 24 46 | 202 24 46 | 125 54 26 | 136 08 26 | 160 09 26 | 22 08 46 |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| AZ. STA. TO B.S. | 202 08 46 | 22 24 46 | 22 24 46 | 305 54 26 | 316 08 26 | 340 09 26 | 202 08 46 |
| HORZ. ANGLE | 00 16 00 | 103 29 40 | 181 34 10 | 190 14 00 | 204 01 00 | 199 59 30 | 358 10 40 |
| - 360 - 00' - 00" | 202 24 46 | 125 54 26 | 203 58 56 | 496 08 26 | 520 09 26 | 540 08 56 | 560 19 26 |
| AZ. STA. TO F.S. | | | | 136 08 26 | 160 09 26 | 180 08 56 | 200 19 26 |
| BEARING | S 22 24 46 W | S 54 05 34 E | S 23 58 56 W | S 43 51 34 E | S 19 50 34 E | S 00 08 56 W | S 20 19 26 W |
| HORZ. DISTANCE | 195.50 | 254.74 | 363.38 | 223.10 | 221.93 | 358.99 | 378.66 |
| COSINE BEARING | .92446 | .58647 | .91367 | .72104 | .94062 | 1.00000 | .93774 |
| STA. LAT. | 35 467.63 | 35 278.90 | 35 278.90 | 35 129.50 | 34 968.64 | 34 737.89 | 35 457.63 |
| DIFF. | −180.73 | −149.40 | −332.01 | −160.86 | −208.75 | −358.99 | −355.08 |
| F.S. LAT. | 35 278.90 N | 35 129.50 N | 34 946.89 N | 34 968.64 N | 34 759.89 N | 34 400.90 N | 35 104.55 N |
| SINE BEARING | .38127 | .80997 | .40645 | .69289 | .33945 | .00260 | .34732 |
| STA. DEP. | 25 376.43 | 25 301.89 | 25 301.89 | 25 508.22 | 25 662.80 | 25 738.13 | 25 376.43 |
| DIFF. | −74.54 | +206.33 | −147.70 | +154.58 | +75.33 | −0.93 | −131.52 |
| F.S. DEP. | 25 301.89 E | 25 508.22 E | 25 154.19 E | 25 662.80 E | 25 738.13 E | 25 737.20 E | 25 244.91 E |
| GRADE CALC. | | | | | | | ROUGH CHECK FOR A-70. PLEASE SEE P-21 FOR FINAL EL. & CO-ORDS |
| | | | | | 10 594.814 N | 10 495.394 N | |
| | | | | | 7 844.962 E | 7 844.650 E | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | " | ROA |
| CHECKED BY: | RW | R.W | RW | RW | R.W. | RW | |
| DATE | | | | | | | |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW4 | TP19 | TP19 | TP19 | TP19 | TP19 | TP19 |
| S.T.A. | TP19 | TP20 | TP20 | TP20 | TP21 | TP21 | TP21 |
| F.S. | A-70 ✓ | A-52 ✓ | A-994 | A-45 ✓ | A-62 | A-23 | ✓ A-134 |
| MEAS. DISTANCE | 184 | 28 | 224 | 200 | 60 | 154 | 275 |
| VERT. ANGLE | − 08 31 30 | − 04 22 40 | − 03 13 40 | − 05 54 00 | − 01 25 00 | + 00 37 00 | − 00 06 00 |
| SINE – V.A. | .1465 | .0762 | .0562 | .1022 | .0247 | .0108 | .0017 |
| COSINE – V.A. | .9781 | .9941 | .9968 | .9894 | .9994 | .9992 | 1.0000 |
| STA. ELEVATION | 4281.02 | 4266.01 | 4266.01 | 4266.01 | 4232.25 | 4232.26 | 4232.25 |
| H.I. | + 5.10 | + 5.00 | + 5.00 | + 5.00 | + 5.30 | + 5.30 | + 5.30 |
| INST. HEIGHT | 4286.12 | 4271.01 | 4271.01 | 4271.01 | 4237.55 | 4237.55 | 4237.55 |
| DISTANCE | − 26.96 | − 2.13 | − 12.59 | − 20.44 | − 1.48 | + 1.66 | − 0.47 |
| DIFF. | 4259.16 | 4268.88 | 4258.42 | 4250.57 | 4236.07 | 4239.21 | 4237.08 |
| H.P. | − 4.92 | − 4.14 | − 5.12 | − 11.00 | − 2.30 | − 11.77 | − 12.37 |
| F.S. ELEVATION | 4254.24 | 4264.74 | 4253.30 | 4239.57 | 4233.77 | 4227.44 | 4224.71 |
| AZ. B.S. TO STA. | 202 24 46 | 125 54 26 | | | 203 58 56 | | |
| ±180 - 00' - 00" | 180 | 180 | | | 180 | | |
| AZ. STA. TO B.S. | 22 24 46 | 305 54 26 | 305 54 26 | 305 54 26 | 23 58 56 | 23 58 56 | 23 58 56 |
| HORZ. ANGLE | 175 43 20 | 176 34 20 | 190 45 30 | 270 26 00 | 273 25 00 | 114 54 30 | 161 08 00 |
| - 360 - 00' - 00" | 198 08 06 | 482 28 46 | 496 39 56 | 576 20 26 | 297 23 56 | 138 53 26 | 185 06 56 |
| AZ. STA. TO F.S. | | 122 28 46 | 136 39 56 | 216 20 26 | | | |
| BEARING | S 18 08 06 W | S 57 31 14 E | S 43 20 04 E | S 36 20 26 W | N 62 36 04 W | S 41 06 34 E | S 05 06 56 W |
| HORZ. DISTANCE | 179.97 | 27.83 | 223.28 | 197.88 | 59.96 | 153.88 | 275.0 |
| COSINE BEARING | .95032 | .53699 | .72736 | .80581 | .46018 | .75346 | .99662 |
| STA. LAT. | 35 270.90 | 35 [illegible] | 35 [illegible] | 35 [illegible] | 34 [illegible] | 34 [illegible] | 34 [illegible] |
| DIFF. | − 171.03 | − 14.94 | − 162.40 | − 159.39 | + 27.59 | − 115.94 | − 273.91 |
| F.S. LAT. ✓ | 25 107.87 N | ✓35 114.56 N | ✓34 967.10 N | ✓34 970.11 N | ✓34 974.48 N | 34 830.95 N | ✓34 672.98 N |
| SINE BEARING | .31126 | .84358 | .68626 | .59258 | .88783 | .65750 | .08916 |
| STA. DEP. | 25 301.89 | 25 508.22 | 25 508.22 | 25 508.22 | 25 154.19 | 26 154.19 | 26 154.19 |
| DIFF. | − 56.02 | + 23.48 | + 153.23 | − 117.26 | − 53.23 | + 101.18 | − 24.52 |
| F.S. DEP. ✓ | 25 245.87 E | ✓25 531.70 E | ✓25 661.45 E | ✓25 390.96 E | ✓25 100.96 E | 25 255.37 E | ✓26 129.67 E |
| GRADE CALC. | | | | TIED IN WITH H.I.W. SURVEYOR ± 1.0 / OK. | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | " | ROA |
| CHECKED BY: | RW. | RW | R.W. | R.W. | RW | R.W. | R.W. |
| DATE | | | | | | | |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET

PAGE NO. 22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP19 | TP22 | TP22 | TP22 | TP22 | TP22 | TP22 |
| S.T.A. | TP21 | TP28 | TP23 | TP23 | TP23 | TP23 | TP23 |
| F.S. | A-74 ✓ | A-58 ✓ | A-55 ✓ | A-26 ✓ | A-28 ✓ | A-102 | A-103 |
| MEAS. DISTANCE | 450 | 115 | 92 | 290 | 492 | 234 | 214 + 10 |
| VERT. ANGLE | -01 48 00 | -04 54 00 | -13 52 00 | -05 37 00 | -03 38 00 | -02 14 00 | -06.56 ⊖ |
| SINE – V.A. | .0314 | .0851 | .2327 | .0974 | .0633 | .0390 | .1198 |
| COSINE – V.A. | .9990 | .9927 | .9726 | .9904 | .9960 | .9985 | .9854 |
| STA. ELEVATION | 4232.25 | 4250.23 | 4250.23 | 4250.23 | 4250.23 | 4250.23 | 4250.23 |
| H.I. | + 5.30 | + 5.10 | + 5.10 | + 5.10 | + 5.10 | + 5.10 | + 5.10 |
| INST. HEIGHT | 4237.55 | 4255.33 | 4255.33 | 4255.33 | 4255.33 | 4255.33 | 4255.33 |
| DISTANCE | -14.13 | - 9.79 | -21.41 | -28.25 | - 31.14 | - 9.13 | - 25.64 |
| DIFF. | 4223.42 | 4245.54 | 4233.92 | 4227.08 | 4224.19 | 4246.20 | 4229.69 |
| H.P. | -11.25 | - 2.58 | - 7.46 | - 2.45 | - 9.46 | -14.17 | - 3.07 |
| F.S. ELEVATION | 4212.17 | 4242.96 | 4226.46 | 4224.63 | 4214.73 | 4232.03 | 4226.62 |
| AZ. B.S. TO STA. | | 160 09 26 | 160 09 26 | | | | |
| ±180 - 00' - 00" | | 180 | 180 | | | | |
| AZ. STA. TO B.S. | 23 58 56 | 340 09 26 | 340 09 26 | 340 09 26 | 340 09 26 | 340 09 26 | 340 09 26 |
| HORZ. ANGLE | 179 15 00 | 67 53 30 | 242 32 30 | 242 56 00 | 243 32 00 | 125 45 00 | 177 54 00 |
| - 360 - 00' - 00" | 203 13 56 | 408 02 56 | 582 41 56 | 583 05 26 | 583 41 26 | 465 54 26 | 518 03 26 |
| AZ. STA. TO F.S. | | 48 02 56 | 222 41 56 | 223 05 26 | 223 41 26 | 105 54 26 | 158 03 26 |
| BEARING | S 23 13 56 W | N 48 02 56 E | S 42 41 56 W | S 43 05 26 W | S 43 41 26 W | S 74 05 34 E | S 21 56 34 E |
| HORZ. DISTANCE | 449.55 | 114.16 | 86.72 | 287.22 | 490.03 | 233.65 | 210.88 +10=220.88 |
| COSINE BEARING | .91897 | .66850 | .73493 | .73037 | .72388 | .27408 | .92756 |
| STA. LAT. | 34 946.89 | 34 759.89 | 34 757.89 | 34 757.89 | 34 757.89 | 34 757.89 | 34 757.89 |
| DIFF. | - 413.10 | + 76.32 | - 63.73 | -209.75 | - 354.33 | - 64.04 | - 204.88 |
| F.S. LAT. | 34 533.79 N | 34 836.21 N | 34 696.16 N | 34 550.14 N | 34 405.56 N | 34 695.85 N | 34 555.01 N |
| SINE BEARING | .39446 | .74372 | .67814 | .68315 | .69076 | .96170 | .37368 |
| STA. DEP. | 25 154.19 | 25 738.13 | 25 738.13 | 25 738.13 | 25 738.13 | 25 738.13 | 25 738.13 |
| DIFF. | - 177.33 | + 84.90 | -58.81 | - 196.21 | - 338.49 | + 224.70 | + 82.54 |
| F.S. DEP. | 24 976.86 E | 25 823.03 E | 25 679.32 E | 25 541.92 E | 25 399.64 E | 25 962.83 E | 25 820.67 E |
| GRADE CALC. | | | TIED IN WITH H.I.W. SURVEYOR WITH ± 1.0' | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | *USE SHT 2 DDH LOG | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | RDA | " | " | " | " | " | RDA |
| CHECKED BY: | RW | RW | RW | RW | R.W. | RW | |
| DATE | | | | | | | |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET

PAGE NO. 23

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP23 | TP19 | VG-8 | TP11 | HIW 4 | | |
| S.T.A. | TP24 | TP20 | TP11 | TP25 | S 75-31 | | |
| F.S. | A-31 ✓ | A-100 ✓ | TP25 | A-101 | TP26 | | |
| MEAS. DISTANCE | 274 | 272 | 263 | 111 | | | |
| VERT. ANGLE | -05 - 58 - 00 | +07 37 00 | +04 31 30 | -01 -14 -00 | | | |
| SINE – V.A. | .1034 | .1314 | .0786 | .0245 | | | |
| COSINE – V.A. | .9892 | .9824 | .9938 | .9995 | | | |
| STA. ELEVATION | 4223.59 | 4266.01 | 4299.57 | 4317.03 | | | |
| H.I. | + 4.80 | +5.00 | +3.10 | +5.20 | | | |
| INST. HEIGHT | 4228.39 | 4271.01 | 4302.67 | 4322.23 | | | |
| DISTANCE | - 28.33 | + 35.74 | +20.67 | - 2.39 | | | |
| DIFF. | 4200.06 | 4306.75 | 4323.34 | 4319.84 | | | |
| H.P. | - 6.37 | -11.36 | - 6.31 | -5.56 | | | |
| F.S. ELEVATION | 4193.69 | 4295.39 | 4317.03 | 4314.28 | | | |
| AZ. B.S. TO STA. | 180 08 56 | 125 54 26 | 28 - 04 - 38 | 101 15 38 | | | |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | | | |
| AZ. STA. TO B.S. | 0 08 56 | 305 54 26 | 208 - 04 - 38 | 281 15 38 | | | |
| HORZ. ANGLE | 190 27 00 | 57 56 00 | 253 - 11 - 00 | 196 - 14 - 00 | | | |
| - 360 - 00' - 00" | 190 35 56 | 363 50 26 | 461 - 15 - 38 | 477 29 38 | | | |
| AZ. STA. TO F.S. | | 03 50 26 | 101 - 15 - 38 | 117 29 38 | | | |
| BEARING | S10 35 56 W | N03 50 26 E | S78 -44-22E | S62 30 22E | | | |
| HORZ. DISTANCE | 271.04 | 267.21 | 261.37 | 110.94 | | | |
| COSINE BEARING | .98294 | .99775 | .19521 | .46165 | | | |
| STA. LAT. | 34 [illegible] | 35 139.50 | 39 639 16 | 39 [illegible] | | | |
| DIFF. | - 266.42 | + 266.61 | - 51.04 | - 51.22 | | | |
| F.S. LAT. | 34 134.48 N | 35 396.11 N | 39 588.12 N | 39 536.90 N | N | N | N |
| SINE BEARING | .18393 | .06698 | .98075 | .88706 | | | |
| STA. DEP. | 25 737.20 | 25 508.22 | 24 723 45 | 24 979.79 | | | |
| DIFF. | - 49.85 | + 17.90 | + 256.34 | + 98.41 | | | |
| F.S. DEP. | 25 687.35 E | 25 526.12 E | 24 979.79 E | 22 078.20 E | E | E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | | | |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | S75-31 | TP16 | TP16 | S75-43 | HIW 7 | TP27 |
| S.T.A. | S75-31 | TP25 | TP17 | TP17 | HIW 7 | TP27 | TP28 |
| F.S. | TP25 | A-105 | 162 | 165 | TP27 | TP28=S75-42 | A-34 |
| MEAS. DISTANCE | 251 | 274 | 335 | 360 | 391 | 377 | 586 |
| VERT. ANGLE | -00 -10 -00 | -01 13 00 | -00 39 00 | -06 10 00 | +04 -33 -00 | +03 39 00 | -03 43 00 |
| SINE – V.A. | .0029 | .0212 | .0114 | .1068 | .0791 | .0636 | .0647 |
| COSINE – V.A. | 1.000 | .9996 | .9999 | .9885 | .9938 | .9960 | .9958 |
| STA. ELEVATION | 4185.39 | 4186.21 | 4137.09 | 4137.09 | 4309.26 | 4332.38 | 4355.63 |
| H.I. | +4.80 | +4.90 | +5.00 | +5.00 | +5.05 | +5.15 | +4.50 |
| INST. HEIGHT | 4190.19 | 4191.11 | 4142.09 | 4142.09 | 4314.31 | 4337.53 | 4360.13 |
| DISTANCE | -0.73 | -5.81 | -3.82 | -38.45 | +30.93 | +23.98 | -37.91 |
| DIFF. | 4189.46 | 4185.30 | 4138.27 | 4103.64 | 4345.24 | 4361.51 | 4322.22 |
| H.P. | -3.25 | -6.37 | -17.68 | -13.81 | -12.86 | -5.88 | -6.93 |
| F.S. ELEVATION | 4186.21 | 4178.93 | 4120.59 | 4089.83 | 4332.38 | 4355.63 | 4315.29 |
| AZ. B.S. TO STA. | 190 48 16 | 32 07 48 | 139 35 16 | | 131 11 37 | 170 11 17 | 141 07 43 |
| ±180 - 00' - 00" | 180 | 180 | 180 | | 180 | 180 | 180 |
| AZ. STA. TO B.S. | 10 48 16 | 212 07 48 | 319 35 16 | 319 35 16 | 311 11 37 | 350 11 17 | 321 07 43 |
| HORZ. ANGLE | 21 19 30 | 173 59 00 | 304 24 00 | 251 22 00 | 218 59 40 | 151 41 00 | 81 51 00 |
| - 360 - 00' - 00" | 32 07 48 | 386 06 48 | 623 59 16 | 570 57 16 | 530 11 17 | 501 52 17 | 402 58 43 |
| AZ. STA. TO F.S. | | 26 06 48 | 263 59 16 | 210 57 16 | 170 11 17 | 141 07 43 | 42 58 43 |
| BEARING | N32 07 48 E | N 26 06 48E | S83 59 16 W | S 30 57 16 W | S09 48 43 E | S38 52 17 E | N42 58 43 E |
| HORZ. DISTANCE | 251 | 273.89 | 334.97 | 355.86 | 388.58 | 375.49 | 583.54 |
| COSINE BEARING | .84684 | .89792 | .10474 | .85758 | .98537 | .77856 | .73161 |
| STA. LAT. | 33 021.33 | 33 723.81 | 33 301.41 | 33 301.49 | 37 773.07 | 37 592.72 | 37 300.38 |
| DIFF. | +212.56 | +245.93 | -35.08 | -305.18 | -381.90 | -292.34 | +426.92 |
| F.S. LAT. | 33 723.89 N | 33 969.82 N | 33 266.41 N | 32 996.31 N | 37 592.72 N | 37 300.38 N | 37 727.30 N |
| SINE BEARING | .53184 | .44015 | .99450 | .51435 | .17042 | .62758 | .68172 |
| STA. DEP. | 25 004.65 | 25 138.14 | 26 018.05 | 26 018.05 | 22 379.89 | 22 446.11 | 22 681.76 |
| DIFF. | +133.49 | +120.55 | -333.13 | -183.04 | +66.22 | +235.65 | +397.81 |
| F.S. DEP. | 25 138.14 E | 25 258.69 E | 25 684.92 E | 25 835.01 E | 22 446.11 E | 22 681.76 E | 23 079.57 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | " | " |
| CHECKED BY: | RW | | | | | | |
| DATE | 13.08.75 | " | " | " | 14.08.75 | " | " |

WORK PLACE DDHs SURVEY

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP27 | TP10 OLD | TP10 OLD | TP9 OLD | TP9 | TP30 | |
| S.T.A. | TP28 | TP9 OLD | TP9 OLD | TP30 | TP30 | TP31 | |
| F.S. | TP29 | A-14 | TP30 | A-1 | TP31 | A-41 | |
| MEAS. DISTANCE | 583 | 75 | 230 | 259 | 24.5 | 420 | |
| VERT. ANGLE | − 03 44 00 | − 03 01 00 | + 01 52 00 | + 02 04 00 | 0 | + 06 − 11 − 00 | |
| SINE – V.A. | .0650 | .0526 | .0673 | .0360 | | .1071 | |
| COSINE – V.A. | .9958 | .9972 | .9955 | .9987 | | .9884 | |
| STA. ELEVATION | 4355.63 | 4274.23 | 4274.23 | 4282.31 | 4289.54 | 4290.32 | |
| H.I. | + 4.50 | + 4.75 | + 4.75 | + 5.20 | + 5.20 | + 4.10 | |
| INST. HEIGHT | 4360.13 | 4278.98 | 4278.98 | 4287.51 | 4294.74 | 4294.42 | |
| DISTANCE | − 37.90 | − 3.94 | + 15.48 | + 9.32 | 0 | + 44.98 | |
| DIFF. | 4322.23 | 4275.04 | 4294.46 | 4296.83 | 4294.74 | 4339.40 | |
| H.P. | − 6.91 | − 7.38 | − 12.15 | − 7.29 | − 4.42 | − 13.20 | |
| F.S. ELEVATION | 4315.32 | 4267.66 | 4282.31 | 4289.54 | 4290.32 | 4326.20 | |
| AZ. B.S. TO STA. | | 247 51 32 | | 206 − 38 − 32 | 206 38 32 | | |
| ±180 - 00' - 00" | | 180 | | 180 | 180 | | |
| AZ. STA. TO B.S. | 321 07 43 | 67 51 32 | 67 51 32 | 26 − 38 − 32 | 26 38 32 | 26 38 32 | |
| HORZ. ANGLE | 82 16 00 | 106 08 00 | 138 47 00 | 200 − 19 30 | 180 | 272 58 00 | |
| - 360 - 00' - 00" | 403 23 43 | 173 59 32 | 206 38 32 | 226 − 58 − 02 | 206 38 32 | 299 36 32 | |
| AZ. STA. TO F.S. | 43 23 43 | | 26 38 32 | 46 − | | | |
| BEARING | N43 23 43 E | S06 00 28E | S 26 38 32W | S 46 58 02W | S 26 38 32W | N 60 23 28 W | |
| HORZ. DISTANCE | 580.55 | 74.79 | 228.96 | 258.66 | 24.5 | 415.13 | |
| COSINE BEARING | .72663 | .99451 | .89383 | .68241 | .89383 | .49488 | |
| STA. LAT. | 37 306.38 | 35 090.38 | 35 090.38 | 34 885.73 | 34 885.73 | 34 884.55 | |
| DIFF. | + 421.84 | − 74.38 | − 204.65 | − 176.51 | − 21.90 | + 205.11 | |
| F.S. LAT. | 37 722.22 N | 35 016.20 N | 34 885.93 N | 34 709.42 N | 34 864.03 N | 35 069.14 N | N |
| SINE BEARING | .68703 | .10466 | .44842 | .73097 | .44842 | .86942 | |
| STA. DEP. | 22 681.76 | 24 318.21 | 24 318.21 | 24 215.54 | 24 215.54 | 24 204.55 | |
| DIFF. | + 398.86 | + 7.83 | − 102.67 | − 189.07 | − 10.99 | − 360.92 | |
| F.S. DEP. | 23 080.62 E | 24 326.04 E | 24 215.54 E | 24 026.47 E | 24 204.55 E | 23 843.63 E | E |
| GRADE CALC. | | | | | | | |
| | | 16672.938 N | | | | | |
| | | 7414.577 | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | " | |
| CHECKED BY: | | | | | | | |
| DATE | 14.08.75 | " | " | " | " | " | |

WORK PLACE DDH SURVEY

**SURVEY CALCULATION SHEET**

PAGE NO. 26

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | VG-8 | VG-8 | | | | | | |
| S.T.A. | HIW7 | HIW7 | | | | | | |
| F.S. | A-29 | A-64 | | | | | | |
| MEAS. DISTANCE | 277.5 | 411 | | | | | | |
| VERT. ANGLE | +02 12 00 | −03 15 00 | | | | | | |
| SINE – V.A. | .0384 | .0566 | | | | | | |
| COSINE – V.A. | .9985 | .9968 | | | | | | |
| STA. ELEVATION | 4309.26 | 4309.26 | | | | | | |
| H.I. | +5.05 | +5.05 | | | | | | |
| INST. HEIGHT | 4314.31 | 4314.31 | | | | | | |
| DISTANCE | +10.66 | −23.26 | | | | | | |
| DIFF. | 4324.97 | 4291.05 | | | | | | |
| H.P. | −3.38 | −7.05 | | | | | | |
| F.S. ELEVATION | 4321.59 | 4284.00 | | | | | | |
| AZ. B.S. TO STA. | 126 01 00 | | | | | | | |
| ±180 - 00' - 00" | 180 00 00 | | | | | | | |
| AZ. STA. TO B.S. | 306 01 00 | 306 01 00 | | | | | | |
| HORZ. ANGLE | 208 51 40 | 137 24 10 | | | | | | |
| - 360 - 00' - 00" | 514 52 40 | 443 25 10 | | | | | | |
| AZ. STA. TO F.S. | 154 52 40 | 83 25 10 | | | | | | |
| BEARING | S 25 07 20 E | N 83 25 10 E | | | | | | |
| HORZ. DISTANCE | 277.08 | 409.68 | | | | | | |
| COSINE BEARING | .90540 | .11460 | | | | | | |
| STA. LAT. | 37 975.62 | 37 975.62 | | | | | | |
| DIFF. | −250.87 | +46.95 | | | | | | |
| F.S. LAT. | 37 724.75 N | 38 022.57 N | N | N | N | N | N | |
| SINE BEARING | .42455 | .99341 | | | | | | |
| STA. DEP. | 22 379.89 | 22 379.89 | | | | | | |
| DIFF. | +117.63 | +406.98 | | | | | | |
| F.S. DEP. | 22 497.52 E | 22 786.87 E | E | E | E | E | E | |
| GRADE CALC. | | | | | | | | |
| | OLD CALC. MISSING – TIE IN | | | | | | | |
| | WITH OLD CO-ORDS & ELEV. O.K. | | | | | | | |
| F.S. GRADE ELV. | PLS. SEE DDH LOG ON SHT. #1-2 | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | ROA | ROA | | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | 16.08.75 | 16.08.75 | | | | | | |

WORK PLACE DDH Aug 28 — SURVEY CALCULATION SHEET — PAGE NO. 27

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW5 | HIW4 | TP 28(08) | TP 28(08) | TP 29 | TP 29 | TP 29 |
| S.T.A. | HIW4 | TP 28(08) | TP 29(08) | TP 29(08) | TP 30 | TP 30 | TP 30 |
| F.S. | TP 28(08) | TP 29(08) | A 106 | TP 30(08) | A 109 | A 112 | TP 31 |
| MEAS. DISTANCE | 104 | 160 | 146 | 145 | 196 | 406 | 394 |
| VERT. ANGLE | - 01 35 | - 7°03'20" | - 2°22' | - 2°26' | - 3.41 | - 1°42' | - 2°19' |
| SINE – V.A. | .0275 | .1218 | .0413 | .0424 | 0641 | .0297 | .0404 |
| COSINE – V.A. | 9992 | .9849 | .9983 | .9982 | .9959 | .9991 | .9984 |
| STA. ELEVATION | 4308.00 | 4295.61 | 4279.45 | 4279.45 | 4276.83 | 4276.83 | 4276.83 |
| H.I. | + 3.99 | + 5.13 | + 5.25 | + 5.25 | 5.12 | 5.12 | 5.12 |
| INST. HEIGHT | 4311.99 | 4300.74 | 4284.70 | 4284.70 | 4281.95 | 4281.95 | 4281.95 |
| DISTANCE | - 2.86 | - 19.49 | 6.03 | - 6.15 | 12.56 | 12.06 | 15.92 |
| DIFF. | 4309.13 | 4281.25 | 4278.67 | 4278.55 | 4269.39 | 4269.89 | 4266.03 |
| H.P. | - 13.52 | - 1.80 | 1.73 | 1.72 | 3.98 | 12.03 | 7.97 |
| F.S. ELEVATION | 4295.61 | 4279.45 | 4276.94 | 4276.83 | 4265.41 | 4257.86 | 4258.06 |
| AZ. B.S. TO STA. | | 175 05 46 | 124 34 46 | 124 34 46 | 98 22 26 | 98 22 26 | 98 22 26 |
| ±180 - 00' - 00" | | 180 | 180 | 180 | 180 | 180 | 180 |
| AZ. STA. TO B.S. | 202 08 46 | 355 05 46 | 304 34 46 | 304 34 46 | 278 22 26 | 278 22 26 | 278 22 26 |
| HORZ. ANGLE | 332 57 | 129 29 | 155 23 | 153 47 40 | 215 19 40 | 213 18 40 | 213 44 |
| - 360 - 00' - 00" | 534 65 46 | 484 34 46 | 459 57 46 | 457 81 86 | 493 41 66 | 491 40 66 | 491 66 26 |
| AZ. STA. TO F.S. | 175 05 46 | 124 34 46 | 99 57'46" | 98 22 26 | 133 42 06 | 131 41 06 | 132 06 26 |
| BEARING | S 4 54 14 E | S 55 25 14 E | | | | | |
| HORZ. DISTANCE | 103.92 | 157.58 | 145.75 | 144.74 | 195.20 | 405.63 | 393.37 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 35459.63 | 35356.09 | 35265.66 | 35266.66 | 35245.58 | 35245.58 | 35245.58 |
| DIFF. | - 103.54 | - 89.43 | - 25.22 | - 21.08 | - 134.86 | - 269.76 | - 263.76 |
| F.S. LAT. | 35356.09 N | 35266.66 N | 35241.44 N | 35245.58 N | 35110.72 N | 34975.82 N | 34981.82 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 25376.43 | 25385.31 | 25515.05 | 25515.05 | 25658.25 | 25658.25 | 25658.25 |
| DIFF. | 8.88 | 129.74 | 143.55 | 143.20 | 141.12 | 302.93 | 291.84 |
| F.S. DEP. | 25385.31 E | 25515.05 E | 25658.60 E | 25658.25 E | 25799.37 E | 25961.18 E | 25950.09 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | Aug 29-75 | | | | | | |

WORK PLACE DDH Aug 28

SURVEY CALCULATION SHEET

PAGE NO. 27 28

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP30 | TP31 | | | | | | |
| S.T.A. | TP31 | TP32 | | | | | | |
| F.S. | TP32 | A107 | | | | | | |
| MEAS. DISTANCE | 315 | 375 | | | | | | |
| VERT. ANGLE | -0 56 | -3°58' | | | | | | |
| SINE – V.A. | .0163 | .0690 | | | | | | |
| COSINE – V.A. | .9997 | .9952 | | | | | | |
| STA. ELEVATION | 4258.06 | 4250.39 | | | | | | |
| H.I. | 5.02 | 5 03 | | | | | | |
| INST. HEIGHT | 4263.08 | 4255.42 | | | | | | |
| DISTANCE | 5.13 | 25.88 | | | | | | |
| DIFF. | 4257.95 | 4229.54 | | | | | | |
| H.P. | 7.56 | 8.87 | | | | | | |
| F.S. ELEVATION | 4250.39 | 4220.67 | | | | | | |
| AZ. B.S. TO STA. | 132 06 26 | 230 17 06 | | | | | | |
| ±180 - 00' - 00" | 180 | 180 | | | | | | |
| AZ. STA. TO B.S. | 312 06 26 | 50 17 06 | | | | | | |
| HORZ. ANGLE | 278 10 40 | 133 29 30 | | | | | | |
| - 360 - 00' - 00" | 590 17 06 | 183 46 36 | | | | | | |
| AZ. STA. TO F.S. | 230 17 06 | 183 46 36 | | | | | | |
| BEARING | | | | | | | | |
| HORZ. DISTANCE | 314.91 | 373.20 | | | | | | |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | 34981.82 | 34780.60 | | | | | | |
| DIFF. | -201.22 | -372.39 | | | | | | |
| F.S. LAT. | 34780.60 N | 34407.21 N | N | N | N | N | N | N |
| SINE BEARING | | | | | | | | |
| STA. DEP. | 25950.09 | 25707.85 | | | | | | |
| DIFF. | -242.24 | -24.58 | | | | | | |
| F.S. DEP. | 25707.85 E | 25683.27 E | E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | | | | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | Aug 29.75 | | | | | | | |

WORK PLACE DDH SURVEY SEPT 2-75

SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | 575 33 | HIW6 | HIW6 | HIW6 | HIW6 | TP(09)3 | 97533 |
| S.T.A. | HIW6 | TP(09)3 | TP(09)3 | TP(09)3 | TP(09)3 | TP(09) 4 | HIW 6 |
| F.S. | TP(091)3 | A111 | A115 | A113 | TP(09)4 | A59 | A51 |
| MEAS. DISTANCE | 465 | 216 | 415 | 75 | 201 | 148 | 292 |
| VERT. ANGLE | + 2°52' | +0 21 | +1°46' | +9°30' | +3°49' | +044' | +4°07' |
| SINE – V.A. | .0499 | .0060 | .0308 | .1628 | .0663 | .0128 | .0715 |
| COSINE – V.A. | .9975 | 1 | .9990 | .9728 | 9956 | .9998 | .9948 |
| STA. ELEVATION | 4327.10 | 4348.77 | 4348.77 | 4348.77 | 4348.77 | 4361.16 | 4327.10 |
| H.I. | 4.80 | 5.06 | 5.06 | 5.06 | 5.06 | 4.8 | 4.65 |
| INST. HEIGHT | 4331.90 | 4353.83 | 4353.83 | 4353.83 | 4353.83 | 4365.96 | 4331.75 |
| DISTANCE | 23.20 | +1.30 | +12.78 | +12.21 | 13.33 | 1.89 | 20.89 |
| DIFF. | 4355.10 | 4355.13 | 4366.61 | 4366.04 | 4367.16 | 4367.85 | 4352.64 |
| H.P. | -6.33 | -4.08 | -13.4 | -13.86 | -6.00 | -6.74 | -12.00 |
| F·S· ELEVATION | 4348.77 | 4351.05 | 4353.21 | 4352.18 | 4361.16 | 4361.11 | 4340.63 |
| AZ. B·S· TO STA. | 285 59 41 | 349 22 11 | 349 22 11 | 349 22 11 | | 287 36 41 | 285 59 41 |
| ±180 - 00' - 00" | 180 | 180 | | | | 180 | |
| AZ. STA. TO B.S. | 105 59 41 | 169 22 11 | 169 22 11 | 169 22 11 | 169 22 11 | 467 36 41 | 105 59 41 |
| HORZ. ANGLE | 243 22 30 | 73 51 | 64 35 | 141 06 30 | 118 18 30 | 154 13 | 178 53 40 |
| - 360 - 00' - 00" | 348 81 71 | 242-73-11 | 233 57 11 | 310 28 41 | 287 40 41 | 621 49 41 | 283 112 81 |
| AZ. STA. TO F.S. | 349 22 11 | 242-73-11 | 233 57 11 | 310 28 41 | 287 40 41 | 261 49 41 | 284 53 21 |
| BEARING | | | | | | | |
| HORZ. DISTANCE | 464.42 | 216 | 414.59 | 72.96 | 200.12 | 147.97 | 290.48 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 35707.21 | 36163.66 | 36163.66 | 36163.66 | 36163.66 | 36224.43 | 35781.85 |
| DIFF. | 456.45 | - 97.32 | - 243.96 | + 47.36 | + 60.77 | - 21.03 | 74.64 |
| F.S. LAT. | 36163.66 N | 36066.34 N | 35919.70 N | 36211.02 N | 36224.43 N | 36203.40 N | 35781.85 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 24241.89 | 24156.22 | 24156.22 | 24156.22 | 24156.22 | 23965.55 | 24241.89 |
| DIFF. | -85.67 | - 192.83 | - 335.21 | - 55.50 | - 190.67 | - 146.47 | - 280.73 |
| F.S. DEP. | 24156.22 E | 23963.39 E | 23821.01 E | 24100.72 E | 23965.55 E | 23819.08 E | 23961.16 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE DDH SURVEY SEPT 2/75

SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | S75-31 | S75-31 | S75-31 | S75-31 | TP(091)1 | |
| S.T.A. | 75-31 | TP(091)1 | TP(091)1 | TP(091)1 | TP(091)1 | TP(091)2 | |
| F.S. | TP(091)1 | A114 | A108 | A110 | TP(091)2 | A17 | |
| MEAS. DISTANCE | 220 | 142 | 379 | 505 | 725 | 108 | |
| VERT. ANGLE | -01 07 | -05 48 | -02 27 | -0 18 | +02 12 | +02 27 | |
| SINE – V.A. | .0198 | .1005 | .0427 | .0052 | .0384 | .0426 | |
| COSINE – V.A. | .9996 | .9898 | .9982 | 1 | .9985 | .9982 | |
| STA. ELEVATION | 4185.30 | 4182.79 | 4182.79 | 4182.79 | 4182.79 | 4209.11 | |
| H.I. | 4.95 | 5.10 | 5.10 | 5.10 | 5.10 | 5.1 | |
| INST. HEIGHT | 4190.25 | 4187.89 | 4187.89 | 4187.89 | 4187.89 | 4214.21 | |
| DISTANCE | 4.36 | 14.27 | 16.18 | 2.63 | +27.84 | +4.60 | |
| DIFF. | 4185.89 | 4173.62 | 4171.71 | 4185.26 | 4215.73 | 4218.81 | |
| H.P. | 3.10 | 7.71 | 4.99 | 7.52 | 6.62 | -4.54 | |
| F.S. ELEVATION | 4182.79 | 4165.91 | 4166.72 | 4177.74 | 4209.11 | 4214.27 | |
| AZ. B.S. TO STA. | | 50 24 16 | | | | 337 48 56 | |
| ±180 - 00' - 00" | | 180 | | | | 180 | |
| AZ. STA. TO B.S. | 10 48 16 | 230 24 16 | 230 24 16 | 230 24 16 | 230 24 16 | 157 48 56 | |
| HORZ. ANGLE | 39 36 | 215 45 30 | 211 57 | 178 09 20 | 107 24 40 | 159 23 30 | |
| - 360 - 00' - 00" | 49 84 16 | | 441 81 16 | 408 33 36 | 337 48 56 | 316 71 86 | |
| AZ. STA. TO F.S. | 50 24 16 | 86 09 46 | 82 21 16 | 48 33 36 | | 317 12 26 | |
| BEARING | N50 24 16E | N E | N E | N E | | | |
| HORZ. DISTANCE | 219.91 | 140.55 | 378.32 | 505 | 723.91 | 107.81 | |
| COSINE BEARING | | | | | | | |
| STA. LAT | 33651.33 | 33651.49 | 33651.49 | 33651.49 | 33651.49 | 34321.81 | |
| DIFF. | 140.16 | 9.41 | 50.33 | 334.23 | 670.32 | -79.11 | |
| F.S. LAT. | 33651.49 N | 33660.90 N | 33701.82 N | 33985.72 N | 34321.81 N | 34400.92 N | N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 25004.65 | 25174.10 | 25174.10 | 25174.10 | 25174.10 | 24900.76 | |
| DIFF. | 169.45 | 140.23 | 374.96 | 378.57 | 273.34 | -73.24 | |
| F.S. DEP. | 25174.10 E | 25314.33 E | 25549.06 E | 25552.67 E | 24900.76 E | 24827.58 E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE ORE STOCKPILE

**SURVEY CALCULATION SHEET**

PAGE NO. 31

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | S75-31 | | | | | | |
| S.T.A. | S75-31 | TP26 | | | | | | |
| F.S. | TP26 | TP32 | | | | | | |
| MEAS. DISTANCE | 340 | 270 | | | | | | |
| VERT. ANGLE | 0 | + 00 - 50 - 00 | | | | | | |
| SINE – V.A. | | .0145 | | | | | | |
| COSINE – V.A. | | .9998 | | | | | | |
| STA. ELEVATION | 4185.39 | 4177.58 | | | | | | |
| H.I. | + 4.89 | + 4.90 | | | | | | |
| INST. HEIGHT | 4190.28 | 4182.48 | | | | | | |
| DISTANCE | 0. – | + 3.92 | | | | | | |
| DIFF. | 4190.28 | 4186.40 | | | | | | |
| H.P. | – 12.70 | – 10.35 | | | | | | |
| F.S. ELEVATION | 4177.58 | 4176.05 | | | | | | |
| AZ. B.S. TO STA. | 190 - 48 - 16 | 157 - 45 - 16 | | | | | | |
| ±180 - 00' - 00" | 180 | 180 | | | | | | |
| AZ. STA. TO B.S. | 10 - 48 - 16 | 337 45 - 16 | | | | | | |
| HORZ. ANGLE | 146 - 57 - 00 | 196 - 23 - 00 | | | | | | |
| - 360 - 00' - 00" | 157 - 45 - 16 | 534 - 08 - 16 | | | | | | |
| AZ. STA. TO F.S. | | 174 - 08 - 16 | | | | | | |
| BEARING | S22 - 14 - 44E | S05 - 51 - 44E | | | | | | |
| HORZ. DISTANCE | 340 | 269.95 | | | | | | |
| COSINE BEARING | .92557 | .99477 | | | | | | |
| STA. LAT. | 33 511.33 | 33 196.64 | | | | | | |
| DIFF. | – 314.69 | – 268.54 | | | | | | |
| F.S. LAT. | 33 196.64 N | 32 928.10 N | N | | N | | N | |
| SINE BEARING | .37858 | .10214 | | | | | | |
| STA. DEP. | 25 004.65 | 25 133.37 | | | | | | |
| DIFF. | + 128.72 | + 27.57 | | | | | | |
| F.S. DEP. | 25 133.37 E | 25 160.94 E | E | | E | | E | |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | | | | | | | | |
| CHECKED BY: | RW. | RW | | | | | | |
| DATE | | | | | | | | |

WORK PLACE ORE STOCKPILE

**SURVEY CALCULATION SHEET**



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW4 | S75-31 | TPA | TPE | TPE | TPB | |
| S.T.A. | S75-31 | TPA | TPE | TPB | TPB | TPF | |
| F.S. | TPA | TPE | TPB | TPD | TPF | TPC | |
| MEAS. DISTANCE | 448 | 191 | 455 | 262 | 494 | 162 | |
| VERT. ANGLE | +01 00 | +01 30 | -03 25 20 | +1° 22′ | -0°·37 | -04 07 30 | |
| SINE – V.A. | .0174 | .0262 | .0595 | .0238 | .0108 | .0716 | |
| COSINE – V.A. | .9997 | .9993 | .9964 | .9994 | .9999 | .9948 | |
| STA. ELEVATION | 4185.30 | 4184.62 | 4183.44 | 4152.66 | 4152 66 | 4144.35 | |
| H.I. | 4.75 | 4.78 | 4.55 | 4.50 | 4.50 | 4.8 | |
| INST. HEIGHT | 4190.05 | 4189.40 | 4187.99 | 4157.16 | 4157.16 | 4149.15 | |
| DISTANCE | + 7.80 | + 5.00 | - 27.07 | 6.24 | - 5.34 | - 11.60 | |
| DIFF. | 4197.85 | 4194.40 | 4160.92 | 4163.40 | 4151.82 | 4137.55 | |
| H.P. | - 13.23 | - 10.96 | - 8.26 | -3.31 | - 7.47 | - 5.80 | |
| F·S· ELEVATION | 4184.62 | 4183.44 | 4152.66 | 4160.09 | 4144.35 | 4131.75 | |
| AZ. B·S· TO STA. | | 166 26 46 | 196 42 36 | 172 28 36 | 172 2836 | 53 24 06 | |
| ±180 - 00′ - 00″ | | 180 | 180 | 180 | 180 | 180 | |
| AZ. STA. TO B.S. | 10°48′16″ | 346 26 46 | 376 42 36 | 352 28 36 | 352 28 36 | 233 24 06 | |
| HORZ. ANGLE | 155 38 30 | 210 15 50 | 155 46 | 256 50 | 60·55-30 | 151 36 20 | |
| - 360 - 00′ - 00″ | 165 86 46 | 556 41 96 | 531 88 36 | 608 78 36 | 412 83 66 | 384 60 26 | |
| AZ. STA. TO F.S. | 166 26 46 | 196 42 36 | 172 28 36 | 249 - 18·36 | 53 24 06 | 25 00 26 | |
| BEARING | | | | | | | |
| HORZ. DISTANCE | 447.87 | 190.87 | 453.36 | 261.84 | 493.95 | 161 16 | |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 33511.33 | 33075.93 | 32893.12 | 32443.66 | 32443.66 | 32738.15 | |
| DIFF. | - 435.40 | - 182.81 | - 449.46 | - 92.51 | - 294 99 | - 146.05 | |
| F.S. LAT. | 33075.93 N | 32893.12 N | 32443.66 N | 32351.15 N | 32738.15 N | 32884.20 N | N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 25004.65 | 25109.61 | 25054.73 | 25114.09 | 25114.09 | 25510.65 | |
| DIFF. | 104 96 | 54.88 | 59.36 | -244.95 | 396.56 | 68.13 | |
| F.S. DEP. | 25109.61 E | 25054.73 E | 25114.09 E | 24869.14 E | 25510.65 E | 25578.78 E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE ORE STOCK PILE DAM (STADIA

SURVEY CALCULATION SHEET



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP B | TP F | | | | | | |
| S.T.A. | TP F | TP 42 | | | | | | |
| F.S. | TP 42 | S 75 31 | | | | | | |
| MEAS. DISTANCE | 364 | 598 | | | | | | |
| VERT. ANGLE | +02°31' | +03°09' | | | | | | |
| SINE – V.A. | .0438 | .0549 | | | | | | |
| COSINE – V.A. | .9981 | .9970 | | | | | | |
| STA. ELEVATION | 4144.35 | 4156.87 | | | | | | |
| H.I. | 5 4 | 4.85 | | | | | | |
| INST. HEIGHT | 4149.75 | 4161.72 | | | | | | |
| DISTANCE | +15.94 | +32.83 | | | | | | |
| DIFF. | 4165.69 | 4194.55 | | | | | | |
| H.P. | – 8.82 | – 8.99 | | | | | | |
| F.S. ELEVATION | 4156.87 | 4185.56 | | | | | | |
| AZ. B.S. TO STA. | 53 24 06 | 347 48 06 | | | | | | |
| ±180 - 00' - 00" | 180 | 180 | | | | | | |
| AZ. STA. TO B.S. | 233 24 06 | 167 48 06 | | | | | | |
| HORZ. ANGLE | 114 24 | 146 21 | | | | | | |
| - 360 - 00' - 00" | 347 48 06 | 314 09 06 | | | | | | |
| AZ. STA. TO F.S. | 347 48 06 | | | | | | | |
| BEARING | | | | | | | | |
| HORZ. DISTANCE | 363.31 | 596.21 | | | | | | |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | 32738.15 | 33093.26 | | | | | | |
| DIFF. | 355.11 | 415.30 | Closure | | | | | |
| F.S. LAT. | 33093.26 N | 33508.56 N | – 2.77 N | N | N | N | N | N |
| SINE BEARING | | | | | | | | |
| STA. DEP. | 25510.65 | 25433.88 | | | | | | |
| DIFF. | – 76.77 | – 427.78 | | | | | | |
| F.S. DEP. | 25433.88 E | 25006.10 E | + 1.45 E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | | | | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | | | | | | | | |

WORK PLACE DDH SURFACE SURVEY

# SURVEY CALCULATION SHEET

PAGE NO. 34

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | HIW 6 | HIW 6 | HIW 6 | HIW 5 | HIW 4 | |
| S.T.A. | HIW 6 | TP 40 | TP 40 | TP 40 | HIW 4 | TP 41 | |
| F.S. | TP 40 | A-61 | A-104 | A-118 | TP 41 | A-116 | |
| MEAS. DISTANCE | 382 | 364 | 404 | 254 | 286 | 406 | |
| VERT. ANGLE | +02-30-00 | +02-23-00 | -01-08-00 | +01-55-00 | -00-40-00 | -02-36-00 | |
| SINE – V.A. | .0436 | .0416 | .0198 | .0334 | .0116 | .0453 | |
| COSINE – V.A. | .9981 | .9982 | .9996 | .9989 | .9999 | .9979 | |
| FINAL → STA. ELEVATION | 4327.10 | 4343.60 | 4343.60 | 4343.60 | 4308.00 | 4305.40 | |
| H.I. | +4.75 | +5.10 | +5.10 | +5.10 | +4.15 | +5.15 | |
| INST. HEIGHT | 4331.85 | 4348.70 | 4348.70 | 4348.70 | 4312.15 | 4310.55 | |
| V. DISTANCE | +16.66 | +15.14 | -8.00 | +8.48 | -3.32 | -18.39 | |
| DIFF. | 4348.51 | 4363.84 | 4340.70 | 4357.18 | 4308.83 | 4292.16 | |
| H.P. | -4.91 | -3.81 | -9.52 | -9.27 | -3.43 | -12.03 | |
| F.S. ELEVATION (1323945) | 4343.60 | 4360.02 | 4331.18 | 4347.91 | 4305.40 | 4280.13 | 304599 |
| AZ. B.S. TO STA. | 282-18-37 | 356-39-37 | 1320.166 | 1325.259 | 22-08-46 | 72-54-46 | |
| ±180 - 00' - 00" | 180- | 180- | | | 180- | 180 | |
| AZ. STA. TO B.S. | 102-18-37 | 176-39-37 | 176-39-37 | 176-39-37 | 202-08-46 | 252-54-46 | |
| HORZ. ANGLE | 254-21-00 | 137-29-00 | 231-10-30 | 188-02-00 | 230-46-00 | 242-17-00 | |
| - 360 - 00' - 00" | 356-39-37 | 314-08-37 | 407-50-07 | 364-41-37 | 432-54-46 | 495-11-46 | |
| AZ. STA. TO F.S. | | | 47-50-07 | 04-41-37 | 72-54-46 | 135-11-46 | |
| BEARING | N 03-20-23 W | N 45-51-23 W | N 47-50-07 E | N 04-41-37 E | N 72-54-46 E | S 44-48-14 E | |
| HORZ. DISTANCE | 381.27 | 363.34 | 403.84 | 253.72 | 285.97 | 405.15 | |
| COSINE BEARING | .99830 | .69646 | .67126 | .99665 | .29383 | .70752 | |
| STA. LAT. | 35 707.21 | 36 887.83 | 36 087.83 | 36 887.83 | 35 457.63 | 35 543.66 | |
| DIFF. | +380.62 | +253.05 | +271.08 | +252.87 | +84.03 | -287.46 | |
| F.S. LAT. | 36 087.83 N | 36 340.88 N | 36 358.91 N | 36 340.70 N | 35 543.66 N | 35 256.20 N | N |
| SINE BEARING | .05826 | .71760 | .74122 | .08182 | .95586 | .70468 | |
| STA. DEP. | 24 241.89 | 24 719.68 | 24 719.68 | 24 219.68 | 25 376.43 | 25 649.78 | |
| DIFF. | -22.21 | -260.73 | +299.33 | +20.76 | +273.35 | +285.50 | |
| F.S. DEP. | 24 219.68 E | 23 958.95 E | 24 519.01 E | 24 240.44 E | 25 649.78 E | 25 935.28 E | 7905.169 E |
| GRADE CALC. | 7382.248 | 7302.777 | 7473.485 | 7398.576 | 7818.148 | | |
| | RED = METRIC | | | | | | |
| | | EL 1328.934 | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | ROA | |
| CHECKED BY: | RW | RW | RW | RW | RW | RW | |
| DATE | 17 SEP 15 | 17 SEP 15 | | | | 17 SEP 15 | |

WORK PLACE ORE STOCKPILE

# SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW4 | HIW5 | A | TP22 OLD | TP23 OLD | B | C |
| S.T.A. | HIW5 | A | TP22 OLD | TP23 OLD | B | C | D |
| F.S. | A | TP22 OLD | TP23 OLD | B | C | D | E |
| MEAS. DISTANCE | 366 | 177.5 | 290 | 437 | 247 | 426 | 511 |
| VERT. ANGLE | -01 28 10 | -03-35-00 | -00-46-40 | -04-57-20 | -03-07-00 | 0 | +02-39-00 |
| SINE – V.A. | .0256 | .0624 | .0135 | .0860 | .0543 | | .0462 |
| COSINE – V.A. | .9993 | .9962 | .9998 | .9925 | .9970 | | .9978 |
| STA. ELEVATION | 4223.20 | 4209.75 | 4197.68 | 4192.11 | 4156.19 | 4140.34 | 4134.39 |
| H.I. | +3.75 | +4.80 | +4.85 | +4.85 | +3.50 | +4.80 | +4.85 |
| INST. HEIGHT | 4226.95 | 4214.55 | 4202.53 | 4196.96 | 4159.69 | 4145.14 | 4139.24 |
| DISTANCE | -9.37 | -11.08 | -3.92 | -37.58 | -13.14 | | +23.61 |
| DIFF. | 4217.58 | 4203.47 | 4198.61 | 4159.38 | 4146.55 | 4145.14 | 4162.85 |
| H.P. | -7.83 | -5.79 | -6.45 | -3.19 | -6.21 | -10.75 | -4.80 |
| F.S. ELEVATION | 4209.75 | 4197.68 | 4192.16 | 4156.19 | 4140.34 | 4134.39 | 4158.05 |
| AZ. B.S. TO STA. | 202-08-46 | 144-19-06 | 142-08-26 | 216-48-46 | 137-01-06 | 70-38-46 | 45-27-46 |
| ±180 - 00' - 00" | 180 - | 180 | 180 | 180 | 180 | 180 - | 180 |
| AZ. STA. TO B.S. | 22-08-46 | 324 19-06 | 322 08-26 | 36-48-46 | 317-01-06 | 250-38-46 | 225-27-46 |
| HORZ. ANGLE | 122-10-20 | 177 49-20 | 254-40-20 | 100-12-20 | 113-37-40 | 154-49-00 | 111-19-00 |
| - 360 - 00' - 00" | 144-19-06 | 502-08-26 | 576-48-46 | 137-01-06 | 430-38-46 | 405-27-46 | 336-46-46 |
| AZ. STA. TO F.S. | | 142-08-26 | 216-48-46 | | 70-38-46 | 45-27-46 | |
| BEARING | S 35-40-54 E | S 37-51-34 E | S 36-48-46 W | S 42-58-54 E | N 70-38-46 E | N 45-27-46 E | N 23-13-14 W |
| HORZ. DISTANCE | 365.74 | 176.83 | 289.94 | 433.72 | 241.27 | 426 | 509.88 |
| COSINE BEARING | .81226 | .78952 | .80060 | .73157 | .33140 | .70137 | .91891 |
| STA. LAT. | 33 408.38 | 33 111.30 | 32 971.69 | 32 739.56 | 32 422.26 | 32 502.22 | 32 801.00 |
| DIFF. | -297.08 | -139.61 | -232.13 | -317.30 | +79.96 | +298.78 | +468.57 |
| F.S. LAT. | 33 111.30 N | 32 971.69 N | 32 739.56 N | 32 422.26 N | 32 502.22 N | 32 801.00 N | 33 269.57 N |
| SINE BEARING | .58328 | .61373 | .59980 | .68177 | .94349 | .71279 | .39428 |
| STA. DEP. | 24 541.58 | 24 754.91 | 24 863.44 | 24 689.71 | 24 985.41 | 25 213.05 | 25 516.70 |
| DIFF. | +213.33 | +108.53 | -173.73 | +295.70 | +227.64 | +303.65 | -201.04 |
| F.S. DEP. | 24 754.91 E | 24 863.44 E | 24 689.71 E | 24 985.41 E | 25 213.05 E | 25 516.70 E | 25 315.66 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | " | " | " | " | " | ROA |
| CHECKED BY: | ROA | " | " | " | " | " | ROA |
| DATE | 2.08.95 | " | " | " | " | " | |

WORK PLACE ORE STOCKPILE

# SURVEY CALCULATION SHEET

PAGE NO. 36

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | D | | | | | | | |
| S.T.A. | E | | | | | | | |
| F.S. | S75-31 | | | | | | | |
| MEAS. DISTANCE | 377 | | | | | | | |
| VERT. ANGLE | +04-12-40 | | | | | | | |
| SINE – V.A. | .0732 | | | | | | | |
| COSINE – V.A. | .9946 | | | | | | | |
| STA. ELEVATION | 4158.05 | | | | | | | |
| H.I. | +4.90 | | | | | | | |
| INST. HEIGHT | 4162.95 | | | | | | | |
| DISTANCE | +27.60 | | | | | | | |
| DIFF. | 4190.55 | | | | | | | |
| H.P. | -5.89 | | | | | | | |
| F.S. ELEVATION | 4184.66 | | | | | | | |
| AZ. B.S. TO STA. | 336-46-46 | | | | | | | |
| ±180 - 00' - 00" | 180- | | | | | | | |
| AZ. STA. TO B.S. | 156-46-46 | | | | | | | |
| HORZ. ANGLE | 150-37-00 | | | | | | | |
| -360 - 00' - 00" | 307-23-46 | | | | | | | |
| AZ. STA. TO F.S. | | | | | | | | |
| BEARING | N52-36-14W | | | | | | | |
| HORZ. DISTANCE | 374.96 | | | | | | | |
| COSINE BEARING | .60732 | | | | | | | |
| STA. LAT. | 33 269.89 | | | | | | | |
| DIFF. | +227.72 | | | | | | | |
| F.S. LAT. | 33 497.29 N | 33 511.33 N | N | N | N | N | N | |
| SINE BEARING | .79445 | | | | | | | |
| STA. DEP. | 25 315.66 | | | | | | | |
| DIFF. | -297.89 | | | | | | | |
| F.S. DEP. | 25 017.77 E | 25 004.77 E | E | E | E | E | E | |
| GRADE CALC. | | | | | | | | |
| | | E.C. = 14 x 13 | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | [illegible] | | | | | | | |
| CHECKED BY: | [illegible] | | | | | | | |
| DATE | 4 | | | | | | | |

WORK PLACE DDHs

# SURVEY CALCULATION SHEET



| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.S. | HIW4 | S-75-31 | TP43 | TP43 | TP23 OLD | TP24 OLD | | | | | | |
| S.T.A. | S 75-31 | TP43 | TP44 | TP44 | TP24 OLD | TP23 OLD | | | | | | |
| F.S. | TP43 | TP44 | A-122 | A-117 | A-119 | A-121 | | | | | | |
| MEAS. DISTANCE | 80.75 | 200.50 | 3.47 | 117 | 48 | 69 | | | | | | |
| VERT. ANGLE | + 0-51-00 | +01-33-00 | 0 | + 03-19-00 | - 02-50-00 | - 02-57-00 | | | | | | |
| SINE – V.A. | .0119 | .0270 | | .0578 | .0494 | .0514 | | | | | | |
| COSINE – V.A. | .9999 | .9993 | | .9966 | .9976 | .9974 | | | | | | |
| STA. ELEVATION | 1275.679 | 1275.730 | 1280.784 | 1280.784 | 1287.350 | 1295.470 | | | | | | |
| H.I. | + 1.500 | + 1.640 | + 1.610 | + 1.500 | + 1.480 | + 1.520 | | | | | | |
| INST. HEIGHT | 1277.179 | 1277.370 | 1282.394 | 1282.284 | | | | | | | | |
| DISTANCE | + 0.961 | + 5.414 | 0 | + 6.763 | 2.371 | 3.547 | | | | | | |
| DIFF. | 1278.140 | 1282.784 | 1282.394 | 1289.047 | | | | | | | | |
| H.P. | - 2.410 | - 2.000 | - 1.610 | - 2.590 | - 2.245 | - 2.340 | | | | | | |
| F.S. ELEVATION | 1275.730 | 1280.784 | 1280.784 | 1286.457 | 1284.215 | 1293.131 | | | | | | |
| AZ. B.S. TO STA. | 190-48-16 | 28-35-16 | 37-08-16 | | 180-08-56 | 0-08-56 | | | | | | |
| ±180 - 00' - 00" | 180 | 180- | 180 | | 180- | 180- | | | | | | |
| AZ. STA. TO B.S. | 10-48-16 | 208-35-16 | 217-08-16 | 217-08-16 | 00-08-56 | 180-08-56 | | | | | | |
| HORZ. ANGLE | 17-47-00 | 188-33-00 | 259-58-00 | 97-19-00 | 146-18-00 | 109-43-00 | | | | | | |
| - 360 - 00' - 00" | 28-35-16 | 397-08-16 | 477-06-16 | 314-27-16 | 146-26-56 | 289-51-56 | | | | | | |
| AZ. STA. TO F.S. | | 37-08-16 | 117-06-16 | [314 27 16] | | | | | | | | |
| BEARING | N 28-35-16 E | N 37-08-16 E | S 62-53-44 E | N 55-32-44 W | S 33-33-04 E | N 70-08-04 W | | | | | | |
| HORZ. DISTANCE | 80.742 | 200.360 | 3.47 | 116.602 | 47.885 | 68.821 | | | | | | |
| COSINE BEARING | .87809 | .79718 | .45361 | .56575 | .83339 | .33781 | | | | | | |
| STA. LAT. | 10 214.253 | 10 285.757 | 10 444.875 | 10 443.294 | 10 485.374 | 10 594.044 | | | | | | |
| DIFF. | + 70.899 | + 159.723 | - 1.581 | + 65.968 | - 39.907 | + 23.386 | | | | | | |
| F.S. LAT. | 10 285.152 N | 10 444.875 N | 10 443.294 N | 10 509.262 N | 10 445.487 N | 10 618.200 N | | | | | | N |
| SINE BEARING | .47850 | .60378 | .89018 | .82458 | .55268 | .94049 | | | | | | |
| STA. DEP. | 7 624.417 | 7 660.052 | 7 781.025 | 7 784.114 | 7 844.698 | 7 844.982 | | | | | | |
| DIFF. | + 38.635 | + 120.973 | + 3.089 | - 96.148 | + 26.465 | - 64.715 | | | | | | |
| F.S. DEP. | 7 660.052 E | 7 781.025 E | 7 784.114 E | 7687.966 E | 7871.163 E | 7780.257 E | | | | | | E |
| GRADE CALC. | | .017 | 105 | 7700.074 | | | | | | | | |
| | | | | 90 | | | | | | | | |
| | | | | | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | | | | | |
| GRADE CHAIN | | | | | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | | | | | |
| CALCULATED BY: | MB | MB | MB | MB | MB | MB | | | | | | |
| CHECKED BY: | ROA | ROA | ROA | ROA | ROA | ROA | | | | | | |
| DATE | 25 SEP 75 | 25 SEP 75 | 25 SEP 75 | 25 SEP 75 | 25 SEP 75 | 25 SEP 75 | | | | | | |

WORK PLACE DDH's SURFACE SURVEY

# SURVEY CALCULATION SHEET

PAGE NO. 38

| B.S. | HIW 6 | TP40 OLD | HIW 6 | TP40 OLD | TP40 OLD | TP40 OLD | TP46 |
|---|---|---|---|---|---|---|---|
| S.T.A. | TP40 OLD | TP45 | TP40 OLD | TP46 | TP46 | TP46 | TP47 |
| F.S. | TP45 | A-123 | TP46 | A-8 | A-120 | TP47 | A-124 |
| MEAS. DISTANCE | 111.5 | 60.37 | 143 | 69.5 | 59.5 | 61.0 | 7.10 |
| VERT. ANGLE | + 2-36-40 | -00-23-00 | -01-11-30 | +00-08-00 | + 4-43-00 | + 3-29-20 | ⊖ |
| SINE – V.A. | .0455 | .0067 | .0207 | .0023 | .0820 | .0607 | |
| COSINE – V.A. | .9979 | +.000.9999 | .9996 | 1.000 | .9932 | .9963 | |
| STA. ELEVATION | 1323.945 | 1328.933 | 1323.945 | 1320.235 | 1320.235 | 1320.235 | 1323.058 |
| H.I. | + 1.470 | + 1.530 | + 1.470 | + 1.420 | + 1.420 | + 1.420 | + 1.470 |
| INST. HEIGHT | 1325.415 | 1330.463 | 1325.415 | 1321.655 | 1321.655 | 1321.655 | 1324.528 |
| DISTANCE | + 5.073 | - 0.402 | - 2.960 | + 0.160 | + 4.879 | + 3.703 | |
| DIFF. | 1530.488 | 1330.061 | 1322.455 | 1321.815 | 1326.534 | 1325.358 | |
| H.P. | - 1.555 | - 1.300 | - 2.220 | - 2.350 | - 1.800 | - 2.300 | - 1.500 |
| F.S. ELEVATION | 1328.933 | 1328.761 | 1320.235 | 1319.465 | 1324.734 | 1323.058 | 1323.028 |
| AZ. B.S. TO STA. | 356-39-37 | 314-34-47 | 356-39-37 | 45-06-57 | | | 341-23-07 |
| ±180 - 00' - 00" | 180 | 180 | 180- | 180- | | | 180 |
| AZ. STA. TO B.S. | 176-39-37 | 134-34-47 | 176-39-37 | 225-06-57 | 225-06-57 | 225-06-57 | 161-23-07 |
| HORZ. ANGLE | 137-55-10 | 270-27-00 | 228-27-20 | 185-32-00 | 62-37-00 | 116-16-10 | 254-55-00 |
| - 360 - 00' - 00" | 314-34-47 | 405-01-47 | 405-06-57 | 410-38-57 | 287-43-57 | 341-23-07 | 416-18-07 |
| AZ. STA. TO F.S. | | 45-01-47 | 45-06-57 | 50-38-57 | | | 56-18-07 |
| BEARING | N 45-25-13 W | N 45-01-47 E | N 45-06-57 E | N 50-38-57 E | N 72-16-03 W | N 18-36-53 W | N 56-18-07 E |
| HORZ. DISTANCE | 111.266 | 60.0 59.996 | 142.943 | 69.5 | 59.095 | 60.774 | 7.100 |
| COSINE BEARING | .70190 | .70674 | .70568 | .63407 | .30458 | .94768 | .55481 |
| STA. LAT. | 10 999.704 | 11 077.802 | 10 999.704 | 11 100.576 | 11 100.576 | 11 100.576 | 11 158.170 |
| DIFF. | + 78.098 | + 42.404 | + 100.872 | + 44.068 | + 18.000 | + 57.594 | + 3.939 |
| F.S. LAT. | 11 077.802 N | 11 120.206 N | 11 100.576 N | 11 144.644 N | 11 118.576 N | 11 158.170 N | 11 162.109 N |
| SINE BEARING | .71227 | .70747 | .70854 | 77328 | 95249 | .31920 | .83197 |
| STA. DEP. | 7382.248 | 7302.997 | 7382.248 | 7483.529 | 7483.529 | 7483.529 | 7464.130 |
| DIFF. | - 79.251 | + 42.448 | + 101.281 | + 53.743 | - 56.287 | - 19.399 | + 5.907 |
| F.S. DEP. | 7302.997 E | 7345.445 E | 7483.529 E | 7537.272 E | 7427.242 E | 7464.130 E | 7470.037 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | ROA | ROA | ROA | ROA | ROA | ROA | ROA |
| CHECKED BY: | | | | | | | |
| DATE | 29.09.75 | | | | | | |

WORK PLACE DDHs SURFACE SURVEY

SURVEY CALCULATION SHEET



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP46 | TP46 | TP40 OLD | TP40 | TP40 | | | |
| S.T.A. | TP47 | TP47 | TP45 | TP45 | TP45 | | | |
| F.S. | A-127 | TP48 | A-125 | A-126 | A-128 | | | |
| MEAS. DISTANCE | 61.0 | 50.0 | 120.5 | 1.22.5 | 1,32.0 | | | |
| VERT. ANGLE | + 7-39-00 | + 2-43-20 | - 00-27-00 | + 0 46' 50" | 0° 56' 50" | | | |
| SINE – V.A. | .1320 | .0474 | .0078 | .0137 | .0166 | | | |
| COSINE – V.A. | .9823 | .9977 | .9999 | .9998 | .9997 | | | |
| STA. ELEVATION | 1323.058 | 1323.058 | 1328.933 | 1328.933 | 1328.933 | | | |
| H.I. | + 1.470 | + 1.470 | + 1.530 | +1.51 | + 1.51 | | | |
| INST. HEIGHT | 1324.528 | 1324.528 | 1330.463 | | | | | |
| DISTANCE | + 8.052 | + 2.370 | - 0.940 | + 1.678 | + 2.191 | | | |
| DIFF. | 1332.580 | 1326.898 | 1329.523 | | | | | |
| H.P. | - 5.800 | - 0.960 | - 2.050 | - 1.612 | - 1.660 | | | |
| F.S. ELEVATION | 1326.780 ✓ | 1325.938 ✓ | 1327.473 | 1330.509 ✓ | 1330.974 | | | |
| AZ. B.S. TO STA. | | | 314-34-47 | | | | | |
| ±180 - 00' - 00" | | | 180 | | | | | |
| AZ. STA. TO B.S. | 161-23-07 | 161-23-07 | 134-34-47 | 134 34 47 | 134 34 47 | | | |
| HORZ. ANGLE | 159-53-00 | 167-45-00 | 270-08-00 | 89°30 00 | 89 47 50 | | | |
| - 360 - 00' - 00" | 321-16-07 | 329-08-07 | 404-42-47 | 224 04 47 | | | | |
| AZ. STA. TO F.S. | 52 | | 44-42-47 | 224 04 47 | 224 22 37 | | | |
| BEARING | N38-43-53W | N30-51-53W | N44-42-47"E | S 44 04 47 W | S 44 22 37 W | | | |
| HORZ. DISTANCE | 59.920 | 49.885 | 120.488 ✓ | 122.475 | 131.960 | | | |
| COSINE BEARING | .78009 | .85838 | .71064 | .71837 | .71475 | | | |
| STA. LAT. | 11 158.170 | 11 158.170 | 11 277.803 | 11 077.302 | 11 077.802 | | | |
| DIFF. | + 46.743 | + 42.820 | + 85.624 | - 87.982 | - 94.318 | | | |
| F.S. LAT. | 11 204.913 ✓N | 11 200.990 N | 11 163.426 ✓N | 10989.820 ✓N | 10983.484 ✓N | N | | N |
| SINE BEARING | .62567 | 51301 | .70355 | .69566 | .69938 | | | |
| STA. DEP. | 7464.130 | 7464.130 | 7302.997 | 7302.997 | 7302.997 | | | |
| DIFF. | - 37.490 | - 25.592 | + 84.769 | - 85.201 | - 92.290 | | | |
| F.S. DEP. | 74 26.640 E | 7438.538 ✓E | 7387.766 ✓ E | 7217.796 ✓ E | 7210.707 ✓ E | E | | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | RDA | RDA | RSR | JC | JC | | | |
| CHECKED BY: | JC | JC | JC | | | | | |
| DATE | | | | | | | | |

WORK PLACE DDH

SURVEY CALCULATION SHEET

PAGE NO. 40

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP 40 | TP 40 | TP 9 | | | | | |
| S.T.A. . | TP 45 | TP 45 | TP 10 | | | | | |
| F.S. | A 126 | A-126 | 9.744 TP 46 | | | | | |
| MEAS. DISTANCE | 122.5 | 132.00 | HD=(91.295 m) | | | | | |
| VERT. ANGLE | 89 13 10 | 89 03 10 | - 4° 01' 40" | | | | | |
| SINE – V.A. | | | .0699 | | | | | |
| COSINE – V.A. | | | .9951 | | | | | |
| STA. ELEVATION | 1328.933 | 1328.933 | 1297.351 | USE | | | | |
| H.I. | + 1.510 | +1.510 | + 1.590 | TABLE 6 | | | | |
| INST. HEIGHT | | | 1298.941 | STADIA | | | | |
| DISTANCE | | | - 6.413 | COEFF. | | | | |
| DIFF. | | | 1292.528 | | | | | |
| H.P. | -1.612. | -1.660 | - 1.679 | | | | | |
| F.S. ELEVATION | 1330.499 | 1331.025 | 1290.849 | | | | | |
| AZ. B.S. TO STA. | 314 34 47 | 314 34 47 | 67 51 32 | | | | | |
| ±180 - 00' - 00" | | | 180 | | | | | |
| AZ. STA. TO B.S. | | | 247 51 32 | | | | | |
| HORZ. ANGLE | 89° 30' 00 | 89 47 50 | 259 20 10 | | | | | |
| - 360 - 00' - 00" | | | 507 11 42 | | | | | |
| AZ. STA. TO F.S. | 224° 04' 47" | 224° 22' 37" | 147 11 42 | | | | | |
| BEARING | | | S 32 48 18 E | | | | | |
| HORZ. DISTANCE | 122.48 | 131.97 | 91.295 | | | | | |
| COSINE BEARING | | | .84052 | | | | | |
| STA. LAT. | 11,071.802 | 11,071.802 | 10 121.21 | | | | | |
| DIFF. | | | - 76.73 | | | | | |
| F.S. LAT. | 10,989.816 N | 10,983.476 N | 10,644.48 N | N | N | N | N | N |
| SINE BEARING | | | .54178 | | | | | |
| STA. DEP. | 7,302.997 | 7,302.997 | 7475.12 | | | | | |
| DIFF. | | | + 49.46 | | | | | |
| F.S. DEP. | 7,211.193 E | 7210.100 E | 7,524.58 E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | WB | WB. | WS | | | | | |
| CHECKED BY: | | | RDH | | | | | |
| DATE | | | 12-17-25 | | | | | |

WORK PLACE SURFACE DDH's A154A16

**SURVEY CALCULATION SHEET**

PAGE NO. 41

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | S 75-40 | VG 6 | TP1 | TP1 | TP2 | TP2 | TP3 |
| S.T.A. | VG 6 | TP1 | TP2 | TP2 | TP3 | TP3 | TP4 |
| F.S. | TP1 | TP2 | A-15 | TP3 | TP5 | TP4 | A-16 |
| MEAS. DISTANCE | 90 | 123 | 4.15 | 126 | 74 | 57 | 24 |
| VERT. ANGLE | + 2 10 40 | − 1 50 00 | −23 18 00 | −00 56 00 | +00 23 00 | −2 14 00 | 0 |
| SINE – V.A. | .0380 | .0320 | .39555 | .0163 | .0067 | .0390 | .0000 |
| COSINE – V.A. | .9986 | .9990 | .91845 | .9997 | 1.0000 | .9985 | 1.0000 |
| STA. ELEVATION | 1317.265 | 1318.655 | 1313.999 | 1313.999 | 1311.495 | 1311.495 | 1309.302 |
| H.I. | + 1.370 | + 1.280 | + 1.550 | + 1.550 | + 1.03 | + 1.03 | + 1.14 |
| INST. HEIGHT | 1318.635 | 1319.935 | 1315.549 | 1315.549 | 1312.525 | 1312.525 | 1310.442 |
| VERT. DISTANCE | + 3.420 | − 3.936 | − 1.642 | − 2.054 | + .496 | − 2.223 | 0 |
| DIFF. | 1322.055 | 1315.999 | 1313.907 | 1313.495 | 1313.021 | 1310.302 | 1310.442 |
| H.P. | − 3.400 | − 2.000 | 0 | − 2.000 | − 3.000 | − 1.000 | − 1.920 |
| F.S. ELEVATION | 1318.655 | 1313.999 | 1313.907 | 1311.495 | 1310.021 | 1309.302 | 1308.522 |
| AZ. B.S. TO STA. | 99 10 56 | 346 56 16 | 33 33 16 | 33 33 16 | 316 09 16 | 316 09 16 | 347 36 56 |
| ±180 - 00' - 00" | +180 | −180 | +180 | +180 | −180 | −180 | −180 |
| AZ. STA. TO B.S. | 279 10 56 | 166 56 16 | 213 33 16 | 213 33 16 | 136 09 16 | 136 09 16 | 167 36 56 |
| HORZ. ANGLE | 67 45 20 | 226 37 00 | 16 31 00 | 102 36 00 | 270 54 30 | 211 27 40 | 206 03 00 |
| - 360 - 00' - 00" | 346 56 16 | 393 33 16 | 230 04 16 | 316 09 16 | 407 03 46 | 347 36 56 | 373 39 56 |
| AZ. STA. TO F.S. | | 33 33 16 | | | 47 03 46 | | 13 39 56 |
| BEARING | | | | | | | |
| HORZ. DISTANCE | 89.874 | 122.877 | 3.812 | 125.962 | 74.000 | 56.914 | 24.000 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 11106.740 | 11194.288 | 11296.689 | 11296.689 | 11387.534 | 11387.534 | 11443.124 |
| DIFF. | + 87.548 | + 102.401 | − 2.447 | + 90.845 | + 50.408 | + 55.590 | + 23.320 |
| F.S. LAT. | 11194.288 N | 11296.689 N | 11294.242 N | 11387.534 N | 11437.942 N | 11443.124 N | 11466.444 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 7301.810 | 7281.498 | 7349.416 | 7349.416 | 7262.160 | 7262.160 | 7249.954 |
| DIFF. | − 20.312 | + 67.918 | − 2.923 | − 87.256 | + 54.175 | − 12.206 | + 5.670 |
| F.S. DEP. | 7281.498 E | 7349.416 E | 7346.493 E | 7262.160 E | 7316.335 E | 7249.954 E | 7255.624 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | WS | WS | WS | WS | WS | WS | WS |
| CHECKED BY: | P.A.G. | P.A.G. | P.A.G. | P.A.G. | P.A.G. | P.A.G. | P.A.G. |
| DATE | July 6/76 | July 6/76 | July 6/76 | July 6/76 | July 6/76 | July 6/76 | July 6/76 |

WORK PLACE SURFACE DDH A 25 & A 57

SURVEY CALCULATION SHEET

PAGE NO. 42

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP 3 | TP 5 | VG 6 | S75-40 | TP7 | | | |
| S.T.A. | TP 5 | TP 6 | S75-40 | TP 7 | TP8 | | | |
| F.S. | TP 6 | A-25 | TP 7 | TP 8 | A-57 | | | |
| MEAS. DISTANCE | 66 | 94 | 106 | 88 | 112 | | | |
| VERT. ANGLE | + 00 24 00 | - 4 45 00 | +00 50 00 | - 2 13 00 | - 1 54 30 | | | |
| SINE – V.A. | .0070 | .0826 | .0145 | .0387 | .0332 | | | |
| COSINE – V.A. | 1.0000 | .99315 | .9998 | .9985 | .9989 | | | |
| STA. ELEVATION | 1310.021 | 1308.683 | 1320.491 | 1322.458 | 1318.342 | | | |
| H.I. | + 1.200 | + 1.370 | + 1.430 | + 1.290 | + 1.090 | | | |
| INST. HEIGHT | 1311.221 | 1310.053 | 1321.921 | 1323.748 | 1319.432 | | | |
| VERT. DISTANCE | + .462 | - 7.764 | + 1.537 | - 3.406 | - 3.718 | | | |
| DIFF. | 1311.683 | 1302.289 | 1323.458 | 1320.342 | 1315.714 | | | |
| H.P. | - 3.000 | - 2.000 | - 1.000 | - 2.000 | - 3.300 | | | |
| F.S. ELEVATION | 1308.683 | 1300.289 | 1322.458 | 1318.342 | 1312.414 | | | |
| AZ. B.S. TO STA. | 47 03 46 | 43 33 26 | 279 10 56 | 309 49 16 | 24 12 36 | | | |
| ±180 - 00' - 00" | +180 | +180 | -180 | -180 | +180 | | | |
| AZ. STA. TO B.S. | 227 03 46 | 223 33 26 | 99 10 56 | 129 49 16 | 204 12 36 | | | |
| HORZ. ANGLE | 176 29 40 | 180 14 00 | 210 38 20 | 254 23 20 | 127 24 30 | | | |
| - 360 - 00' - 00" | 403 33 26 | 403 47 26 | 309 49 16 | 384 12 36 | 331 37 06 | | | |
| AZ. STA. TO F.S. | 43 33 26 | 43 47 26 | | 24 12 36 | | | | |
| BEARING | | | | | | | | |
| HORZ. DISTANCE | 66.000 | 93.356 | 105.979 | 87.868 | 111.877 | | | |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | 11437.942 | 11485.771 | 11126.530 | 11194.398 | 11274.538 | | | |
| DIFF. | + 47.829 | + 67.391 | + 67.868 | + 80.140 | + 98.429 | | | |
| F.S. LAT. | 11485.771 N | 11553.162 N | 11194.398 N | 11274.538 N | 11372.967 N | N | | N |
| SINE BEARING | | | | | | | | |
| STA. DEP. | 7316.335 | 7361.814 | 7179.380 | 7097.983 | 7134.016 | | | |
| DIFF. | + 45.479 | + 64.605 | - 81.397 | + 36.033 | - 53.180 | | | |
| F.S. DEP. | 7361.814 E | 7426.419 E | 7097.983 E | 7134.016 E | 7080.836 E | E | | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | WS | WS | WS | WS | WS | | | |
| CHECKED BY: | P.G. | P.G. | P.G. | P.G. | P.G. | | | |
| DATE | July 6/76 | July 6/76 | July 6/76 | July 6/76 | July 6/76 | | | |

WORK PLACE ORE STOCKPILE

JULY 1976

SURVEY CALCULATION SHEET

PAGE NO. 1A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | HIW 4 | S75-31 | | | | | | |
| S.T.A. | S75-31 | ST. A. | ST A | ST. A. | | | | |
| F.S. | ST. A. | ST. B | ST D | ST E | | | | |
| MEAS. DISTANCE | STADIA 126 | 74 | 145 | 145.5 | | | | |
| VERT. ANGLE | +00-02.00 | -07-09-30 | -03-43-30 | -03-38-30 | | | | |
| SINE – V.A. | .0006 | .1237 | .0649 | .0634 | | | | |
| COSINE – V.A. | 1.0000 | .9844 | .9958 | .9960 | | | | |
| STA. ELEVATION | 1275.707 | 1275.943 | | | | | | |
| H.I. | + 1.160 | + 0.700 | | | | | | |
| INST. HEIGHT | 1276.867 | 1276.643 | 1276.643 | 1276.643 | | | | |
| VERT. DISTANCE | + 0.076 | - 9.152 | - 9.408 | - 9.225 | | | | |
| DIFF. | 1276.943 | | | | | | | |
| H.P. | - 1.000 | 0 | 0 | 0 | | | | |
| F.S. ELEVATION | 1275.943 | 1267.493 | 1267.240 | 1267.418 | | | | |
| AZ. B.S. TO STA. | | 161-07-16 | | | | | | |
| ±180 - 00' - 00" | | 180 | | | | | | |
| AZ. STA. TO B.S. | 10-48-16 | 341-07-16 | 341-07-16 | 341-07-16 | | | | |
| HORZ. ANGLE | 150-19-00 | 168-24-00 | 204-55-15 | 160-08-45 | | | | |
| - 360 - 00' - 00" | | 509 | 546 | 501 | | | | |
| AZ. STA. TO F.S. | 161-07-16 | 149-31-16 | 186-02-31 | 141-16-01 | | | | |
| BEARING | | | | | | | | |
| HORZ. DISTANCE | 126 | 72.846 | 144.391 | 144.918 | | | | |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | 10214.252 | 10095.031 | 10095.031 | 10095.031 | | | | |
| DIFF. | - 119.222 | - 62.780 | - 143.589 | - 113.046 | | | | |
| F.S. LAT. | 10095.031 N | 10032.251 N | 9951.442 N | 9981.985 N | N | N | N | |
| SINE BEARING | | | | | | | | |
| STA. DEP. | 7621.417 | 7662.187 | 7662.187 | 7662.187 | | | | |
| DIFF. | + 40.770 | + 36.949 | - 15.198 | + 90.674 | | | | |
| F.S. DEP. | 7662.187 E | 7699.136 E | 7646.989 E | 7752.861 E | E | E | E | |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | P.H.G. | P.H.G. | P.H.G. | P.H.G. | | | | |
| CHECKED BY: | WS | WS | WS | WS | | | | |
| DATE | 09/07/76 | 09/07/76 | 09/07/76 | 09/07/76 | | | | |

WORK PLACE _____ SURFACE DDHs.

## SURVEY CALCULATION SHEET

PAGE NO. 1 2A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | S75-40 | V6-6 | TP1 | TP1 | TP2 | TP2 | TP3 |
| S.T.A. | V6-6 | TP1 | TP2 | TP2 | TP3 | TP3 | TP4 |
| F.S. | TP1 | TP2 | A-15 | TP3 | TP5 | TP4 | A-16 |
| MEAS. DISTANCE | 90. | 123 | 4.150 | 126 | 74 | 57 | 24 |
| VERT. ANGLE | +02 - 10 - 40 | -01 - 50 - 00. | -23 - 18 - 00 | -00 - 56 - 00. | +00 -23 -00 | -02 - 14 - 00. | 0 |
| SINE – V.A. | .0380 | .0320 | | .0163 | .0067 | .0390 | |
| COSINE – V.A. | .9986. | .9990. | | .9997 | 1.0000. | .9985 | |
| STA. ELEVATION | 1317.265 | 1318.655 | 1313.999 | | 1311.495 | [illegible] | 1309.302 |
| H.I. | + 1.370 | + 1.280 | + 1.550 | + 1.550 | + 1.030 | + 1.03 | + 1.140 |
| INST. HEIGHT | 1318.635 | 1319.935 | 1315.549 | 1315.549 | 1312.525 | 1312.525 | 1310.442 |
| VERT. DISTANCE | + 3.420 | - 3.936 | - 1.642 | - 2.054 | + 0.496 | - 2.223 | |
| DIFF. | 1322.055 | 1315.999 | | 1313.495 | 1313.021 | 1310.302 | |
| H.P. | - 3.400 | - 2.000 | + 0 | - 2.000 | - 3.00 | - 1.000 | - 1.920 |
| F.S. ELEVATION | 1318.655 | 1313.999 | 1313.907 | 1311.495 | 1310.021 | 1309.302 | 1308.522 |
| AZ. B.S. TO STA. | 279 - 10 - 56 | 346 - 56 - 16 | 33 - 33 - 16 | 233 - 33 - 16 | 316 - 09 - 16 | | 347 - 36 - 56 |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | 180 | | 180 |
| AZ. STA. TO B.S. | 279 - 10 - 56 | 166 - 56 - 16 | 213 - 33 - 16 | 213 - 33 - 16 | 136 - 09 - 16 | 136 - 09 - 16 | 167 - 36 - 56 |
| HORZ. ANGLE | 67 - 45 - 20 | 226 - 37 - 00 | 16 - 31 - 00 | 102 - 36 - 00 | 270 - 54 - 30. | 211 - 27 - 40. | 206 - 03 - 00 |
| - 360 - 00' - 00" | | 393 - 33 - 16 | | | 407 | | 373 |
| AZ. STA. TO F.S. | 346 - 56 - 16 | 133 - 33 - 16 | 230 - 04 - 16 | 316 - 09 - 16 | 147 - 03 - 46 | 347 - 36 - 56 | 193 - 39 - 56 |
| BEARING | | | | | | | |
| HORZ. DISTANCE | 89.874. | 122.877 | 3.812 | 125.962 | 74 | 56.914. | 24 |
| COSINE BEARING | | | | | | | |
| STA. LAT. | 11196.740 | 11194.288 | 11296.689 | 11296.689 | 11387.534 | 11387.534 | 11466.445 |
| DIFF. | + 87.548 | + 102.401 | - 2.447 | + 90.845 | + 50.409 | + 55.590 | + 23.321 |
| F.S. LAT. | 11194.288 N | 11296.689 N | 11294.242 N | 11387.534 N | 11437.943 N | 11443.124 N | 11466.445 N |
| SINE BEARING | | | | | | | |
| STA. DEP. | 7301.810 | 7281.498 | 7349.416 | 7349.416 | 7262.160 | 7262.160 | 7249.954 |
| DIFF. | - 20.312 | + 67.918 | - 2.923 | - 87.256 | + 54.175 | - 12.206 | + 5.670 |
| F.S. DEP. | 7281.498 E | 7349.416 E | 7346.493 E | 7262.160 E | 7316.335 E | 7249.954 E | 7255.624 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | PG | | | |
| CHECKED BY: | | | | WS | | | |
| DATE | | | | 86-4-16 | | | |

WORK PLACE SURFACE DD. H's.

## SURVEY CALCULATION SHEET



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP3 | TP5 | VG6 | S75-40 | TP7 | | | |
| S.T.A. | TP5 | TP6 | S75-40 | TP7 | TP8 | | | |
| F.S. | TP6 | A-25 | TP7 | TP8 | A-57 | | | |
| MEAS. DISTANCE | 66 | 94 | 106 | 88 | 112 | | | |
| VERT. ANGLE | +00-24-00 | -04-45-00 | +00-50-00 | -02-13-00 | -01-54-30 | | | |
| SINE – V.A. | .0070 | .0826 | .0145 | .0387 | .0332 | | | |
| COSINE – V.A. | 1.0000 | .99315 | .9998 | .9985 | .9989 | | | |
| STA. ELEVATION | 1309.021 | 1308.683 | 1320.491 | 1322.458 | 1318.342 | | | |
| H.I. | + 1.200 | + 1.370 | + 1.430 | + 1.290 | + 1.090 | | | |
| INST. HEIGHT | 1311.221 | 1310.053 | 1321.921 | 1323.748 | 1319.432 | | | |
| VERT. DISTANCE | + 0.462 | - 7.764 | + 1.537 | - 3.406 | - 3.718 | | | |
| DIFF. | 1311.683 | 1302.289 | 1323.458 | 1320.342 | 1315.714 | | | |
| H.P. | - 3.000 | - 2.000 | - 1.000 | - 2.000 | - 3.300 | | | |
| F.S. ELEVATION | 1308.683 | 1300.289 | 1322.458 | 1318.342 | 1312.414 | | | |
| AZ. B.S. TO STA. | 347-03-46 | 343-33-26 | 279-10-56 | 309-49-16 | 24-12-36 | | | |
| ±180 - 00' - 00" | 180 | 180 | 180 | 180 | | | | |
| AZ. STA. TO B.S. | 227 03 46 | 223 33 26 | 99 10 56 | 129 49 16 | 204 12 36 | | | |
| HORZ. ANGLE | 176-29-40 | 180-14-00 | 210-38-20 | 254-23-20 | 127-24-30 | | | |
| - 360 - 00' - 00" | 403 | 403 | | 384-12-36 | | | | |
| AZ. STA. TO F.S. | 343-33-26 | 343-47-26 | 309-49-16 | 24-12-36 | 331-37-06 | | | |
| BEARING | | | | | | | | |
| HORZ. DISTANCE | 66 | 93.356 | 105.979 | 87.868 | 111.877 | | | |
| COSINE BEARING | | | | | | | | |
| STA. LAT. | 11437.949 | 11485.772 | 11126.530 | 11194.318 | 11274.538 | | | |
| DIFF. | + 47.829 | + 67.391 | + 67.868 | + 80.140 | + 98.429 | | | |
| F.S. LAT. | 11485.772N | 11553.163N | 11194.398N | 11274.538N | 11372.967N | N | | N |
| SINE BEARING | | | | | | | | |
| STA. DEP. | 7346.335 | 7361.814 | 7179.380 | 7097.983 | 7134.016 | | | |
| DIFF. | + 45.479 | + 64.605 | - 81.397 | + 36.033 | - 53.180 | | | |
| F.S. DEP. | 7361.864E | 7426.419E | 7097.983E | 7134.016E | 7080.836E | E | | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | | | P.F.C. | | | | | |
| CHECKED BY: | | | WS | | | | | |
| DATE | | | 3-1-76 | | | | | |

WORK PLACE Grum (O.D.H. A-128, 130, & 131) SURVEY CALCULATION SHEET PAGE NO. 1 of 3 4A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | HIW-5 | HIW-1 | TP1 | TP2 | TP3 | TP4 | TP5 |
| S.T.A. | HIW-1 | TP1 | TP2 | TP3 | TP4 | TP5 | TP6 |
| F.S. | TP1 | TP2 | TP3 | TP4 | TP5 | TP6 | TP7 |
| MEAS. DISTANCE | 35.369 | 60.256 | 59.296 | 60.024 | 59.424 | 59.323 | 63.682 |
| VERT. ANGLE | -2°-02'-38" | -1°-59'-50" | -2°-33'-01" | -1°-27'-26" | -2°-16'-50" | -5°-29'-50" | -5°-31'-41" |
| SINE – V.A. | .035665 | .034851 | .044496 | .025431 | .039793 | 0.095797 | 0.097202 |
| COSINE – V.A. | .999368 | 0.999393 | 0.999816 | 0.999677 | 0.999208 | 0.995401 | 0.995265 |
| STA. ELEVATION | 1313.100 | 1313.019 | 1312.294 | 1311.128 | 1310.961 | 1309.837 | 1305.584 |
| H.I. | +1.180 | +1.375 | +1.171 | +1.359 | +1.241 | +1.430 | +1.421 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | -1.261 | -2.10 | -2.64 | -1.526 | -2.365 | -5.683 | -6.190 |
| DIFF. | | | | | | | |
| H.P. | Ø | Ø | Ø | Ø | Ø | Ø | Ø |
| F.S. ELEVATION | 1313.019 | 1312.294 | 1311.128 | 1310.961 | 1309.837 | 1305.584 | 1300.815 |
| AZ. B.S. TO STA. | | 51°-25'-36" | 91°-03'-59" | 92°-17'-54" | 96°-10'-16" | 108°-20'-25" | 201°-13'-52" |
| ±180 - 00' - 00" | | +180° | +180 | +180 | +180 | +180° | -180 |
| AZ. STA. TO B.S. | 202°-08'-16" | 231°-25'-36" | 271-03-59" | 272-17'-54" | 276°-10'-16" | 288°-20'-25" | 21°-13'-52" |
| HORZ. ANGLE | 212°-16'-50" | 216°-38'-23" | 181°-13'-55" | 183°-52"-52" | 192°09'39" | 213°-23'-27" | 195°-19'-57" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 51°-25'-36" | 91°-03'-59" | 92°-17'-54" | 96°-10'-16" | 108°-20'-25" | 201°-13'-52" | 217°-33'-49" |
| BEARING | N-51°-25'-36"-E | S-88°-56'-01"-E | S-87°-42'-06"-E | S-83°-49'-44"-E | S-71°-39'-35"-E | S-21°-13'-52"-W | S-37°-33'-49"-W |
| HORZ. DISTANCE | 35.347 | 60.219 | 59.285 | 60.005 | 59.377 | 59.050 | 63.380 |
| COSINE BEARING | .581741 | .018611 | .040103 | 0.107613 | 0.316660 | 0.928932 | 0.792477 |
| STA. LAT. | 10,908.10 | 10,829.46 | 10,827.51 | 10,823.16 | 10,818.70 | 10,800.04 | 10,745.17 |
| DIFF. | +20.56 | -1.12 | -2.38 | -6.16 | -18.68 | -54.85 | -50.24 |
| F.S. LAT. | 10,828.66 N | 10,827.51 N | 10,825.16 N | 10,818.70 N | 10,800.02 N | 10,745.17 N | 10,694.93 N |
| SINE BEARING | .813372 | 0.999827 | 0.999196 | 0.994190 | 0.949205 | 0.370251 | 0.609470 |
| STA. DEP. | 7,732.71 | 7763.19 | 7,823.70 | 7,882.91 | 7,942.60 | 7,998.96 | 7,977.10 |
| DIFF. | +28.75 | +60.21 | +59.21 | +59.66 | +56.36 | - 21.86 | - 38.63 |
| F.S. DEP. | 7,763.19 E | 7,823.70 E | 7,882.91 E | 7,942.60 E | 7,998.96 E | 7,977.10 E | 7,938.47 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | KB | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | June 20, 1976 | | | | | | |

WORK PLACE Grum. SURVEY CALCULATION SHEET PAGE NO. 2 of 3 54

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP6 | TP7 | TP7 | TP8 | TP9 | TP9 | TP10 |
| S.T.A. | TP7 | TP8 | TP8 | TP9 | TP10 | TP10 | TP11 |
| F.S. | TP8 | TP9 | A-129 | TP10 | A-130 | TP11 | TP12 |
| MEAS. DISTANCE | 22.994 | 56.550 | 55.641 | 47.744 | 10.380 | 27.822 | 31.714 |
| VERT. ANGLE | -7°-12'-43" | -7°-22'-12" | -7°-09'-20" | -6°-51'-57" | -1°-36'-52" | -5°-30'-27" | -2°-19'-50" |
| SINE – V.A. | 0.125510 | 0.128276 | 0.124564 | 0.119545 | .080150 | .095976 | 0.040382 |
| COSINE – V.A. | 0.992089 | 0.991738 | 0.992212 | 0.992829 | 0.996759 | 0.995384 | 0.9987799 |
| STA. ELEVATION | 1300.815 | 1299.362 | 1299.362 | 1293.510 | 1289.278 | 1289.278 | 1287.988 |
| H.I. | +1.437 | +1.402 | +1.402 | +1.476 | +1.380 | +1.380 | +1.352 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | -2.890 | -7.254 | -6.921 | -5.708 | -3.269 | -2.670 | -1.566 |
| DIFF. | | | | | 1287.209 - 0.05 | | |
| H.P. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| F.S. ELEVATION | 1299.362 | 1293.510 | 1293.843 | 1289.278 | 1287.359 | 1287.988 | 1287.774 |
| AZ. B.S. TO STA. | 217°-33'-49" | 173°-10'-11" | 173°-10'-11" | 163°-52'-22" | 168°-52'-26" | 168°-52'-26" | 212°-19'-59" |
| ±180 - 00' - 00" | -180 | +180° | +180° | +180° | +180 | +180 | -180° |
| AZ. STA. TO B.S. | 37°-33'-49" | 353°-10'-11" | 353°-10'-11" | 343°-52'-22" | 348°-52'-26" | 348°-52'-26" | 32°-19'-59" |
| HORZ. ANGLE | 136°-06'-55" | 170°-11'-38" | 171°-11'-30" | 185°-00'-04" | 205°-03'-27" | 223°-27'-33" | 191°-21'-06" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 173°-10'-11" | 163°-52'-22" | 165°-25'-11" | 168°-52'-26" | 193°-55'-53" | 212°-19'-59" | 226°-41'-05" |
| BEARING | S-06°-19'-16"-E | S-16°-07'-38-E | S-14°-34'-46"-E | S-11°-07'-34"-E | S-13°-55'-53"-W | S-32°-19'-59"-W | S-46°-41'-05"-W |
| HORZ. DISTANCE | 22.812 | 56.083 | 55.208 | 47.102 | 10.219 | 27.694 | 31.675 |
| COSINE BEARING | 0.993920 | 0.960647 | 0.9677995 | 0.981205 | 0.970585 | 0.881953 | 0.686042 |
| STA. LAT. | 10,694.93 | 10,672.26 | 10,672.26 | 10,618.38 | 10,571.87 | 10,571.87 | 10,548.17 |
| DIFF. | -22.67 | -53.88 | -53.88 | -46.51 | -32.07 | -23.70 | -21.73 |
| F.S. LAT. | 10,672.26 N | 10,618.38 N | 10,618.83 N | 10,571.87 N | 10,539.80 N | 10,548.17 N | 10,526.74 N |
| SINE BEARING | 0.110101 | 0.277771 | 0.251722 | 0.192969 | 0.2107598 | 0.5318399 | 0.7275598 |
| STA. DEP. | 7,938.47 | 7,940.98 | 7,940.98 | 7,956.56 | 7,965.71 | 7,965.71 | 7,950.90 |
| DIFF. | +2.51 | +15.58 | +13.90 | +9.15 | -7.69 | -14.81 | -23.05 |
| F.S. DEP. | 7,940.98 E | 7,956.56 E | 7,954.88 E | 7,965.71 E | 7,956.02 E | 7,950.90 E | 7,927.85 E |
| GRADE CALC. | | | | | | | |
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| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | | | | | | | |

WORK PLACE GRUM

# SURVEY CALCULATION SHEET



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|---|---|---|---|---|---|---|---|---|
| B.S. | TP11 | | | | | | | |
| S.T.A. | TP12 | | | | | | | |
| F.S. | A-131 | | | | | | | |
| MEAS. DISTANCE | 40.072 | | | | | | | |
| VERT. ANGLE | -02°-18'-47" | | | | | | | |
| SINE – V.A. | .049077 | | | | | | | |
| COSINE – V.A. | 0.998795 | | | | | | | |
| STA. ELEVATION | 1287.776 | | | | | | | |
| H.I. | +1.411 | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| VERT. DISTANCE | -1.967 | | | | | | | |
| DIFF. | 1287.220 - 0.25 = | | | | | | | |
| H.P. | 0 | | | | | | | |
| F.S. ELEVATION | 1286.970 | | | | | | | |
| AZ. B.S. TO STA. | 226°-11'-05" | | | | | | | |
| ±180 - 00' - 00" | -180 | | | | | | | |
| AZ. STA. TO B.S. | 46°-11'-05" | | | | | | | |
| HORZ. ANGLE | 154°-14'-17" | | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 200°-55'-22" | | | | | | | |
| BEARING | S-20°-55'-22"-W | | | | | | | |
| HORZ. DISTANCE | 40.021 | | | | | | | |
| COSINE BEARING | 0.931063 | | | | | | | |
| STA. LAT. | 10,576.74 | | | | | | | |
| DIFF. | -37.38 | | | | | | | |
| F.S. LAT. | 10,489.36 N | N | N | N | N | N | N | N |
| SINE BEARING | 0.357109 | | | | | | | |
| STA. DEP. | 7,927.85 | | | | | | | |
| DIFF. | -14.29 | | | | | | | |
| F.S. DEP. | 7,913.56 E | E | E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | | | | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | | | | | | | | |

WORK PLACE Grum.

# SURVEY CALCULATION SHEET

PAGE NO. 1 7A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | HW5 | | | | | | | |
| S.T.A. | HW1 | | | | | | | |
| F.S. | A-132 | | | | | | | |
| MEAS. DISTANCE | 20.251 | | | | | | | |
| VERT. ANGLE | -2°38'50" | | | | | | | |
| SINE – V.A. | 0.046186 | | | | | | | |
| COSINE – V.A. | 0.998933 | | | | | | | |
| STA. ELEVATION | 1313.100 | | | | | | | |
| H.I. | +1.166 | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| VERT. DISTANCE | -0.935 | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | 0 | | | | | | | |
| F.S. ELEVATION | 1313.331 - .076 = 1313.255 | | | | | | | |
| AZ. B.S. TO STA. | | | | | | | | |
| ±180 - 00' - 00" | | | | | | | | |
| AZ. STA. TO B.S. | 202°08'16" | | | | | | | |
| HORZ. ANGLE | 71°10'08" | | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 273°18'24" | | | | | | | |
| BEARING | N-86°11'06"-W | | | | | | | |
| HORZ. DISTANCE | 20.232 | | | | | | | |
| COSINE BEARING | 0.066535 | | | | | | | |
| STA. LAT. | 10,808.100 | | | | | | | |
| DIFF. | +1.316 | | | | | | | |
| F.S. LAT. | 10,809.416 N | N | N | N | N | N | N | N |
| SINE BEARING | 0.997784 | | | | | | | |
| STA. DEP. | 7,731.140 | | | | | | | |
| DIFF. | -20.187 | | | | | | | |
| F.S. DEP. | 7,711.953 E | E | E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | LB | | | | | | | |
| CHECKED BY: | | | | | | | | |
| DATE | Aug. 6, 1976 | | | | | | | |

WORK PLACE GRUM.

## SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | H.W.5 | H.W.4 | TP.1 | TP2 | TP3 | TP3 | |
| S.T.A. | H.W.4 | TP-1 | TP2 | TP3 | TP4 | TP4 | |
| F.S. | TP-1 | TP-2 | TP3 | TP4 | S-100 | S-200 | |
| MEAS. DISTANCE | 29.386 | 35.835 | 31.637 | 27.414 | 14.670 | 29.535 | |
| VERT. ANGLE | -6°40'20" | -11°30'35" | -3°13'05" | -8°55'30" | +1°30'10" | -1°45'38" | |
| SINE – V.A. | 0.116189 | 0.199531 | 0.056136 | 0.155141 | 0.026225 | 0.030792 | |
| COSINE – V.A. | 0.993227 | 0.979891 | 0.998423 | 0.987892 | 0.999656 | 0.996550 | |
| STA. ELEVATION | 1313.100 | 1310.852 | 1301.360 | 1303.312 | 1300.608 | 1300.608 | |
| H.I. | +1.166 | +0.658 | +0.926 | +1.519 | +1.439 | +1.439 | |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | -3.414 | -7.150 | -1.911 | -4.253 | +0.385 | -2.451 | |
| DIFF. | | | | | | | |
| H.P. | ø | ø | ø | ø | ø | | |
| F.S. ELEVATION | 1310.852 | 1301.360 | 1303.312 | 1300.608 | 1302.432 | 1299.596 | |
| AZ. B.S. TO STA. | | 191°59'06" | 173°13'56" | 96°59'21" | 180°28'24" | 180°28'24" | |
| ±180 - 00' - 00" | | -180° | +180 | +180 | -180° | -180° | |
| AZ. STA. TO B.S. | 202°08'16" | 11°59'06" | 353°13'56" | 276°59'21" | 00°28'24" | 00°28'24" | |
| HORZ. ANGLE | 349°50'20" | 161°41'50" | 103°15'25" | 263°29'03" | 313°13'03" | 140°21'33" | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 191°59'06" | 173°13'56" | 96°59'21" | 180°28'24" | 313°41'27" | 140°52'57" | |
| BEARING | S-11°59'06"-W. | S-6°16'04"-E | S-83°00'39"-E | S-00°28'24"-W. | N-46°18'33"-W. | S-39°07'03"-E | |
| HORZ. DISTANCE | 29.187 | 35.114 | 31.582 | 27.082 | 14.665 | 29.133 | |
| COSINE BEARING | 0.978202 | 0.994023 | 0.121682 | 0.999966 | 0.690767 | 0.778834 | |
| STA. LAT. | 10,728.170 | 10,779.519 | 10,744.645 | 10,740.437 | 10,723.356 | 10,690.526 | |
| DIFF. | -28.551 | -31.904 | -4.208 | -27.081 | +10.130 | -22.836 | |
| F.S. LAT. | 10,779.549 N | 10,744.645 N | 10,740.437 N | 10,713.356 N | 10,723.486 N | 10,690.520 N | N |
| SINE BEARING | 0.207655 | 0.109175 | 0.992569 | 0.000261 | 0.723078 | 0.630913 | |
| STA. DEP. | 7,732.740 | 7,728.679 | 7,732.513 | 7,766.838 | 7,766.614 | 7,766.614 | |
| DIFF. | -6.061 | +3.834 | +34.325 | -0.224 | -10.604 | +18.570 | |
| F.S. DEP. | 7,728.679 E | 7,732.513 E | 7,766.838 E | 7,766.614 E | 7,756.010 E | 7,785.184 E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | KB | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | Aug. 6, 1976 | | | | | | |

WORK PLACE GRUM - SURFACE D.D.Hs. **SURVEY CALCULATION SHEET** PAGE NO. 1 9A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | S-200 | S-100 | S-100 | | | | | |
| S.T.A. | S-100 | TP-1 | TP-1 | | | | | |
| F.S. | TP1 | A-133 | A-134 | | | | | |
| MEAS. DISTANCE | 29.654 | 27.871 | 32.510 | | | | | |
| VERT. ANGLE | +2° 20' 13" | +8° 23' 18" | -6° 55' 23" | | | | | |
| SINE – V.A. | 0.040776 | 0.145881 | 0.120536 | | | | | |
| COSINE – V.A. | 0.999168 | 0.989302 | 0.992709 | | | | | |
| STA. ELEVATION | 1302.432 | 1304.313 | 1304.313 | | | | | |
| H.I. | +0.702 | +1.177 | +1.177 | | | | | |
| INST. HEIGHT | | | | | | | | |
| VERT. DISTANCE | +1.209 | +4.066 | -3.919 | | | | | |
| DIFF. | | | | | | | | |
| H.P. | ø | ø | ø | | | | | |
| F.S. ELEVATION | 1304.313 ✓ | 1309.586 = 1307.432 ✓ | 1301.601 = 1301.177 ✓ | | | | | |
| AZ. B.S. TO STA. | | 41° 57' 41" | | | | | | |
| ±180 - 00' - 00" | | +180 | | | | | | |
| AZ. STA. TO B.S. | 138° 29' 31" | 221° 57' 41" | 221° 57' 41" | | | | | |
| HORZ. ANGLE | 263° 28' 10" | 107° 53' 07" | 271° 58' 55" | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 41° 57' 41" | 329° 50' 40" | 133° 56' 36" | | | | | |
| BEARING | N-41° 57' 41"-E | N-30° 09' 20"-W | S-46° 03' 24"-E | | | | | |
| HORZ. DISTANCE | 29.629 | 27.573 | 32.213 | | | | | |
| COSINE BEARING | 0.743596 | 0.862665 | 0.693117 | | | | | |
| STA. LAT. | [illegible] | [illegible] | [illegible] | | | | | |
| DIFF. | +22.032 | +23.841 | -22.396 | | | | | |
| F.S. LAT. | 10,715.518 ✓ N | 10,719.359 ✓ N | 10,723.122 ✓ N | N | N | N | N | N |
| SINE BEARING | 0.668630 | 0.502319 | 0.720026 | | | | | |
| STA. DEP. | 7,756.010 | 7,775.821 | 7,775.821 | | | | | |
| DIFF. | +19.811 | -13.851 | +23.237 | | | | | |
| F.S. DEP. | 7,775.821 ✓ E | 7,761.970 ✓ E | 7799.058 ✓ E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | LB | LB | LB | | | | | |
| CHECKED BY: | R.G | R.G | R.G | | | | | |
| DATE | Aug. 13, 1976 | Aug. 13, 1976 | Aug. 13, 1976 | | | | | |

WORK PLACE GRUM - SURFACE D.DHs

# SURVEY CALCULATION SHEET



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | S-100 | S-200 | TP-1 | | | | | |
| S.T.A. | S-200 | TP-1 | TP-2 | | | | | |
| F.S. | TP-1 | TP-2 | A-135 | | | | | |
| MEAS. DISTANCE | 30.608 | 11.616 | 31.760 | | | | | |
| VERT. ANGLE | -3°08'38" | -13°20'28" | -0°21'50" | | | | | |
| SINE – V.A. | 0.054843 | 0.230718 | 0.007223 | | | | | |
| COSINE – V.A. | 0.998195 | 0.973014 | 0.999974 | | | | | |
| STA. ELEVATION | 1299.596 | 1298.813 | 1296.518 | | | | | |
| H.I. | +0.896 | +0.392 | +1.420 | | | | | |
| INST. HEIGHT | | | | | | | | |
| VERT. DISTANCE | -1.679 | -2.687 | -0.229 | | | | | |
| DIFF. | | | | | | | | |
| H.P. | Ø | Ø | Ø | | | | | |
| F.S. ELEVATION | 1298.813 | 1296.518 | 1297.709 | | | | | |
| AZ. B.S. TO STA. | 138°29'31" | 127°15'14" | 113°16'54" | | | | | |
| ±180 - 00' - 00" | +180° | +180° | +180° | | | | | |
| AZ. STA. TO B.S. | 318°29'31" | 307°15'14" | 323°16'54" | | | | | |
| HORZ. ANGLE | 168°45'43" | 196°01'40" | 95°02'20" | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 127°15'14" | 113°16'54" | 38°19'14" | | | | | |
| BEARING | S-52°44'46"-E | S-36°43'06"-E | N-38°19'14"-E | | | | | |
| HORZ. DISTANCE | 30.562 | 11.332 | 31.759 | | | | | |
| COSINE BEARING | 0.605318 | 0.801585 | 0.785167 | | | | | |
| STA. LAT. | 10,690.520 | 10,673.247 | 10,662.935 | | | | | |
| DIFF. | -18.501 | -9.084 | +16.679 | | | | | |
| F.S. LAT. | 10,672.019 N | 10,662.935 N | 10,679.614 N | N | N | N | N | N |
| SINE BEARING | 0.795961 | 0.597881 | 0.850999 | | | | | |
| STA. DEP. | 7,785.184 | 7,809.510 | 7,816.285 | | | | | |
| DIFF. | +24.326 | +6.775 | +27.027 | | | | | |
| F.S. DEP. | 7,809.510 E | 7,816.285 E | 7,843.312 E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | LB | LB | LB | | | | | |
| CHECKED BY: | R.G. | R.G. | R.G. | | | | | |
| DATE | SEP 2 1976 | SEP 2 1976 | SEP 2 1976 | | | | | |

WORK PLACE Surface Diamond Drill Holes

**SURVEY CALCULATION SHEET**



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP-11 | TP-10 | TP-A | TP-A | TP-A | TP-B | TP-B |
| S.T.A. | TP-10 | TP-A | TP-B | TP-B | TP-B | TP-C | TP-D |
| F.S. | TP-A | TP-B | A-137 | TP-C | TP-D | A-139 | A-136 |
| MEAS. DISTANCE | 17.512 | 54.721 | 11.807 | 39.901 | 29.398 | 11.118 | 32.092 |
| VERT. ANGLE | +3°26'13" | +1°16'08" | -0°27'35" | +0°30'20" | -1°15'23" | +2°31'35" | -7°21'00" |
| SINE – V.A. | 0.059950 | 0.022137 | 0.008021 | 0.008823 | 0.021220 | 0.043891 | 0.128796 |
| COSINE – V.A. | 0.998201 | 0.999226 | 0.999968 | 0.999961 | 0.999212 | 0.998755 | 0.991671 |
| STA. ELEVATION | 1289.278 | 1293.191 | 1298.990 | 1298.990 | 1298.990 | 1300.639 | 1298.105 |
| H.I. | +1.365 | +1.126 | +1.297 | +1.297 | +1.297 | +0.582 | +1.326 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | +2.818 | +1.073 | -0.119 | +0.352 | -2.182 | +2.051 | -1.133 |
| DIFF. | | | | | | | |
| H.P. | Ø | Ø | Ø | Ø | Ø | Ø | Ø |
| F.S. ELEVATION | 1293.191 ✓ | 1298.990 ✓ | 1300.168 ✓ | 1300.639 ✓ | 1298.105 ✓ | 1302.867 ✓ | 1299.298 ✓ |
| AZ. B.S. TO STA. | | 348°52'17" | 339°58'15" | | | 295°19'03" | 263°08'15" |
| ±180 - 00' - 00" | | -180° | -180 | | | -180 | -180 |
| AZ. STA. TO B.S. | 212°19'59" | 168°52'17" | 159°58'15" | 159°58'15" | 159°58'15" | 115°19'03" | 83°08'15" |
| HORZ. ANGLE | 136°32'18" | 171°06'28" | 177°28'05" | 135°30'18" | 103°10'00" | 218°16'20" | 132°35'00" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 348°52'17" | 339°58'15" | 337°26'50" | 295°19'03" | 263°08'15" | 334°05'23" | 215°13'15" |
| BEARING | N-11°07'43"-W | N-20°01'15"-W | N-22°33'10"-W | N-64°40'57"-W | S-83°08'15"-W | N-25°54'37"-W | S-35°13'15"-W |
| HORZ. DISTANCE | 17.127 | 51.569 | 11.807 | 39.902 | 29.317 | 11.067 | 31.825 |
| COSINE BEARING | 0.981197 | 0.939268 | 0.923527 | 0.433506 | 0.119203 | 0.899180 | 0.817767 |
| STA. LAT. | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| DIFF. | +16.535 | +51.271 | +13.675 | +17.378 | -3.199 | +36.939 | -25.835 |
| F.S. LAT. | 10,618.405 ✓ N | 10,669.676 ✓ N | 10,683.351 ✓ N | 10,687.054 ✓ N | 10,666.177 ✓ N | 10,713.923 ✓ N | 10,640.342 ✓ N |
| SINE BEARING | 0.193012 | 0.342362 | 0.383531 | 0.900186 | 0.992853 | 0.436963 | 0.583951 |
| STA. DEP. | 7,965.110 | 7,956.556 | 7,937.874 | 7,937.874 | 7,937.874 | 7,901.955 | 7,908.767 |
| DIFF. | -9.151 | -18.682 | -5.679 | -35.919 | -29.107 | -17.945 | -18.584 |
| F.S. DEP. | 7,956.556 ✓ E | 7,937.874 ✓ E | 7,932.195 ✓ E | 7,901.955 ✓ E | 7,908.767 ✓ E | 7,884.050 ✓ E | 7,890.183 ✓ E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | LB | LB | LB | LB | LB | LB | LB |
| CHECKED BY: | R.G | R.G | R.G | R.G | R.G | R.G. | R.G. |
| DATE | SEP 4 1976 | SEP 4 1976 | SEP 4 1976 | SEP 4 1976 | SEP 4 1976 | SEP 4 1976 | SEP 4 1976 |

WORK PLACE *SURFACE DIAMOND DRILL HOLES* — **SURVEY CALCULATION SHEET** — PAGE NO. *1 of 3* *12A*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | H.I.W.-5 | H.I.W.-4 | H.I.W.-4 | H.I.W.-5 | H.I.W.-6 | TP-A | T.P.-B |
| S.T.A. | H.I.W.-4 | TP-1 | TP-1 | H.I.W.-6 | TP-A | TP-B | TP-C |
| F.S. | TP-1 | A-111 | A-138 | TP-A | TP-B | T.P.-C | TP-D |
| MEAS. DISTANCE | 10.167 | 18.792 | 83.896 | 51.395 | 50.548 | 31.869 | 47.079 |
| VERT. ANGLE | +1°01'15" | -1°11'30" | -2°58'30" | +0°19'43" | +1°21'53" | +0°16'25" | -3°15'30" |
| SINE – V.A. | 0.017816 | 0.021793 | 0.051900 | 0.005735 | 0.024689 | 0.004775 | 0.056838 |
| COSINE – V.A. | 0.999841 | 0.999629 | 0.998652 | 0.999984 | 0.999695 | 0.999989 | 0.998383 |
| STA. ELEVATION | 1313.100 | 1315.026 | 1315.026 | 1318.900 | 1320.541 | 1323.211 | 1321.741 |
| H.I. | +1.210 | +1.296 | +1.296 | +1.316 | +1.185 | +1.321 | +0.859 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | +0.716 | -3.991 | -1.351 | +0.295 | +1.218 | +0.166 | -2.676 |
| DIFF. | | | | | | | |
| H.P. | ∅ | ∅ | ∅ | ∅ | ∅ | ∅ | ∅ |
| F.S. ELEVATION | 1315.026 | 1312.331 | 1311.968 | 1320.541 | 1323.211 | 1321.741 | 1322.947 |
| AZ. B.S. TO STA. | | 345°20'11" | | | 335°53'31" | 349°17'29" | 16°39'01" |
| ±180 - 00' - 00" | | -180 | | | -180 | -180° | +180 |
| AZ. STA. TO B.S. | 202°08'16" | 165°20'11 | 165°20'11 | 172°31'21" | 155°53'31" | 169°17'29" | 226°39'01" |
| HORZ. ANGLE | 113°11'25" | 180°15'10" | 310°06'35" | 163°19'10" | 193°23'58" | 239°21'38" | 171°18'10" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 315°20'11" | 345°35'51" | 115°26'46" | 335°53'31" | 349°17'29" | 16°39'01" | 13°57'17" |
| BEARING | N-11°39'49"-W | N-11°21'09"-W | S-61°33'11"-E | N-21°06'29"-W | N-10°42'31"-W | N-16°39'01"-E | N-13°57'17"-E |
| HORZ. DISTANCE | 10.161 | 18.628 | 83.783 | 51.394 | 50.533 | 31.869 | 47.003 |
| COSINE BEARING | 0.981439 | 0.980518 | 0.482662 | 0.932417 | 0.983589 | 0.960189 | 0.971089 |
| STA. LAT. | 10,809.100 | 10,844.953 | 10,809.953 | 10,893.541 | 10,930.471 | 10,980.124 | 11,031.896 |
| DIFF. | +38.853 | +47.100 | -35.998 | +16.911 | +49.653 | +23.935 | +33.837 |
| F.S. LAT. | 10,846.953 N | 10,894.053 N | 10,810.955 N | 10,930.471 N | 10,980.124 N | 11,004.059 N | 11,037.896 N |
| SINE BEARING | 0.253143 | 0.218732 | 0.902990 | 0.108159 | 0.185814 | 0.727197 | 0.691090 |
| STA. DEP. | 7,734.710 | 7,724.574 | 7,724.574 | 7,388.930 | 7,367.938 | 7,358.548 | 7,383.905 |
| DIFF. | -10.166 | -12.095 | +75.655 | -20.992 | -9.390 | +25.357 | +32.624 |
| F.S. DEP. | 7,724.574 E | 7,712.479 E | 7,800.229 E | 7,367.938 E | 7,358.548 E | 7,383.905 E | 7,416.529 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | LB | LB | LB | LB | LB | LB | LB |
| CHECKED BY: | R.G. | R.G. | R.G. | R.G | R.G | R.G. | R.G |
| DATE | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 2 of 3 13A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | T.P.-C | TP-D | TP-E | TP-F | TP-G | D-1 | TP-I |
| S.T.A. | TP-D | TP-E | TP-F | TP-G | D-1 | TP-I | T.P.-J |
| F.S. | TP-E | TP-F | TP-G | D-1 | TP-I | TP-J | A-110 |
| MEAS. DISTANCE | 15.161 | 18.991 | 11.285 | 29.810 | 10.035 | 39.331 | 36.905 |
| VERT. ANGLE | -3°12'58" | -2°27'15" | -0°51'58" | -2°26'13" | -3°25'35" | -0°15'05" | -6°38'30" |
| SINE – V.A. | 0.056102 | 0.042820 | 0.015988 | 0.042665 | 0.059766 | 0.013114 | 0.115659 |
| COSINE – V.A. | 0.998425 | 0.999083 | 0.999872 | 0.999089 | 0.998212 | 0.999914 | 0.993289 |
| STA. ELEVATION | 1322.947 | 1321.733 | 1320.833 | 1321.399 | 1321.158 | 1319.643 | 1320.361 |
| H.I. | +1.336 | +1.198 | +1.226 | +1.032 | +0.878 | +1.237 | +1.203 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | -2.550 | -2.098 | -0.660 | -1.273 | -2.393 | -0.516 | -4.268 |
| DIFF. | | | | | | | |
| H.P. | Ø | Ø | Ø | Ø | Ø | Ø | Ø |
| F.S. ELEVATION | 1321.733 | 1320.833 | 1321.399 | 1321.158 | 1319.643 | 1320.361 | 1317.299 |
| AZ. B.S. TO STA. | 43°57'17" | 53°10'55" | 39°30'53" | 31°18'53" | 15°01'11" | 13°07'11" | 11°37'32" |
| ±180 - 00' - 00" | +180 | +180 | +180° | +180 | +180 | +180 | +180 |
| AZ. STA. TO B.S. | 223°57'17" | 233°10'55" | 219°30'53" | 211°18'53" | 225°01'11" | 223°07'11" | 191°37'32" |
| HORZ. ANGLE | 189°13'38" | 165°19'58" | 171°18'00" | 190°15'18" | 178°03'33" | 151°29'18" | 262°39'10" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 53°10'55" | 39°30'53" | 31°18'53" | 15°01'11" | 13°07'11" | 11°37'32" | 97°17'12" |
| BEARING | N-53°10'55"-E | N-39°30'53"-E | N-31°18'53"-E | N-15°01'11"-E | N-13°07'11"-E | N-11°37'32"-E | S-82°42'48"-E |
| HORZ. DISTANCE | 15.389 | 18.919 | 11.280 | 29.813 | 39.963 | 39.331 | 36.657 |
| COSINE BEARING | 0.602261 | 0.771161 | 0.852951 | 0.966216 | 0.976818 | 0.979297 | 0.132654 |
| STA. LAT. | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| DIFF. | +26.882 | +37.762 | +31.095 | +21.055 | +29.166 | +38.057 | -4.649 |
| F.S. LAT. | 11,061.778 N | 11,102.540 N | 11,136.635 N | 11,157.690 N | 11,186.856 N | 11,224.913 N | 11,220.264 N |
| SINE BEARING | 0.805142 | 0.636276 | 0.563738 | 0.707967 | 0.683642 | 0.252501 | 0.991921 |
| STA. DEP. | 7,416.529 | 7,453.101 | 7,481.216 | 7,507.517 | 7,528.624 | 7,555.911 | 7,565.875 |
| DIFF. | +36.572 | +31.115 | +23.271 | +21.107 | +27.320 | +9.931 | +36.361 |
| F.S. DEP. | 7,453.101 E | 7,481.216 E | 7,507.517 E | 7,528.624 E | 7,555.911 E | 7,565.875 E | 7,602.236 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | KB | KB | KB | KB | KB | KB | KB |
| CHECKED BY: | R.G. | R.G. | R.G. | R.G. | R.G. | R.G. | R.G. |
| DATE | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 | SEP 5 1976 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 3 of 3 14A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | T.P. I | T.P. I | | | | | | |
| S.T.A. | T.P. J | T.P. J | | | | | | |
| F.S. | R.P. A | S-300 | | | | | | |
| MEAS. DISTANCE | 27.386 | 50.170 | | | | | | |
| VERT. ANGLE | -0°23'13" | +0°18'15" | | | | | | |
| SINE – V.A. | 0.006753 | 0.005180 | | | | | | |
| COSINE – V.A. | 0.999977 | 0.999900 | | | | | | |
| STA. ELEVATION | 1320.361 | 1320.361 | | | | | | |
| H.I. | +1.203 | +1.203 | | | | | | |
| INST. HEIGHT | | | | | | | | |
| VERT. DISTANCE | -0.185 | +0.711 | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | ø | ø | | | | | | |
| F.S. ELEVATION | 1321.382 | 1322.278 | | | | | | |
| AZ. B.S. TO STA. | | | | | | | | |
| ±180 - 00' - 00" | | | | | | | | |
| AZ. STA. TO B.S. | 191°37'32" | 191°37'32" | | | | | | |
| HORZ. ANGLE | 83°05'05" | 81°42'03" | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 277°42'37" | 279°19'35" | | | | | | |
| BEARING | N-82°17'23"-W | N-80°40'25"-W | | | | | | |
| HORZ. DISTANCE | 27.385 | 50.165 | | | | | | |
| COSINE BEARING | 0.131761 | 0.161059 | | | | | | |
| STA. LAT. | 11,224.910 | 11,224.910 | | | | | | |
| DIFF. | +3.677 | +8.130 | | | | | | |
| F.S. LAT. | 11,228.587 N | 11,233.040 N | N | N | N | N | N | N |
| SINE BEARING | 0.990959 | 0.986781 | | | | | | |
| STA. DEP. | 7,565.875 | 7,565.875 | | | | | | |
| DIFF. | -27.137 | -49.502 | | | | | | |
| F.S. DEP. | 7,538.738 E | 7,516.373 E | E | E | E | E | E | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | [illegible] | [illegible] | | | | | | |
| CHECKED BY: | R.G. | R.G. | | | | | | |
| DATE | SEP 5 1976 | SEP 5 1976 | | | | | | |

WORK PLACE Grum – Surface D.D.Hs. SURVEY CALCULATION SHEET PAGE NO. 1 of 2 154

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | S-100 | S-200 | TP-1 | S-200 | TP-1 | TP-1 | TP-1 |
| S.T.A. | S-200 | TP-1 | TP-2 | TP-1 | TP-3 | TP-3 | TP-3 |
| F.S. | TP-1 | TP-2 | A-149 | TP-3 | A-147 | A-142 | TP-1 |
| MEAS. DISTANCE | 11.367 | 57.741 | 15.152 | 51.989 | 11.171 | 52.231 | 55.897 |
| VERT. ANGLE | -6°33'08" | -0°11'25" | -2°31'26" | -8°31'28" | -1°53'50" | -1°16'20" | -1°30'58" |
| SINE – V.A. | 0.114109 | 0.019920 | 0.044007 | 0.149091 | 0.033368 | 0.022203 | 0.026458 |
| COSINE – V.A. | 0.993468 | 0.999917 | 0.999031 | 0.988823 | 0.996350 | 0.999751 | 0.999650 |
| STA. ELEVATION | 1299.596 | 1295.881 | 1296.153 | 1295.881 | 1288.659 | 1288.659 | 1288.659 |
| H.I. | +1.005 | +1.018 | +1.029 | +0.977 | +1.051 | +1.051 | +1.051 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | -1.720 | -0.716 | -2.000 | -8.199 | -0.954 | -1.160 | -1.479 |
| DIFF. | | | | | | | |
| H.P. | 0 | 0 | 0 | 0 | 0 | -0.150 | 0 |
| F.S. ELEVATION | 1295.881 | 1296.153 | 1295.182 | 1288.659 | 1288.756 | 1288.100 | 1288.231 |
| AZ. B.S. TO STA. | 138°29'31" | 212°36'16" | 122°22'54" | | 238°32'11" | | |
| ±180 - 00' - 00" | +180° | -180° | +180° | | -180 | | |
| AZ. STA. TO B.S. | 318°29'31" | 32°36'16" | 302°22'54" | 32°36'16" | 58°32'11" | 58°32'11" | 58°32'11" |
| HORZ. ANGLE | 251°07'15" | 89°16'08" | 183°51'20" | 205°55'55" | 315°13'25" | 171°20'15" | 166°50'38" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 212°36'16" | 122°22'54" | 126°14'14" | 238°32'11" | 14°16'06" | 229°53'26" | 225°23'39" |
| BEARING | S-32°36'16"-W | S-57°37'06"-E | S-53°45'46"-E | S-58°32'11"-W | N-14°16'06"-E | S-49°53'26"-W | S-45°23'39"-W |
| HORZ. DISTANCE | 11.097 | 57.736 | 15.108 | 51.374 | 11.130 | 52.218 | 55.877 |
| COSINE BEARING | 0.842337 | 0.535057 | 0.594130 | 0.521833 | 0.969155 | 0.651150 | 0.702716 |
| STA. LAT. | 10,490.520 | 10,655.903 | 10,621.982 | 10,627.529 | 10,638.316 | 10,593.888 | 10,588.291 |
| DIFF. | -31.617 | -30.921 | -26.842 | -28.371 | +10.787 | -33.641 | -39.238 |
| F.S. LAT. | 10,655.903 N | 10,621.982 N | 10,595.140 N | 10,627.529 N | 10,638.316 N | 10,593.888 N | 10,588.291 N |
| SINE BEARING | 0.535958 | 0.811199 | 0.806576 | 0.853018 | 0.246163 | 0.764815 | 0.711955 |
| STA. DEP. | 7,785.184 | 7,763.034 | 7811.792 | 7,763.034 | 7716.650 | 7716.650 | 7716.650 |
| DIFF. | -22.150 | +48.758 | +36.625 | -46.384 | +2.743 | -39.937 | -39.782 |
| F.S. DEP. | 7,763.034 E | 7,811.792 E | 7,848.417 E | 7,716.650 E | 7,719.393 E | 7676.713 E | 7676.868 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | LB | LB | LB | LB | LB | LB | LB |
| CHECKED BY: | J.C. | J.C. | J.C. | J.C. | J.C. | J.C. | J.C. |
| DATE | SEP 9 1976 | SEP 9 1976 | SEP 9 1976 | SEP 9 1976 | SEP 9 1976 | SEP 9 1976 | SEP 9 1976 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 2 of 2 16A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP3 | TP1 | TP1 | | | | |
| S.T.A. | TP1 | S-100 | S-100 | | | | |
| F.S. | S-100 | S-200 | A-115 | | | | |
| MEAS. DISTANCE | 53.227 | 18.811 | 9.098 | | | | |
| VERT. ANGLE | -3°07'08" | -3°35'20" | -11°29'20" | | | | |
| SINE – V.A. | 0.054108 | 0.062597 | 0.199178 | | | | |
| COSINE – V.A. | 0.998519 | 0.998039 | 0.979964 | | | | |
| STA. ELEVATION | 1288.231 | 1286.657 | 1286.657 | | | | |
| H.I. | +1.322 | +1.125 | +1.125 | | | | |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | -2.896 | -3.056 | -1.812 | | | | |
| DIFF. | | | | | | | |
| H.P. | ø | ø | ø | | | | |
| F.S. ELEVATION | 1286.657 | 1284.726 | 1285.970 | | | | |
| AZ. B.S. TO STA. | 225°23'39" | 230°01'21" | | | | | |
| ±180 - 00' - 00" | -180 | -180 | | | | | |
| AZ. STA. TO B.S. | 45°23'39" | 50°01'21" | 50°01'21" | | | | |
| HORZ. ANGLE | 181°10'15" | 176°19'40" | 163°11'40" | | | | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 230°01'21" | 226°21'01" | 213°16'01" | | | | |
| BEARING | S-50°01'21"-W | S-46°21'01"-W | S-33°16'01"-W | | | | |
| HORZ. DISTANCE | 53.118 | 18.718 | 8.916 | | | | |
| COSINE BEARING | 0.641807 | 0.689606 | 0.831297 | | | | |
| STA. LAT. | 10,588.291 | 10,554.180 | 10,520.584 | | | | |
| DIFF. | -34.111 | -33.596 | -7.412 | | | | |
| F.S. LAT. | 10,554.180 N | 10,520.584 N | 10,513.172 N | N | N | N | N |
| SINE BEARING | 0.766866 | 0.724185 | 0.555828 | | | | |
| STA. DEP. | 1676.868 | 1636.111 | 1636.111 | | | | |
| DIFF. | -40.757 | -35.281 | -4.956 | | | | |
| F.S. DEP. | 1636.111 E | 1600.830 E | 1631.155 E | E | E | E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | JB | JB | JB | | | | |
| CHECKED BY: | J.C. | J.C. | J.C. | | | | |
| DATE | SEP 9 1976 | SEP 9 1976 | SEP 9 1976 | | | | |

WORK PLACE Grum - Surface D.DHs.

## SURVEY CALCULATION SHEET



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | S-100 | S-100 | S-200 | S-200 | TP2 | TP3 | TP3 |
| S.T.A. | S-200 | S-200 | TP1 | TP-2 | TP3 | TP4 | TP4 |
| F.S. | TP-1 | TP-2 | A-113 | TP-3 | TP4 | A-152 | TP5 |
| MEAS. DISTANCE | 58.512 | 11.313 | 11.218 | 51.447 | 18.789 | 20.266 | 17.412 |
| VERT. ANGLE | +3°54'05" | -6°20'18" | +1°06'10" | -1°09'58" | -10°33'55" | -3°38'20" | -1°22'28" |
| SINE – V.A. | 0.068039 | 0.110511 | 0.019391 | 0.020351 | 0.183355 | 0.063168 | 0.023665 |
| COSINE – V.A. | 0.997683 | 0.993871 | 0.999812 | 0.999793 | 0.983047 | 0.997984 | 0.999696 |
| STA. ELEVATION | 1299.596 | 1299.596 | 1304.389 | 1295.838 | 1295.906 | 1288.094 | 1288.094 |
| H.I. | +0.813 | +0.813 | +1.123 | +1.115 | +1.131 | +1.116 | +1.116 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | +3.981 | -1.570 | +0.799 | -1.017 | -8.946 | -1.286 | -1.169 |
| DIFF. | | | | | | | |
| H.P. | ø | ø | ø | ø | ø | ø | ø |
| F.S. ELEVATION | 1304.389 | 1295.838 | 1306.311 | 1295.906 | 1288.094 | 1287.944 | 1288.041 |
| AZ. B.S. TO STA. | | | 18°18'19" | 212°33'29" | 133°10'22" | 178°00'15" | |
| ±180 - 00' - 00" | | | +180 | -180 | +180 | +180 | |
| AZ. STA. TO B.S. | 318°29'31" | 318°29'31" | 198°18'19" | 32°33'29" | 313°10'22" | 358°00'15" | 358°00'15" |
| HORZ. ANGLE | 60°18'48" | 254°03'58" | 221°47'05" | 100°36'53" | 221°29'53" | 172°12'20" | 183°58'13" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 18°18'19" | 212°33'29" | 63°30'24" | 133°10'22" | 178°00'15" | 170°12'35" | 181°58'58" |
| BEARING | N-18°18'19"-E | S-32°33'29"-W | N-63°30'24"-E | S-46°49'38"-E | S-1°59'45"-E | S-9°47'25"-E | S-1°58'58"-W |
| HORZ. DISTANCE | 58.376 | 11.090 | 11.210 | 51.436 | 17.962 | 20.275 | 17.398 |
| COSINE BEARING | 0.946430 | 0.842947 | 0.446091 | 0.681201 | 0.999593 | 0.985137 | 0.999701 |
| STA. LAT. | 10,690.520 | 10,690.520 | 10,715.780 | 10,655.887 | 10,620.691 | 10,572.761 | 10,552.831 |
| DIFF. | +55.260 | -34.633 | +18.391 | -35.193 | -47.933 | -19.930 | -47.310 |
| F.S. LAT. | 10,715.780 N | 10,655.887 N | 10,761.161 N | 10,620.694 N | 10,572.761 N | 10,552.831 N | 10,525.391 N |
| SINE BEARING | 0.322353 | 0.538154 | 0.891986 | 0.729794 | 0.031827 | 0.170012 | 0.031599 |
| STA. DEP. | 7,785.181 | 7,785.181 | 7,804.002 | 7,763.071 | 7,800.583 | 7,802.253 | 7,802.253 |
| DIFF. | +18.818 | -22.113 | +36.882 | +37.512 | +1.670 | +3.439 | -1.640 |
| F.S. DEP. | 7,804.002 E | 7,763.071 E | 7,840.884 E | 7,800.583 E | 7,802.253 E | 7,805.692 E | 7,800.613 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | LB | LB | LB | LB | LB | LB | LB |
| CHECKED BY: | JL | JL | JL | JL | JL | JL | JL |
| DATE | Sept 12, '76 | Sept 12, '76 | Sept 12, '76 | Sept 12, '76 | Sept 12, '76 | Sept 12, '76 | Sept 12, '76 |
| FIELD PAGE NO. | | | | | | | |

WORK PLACE _____ SURVEY CALCULATION SHEET PAGE NO. 2 of 2 18A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP1 | S-200 | | | | | | |
| S.T.A. | TP2 | TP-1 | | | | | | |
| F.S. | A-107 | A-153 | | | | | | |
| MEAS. DISTANCE | 15.973 | 21.616 | | | | | | |
| VERT. ANGLE | -3°21'05" | +2°27'38" | | | | | | |
| SINE – V.A. | 0.058159 | 0.042931 | | | | | | |
| COSINE – V.A. | 0.998290 | 0.999078 | | | | | | |
| STA. ELEVATION | 1288.041 | 1295.838 | | | | | | |
| H.I. | +1.152 | +1.127 | | | | | | |
| INST. HEIGHT | | | | | | | | |
| VERT. DISTANCE | -2.688 | +1.057 | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | Ø | -0.80 | | | | | | |
| F.S. ELEVATION | 1286.505 | 1297.122 | | | | | | |
| AZ. B.S. TO STA. | 181°58'58" | 212°33'29" | | | | | | |
| ±180 - 00' - 00" | -180° | -180° | | | | | | |
| AZ. STA. TO B.S. | 1°58'58" | 32°33'29" | | | | | | |
| HORZ. ANGLE | 142°09'20" | 317°27'08" | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 141°08'18" | 350°00'37" | | | | | | |
| BEARING | S-35°51'42"-E | N-9°59'23"-W | | | | | | |
| HORZ. DISTANCE | 15.894 | 21.593 | | | | | | |
| COSINE BEARING | 0.810431 | 0.984897 | | | | | | |
| STA. LAT. | ~~10,785.891~~ | ~~10,459.687~~ | | | | | | |
| DIFF. | -37.191 | +21.220 | | | | | | |
| F.S. LAT. | 10,488.197 N | 10,480.107 N | N | N | N | N | N | |
| SINE BEARING | 0.585830 | 0.173471 | | | | | | |
| STA. DEP. | 7,800.613 | 7,763.071 | | | | | | |
| DIFF. | +26.886 | -4.266 | | | | | | |
| F.S. DEP. | 7,827.499 E | 7,758.805 E | E | E | E | E | E | |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | | P. M. | | L. R. | P. M. | L. R. |
| CALCULATED BY: | [illegible] | | | | | | | |
| CHECKED BY: | [illegible] | | | | | | | |
| DATE | Sept. 12, '74 | | | | | | | |

WORK PLACE Grum - Surface D.D.Hs

# SURVEY CALCULATION SHEET

PAGE NO. 1 of 2 19A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | S-300 | S-300 | R.P.A | R.P.A. | TP-1 | TP-1 | TP-1 |
| S.T.A. | R.P.A | R.P.A. | TP-1 | TP-1 | TP-2 | TP-2 | TP-2 |
| F.S. | A-151 | TP-1 | TP-2 | A-144 | A-151 | TP-3 | TP-4 |
| MEAS. DISTANCE | 29.337 | 13.891 | 35.019 | 36.000 | 54.705 | 50.700 | 66.023 |
| VERT. ANGLE | 0 | -0°10'30" | +0°21'00" | +1°10'15" | +0°11'20" | -0°21'55" | -0°32'35" |
| SINE – V.A. | 0 | 0.011780 | 0.006108 | 0.020433 | 0.003296 | 0.007218 | 0.009478 |
| COSINE – V.A. | 1.0000 | 0.999931 | 0.999981 | 0.999791 | 0.999995 | 0.999974 | 0.999955 |
| STA. ELEVATION | 1321.382 | 1321.382 | 1321.803 | 1321.803 | 1323.316 | 1323.316 | 1323.316 |
| H.I. | +0.938 | +0.938 | +1.299 | +1.299 | +1.098 | +1.078 | +1.078 |
| INST. HEIGHT | | | | | | | |
| VERT. DISTANCE | 0 | -0.517 | +0.214 | +0.736 | +0.180 | -0.367 | -0.626 |
| DIFF. | | | | | | | |
| H.P. | -0.972 | 0 | 0 | -0.721 | -0.841 | 0 | 0 |
| F.S. ELEVATION | 1321.348 | 1321.803 | 1323.316 | 1323.117 | 1323.753 | 1324.027 | 1323.768 |
| AZ. B.S. TO STA. | 101°16'05" | | 357°00'25" | 357°00'25" | 312°33'00" | | |
| ±180 - 00' - 00" | +180° | | -180 | -180° | -180° | | |
| AZ. STA. TO B.S. | 281° 16' 05" | 281° 16' 05" | 177°00'25" | 177°00'25" | 132°33'00" | 132°33'00" | 132°33'00" |
| HORZ. ANGLE | 307°58'45" | 75°11'20" | 135°32'35" | 115°36'30" | 88°21'15" | 175°19'30" | 265°19'08" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 229°14'50" | 357°00'25" | 312°33'00" | 308°36'55" | 220°54'15" | 308°22'30" | 37°52'08" |
| BEARING | S-49°14'50"-W | N-2°59'35"-W | N-47°27'00"-W | N-37°23'05"-W | S-40°54'15"-W | N-51°37'30"-W | N-37°52'08"-E |
| HORZ. DISTANCE | 29.337 | 13.891 | 35.018 | 35.992 | 54.705 | 50.699 | 66.020 |
| COSINE BEARING | 0.655797 | 0.998636 | 0.676733 | 0.791577 | 0.765806 | 0.620506 | 0.792418 |
| STA. LAT. | 11,278.587 | 11,278.587 | 11,278.418 | 11,278.418 | 11,296.419 | 11,296.419 | 11,296.419 |
| DIFF. | -19.151 | +43.631 | +23.701 | +28.598 | -41.377 | +31.474 | +52.117 |
| F.S. LAT. | 11,209.436 N | 11,272.418 N | 11,296.119 N | 11,301.016 N | 11,254.742 N | 11,327.593 N | 11,348.236 N |
| SINE BEARING | 0.757533 | 0.052215 | 0.136681 | 0.607164 | 0.654796 | 0.783964 | 0.613857 |
| STA. DEP. | 7,538.738 | 7,538.738 | 7,536.116 | 7,536.116 | 7,510.627 | 7,510.627 | 7,510.627 |
| DIFF. | -22.224 | -2.292 | -25.819 | -21.853 | -35.847 | -39.746 | +40.527 |
| F.S. DEP. | 7,516.514 E | 7,536.116 E | 7,510.627 E | 7,514.573 E | 7,474.780 E | 7,470.881 E | 7,551.154 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | | | | | | | |
| CHECKED BY: | | | | | | | |
| DATE | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 2 of 2 2b

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | TP-2 | TP-3 | TP-2 | TP-4 | TP-4 | TP-6 | |
| S.T.A. | TP-3 | TP-5 | TP-4 | TP-6 | TP-6 | TP-7 | |
| F.S. | TP-5 | A-116 | TP-6 | A-150 | TP-7 | A-118 | |
| MEAS. DISTANCE | 10.231 | 33.415 | 35.290 | 32.047 | 58.138 | 53.121 | |
| VERT. ANGLE | -1°29'35" | ø | +0°32'28" | +1°58'25" | -1°07'15" | -3°15'00" | |
| SINE – V.A. | 0.026056 | ø | 0. | | | | |
| COSINE – V.A. | 0.999661 | 1.00000 | 0.009111 | 0.034139 | 0.019706 | 0.056693 | |
| STA. ELEVATION | 1324.027 | 1324.113 | 0.999956 | 0.999407 | 0.999806 | 0.998392 | |
| H.I. | +1.169 | +1.076 | +1.075 | +1.094 | +1.091 | +1.119 | |
| INST. HEIGHT | | | 1323.768 | 1325.176 | 1325.176 | 1325.124 | |
| DISTANCE | -1.018 | ø | +0.333 | +1.101 | -1.116 | -3.012 | |
| DIFF. | | | | | | | |
| H.P. | ø | -1.113 | ø | -0.964 | ø | -0.155 | |
| F.S. ELEVATION | 1324.118 | 1323.781 | 1325.176 | 1326.110 | 1325.124 | 1322.806 | |
| AZ. B.S. TO STA. | 308°22'30" | 327°13'10" | 37°52'08" | 30°12'11" | | 330°23'21" | |
| ±180 - 00' - 00" | -180 | -180° | +180° | +180 | | -180 | |
| AZ. STA. TO B.S. | 128°22'30" | 147°13'10" | 217°52'08" | 210°12'11" | 210°12'11" | 150°23'21" | |
| HORZ. ANGLE | 199°21'10" | 160°57'20" | 172°50'03" | 221°15'30" | 119°11'10" | 170°59'00" | |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 327°13'10" | 308°11'00" | 30°12'11" | 71°57'11" | 330°23'21" | 321°22'21" | |
| BEARING | N-32°16'20"-W | N-51°19'00"-W | N-30°12'11"-E | N-71°57'11"-E | N-29°36'39"-W | N-38°37'39"-W | |
| HORZ. DISTANCE | 10.217 | 33.415 | 35.288 | 32.028 | 58.121 | 53.036 | |
| COSINE BEARING | 0.845321 | 0.625016 | 0.859825 | 0.309658 | 0.869108 | 0.781251 | |
| STA. LAT. | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| DIFF. | +31.001 | +20.885 | +30.312 | +9.918 | +50.536 | +41.133 | |
| F.S. LAT. | 11,361.597 N | 11,382.182 N | 11,378.518 N | 11,388.496 N | 11,429.114 N | 11,470.547 N | N |
| SINE BEARING | 0.533912 | 0.780612 | 0.510589 | 0.950818 | 0.494106 | 0.624255 | |
| STA. DEP. | 7,470.881 | 7,449.107 | 7,551.151 | 7,569.172 | 7,569.172 | 7,540.151 | |
| DIFF. | -21.774 | -26.084 | +18.018 | +30.151 | -28.721 | -33.108 | |
| F.S. DEP. | 7,449.107 E | 7,423.323 E | 7,569.172 E | 7,599.326 E | 7,540.151 E | 7,507.313 E | E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| CHECKED BY: | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| DATE | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | SEP 20 1976 | |

WORK PLACE D.D.H's @ SURFACE

SURVEY CALCULATION SHEET

PAGE NO. 1 of 2 21A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | S-500 | S-500 | S-100 | TP-1 | S-100 | S-500 | TP3 |
| S.T.A. | S-100 | S-100 | TP-1 | TP-2 | S-500 | TP3 | TP4 |
| F.S. | A-159 | TP-1 | TP-2 | A-157 | TP-3 | TP4 | TP5 |
| MEAS. DISTANCE | 58.857 | 10.691 | 32.864 | 30.602 | 59.939 | 58.180 | 17.092 |
| VERT. ANGLE | +0°11'05" | +0°02'33" | -2°09'58" | -7°55'55" | -5°13'38" | -3°11'25" | -1°24'28" |
| SINE – V.A. | 0.001091 | 0.000742 | 0.037797 | 0.137997 | 0.091106 | 0.061363 | 0.024851 |
| COSINE – V.A. | 0.999992 | 1.00000 | 0.999285 | 0.990433 | 0.995841 | 0.997927 | 0.997042 |
| STA. ELEVATION | 1286.657 | 1286.657 | 1287.863 | 1287.896 | 1284.726 | 1280.188 | 1278.063 |
| H.I. | +1.176 | +1.176 | +1.273 | +1.189 | +1.223 | +1.320 | +1.350 |
| INST. HEIGHT | | | | | | | |
| DISTANCE | +0.241 | +0.030 | -1.242 | -1.223 | -5.161 | -3.745 | -3.619 |
| DIFF. | | | | | | | |
| H.P. | -0.62 | 0 | 0 | -0.35 | 0 | 0 | 0 |
| F.S. ELEVATION | 1287.454 | 1287.863 | 1287.894 | 1284.310 | 1280.188 | 1278.063 | 1275.794 |
| AZ. B.S. TO STA. | | | 73°28'44" | 157°27'19" | 226°22'04 | 141°30'34" | 123°01'42" |
| ±180 - 00' - 00" | | | +180 | +180 | -180° | +180° | +180° |
| AZ. STA. TO B.S. | 226°22'04" | 226°22'04" | 253°28'44" | 337°27'19" | 46°22'04" | 321°30'34" | 303°01'42" |
| HORZ. ANGLE | 81°51'05" | 207°04'40" | 263°58'35" | 222°43'00" | 95°06'30" | 161°31'08" | 197°08'33" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 308°18'09" | 73°28'44" | 157°27'19" | 200°10'19" | 141°30'34" | 123°01'42" | 140°10'15" |
| BEARING | N-51°41'51"-W | N-73°28'44"-E | S-22°32'41"-E | S-20°10'19"-W | S-38°29'26"-E | S-56°58'18"-E | S-39°49'45"-E |
| HORZ. DISTANCE | 58.857 | 10.691 | 32.841 | 30.309 | 59.690 | 58.059 | 16.953 |
| COSINE BEARING | 0.619814 | 0.284337 | 0.923581 | 0.938553 | 0.785711 | 0.545054 | 0.767158 |
| STA. LAT. | 10,551.180 | 10,551.180 | 10,564.754 | 10,575.126 | 10,553.250 | 10,542.294 | 10,539.277 |
| DIFF. | +36.180 | +11.571 | -30.331 | -28.150 | -46.720 | -31.615 | -36.058 |
| F.S. LAT. | 10,590.660 N | 10,565.751 N | 10,535.420 N | 10,506.970 N | 10,473.864 N | 10,442.219 N | 10,406.161 N |
| SINE BEARING | 0.784789 | 0.958715 | 0.383204 | 0.341838 | 0.622386 | 0.838401 | 0.640501 |
| STA. DEP. | 7,636.111 | 7,636.111 | 7,675.122 | 7,687.713 | 7,600.830 | 7,637.950 | 7,686.657 |
| DIFF. | -46.188 | +39.011 | +12.591 | -10.452 | +37.150 | +48.677 | +30.073 |
| F.S. DEP. | 7,589.923 E | 7,675.122 E | 7,687.713 E | 7,677.261 E | 7,637.980 E | 7,686.657 E | 7,716.730 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| CHECKED BY: | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| DATE | Sept. 27, '76 | Sept 27, '76 | Sept 27, '76 | Sept 27, '76 | Sept 27, '76 | Sept 27, '76 | Sept 27, '76 |

WORK PLACE D.DHs @ SURFACE

SURVEY CALCULATION SHEET

PAGE NO. 2 of 2 22A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP-1 | | | | | | | |
| S.T.A. | TP-5 | | | | | | | |
| F.S. | 4.162 | | | | | | | |
| MEAS. DISTANCE | 27.156 | | | | | | | |
| VERT. ANGLE | -1°12'10" | | | | | | | |
| SINE – V.A. | 0.021987 | | | | | | | |
| COSINE – V.A. | 0.996633 | | | | | | | |
| STA. ELEVATION | 1275.794 | | | | | | | |
| H.I. | +1.152 | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| DISTANCE | - 2.251 | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | - 0.381 | | | | | | | |
| F.S. ELEVATION | 1274.314 | | | | | | | |
| AZ. B.S. TO STA. | 140°10'15" | | | | | | | |
| ±180 - 00' - 00" | +180 | | | | | | | |
| AZ. STA. TO B.S. | 320° 10' 15" | | | | | | | |
| HORZ. ANGLE | 207°25'25" | | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 167°35'40" | | | | | | | |
| BEARING | S-12°24'20"-E | | | | | | | |
| HORZ. DISTANCE | 27.364 | | | | | | | |
| COSINE BEARING | 0.976653 | | | | | | | |
| STA. LAT. | 10.128.731 | | | | | | | |
| DIFF. | - 26.725 | | | | | | | |
| F.S. LAT. | 10.272.006 N | N | | N | | N | | N |
| SINE BEARING | 0.214830 | | | | | | | |
| STA. DEP. | 7.716.730 | | | | | | | |
| DIFF. | +5.879 | | | | | | | |
| F.S. DEP. | 7.722.609 E | E | | E | | E | | E |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS | MINUS | L. | R. | P. | M. | L. | R. | P. | M. | L. | R. |
| CALCULATED BY: | [illegible] | | | | | | | | | | | | |
| CHECKED BY: | [illegible] | | | | | | | | | | | | |
| DATE | Sept 27. '76 | | | | | | | | | | | | |

TITLE: STADIA SURVEY OF SURFACE D.D.H's

DATE: SEPT. 28, 1976

CALC. BY: L. BETTIOL

CHECKED BY:

| STA. SIGHTED | H.C.R. | V.C.R. | MIDDLE WIRE m | S | H | V | E | REMARKS |
|---|---|---|---|---|---|---|---|---|
| @ STA - H.I.W$_1$ | | | E' = 1313.018m 1308.000 | | e = 3.72' | | | |
| H.I.W$_5$ | | | | | | | | f.c. = 0 |
| TP$_1$ | 117°22'15" | +2°32'25" | 5.58 | 1.16 | 36.287 ✓ 115.772 | +5.136 | 1314.077 m 1311.276 | |
| @ STA - TP$_1$ | | | E' = 1311.276 | | e' = 3.965 | | | |
| H.I.W$_2$ | | | | | | | | |
| TP$_2$ | 136°01'15" | +0°00'15" | 3.01 | 1.02 | 122.530 ✓ 102.000 | +0.029 | 1314.377 m 1312.260 | |
| @ STA. - TP$_2$ | | | E' = 1312.260 | | e' = 1.06' | | | |
| TP$_1$ | | | | | | | | |
| A-155 | 307°20'15" | -1°02'10" | 5.59 | 5.19 | 138.110 ✓ 516.531 | -9.383 | 1311.051 1301.347 | |
| @ STA - TP$_2$ | | | E' = 1312.260 | | e' = 1.06 | | | |
| TP$_1$ | | | | | | | | |
| TP$_3$ | 251°23'55" | -1°01'35" | 3.20 | 2.10 | 78.126 ✓ 259.916 | -4.508 | 1313.265 1308.612 | |
| @ STA - TP$_3$ | | | E' = 1308.612 | | e' 1.01 | | | |
| TP$_2$ | | | | | | | | |
| A-158 | 235°21'10" | +0°01'00" | 6.31 | 2.61 | 80.127 ✓ 262.000 | +0.077 | 1312.587 1306.389 | |
| @ STA - TP$_3$ | | | E' = 1308.612 | | e' 1.01 | | | |
| TP$_2$ | | | | | | | | |
| A-161 | 232°17'15" | -0°02'20" | 6.36 | 2.69' | 81.991 ✓ 269.000 | -0.183 | 1312.493 1306.079 | |
| @ STA. TP$_3$ | | | E' = 1308.612 | | e' 1.10 | | | |
| TP$_2$ | | | | | | | | |
| TP$_4$ | 232°31'55" | -0°37'35" | 2.26 | 2.50 | 76.19 ✓ 249.970 | -2.733 | 1312.993 1307.719 | |
| @ STA. TP$_4$ | | | E' = 1307.719 | | e' 1.08 | | | |
| TP$_3$ | | | | | | | | |
| TP$_5$ | 90°18'20" | +0°36'15" | 3.69 | 3.10 | 103.051 ✓ 339.993 | +3.585 | 1314.204 1311.694 | |

Date:

Calc. By:

℄ Sta - TP3 E' = 4311.691 e' = 3.825

| Sta. Sighted | H.C.R. | V.C.R | Middle Wire m | S | H | V | E | Remarks |
|---|---|---|---|---|---|---|---|---|
| TP1 | | | | | | | | |
| A-160 | 353°12'15" | -2°17'30" | 3.66 | 1.315 | 39.984<br>131.188 ✓ | -6.397 | 1312.305<br>1305.462 | fHC = 0 |

℄ Sta - TP3 E' = 4311.691 e' = 3.825

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TP1 | | | | | | | | |
| A-156 | 190°38'20" | +2°17'35" | 6.31 | 2.62 | 19.410<br>260.532 ✓ | +19.558 | 1319.408<br>1328.767 | |

℄ Sta. - TP3 E' = 4311.691 e' = 3.825

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TP1 | | | | | | | | |
| A-163 | 291°08'15" | -0°37'00" | 1.83 | 3.66 | 111.044<br>365.928 ✓ | -3.939 | 1312.697<br>1306.750 | |

℄ Sta — E' = e' =

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|---|---|---|---|---|---|---|---|---|
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℄ Sta — E' = e' =

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℄ Sta - E' = e'

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℄ Sta. E' = e'

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℄ Sta. E' = e'

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|---|---|---|---|---|---|---|---|---|
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| | | | | | | | | |

WORK PLACE Grum - Surface D.D.H's

SURVEY CALCULATION SHEET

PAGE NO. 1 of 2 23A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B.S. | H.I.S. | H.I.S. | TP1 | TP1 | TP2 | TP2 | TP2 |
| S.T.A. | H.I.S. | TP1 | TP2 | TP2 | TP3 | TP3 | TP3 |
| F.S. | TP1 | TP2 | A-155 | TP3 | A-158 | A-161 | TP4 |
| MEAS. DISTANCE | | | | | | | |
| VERT. ANGLE | | | | | | | |
| SINE – V.A. | | | | | | | |
| COSINE – V.A. | | | | | | | |
| STA. ELEVATION | | | | | | | |
| H.I. | | | | | | | |
| INST. HEIGHT | | | | | | | |
| DISTANCE | | | | | | | |
| DIFF. | | | | | | | |
| H.P. | | | | | | | |
| F.S. ELEVATION | 1314.077 | 1314.377 | 1311.051 | 1313.265 | 1312.587 | 1312.643 | 1312.993 |
| AZ. B.S. TO STA. | | 319°-31'-31" | 275°35'16" | | 346°59'41" | | |
| ±180 - 00' - 00" | | -180° | -180° | | -180 | | |
| AZ. STA. TO B.S. | 202°08'46" | 139°31'31" | 95°35'16" | 95°35'16" | 166°59'41" | 166°59'41" | 166°59'41" |
| HORZ. ANGLE | 117°22'45" | 136°04'15" | 307°20'15" | 251°23'55" | 235°24'10" | 234°17'45" | 232°31'55" |
| - 360 - 00' - 00" | | | | | | | |
| AZ. STA. TO F.S. | 319°31'31" | 275°35'16" | 42°56'31" | 346°59'41" | 42°24'21" | 41°17'26" | 39°31'36" |
| BEARING | N-40°28'29"-W | N-84°24'18"-W | N-42°56'31"-E | N-13°00'19"-W | N-42°24'21"-E | N-41°17'26"-E | N-39°31'36"-E |
| HORZ. DISTANCE | 35.287 | 122.530 | 158.140 | 73.126 | 80.167 | 81.991 | 76.191 |
| COSINE BEARING | 0.760478 | 0.097814 | 0.732045 | 0.974950 | 0.737197 | 0.753586 | 0.771367 |
| STA. LAT | 10,809.120 | 10,804.913 | 10,816.899 | 10,846.899 | 10,918.142 | 10,918.142 | 10,918.142 |
| DIFF. | + 26.813 | + 11.979 | + 115.766 × | + 71.250 | + 59.116 | + 61.131 | + 58.768 |
| F.S. LAT. | 10,831.933 N | 10,816.892 N | 10,962.658 ×N | 10,918.142 N | 10,977.558 N | 10,979.273 N | 10,976.910 N |
| SINE BEARING | 0.649118 | 0.995234 | 0.681257 | 0.225041 | 0.674377 | 0.666410 | 0.636137 |
| STA. DEP. | 7,732.720 | 7,711.835 | 7,589.889 | 7,589.889 | 7,573.133 | 7,573.133 | 7,573.133 |
| DIFF. | - 22.905 | - 121.946 | + 107.734 | - 16.156 | + 54.265 | + 54.640 | + 48.791 |
| F.S. DEP. | 7,711.835 E | 7,589.889 E | 7,697.623 E | 7,573.133 E | 7,627.698 E | 7,628.073 E | 7,621.924 E |
| GRADE CALC. | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| F.S. GRADE ELV. | | | | | | | |
| GRADE CHAIN | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. |
| CALCULATED BY: | LB | LB | LB | LB | LB | LB | LB |
| CHECKED BY: | JC | JC | | JC | JC | JC | JC |
| DATE | SEP 30 1976 | SEP 30 1976 | SEP 30 1976 | SEP 30 1976 | SEP 30 1976 | SEP 30 1976 | SEP 30 1976 |

WORK PLACE _____ **SURVEY CALCULATION SHEET** PAGE NO. 2 of 2 24A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | TP3 | TP4 | TP4 | TP4 | | | | |
| S.T.A. | TP4 | TP5 | TP5 | TP5 | | | | |
| F.S. | TP5 | A-160 | A-156 | A-163 | | | | |
| MEAS. DISTANCE | | | | | | | | |
| VERT. ANGLE | | | | | | | | |
| SINE – V.A. | | | | | | | | |
| COSINE – V.A. | | | | | | | | |
| STA. ELEVATION | | | | | | | | |
| H.I. | | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| DISTANCE | | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | | | | | | | | |
| F.S. ELEVATION | 1312.204 | 1312.305 | 1319.408 | 1312.697 | | | | |
| AZ. B.S. TO STA. | 39°31'36" | 309°19'56" | | | | | | |
| ±180 - 00' - 00" | +180 | -180 | | | | | | |
| AZ. STA. TO B.S. | 219°31'36" | 129°19'56" | 129°19'56" | 129°19'56" | | | | |
| HORZ. ANGLE | 90°18'20" | 353°12'15" | 190°38'20" | 294°03'15" | | | | |
| -360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 309°19'56" | 123°32'41" | 320°28'16" | 63°53'11" | | | | |
| BEARING | N-50°10'01"-W | S-56°27'19"-E | N-39°31'44"-W | N-63°53'11"-E | | | | |
| HORZ. DISTANCE | 103.621 | 37.986 | 19.410 | 111.544 | | | | |
| COSINE BEARING | 0.640548 | 0.553508 | 0.771304 | 0.440159 | | | | |
| STA. LAT. | [illegible] | [illegible] | [illegible] | [illegible] | | | | |
| DIFF. | +66.371 | -22.096 | +61.219 | +19.096 | | | | |
| F.S. LAT. | 11,043.284 N | 11,021.188 N | 11,104.533 N | 11,092.380 N | N | N | N | |
| SINE BEARING | 0.767923 | 0.833155 | 0.636467 | 0.897923 | | | | |
| STA. DEP. | 7,631.924 | 7,542.351 | 7,542.351 | 7,542.351 | | | | |
| DIFF. | -79.573 | +33.327 | -50.542 | +100.158 | | | | |
| F.S. DEP. | 7,542.351 E | 7,575.678 E | 7,491.809 E | 7,642.509 E | E | E | E | |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. R. | P. M. | L. R. | P. M. | L. R. | |
| CALCULATED BY: | LB | LB | LB | LB | | | | |
| CHECKED BY: | AC | | RC | RC | | | | |
| DATE | SEP 30 1976 | SEP 30 1976 | SEP 30 1976 | SEP 30 1976 | | | | |

TITLE: GRUM - SURFACE D.D.H

DATE: OCT. 7, 1976

CALC. BY: L. BETTIOL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ⊼ @ STA - R.P.A. | | | E' = 1321.382 ✓ | | N' = 0.847 ✓ | | | |
| STN SIGHTED | HCR | VCR | MIDDLE ORD. | S | | V | E | ELEV. |
| S-300 | 0 | 0 | — | — | — | — | — | fixed |
| TP1 | 199°46'05" ✓ | -2°37'00" ✓ | 3.85 ✓ | 3.70 ✓ | 183.341m ✓ 369.229 ✓ | - 16.874 ✓ | 1301.505 ✓ | CHK JL. |
| ⊼ @ STA - TP1 | | | E' = 1301.505 ✓ | | N' = 1.451 ✓ | | | |
| R.P.A | 0 | 0 | — | — | — | — | — | |
| A-164 | 179°27'00" | -2°23'05" | 5.92 ✓ | 1.88 ✓ | 57.703 ✓ 127.475 ✓ | - 7.816 ✓ | 1289.220 ✓ | JL. |
| ⊼ @ STA - | | | E' = | | N' = | | | |
| ⊼ @ STA - | | | E' = | | N' = | | | |
| ⊼ @ STA - | | | E' = | | N' = | | | |
| ⊼ @ STA - | | | E' = | | N' = | | | |
| ⊼ @ STA - | | | E' = | | N' = | | | |

WORK PLACE Grum - Surface D.D.H.

SURVEY CALCULATION SHEET

PAGE NO. 1 of 1 25A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| B.S. | 5-300 | B.P.A | | | | | | |
| S.T.A. | B.P.A | TP1 | | | | | | |
| F.S. | TP1 | A-164 | | | | | | |
| MEAS. DISTANCE | | | | | | | | |
| VERT. ANGLE | | | | | | | | |
| SINE – V.A. | | | | | | | | |
| COSINE – V.A. | | | | | | | | |
| STA. ELEVATION | | | | | | | | |
| H.I. | | | | | | | | |
| INST. HEIGHT | | | | | | | | |
| DISTANCE | | | | | | | | |
| DIFF. | | | | | | | | |
| H.P. | | | | | | | | |
| F.S. ELEVATION | 1301.505 ✓ | 1289.220 ✓ | | | | | | |
| AZ. B.S. TO STA. | 101°16'05" | 131°02'10" | | | | | | |
| ±180 - 00' - 00" | +180 | +180 | | | | | | |
| AZ. STA. TO B.S. | 281°16'05" ✓ | 301°02'10" | | | | | | |
| HORZ. ANGLE | 199°46'05" | 179°27'00" | | | | | | |
| - 360 - 00' - 00" | | | | | | | | |
| AZ. STA. TO F.S. | 121°02'10" ✓ | 120°29'10" ✓ | | | | | | |
| BEARING | S-58°57'50"-E ✓ | S-59°30'50"-E ✓ | | | | | | |
| HORZ. DISTANCE | 112.541 ✓ | 57.203 ✓ | | | | | | |
| COSINE BEARING | 0.515518 | 0.507530 | | | | | | |
| STA. LAT. | 11,228.587 | 11,170.613 | | | | | | |
| DIFF. | -58.024 | -29.031 | | | | | | |
| F.S. LAT. | 11,170.563 ✓ N | 11,141.582 ✓ N | N | | N | | N | | N | | N | |
| SINE BEARING | 0.856842 | 0.861752 | | | | | | |
| STA. DEP. | 7,538.738 | 7,635.168 | | | | | | |
| DIFF. | +96.430 | +49.295 | | | | | | |
| F.S. DEP. | 7,635.168 ✓ E | 7,684.463 ✓ E | E | | E | | E | | E | | E | |
| GRADE CALC. | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| F.S. GRADE ELV. | | | | | | | | |
| GRADE CHAIN | | | | | | | | |
| OFFSETS | LEFT RIGHT | PLUS MINUS | L. | R. | P. | M. | L. | R. | P. | M. | L. | R. |
| CALCULATED BY: | [illegible] | [illegible] | | | | | | | | | | |
| CHECKED BY: | [illegible] | [illegible] | | | | | | | | | | |
| DATE | Oct. 1976 | Oct. 1976 | | | | | | | | | | |