WIND-TUNNEL STUDY OF PET PLAZA, ST. LOUIS--
WIND PRESSURES ON GLASS WALL

by

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FLUID MECHANICS AND
WIND ENGINEERING PROGRAM

COLLEGE OF ENGINEERING

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CSU Project 2-95950

November 1984

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CER84-85JAP-JEC19

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LIST OF SYMBOLS

Symbol	Definition
U	Local mean velocity
D	Characteristic dimension (building height, width, etc.)
ν, ρ	Kinematic viscosity and density of approach flow
$\frac{UD}{\nu}$	Reynolds number
E	Mean voltage
A, B, n	Constants
U_{rms}	Root-mean-square of fluctuating velocity
E_{rms}	Root-mean-square of fluctuating voltage
U_∞	Reference mean velocity outside the boundary layer
Z	Height above surface
δ	Height of boundary layer
T_u	Turbulence intensity $\frac{U_{rms}}{U_\infty}$ or $\frac{U_{rms}}{U}$
$C_{p_{mean}}$	Mean pressure coefficient, $\frac{(p-p_\infty)_{mean}}{0.5\ \rho\ U_\infty^2}$
$C_{p_{rms}}$	Root-mean-square pressure coefficient, $\frac{\left((p-p_\infty)-(p-p_\infty)_{mean}\right)_{rms}}{0.5\ \rho\ U_\infty^2}$
$C_{p_{max}}$	Peak maximum pressure coefficient, $\frac{(p-p_\infty)_{max}}{0.5\ \rho\ U_\infty^2}$
$C_{p_{min}}$	Peak minimum pressure coefficient, $\frac{(p-p_\infty)_{min}}{0.5\ \rho\ U_\infty^2}$
$(\ )_{min}$	Minimum value during data record
$(\ )_{max}$	Maximum value during data record
p	Fluctuating pressure at a pressure tap on the structure
p_∞	Static pressure in the wind tunnel above the model

1. INTRODUCTION

1.1 General

A previous wind-tunnel study (1) investigated the pedestrian wind environment in the pedestrian plaza beneath the Pet building in St. Louis. The plaza is located at ground level under the building and is open on the east and west sides of the building. Pressure differences between the east and west sides of the building generated by approaching winds caused wind speeds in the plaza which were unacceptably large. Reference (1) showed that a greenhouse or wall which completely blocked the passage of air under the building would provide a solution to the high wind problem. The design solution was a glass wall lining up with the east facade of the building which completely closed the opening under the building.

The glass wall will be exposed to wind pressures on both sides. Adequate design of the wall should account for the instantaneous pressure differences acting across the wall. The purpose of this study was to define the pressure differences acting across the wall due to wind action. A wind-tuhnel test was performed to determine these design loads. Results of the study show that a design pressure of 30 psf for the glass wall will be adequate.

Techniques have been developed for wind-tunnel modeling of structures which allow the prediction of wind pressures on cladding and windows, overall structural loading, and also wind velocities and gusts in areas of concern. Accurate knowledge of the intensity and distribution of the pressures on the structure permits adequate but economical selection of structural elements such as the Pet building glass wall.

Modeling of the aerodynamic loading on a structure requires special consideration of flow conditions in order to guarantee similitude between model and prototype. A detailed discussion of the similarity requirements and their wind-tunnel implementation can be found in references (2), (3), and (4). In general, the requirements are that the model and prototype be geometrically similar, that the approach mean velocity at the building site have a vertical profile shape similar to the full-scale wind, that the turbulence characteristics of the flows be similar, and that the Reynolds number for model and prototype be equal.

These criteria are satisfied by constructing a scale model of the structure and its surroundings and performing the wind tests in a wind tunnel specifically designed to model atmospheric boundary-layer flows. Reynolds number similarity requires that the quantity UD/ν be similar for model and prototype. Since ν, the kinematic viscosity of air, is identical for both, Reynolds numbers cannot be made precisely equal with reasonable wind velocities. To accomplish this the air velocity in the wind tunnel would have to be as large as the model scale factor times the prototype wind velocity, a velocity which would introduce unacceptable compressibility effects. However, for sufficiently high Reynolds numbers ($>2x10^4$) the pressure coefficient at any location on the structure will be essentially constant for a large range of Reynolds numbers. Typical values encountered are 10^7-10^8 for the full-scale and 10^5-10^6 for the wind-tunnel model. In this range acceptable flow similarity is achieved without precise Reynolds number equality.

1.2 The Wind-Tunnel Test

The wind-tunnel study was performed on a building of the Pet building at a scale of 1:300. The same model used for the pedestrian velocity study was used for the current study. A wall was fitted with pressure taps and inserted into place in the model. The model was subjected to a simulated atmospheric wind flow in a boundary-layer wind tunnel. The model was rotated to 36 approach wind directions to observe the influence of wind direction. Pressure measurements were obtained on both sides of the glass wall and on the south wall of the plaza area near the building entrance to provide information for design of the glass wall and to find wind loads on the entry doors.

The following pages discuss in greater detail the procedures followed and the equipment and data collecting and processing methods used. In addition, the data presentation format is explained and the implications of the data are discussed.

2. EXPERIMENTAL CONFIGURATION

2.1 Wind Tunnel

Wind engineering studies are performed in the Fluid Dynamics and Diffusion Laboratory at Colorado State University (Figure 1). Three large wind tunnels are available for wind loading studies depending on the detailed requirements of the study. The Industrial Aerodynamics Wind Tunnel used for this investigation is shown in Figure 2. The wind tunnel has a flexible roof adjustable in height to maintain a zero pressure gradient along the test section. The mean velocity can be adjusted continuously to the maximum velocity available.

2.2 Model

In order to obtain an accurate assessment of local velocities and pressures, models are constructed to the largest scale that does not produce significant blockage in the wind-tunnel test section. The building model was constructed of thin Lucite plastic and fastened together with glue and metal screws. Piezometer taps (1/16 in. diameter) were drilled normal to the two exterior surfaces of the glass wall and south wall of the plaza. Photographs of the model installed in the wind tunnel are shown in Figure 3. The building site plan is shown in Figure 4.

Pressure tap locations on the glass wall and plaza south wall were located as shown in Figure 5. Pressure tap locations on the doors are shown to scale. Pressure tap numbers are shown on the figure.

The buildings surrounding the model were modeled for a radius of about 1400 ft. An open suburban environment was assumed to be a reasonable estimate for establishing approach wind characteristics. The floor of the wind tunnel upwind of the model turntable was covered with a randomized roughness selected to provide an open suburban environment. Spires and a two-dimensional barrier were installed at the test section entrance to provide a thicker boundary layer than would otherwise be available. The thicker boundary layer permitted a larger scale model than would otherwise be possible.

3. DATA ACQUISITION AND RESULTS

3.1 Velocity

Mean velocity and turbulence intensity profiles were measured upstream of the model to determine that the desired approach boundary-layer flow had been established. Tests were made at one wind velocity in the tunnel. This velocity was well above that required to produce Reynolds number similarity between the model and the prototype as discussed in Section 1.

Measurements are made with a single hot-wire anemometer mounted with its axis vertical. The instrumentation used was a TSI constant temperature anemometer (Model 1050) with a 0.001 in. diameter platinum film sensing element 0.020 in. long. Output is directed to the on-line data acquisition system for analysis.

Calibration of the hot-wire anemometer was performed by comparing output with the pitot-static tube in the wind tunnel. The calibration data were fit to a variable exponent King's Law relationship of the form

$$E^2 = A + BU^n$$

where E is the hot-wire output voltage, U the velocity and A, B, and n are coefficients selected to fit the data. The above relationship was used to determine the mean velocity at measurement points using the measured mean voltage. The fluctuating velocity in the form U_{rms} (root-mean-square velocity) was obtained from

$$U_{rms} = \frac{2\ E\ E_{rms}}{B\ n\ U^{n-1}}$$

where E_{rms} is the root-mean-square voltage output from the anemometer. For interpretation all rms velocity measurements for locations within the model were divided by the local mean velocity. The resulting ratio is termed turbulence intensity.

Velocity and turbulence intensity profiles are shown in Figure 6. Profiles were taken upstream from the model which are characteristic of the boundary layer approaching the model. The height of the reference velocity measurement, δ, is shown in Figure 6. The corresponding prototype value of δ for this study is also shown in the figure. The mean velocity profile approaching the modeled area has the form

$$\frac{U}{U_\infty} = \left(\frac{z}{\delta}\right)^n .$$

The exponent n for the approach flow established for this study is shown in Figure 6. The approach mean velocity characteristics are appropriate for the building location.

The profile of longitudinal turbulence intensity in the flow approaching the modeled area is shown in Figure 6. The turbulence intensities are appropriate for the approach mean velocity profile selected.

3.2 Pressures

Mean and fluctuating pressures were measured at each of the pressure taps on the model structure. Data were obtained for 36 wind directions at 10-degree azimuthal increments, rotating the entire model assembly in a complete circle. Pieces of 1/16 in. I.D. plastic tubing were used to connect the pressure ports to four 48-tap pressure switches mounted underneath the model. Each of the measurement ports was directed in turn by the switch to one of four pressure transducers mounted close to the switch. The four pressure input taps not used for transmitting building surface pressures were connected to a common tube leading to a pitot tube mounted inside the wind tunnel. This arrangement provided a means of automatically monitoring the tunnel speed. A computer-controlled solenoid stepped the switch into each switch position. The computer kept track of switch position but a digital readout of position was provided at the wind tunnel.

The pressure transducers used were setra differential transducers (Model 237) with a ±0.10 psid range. Reference pressures were obtained by connecting the reference sides of the four transducers, using plastic tubing, to the static side of a pitot-static tube mounted in the wind tunnel free stream above the model building. In this way the transducer measured the instantaneous difference between the local pressures on the surface of the building and the static pressure in the free stream above the model.

Output from the pressure transducers was fed to an on-line data acquisition system consisting of a Hewlett-Packard 21 MX computer, disk unit, printer, Digi-Data digital tape drive and a Preston Scientific analog-to-digital converter. The data were processed immediately into pressure coefficient form as described below and stored for printout and further analysis.

All four transducers were recorded simultaneously for 16 seconds at a 250 sample-per-second rate. An examination of a large number of pressure taps from previous experiments showed that the overall accuracy for a 16-second period is, in pressure coefficient form, 0.03 for mean pressures, 0.1 for peak pressures, and 0.01 for rms pressures. Pressure coefficients are defined below.

For each of the pressure taps examined at each wind direction, the data record was analyzed to obtain four separate pressure coefficients. The first is the mean pressure coefficient

$$C_{p_{mean}} = \frac{(p-p_{\infty})_{mean}}{0.5\ \rho\ U_{\infty}^{2}}$$

where the symbols are as defined in the List of Symbols. It represents the mean of the instantaneous pressure difference between the building pressure tap and the static pressure in the wind tunnel above the building model, nondimensionalized by the dynamic pressure

$$0.5\ \rho\ U_{\infty}^{2}$$

at the reference velocity position. This relationship produces a dimensionless coefficient which indicates that the mean pressure difference between building and ambient wind at a given point on the structure is some fraction less or some fraction greater than the undisturbed wind dynamic pressure near the upper edge of the boundary layer. Using the measured coefficient, prototype mean pressure values for any wind velocity may be calculated.

The magnitude of the fluctuating pressure is obtained by the rms pressure coefficient

$$C_{p_{rms}} = \frac{\left((p-p_\infty) - (p-p_\infty)_{mean}\right)_{rms}}{0.5\ \rho\ U_\infty^2}$$

in which the numerator is the root-mean-square of the instantaneous pressure difference about the mean.

If the pressure fluctuations followed a Gaussian probability distribution, no additional data would be required to predict the frequency with which any given pressure level would be observed. However, the pressure fluctuations do not, in general, follow a Gaussian probability distribution so that additional information is required to show the extreme values of pressure expected. The peak maximum and peak minimum pressure coefficients are used to determine these values:

$$C_{p_{max}} = \frac{(p-p_\infty)_{max}}{0.5\ \rho\ U_\infty^2}$$

$$C_{p_{min}} = \frac{(p-p_\infty)_{min}}{0.5\ \rho\ U_\infty^2}$$

The values of $p-p_\infty$ which were digitized at 250 samples per second for 16 seconds, representing about one hour of time in the full-scale, were examined individually by the computer to obtain the most positive and most negative values during the 16-second period. These were converted to $C_{p_{max}}$ and $C_{p_{min}}$ by nondimensionalizing with the free stream dynamic pressure.

The four pressure coefficients were calculated by the on-line data acquisition system computer and tabulated along with the approach wind azimuth in degrees from true north. The list of coefficients is included as Appendix A. The pressure tap code numbers used in the appendix are explained in Figure 5.

For pressure taps on the glass wall, taps on both sides of the wall were measured simultaneously. Instantaneous differences between pressures on the inside and outside ($P_{outside} - P_{inside}$) were calculated to obtain the instantaneous pressure differential across the wall. In this convention, positive pressures act toward the west while negative pressures act to the east. Pressure coefficients were formed as described above for the pressure differences. Pressure difference coefficients for each glass wall tap combination (listed by tap number on the east side of the wall) and wind direction are listed in Appendix A.

To determine the largest peak loads acting at any point on the structure for cladding design purposes, the pressure coefficients for all wind directions were searched to obtain, at each pressure tap, the largest peak negative and peak positive pressure coefficients. Table 1 lists the largest values and associated wind directions.

The pressure coefficients of Table 1 can be converted to full-scale loads by multiplication by a suitable reference pressure selected for the field site. This reference pressure is represented in the equations for pressure coefficients by the $0.5\ \rho\ U_{\infty}^2$ denominator. This value is the dynamic pressure associated with an hourly mean wind at the reference velocity measurement position. In general, the method of arriving at a design reference pressure for a particular site involves selection of a design wind velocity, translation of the velocity to an hourly mean wind at the reference velocity location and conversion to a reference pressure. The 50-year recurrence design velocity was selected from ANSI A58.1 - 1982 (5) as 70 mph fastest mile wind at 10 meters. The calculation of reference pressure for this study is shown in Table 2. The factor used in Table 2 to reduce gust winds to hourly mean winds is given in reference (6).

The reference pressure associated with the design hourly mean velocity at the reference velocity location can be used directly with the peak-pressure coefficients to obtain peak local design wind loads. Local, instantaneous peak loads on the full-scale structure suitable for design were computed by multiplying the reference pressure of Table 2 by the peak coefficients of Table 1 and are listed as peak pressures in that table. The maximum psf loads given at each tap location are the largest peak positive and peak negative values found in the tests.

Peak pressures are shown in Figure 7 for the glass wall and the south wall of the plaza. Pressures for the glass wall are pressure differences. Positive differences act westward while negative differences act eastward. On the south wall of the plaza, positive pressures act inward and negative pressures act outward. Design pressures of ±30 psf on the glass wall and ±20 psf on the plaza south wall are adequate.

REFERENCES

1. Peterka, J. A. and J. E. Cermak, "Wind-Tunnel Study of Pet Pedestrian Plaza, St. Louis," Technical Report CER84-85JAP-JEC9 for Kuhlmann Design Group, Fluid Mechanics and Wind Engineering Program, Colorado State University, October 1984.

2. Cermak, J. E., "Laboratory Simulation of the Atmospheric Boundary Layer," AIAA Jl., Vol. 9, September 1971.

3. Cermak, J. E., "Applications of Fluid Mechanics to Wind Engineering," A Freeman Scholar Lecture, ASME Jl. of Fluids Engineering, Vol. 97, No. 1, March 1975.

4. Cermak, J. E., "Aerodynamics of Buildings," Annual Review of Fluid Mechanics, Vol. 8, pp. 75-106, 1976.

5. American National Standards Institute, Inc. "Minimum Design Loads for Buildings and Other Structures," ANSI A58.1 - 1982.

6. Hollister, S. C., "The Engineering Interpretation of Weather Bureau Records for Wind Loading on Structures," Building Science Series 30--Wind Loads on Buildings and Structures, National Bureau of Standards, pp. 151-164, 1970.

FIGURES

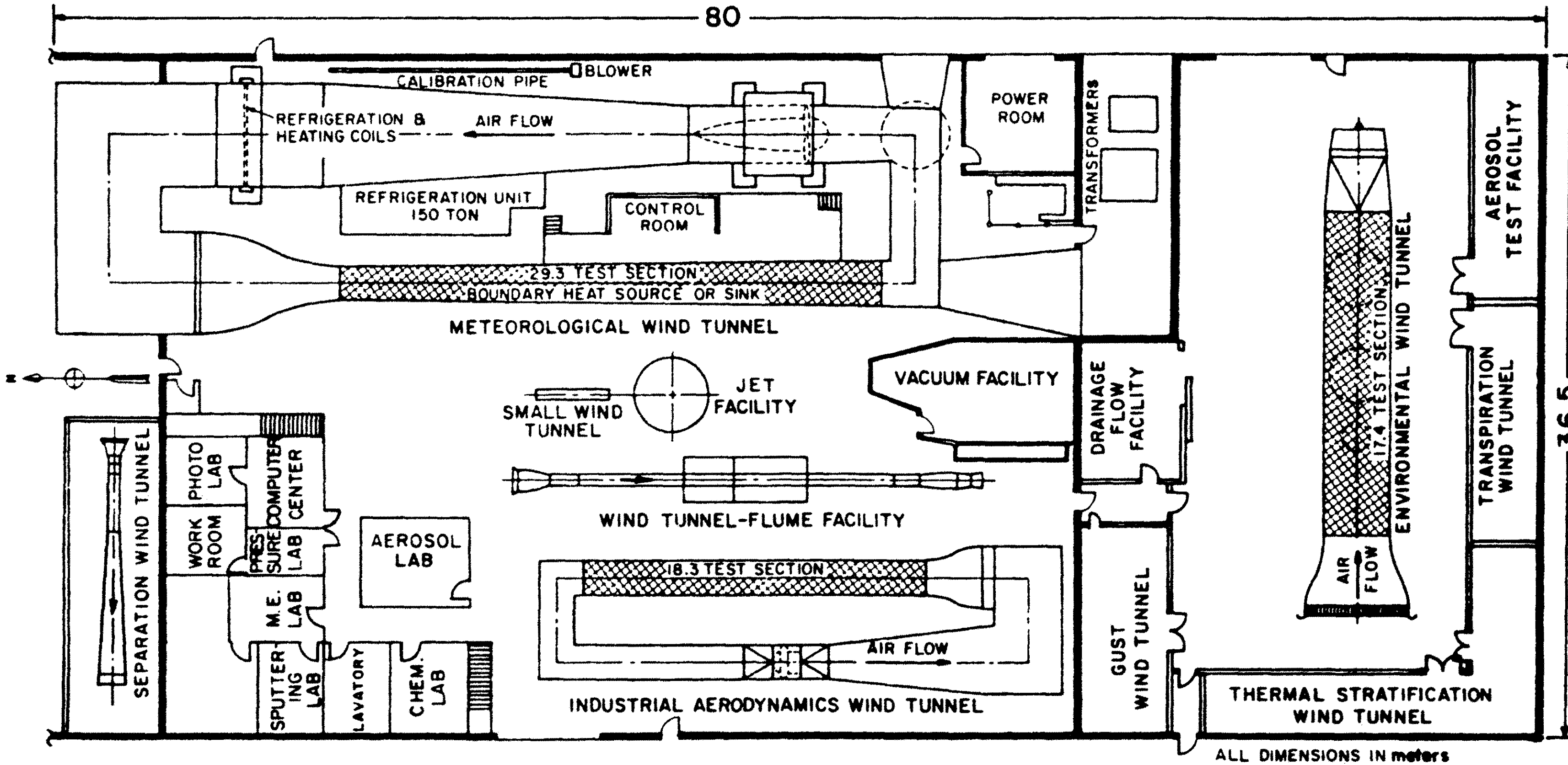
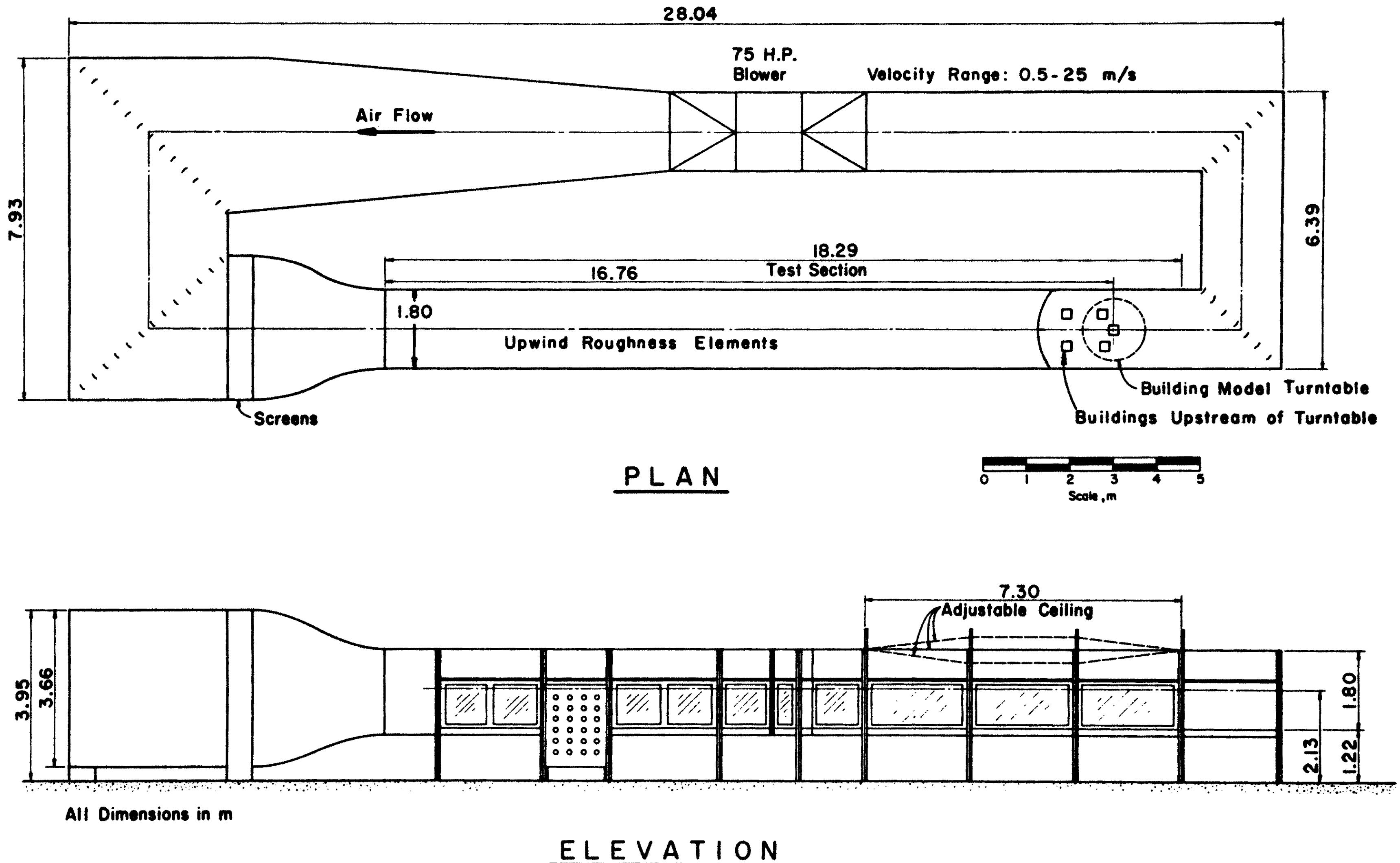


Figure 1. Fluid Dynamics and Diffusion Laboratory, Colorado State University



INDUSTRIAL AERODYNAMICS WIND TUNNEL

Figure 2 - Wind Tunnel Configuration

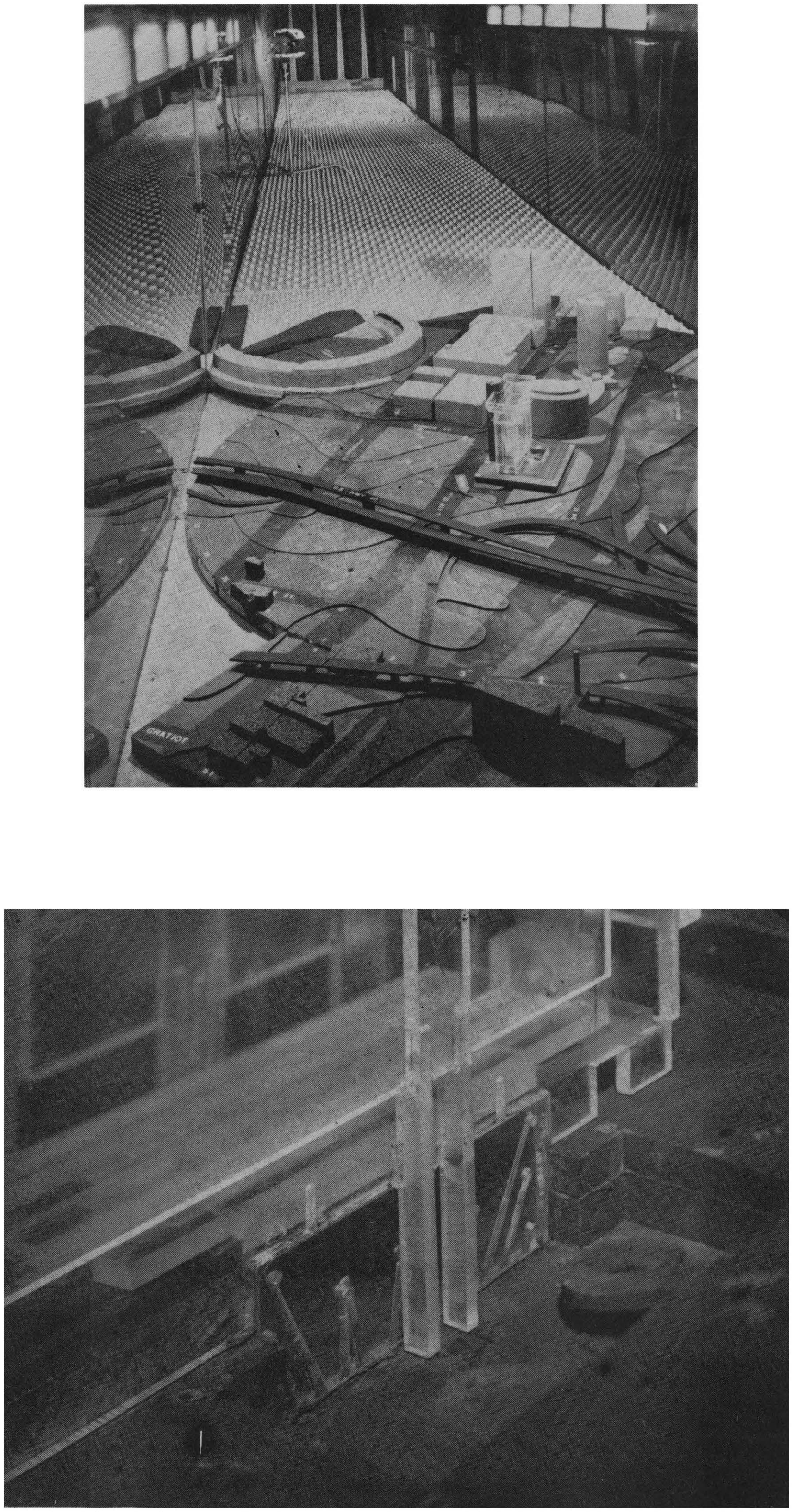


Figure 3. Completed Model in Wind Tunnel

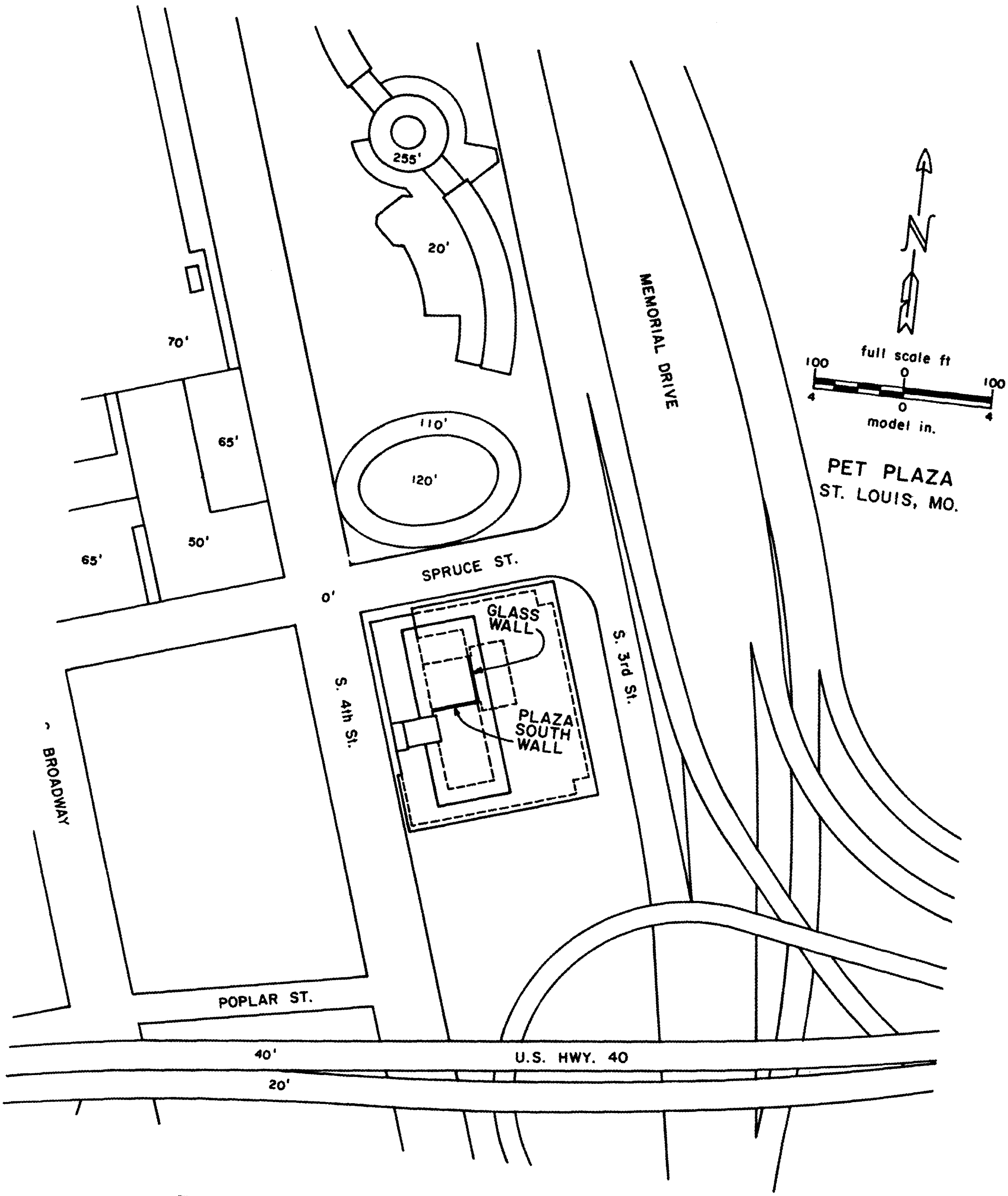
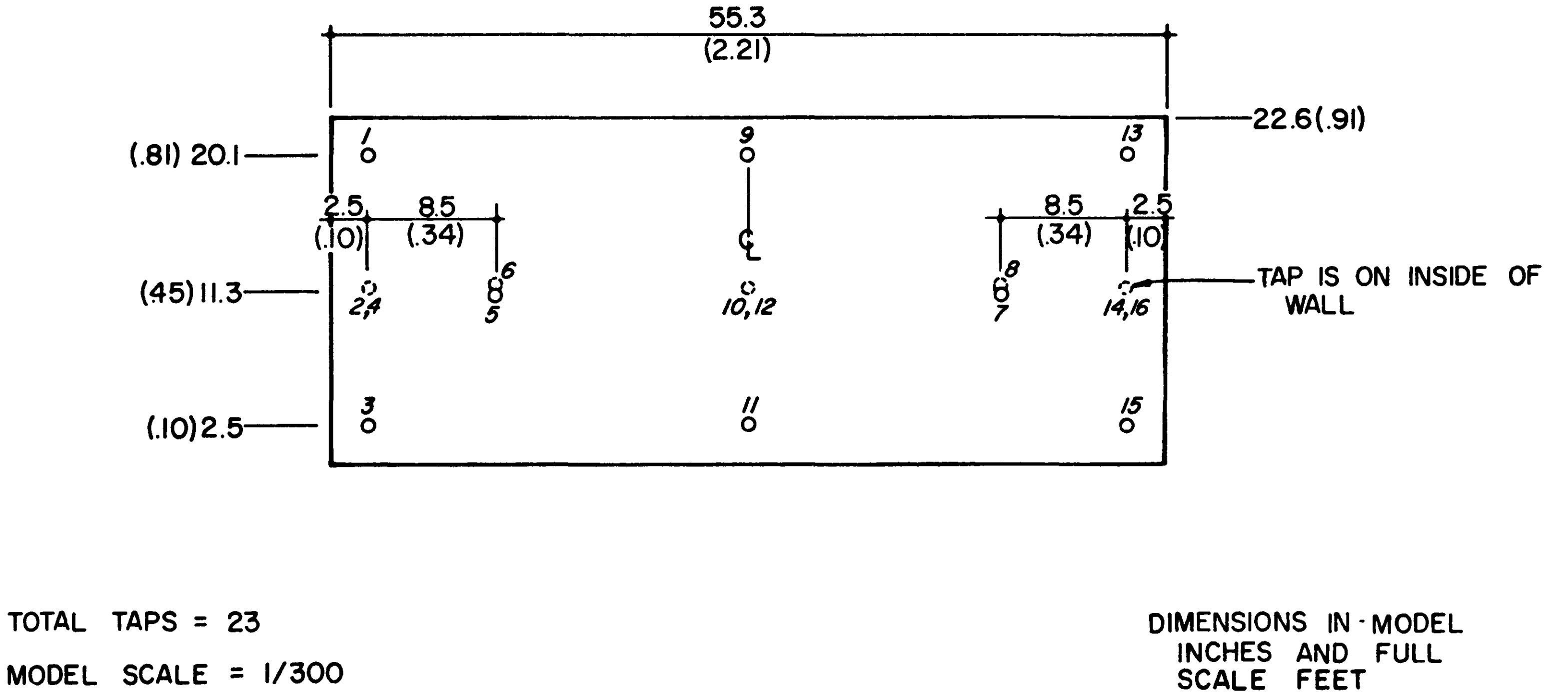
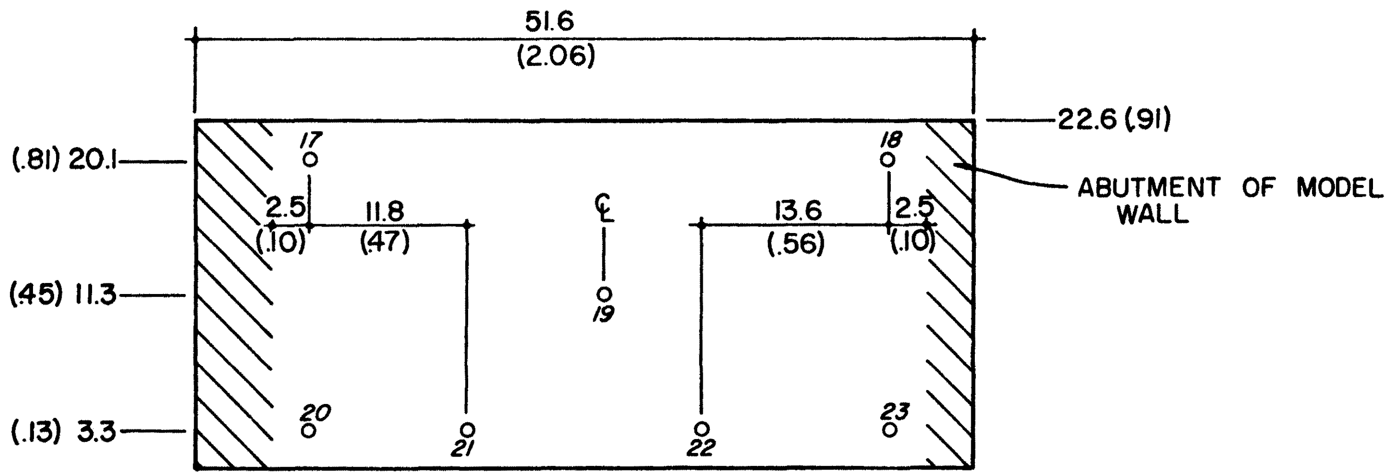


Figure 4. Site Plan Showing Building Location



EAST ELEVATION VIEW OF GLASS WALL

Figure 5a. Pressure Tap Locations



NORTH ELEVATION VIEW OF PLAZA SOUTH WALL

Figure 5b. Pressure Tap Locations

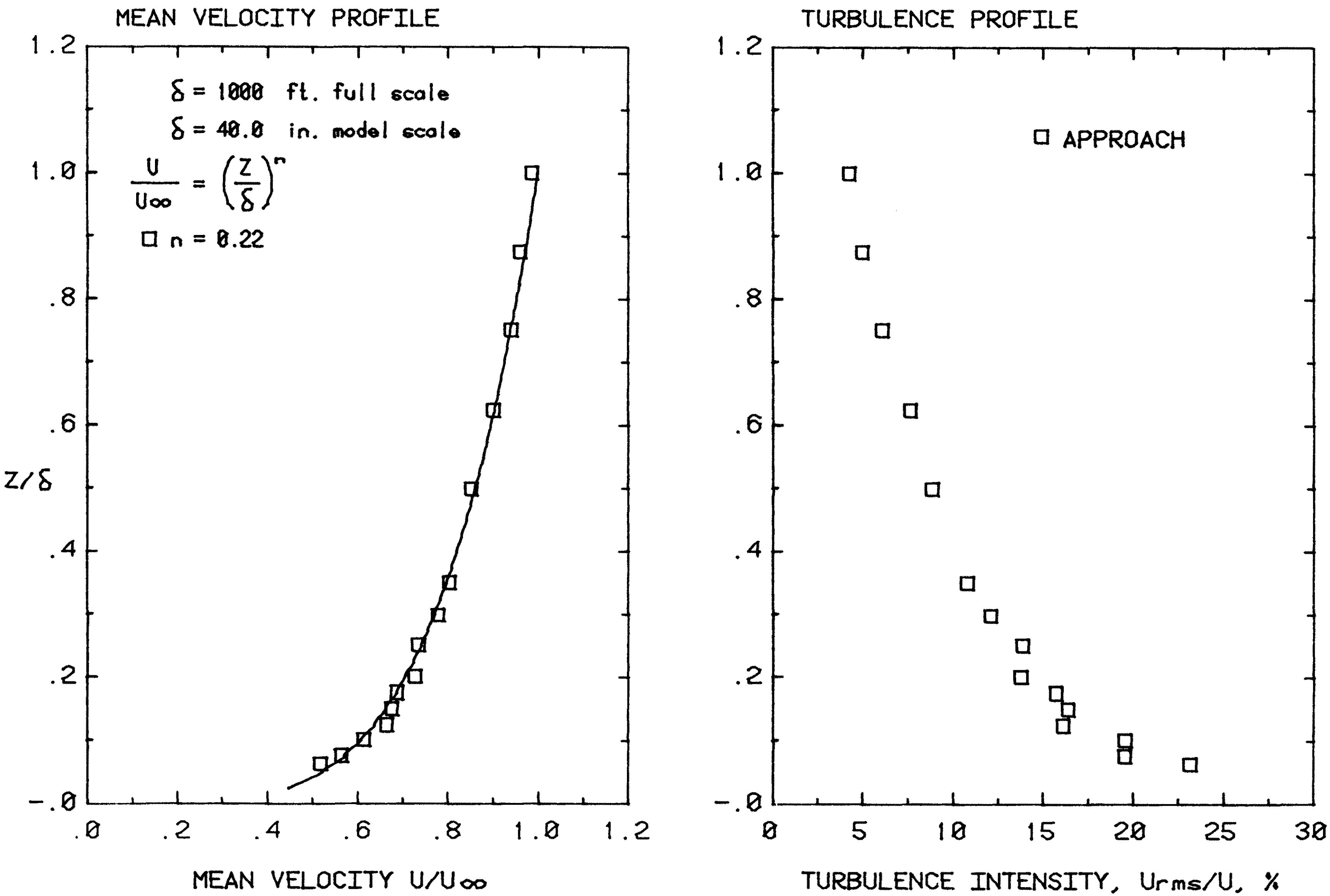
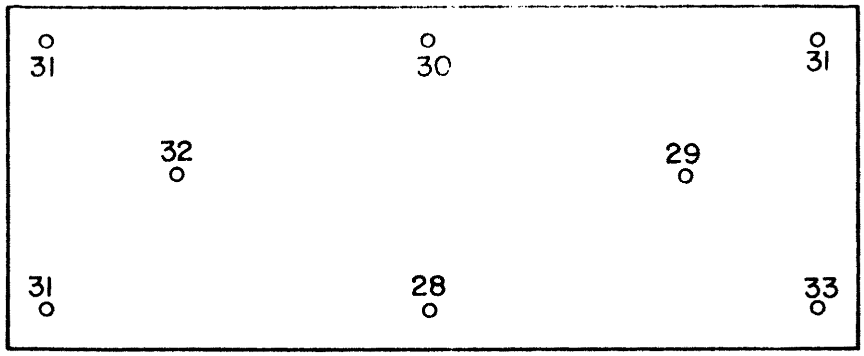
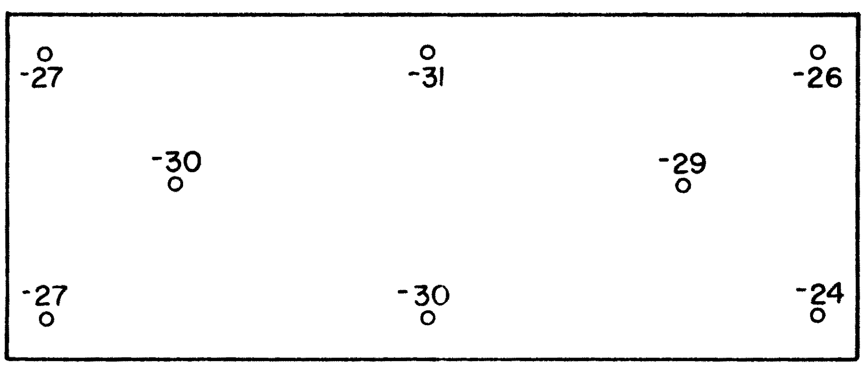


Figure 6. Mean Velocity and Turbulence Profiles Approaching the Model



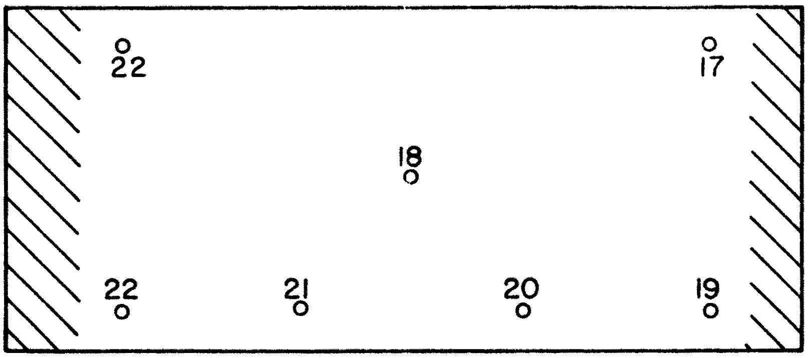
POSITIVE
(WESTWARD ACTING)
PRESSURE



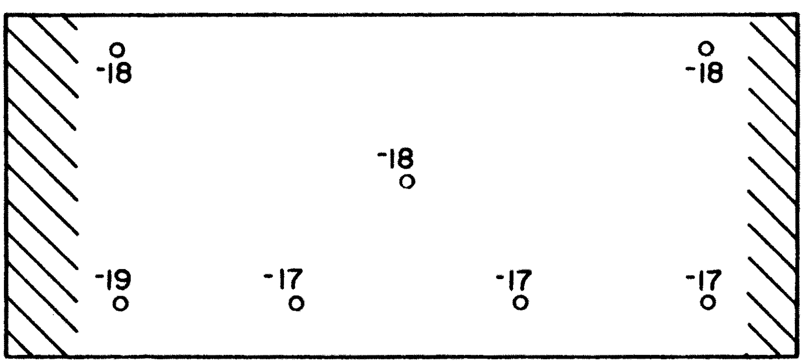
NEGATIVE
(EASTWARD ACTING)
PRESSURE

EAST ELEVATION VIEW OF GLASS WALL
PRESSURE DIFFERENCE ACROSS WALL IN PSF

Figure 7a. Peak Cladding Loads for a 50-Year Recurrence Wind



POSITIVE PRESSURE



NEGATIVE PRESSURE

NORTH ELEVATION VIEW OF PLAZA SOUTH WALL
LOCAL CLADDING PRESSURES IN PSF

Figure 7b. Peak Cladding Pressures for a 50-Year Recurrence Wind

TABLES

TABLE 1A. PEAK LOADS FOR CONFIGURATION A : PET-EAST OR WEST SIDE OF GLASS WALL AND ENTRY DOOR WALL
LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 22.0 PSF

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF	POSITIVE PEAK ---- PSF	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF	POSITIVE PEAK ---- PSF	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF	POSITIVE PEAK ---- PSF
1	320	-.94	-20.6	17.5	9	320	-.97	-21.2	20.0	17	250	.98	-17.4	21.6
2	270	.82	-15.9	18.1	10	260	.86	-16.6	19.0	18	60	-.78	-17.2	17.0
3	80	.91	-19.9	20.1	11	60	.71	-13.6	15.5	19	260	.80	-17.3	17.5
4	270	.84	-16.1	18.5	12	260	.88	-16.8	19.3	20	250	.97	-19.0	21.4
5	320	-.78	-17.2	16.8	13	320	-.87	-19.1	15.5	21	300	.92	-16.9	20.3
6	260	.93	-16.3	20.4	14	60	-.82	-18.1	15.8	22	300	.89	-16.6	19.5
7	50	.78	-15.4	17.1	15	80	.83	-16.0	18.3	23	270	.86	-16.6	19.0
8	260	.91	-16.8	20.0	16	60	-.83	-18.3	16.1					

TABLE 1A. PEAK LOADS FOR CONFIGURATION A : NET-PRESSURE DIFFERENCE ACROSS GLASS WALL
LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 22.0 PSF

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (---- PSF ----)	POSITIVE PEAK (---- PSF ----)	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (---- PSF ----)	POSITIVE PEAK (---- PSF ----)	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (---- PSF ----)	POSITIVE PEAK (---- PSF ----)
1	60	1.37	-27.8	30.2	7	60	1.30	-28.1	28.7	13	50	1.40	-25.8	30.7
3	60	1.41	-27.4	30.9	9	270	-1.41	-31.0	30.0	15	70	1.48	-24.0	32.5
5	60	1.42	-30.1	31.3	11	270	-1.33	-29.2	28.0					

TABLE 2

CALCULATION OF REFERENCE PRESSURE

1. Basic wind speed from ANSI A58.1-1982

   50-yr fastest mile at 33 ft = 70 mph

   Mean hourly wind speed = $\frac{70}{1.25}$ = 56.0 mph

   Mean hourly gradient wind speed = 56.0 $(\frac{960}{33})^{.17}$ = 99.3 mph

   Mean hourly wind at ref location U_∞ = 99.3 $(\frac{825}{1200})^{.22}$ = 91.4 mph

   Reference pressure = 0.5 $\rho U_\infty^{\ 2}$ = (0.00256) $(91.4)^2$ = 21.4 psf

   Use reference pressure = <u>22 psf</u>

2. Loads for 100-yr recurrence wind:

   Multiply 50-yr loads by 1.15

APPENDIX A

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
0	1	.105	.057	.351	-.048
0	2	-.253	.059	-.071	-.455
0	3	.270	.101	.652	.043
0	4	-.232	.061	-.066	-.465
0	5	.139	.064	.432	-.016
0	6	-.270	.066	.063	-.531
0	7	.226	.079	.563	.045
0	8	-.336	.078	-.070	-.674
0	9	.091	.050	.325	-.038
0	10	-.286	.061	-.111	-.524
0	11	.147	.052	.339	.018
0	12	-.284	.063	-.104	-.527
0	13	.232	.089	.591	.037
0	14	-.378	.074	-.129	-.654
0	15	.219	.080	.555	.035
0	16	-.376	.076	-.123	-.656
0	17	-.249	.074	.042	-.525
0	18	-.239	.070	.074	-.502
0	19	-.249	.073	.035	-.523
0	20	-.270	.080	.041	-.561
0	21	-.247	.072	.057	-.583
0	22	-.247	.068	.054	-.549
0	23	-.259	.069	.037	-.589
10	1	.167	.066	.434	-.014
10	2	-.334	.053	-.197	-.519
10	3	.297	.103	.699	.046
10	4	-.333	.054	-.192	-.524
10	5	.199	.072	.520	.027
10	6	-.354	.062	-.185	-.569
10	7	.273	.089	.675	.097
10	8	-.413	.073	-.235	-.728
10	9	.163	.064	.440	.003
10	10	-.369	.059	-.174	-.585
10	11	.201	.061	.414	.035
10	12	-.367	.060	-.167	-.590
10	13	.270	.087	.618	.046
10	14	-.434	.075	-.253	-.722
10	15	.251	.082	.554	.057
10	16	-.432	.076	-.246	-.730
10	17	-.309	.061	-.135	-.544
10	18	-.308	.059	-.113	-.535
10	19	-.326	.062	-.120	-.551
10	20	-.346	.066	-.158	-.633
10	21	-.319	.063	-.103	-.603
10	22	-.335	.060	-.126	-.635
10	23	-.352	.061	-.129	-.678
20	1	.206	.075	.518	.027
20	2	-.357	.048	-.235	-.518
20	3	.299	.098	.628	.089
20	4	-.355	.049	-.231	-.519

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
20	5	.212	.075	.497	.029
20	6	-.363	.052	-.179	-.560
20	7	.281	.085	.585	.078
20	8	-.390	.056	-.231	-.590
20	9	.195	.071	.497	-.012
20	10	-.390	.051	-.246	-.547
20	11	.236	.063	.409	.059
20	12	-.386	.052	-.238	-.546
20	13	.277	.085	.699	.055
20	14	-.421	.056	-.273	-.610
20	15	.279	.081	.602	.084
20	16	-.416	.057	-.267	-.610
20	17	-.354	.052	-.184	-.559
20	18	-.346	.054	-.154	-.542
20	19	-.353	.051	-.187	-.529
20	20	-.371	.056	-.214	-.588
20	21	-.356	.056	-.199	-.578
20	22	-.361	.053	-.213	-.581
20	23	-.370	.053	-.225	-.597
30	1	.257	.087	.572	.012
30	2	-.389	.052	-.249	-.633
30	3	.306	.098	.693	.056
30	4	-.388	.054	-.249	-.640
30	5	.258	.085	.616	.062
30	6	-.394	.059	-.237	-.635
30	7	.315	.096	.721	.110
30	8	-.406	.062	-.231	-.665
30	9	.242	.064	.618	.042
30	10	-.401	.051	-.265	-.578
30	11	.273	.073	.514	.110
30	12	-.397	.052	-.260	-.574
30	13	.296	.093	.705	.060
30	14	-.431	.061	-.278	-.642
30	15	.317	.097	.766	.095
30	16	-.427	.062	-.272	-.644
30	17	-.382	.054	-.233	-.593
30	18	-.383	.053	-.206	-.596
30	19	-.383	.053	-.239	-.594
30	20	-.398	.059	-.240	-.631
30	21	-.389	.056	-.226	-.588
30	22	-.394	.054	-.256	-.571
30	23	-.399	.055	-.262	-.583
40	1	.297	.097	.722	.076
40	2	-.427	.057	-.274	-.703
40	3	.326	.097	.730	.120
40	4	-.426	.058	-.271	-.708
40	5	.288	.092	.602	.022
40	6	-.438	.063	-.295	-.693
40	7	.326	.097	.617	.085
40	8	-.435	.063	-.278	-.697

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
40	9	.280	.087	.651	.047
40	10	-.442	.054	-.274	-.650
40	11	.305	.075	.619	.124
40	12	-.438	.056	-.266	-.651
40	13	.326	.097	.691	.107
40	14	-.455	.060	-.263	-.700
40	15	.358	.103	.774	.142
40	16	-.450	.061	-.257	-.701
40	17	-.414	.059	-.267	-.646
40	18	-.422	.058	-.269	-.631
40	19	-.424	.058	-.283	-.669
40	20	-.442	.064	-.280	-.715
40	21	-.420	.058	-.270	-.630
40	22	-.429	.056	-.286	-.640
40	23	-.428	.056	-.285	-.660
50	1	.310	.098	.664	.087
50	2	-.449	.061	-.300	-.670
50	3	.338	.104	.697	.100
50	4	-.448	.063	-.295	-.675
50	5	.305	.094	.747	.087
50	6	-.456	.071	-.273	-.743
50	7	.325	.096	.779	.132
50	8	-.452	.071	-.270	-.763
50	9	.302	.094	.651	.089
50	10	-.466	.069	-.289	-.729
50	11	.323	.085	.603	.126
50	12	-.463	.070	-.286	-.731
50	13	.315	.099	.691	.058
50	14	-.475	.071	-.302	-.718
50	15	.359	.110	.766	.108
50	16	-.472	.072	-.291	-.722
50	17	-.432	.067	-.265	-.702
50	18	-.436	.068	-.289	-.702
50	19	-.443	.068	-.294	-.707
50	20	-.459	.075	-.279	-.715
50	21	-.454	.070	-.285	-.748
50	22	-.457	.069	-.291	-.734
50	23	-.458	.070	-.288	-.742
60	1	.348	.105	.668	.097
60	2	-.477	.065	-.308	-.703
60	3	.383	.113	.780	.106
60	4	-.477	.067	-.307	-.706
60	5	.349	.101	.690	.097
60	6	-.492	.070	-.270	-.740
60	7	.348	.100	.676	.103
60	8	-.488	.070	-.266	-.737
60	9	.311	.100	.908	.102
60	10	-.493	.070	-.247	-.755
60	11	.326	.087	.706	.136
60	12	-.489	.071	-.239	-.762

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
60	13	.306	.099	.706	.062
60	14	-.498	.071	-.301	-.824
60	15	.361	.108	.773	.095
60	16	-.496	.072	-.295	-.833
60	17	-.476	.069	-.248	-.792
60	18	-.482	.069	-.295	-.781
60	19	-.488	.068	-.303	-.787
60	20	-.506	.076	-.284	-.864
60	21	-.484	.074	-.272	-.768
60	22	-.488	.074	-.290	-.753
60	23	-.491	.075	-.301	-.752
70	1	.361	.109	.731	.131
70	2	-.432	.067	-.223	-.723
70	3	.396	.119	.813	.162
70	4	-.433	.069	-.218	-.731
70	5	.363	.106	.753	.138
70	6	-.454	.065	-.248	-.719
70	7	.333	.094	.713	.128
70	8	-.435	.067	-.240	-.686
70	9	.337	.098	.695	.107
70	10	-.446	.066	-.260	-.675
70	11	.349	.082	.635	.154
70	12	-.447	.067	-.259	-.674
70	13	.300	.101	.682	.080
70	14	-.426	.069	-.237	-.709
70	15	.366	.113	.770	.099
70	16	-.422	.071	-.229	-.713
70	17	-.419	.072	-.220	-.665
70	18	-.432	.070	-.244	-.698
70	19	-.436	.069	-.260	-.706
70	20	-.458	.077	-.268	-.763
70	21	-.438	.066	-.234	-.672
70	22	-.440	.068	-.237	-.671
70	23	-.442	.068	-.227	-.712
80	1	.361	.112	.797	.099
80	2	-.405	.058	-.218	-.605
80	3	.397	.124	.914	.107
80	4	-.404	.059	-.212	-.616
80	5	.359	.107	.763	.117
80	6	-.418	.065	-.229	-.654
80	7	.311	.094	.702	.122
80	8	-.399	.065	-.210	-.655
80	9	.312	.098	.656	.063
80	10	-.402	.060	-.257	-.638
80	11	.326	.082	.577	.112
80	12	-.399	.061	-.251	-.641
80	13	.272	.091	.650	.052
80	14	-.404	.055	-.213	-.608
80	15	.366	.107	.831	.144
80	16	-.400	.057	-.200	-.611

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
80	17	-.389	.063	-.193	-.593
80	18	-.388	.060	-.222	-.578
80	19	-.398	.060	-.236	-.577
80	20	-.427	.068	-.214	-.636
80	21	-.402	.066	-.160	-.637
80	22	-.394	.065	-.141	-.628
80	23	-.389	.065	-.160	-.625
90	1	.312	.107	.771	.066
90	2	-.341	.050	-.195	-.542
90	3	.334	.115	.769	.083
90	4	-.341	.051	-.186	-.545
90	5	.320	.119	.724	.029
90	6	-.351	.060	-.177	-.558
90	7	.258	.096	.570	-.030
90	8	-.341	.060	-.168	-.556
90	9	.269	.099	.719	-.023
90	10	-.351	.050	-.208	-.538
90	11	.286	.084	.532	.098
90	12	-.348	.051	-.200	-.536
90	13	.223	.091	.565	.005
90	14	-.346	.049	-.199	-.560
90	15	.334	.119	.808	.079
90	16	-.342	.050	-.195	-.561
90	17	-.334	.058	-.114	-.560
90	18	-.328	.053	-.140	-.558
90	19	-.345	.054	-.182	-.537
90	20	-.372	.063	-.137	-.608
90	21	-.340	.060	-.164	-.581
90	22	-.335	.059	-.140	-.556
90	23	-.330	.058	-.135	-.556
100	1	.283	.101	.744	.053
100	2	-.306	.043	-.175	-.432
100	3	.272	.103	.721	.097
100	4	-.305	.044	-.172	-.430
100	5	.312	.089	.588	.022
100	6	-.322	.045	-.198	-.482
100	7	.213	.073	.476	-.018
100	8	-.314	.043	-.197	-.479
100	9	.181	.090	.525	-.094
100	10	-.316	.043	-.173	-.471
100	11	.239	.070	.448	-.090
100	12	-.314	.044	-.168	-.475
100	13	.175	.083	.534	-.059
100	14	-.312	.046	-.175	-.530
100	15	.376	.122	.773	.097
100	16	-.309	.047	-.170	-.529
100	17	-.298	.047	-.146	-.474
100	18	-.288	.043	-.143	-.455
100	19	-.311	.047	-.164	-.489
100	20	-.332	.053	-.161	-.520

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
100	21	-.314	.051	-.140	-.468
100	22	-.304	.050	-.123	-.468
100	23	-.299	.048	-.136	-.464
110	1	.269	.086	.613	.069
110	2	-.286	.039	-.156	-.410
110	3	.258	.090	.601	.033
110	4	-.285	.040	-.151	-.413
110	5	.285	.094	.667	.058
110	6	-.295	.043	-.147	-.440
110	7	.200	.077	.469	-.014
110	8	-.285	.042	-.139	-.435
110	9	.177	.081	.504	-.094
110	10	-.287	.040	-.180	-.431
110	11	.226	.061	.437	.056
110	12	-.285	.041	-.175	-.433
110	13	.175	.073	.476	-.055
110	14	-.289	.041	-.140	-.415
110	15	.339	.111	.790	.078
110	16	-.286	.042	-.133	-.415
110	17	-.276	.044	-.102	-.444
110	18	-.269	.041	-.129	-.428
110	19	-.284	.043	-.134	-.474
110	20	-.306	.050	-.115	-.494
110	21	-.285	.045	-.048	-.433
110	22	-.277	.043	-.052	-.406
110	23	-.272	.043	-.048	-.435
120	1	.201	.066	.469	.049
120	2	-.282	.044	-.156	-.465
120	3	.168	.061	.361	.020
120	4	-.280	.045	-.152	-.470
120	5	.201	.062	.434	.038
120	6	-.289	.044	-.154	-.449
120	7	[illegible]	[illegible]	[illegible]	[illegible]
120	8	-.280	.046	-.130	-.428
120	9	.063	.060	.273	-.128
120	10	-.292	.046	-.118	-.447
120	11	.145	.042	.272	.044
120	12	-.289	.047	-.112	-.448
120	13	.071	.053	.269	-.084
120	14	-.287	.044	-.145	-.467
120	15	.289	.098	.679	.016
120	16	-.285	.045	-.137	-.470
120	17	-.269	.047	-.117	-.445
120	18	-.262	.045	-.129	-.417
120	19	-.272	.045	-.140	-.430
120	20	-.283	.052	-.132	-.459
120	21	-.278	.048	-.086	-.430
120	22	-.270	.046	-.082	-.422
120	23	-.267	.047	-.080	-.432
130	1	.132	.063	.401	-.012

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
130	2	-.249	.048	-.123	-.483
130	3	.099	.060	.328	-.029
130	4	-.249	.049	-.118	-.488
130	5	.142	.065	.395	-.010
130	6	-.268	.049	-.132	-.477
130	7	.053	.055	.272	-.128
130	8	-.257	.050	-.127	-.472
130	9	.004	.065	.262	-.204
130	10	-.255	.048	-.152	-.413
130	11	.085	.049	.257	-.029
130	12	-.263	.049	-.145	-.416
130	13	.028	.064	.248	-.202
130	14	-.257	.049	-.125	-.481
130	15	.220	.095	.595	.012
130	16	-.255	.050	-.122	-.486
130	17	-.246	.053	-.082	-.419
130	18	-.246	.051	-.100	-.413
130	19	-.254	.052	-.121	-.426
130	20	-.260	.057	-.106	-.454
130	21	-.253	.054	-.077	-.458
130	22	-.250	.052	-.086	-.459
130	23	-.250	.052	-.078	-.454
140	1	.052	.045	.222	-.143
140	2	-.198	.043	-.090	-.381
140	3	.018	.037	.164	-.127
140	4	-.197	.044	-.086	-.384
140	5	.065	.047	.268	-.058
140	6	-.211	.048	-.086	-.422
140	7	-.015	.034	.128	-.109
140	8	-.210	.050	-.079	-.436
140	9	-.066	.047	.082	-.262
140	10	-.215	.045	-.106	-.388
140	11	.019	.028	.108	-.047
140	12	-.213	.046	-.102	-.391
140	13	-.019	.038	.143	-.159
140	14	-.208	.043	-.106	-.379
140	15	.122	.068	.496	-.064
140	16	-.205	.044	-.099	-.384
140	17	-.204	.052	-.058	-.402
140	18	-.204	.050	-.049	-.395
140	19	-.209	.050	-.066	-.394
140	20	-.208	.054	-.061	-.409
140	21	-.212	.049	-.078	-.393
140	22	-.212	.047	-.081	-.393
140	23	-.211	.048	-.083	-.402
150	1	-.028	.040	.155	-.219
150	2	-.165	.038	-.053	-.288
150	3	-.045	.033	.092	-.176
150	4	-.164	.039	-.049	-.289
150	5	-.013	.040	.166	-.164
150	6	-.179	.040	-.080	-.350
150	7	-.048	.027	.051	-.134
150	8	-.184	.043	-.079	-.413
150	9	-.074	.036	.062	-.224
150	10	-.187	.038	-.090	-.338
150	11	-.028	.022	.055	-.110
150	12	-.184	.039	-.083	-.342
150	13	-.040	.036	.117	-.199
150	14	-.187	.038	-.069	-.331
150	15	.014	.052	.234	-.195
150	16	-.165	.039	-.063	-.333
150	17	-.161	.039	-.022	-.357
150	18	-.163	.039	-.027	-.340
150	19	-.166	.039	-.030	-.359
150	20	-.162	.039	-.026	-.344
150	21	-.164	.042	-.053	-.330
150	22	-.166	.041	-.062	-.329
150	23	-.170	.042	-.051	-.322
160	1	-.159	.085	.078	-.561
160	2	-.155	.045	-.050	-.346
160	3	-.144	.070	.046	-.477
160	4	-.154	.046	-.046	-.349
160	5	-.154	.080	.041	-.541
160	6	-.177	.048	-.030	-.373
160	7	-.119	.059	.035	-.421
160	8	-.195	.058	-.031	-.496
160	9	-.141	.087	.047	-.653
160	10	-.185	.051	-.062	-.405
160	11	-.142	.065	-.029	-.421
160	12	-.181	.052	-.053	-.406
160	13	-.117	.070	.067	-.417
160	14	-.199	.056	-.053	-.480
160	15	-.123	.070	.061	-.427
160	16	-.194	.057	-.042	-.485
160	17	-.158	.054	-.023	-.417
160	18	-.172	.058	-.021	-.444
160	19	-.158	.054	-.029	-.436
160	20	-.162	.054	-.021	-.435
160	21	-.155	.051	-.036	-.390
160	22	-.152	.051	-.018	-.405
160	23	-.166	.056	-.034	-.421
170	1	-.270	.085	-.022	-.570
170	2	-.255	.084	-.066	-.651
170	3	-.256	.074	-.052	-.526
170	4	-.252	.086	-.060	-.658
170	5	-.264	.081	-.011	-.618
170	6	-.262	.092	-.018	-.640
170	7	-.236	.065	-.039	-.530
170	8	-.273	.100	.046	-.677
170	9	-.291	.106	-.009	-.833
170	10	-.272	.095	-.064	-.610
170	11	-.284	.056	-.118	-.524
170	12	-.269	.097	-.056	-.620
170	13	-.241	.077	-.009	-.603
170	14	-.294	.095	-.084	-.722
170	15	-.255	.076	.007	-.569
170	16	-.290	.097	-.079	-.731
170	17	-.249	.094	-.000	-.688
170	18	-.273	.091	-.073	-.663
170	19	-.252	.091	-.011	-.666
170	20	-.256	.094	.005	-.692
170	21	-.253	.093	.013	-.601
170	22	-.256	.091	-.002	-.553
170	23	-.274	.093	-.049	-.601
180	1	-.303	.058	-.135	-.552
180	2	-.218	.103	.017	-.603
180	3	-.298	.052	-.149	-.505
180	4	-.219	.105	.021	-.616
180	5	-.304	.063	-.131	-.628
180	6	-.205	.096	-.019	-.621
180	7	-.286	.047	-.149	-.539
180	8	-.197	.115	.050	-.657
180	9	-.311	.071	-.139	-.753
180	10	-.218	.102	-.010	-.619
180	11	-.302	.040	-.191	-.458
180	12	-.216	.104	-.006	-.632
180	13	-.284	.053	-.100	-.604
180	14	-.220	.105	.039	-.603
180	15	-.293	.051	-.115	-.595
180	16	-.218	.108	.045	-.612
180	17	-.210	.115	.052	-.664
180	18	-.279	.099	-.069	-.689
180	19	-.239	.102	-.023	-.654
180	20	-.224	.114	.025	-.666
180	21	-.211	.106	.013	-.747
180	22	-.228	.091	-.035	-.756
180	23	-.255	.092	-.042	-.716
190	1	-.339	.045	-.185	-.531
190	2	-.135	.084	.084	-.516
190	3	-.334	.043	-.201	-.509
190	4	-.135	.086	.088	-.532
190	5	-.335	.044	-.209	-.526
190	6	-.138	.080	.048	-.503
190	7	-.313	.037	-.204	-.445
190	8	-.106	.099	.110	-.543
190	9	-.347	.050	-.181	-.615
190	10	-.140	.079	.095	-.521
190	11	-.340	.034	-.238	-.449
190	12	-.138	.081	.101	-.529
190	13	-.325	.047	-.190	-.500

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
190	14	-.117	.113	.271	-.478
190	15	-.333	.045	-.208	-.507
190	16	-.115	.115	.285	-.480
190	17	-.116	.097	.199	-.589
190	18	-.201	.087	.025	-.595
190	19	-.168	.083	.074	-.618
190	20	-.127	.099	.189	-.655
190	21	-.152	.086	.099	-.492
190	22	-.185	.076	.019	-.512
190	23	-.207	.083	-.003	-.513
200	1	-.353	.040	-.245	-.525
200	2	-.038	.074	.212	-.284
200	3	-.351	.038	-.244	-.502
200	4	-.037	.075	.212	-.292
200	5	-.366	.042	-.241	-.508
200	6	-.074	.074	.217	-.325
200	7	-.354	.040	-.259	-.492
200	8	-.029	.081	.305	-.340
200	9	-.351	.046	-.193	-.510
200	10	-.054	.075	.194	-.300
200	11	-.355	.035	-.257	-.472
200	12	-.052	.076	.205	-.306
200	13	-.352	.046	-.210	-.510
200	14	.007	.097	.315	-.309
200	15	-.357	.043	-.231	-.511
200	16	.010	.099	.328	-.315
200	17	-.024	.081	.352	-.285
200	18	-.103	.078	.221	-.354
200	19	-.084	.077	.240	-.324
200	20	-.040	.079	.323	-.299
200	21	-.053	.084	.251	-.394
200	22	-.086	.084	.210	-.447
200	23	-.095	.086	.208	-.487
210	1	-.348	.044	-.184	-.484
210	2	.065	.060	.325	-.103
210	3	-.348	.043	-.210	-.481
210	4	.064	.062	.327	-.109
210	5	-.354	.040	-.237	-.475
210	6	.048	.063	.275	-.139
210	7	-.358	.039	-.253	-.483
210	8	.083	.065	.334	-.114
210	9	-.353	.042	-.219	-.493
210	10	.058	.059	.266	-.135
210	11	-.358	.035	-.257	-.457
210	12	.057	.061	.273	-.143
210	13	-.343	.046	-.173	-.499
210	14	.125	.074	.411	-.082
210	15	-.346	.043	-.205	-.479
210	16	.125	.076	.423	-.087
210	17	.086	.066	.319	-.101

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
210	18	.028	.067	.266	-.196
210	19	.041	.066	.285	-.175
210	20	.072	.066	.309	-.127
210	21	.047	.070	.371	-.184
210	22	.027	.072	.352	-.239
210	23	.017	.073	.352	-.264
220	1	-.348	.042	-.214	-.509
220	2	.171	.077	.489	-.032
220	3	-.350	.041	-.232	-.523
220	4	.170	.078	.492	-.040
220	5	-.342	.041	-.244	-.481
220	6	.152	.078	.489	-.082
220	7	-.357	.043	-.232	-.551
220	8	.173	.078	.490	-.036
220	9	-.354	.047	-.209	-.540
220	10	.167	.076	.430	-.052
220	11	-.356	.033	-.279	-.467
220	12	.168	.077	.438	-.056
220	13	-.356	.045	-.222	-.534
220	14	.186	.073	.473	-.005
220	15	-.354	.042	-.232	-.510
220	16	.187	.074	.483	-.008
220	17	.167	.085	.555	-.082
220	18	.139	.083	.521	-.089
220	19	.145	.085	.520	-.098
220	20	.159	.087	.549	-.085
220	21	.144	.080	.487	-.074
220	22	.137	.079	.469	-.073
220	23	.133	.080	.467	-.096
230	1	-.346	.044	-.217	-.502
230	2	.238	.081	.516	.037
230	3	-.342	.043	-.224	-.500
230	4	.236	.083	.527	.029
230	5	-.349	.045	-.226	-.515
230	6	.233	.085	.552	.021
230	7	-.357	.046	-.228	-.502
230	8	.246	.087	.621	.045
230	9	-.350	.049	-.204	-.533
230	10	.238	.077	.602	.048
230	11	-.344	.038	-.249	-.465
230	12	.236	.079	.612	.043
230	13	-.341	.050	-.184	-.622
230	14	.237	.082	.552	.048
230	15	-.334	.047	-.198	-.594
230	16	.236	.083	.563	.045
230	17	.236	.092	.668	.014
230	18	.208	.081	.539	-.015
230	19	.210	.087	.553	-.022
230	20	.229	.092	.626	.009
230	21	.214	.082	.602	.025

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
230	22	.211	.079	.573	.028
230	23	.210	.080	.575	.025
240	1	-.324	.042	-.199	-.486
240	2	.264	.087	.657	.042
240	3	-.324	.042	-.196	-.496
240	4	.262	.089	.665	.038
240	5	-.326	.040	-.204	-.465
240	6	.261	.088	.761	.035
240	7	-.340	.042	-.230	-.502
240	8	.268	.089	.823	.045
240	9	-.348	.051	-.162	-.541
240	10	.285	.102	.659	.042
240	11	-.343	.040	-.245	-.496
240	12	.285	.104	.674	.038
240	13	-.338	.053	-.208	-.541
240	14	.249	.090	.641	.008
240	15	-.329	.047	-.207	-.511
240	16	.249	.092	.650	-.000
240	17	.266	.102	.736	.049
240	18	.230	.087	.616	.024
240	19	.219	.097	.662	-.153
240	20	.258	.100	.751	.036
240	21	.235	.096	.673	-.012
240	22	.228	.091	.652	-.051
240	23	.240	.098	.651	.001
250	1	-.332	.046	-.187	-.545
250	2	.332	.105	.789	.075
250	3	-.336	.047	-.194	-.558
250	4	.331	.107	.800	.069
250	5	-.327	.041	-.211	-.499
250	6	.336	.114	.839	.082
250	7	-.344	.043	-.241	-.500
250	8	.333	.116	.837	.083
250	9	-.350	.045	-.202	-.526
250	10	.348	.117	.769	.091
250	11	-.345	.035	-.239	-.448
250	12	.348	.120	.778	.085
250	13	-.339	.048	-.219	-.543
250	14	.301	.099	.719	.050
250	15	-.330	.042	-.205	-.511
250	16	.300	.101	.730	.049
250	17	.343	.122	.982	.078
250	18	.289	.103	.773	.057
250	19	.259	.111	.765	-.211
250	20	.325	.115	.972	.072
250	21	.320	.101	.671	.048
250	22	.314	.099	.648	.007
250	23	.345	.109	.802	.097
260	1	-.329	.045	-.127	-.494
260	2	.406	.114	.810	.123

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
260	3	-.334	.045	-.178	-.487
260	4	.406	.117	.820	.112
260	5	-.336	.045	-.212	-.498
260	6	.433	.127	.928	.102
260	7	-.357	.047	-.249	-.537
260	8	.426	.128	.910	.099
260	9	-.340	.054	-.151	-.546
260	10	.417	.131	.862	.107
260	11	-.337	.041	-.217	-.472
260	12	.417	.134	.877	.101
260	13	-.339	.053	-.219	-.570
260	14	.331	.100	.685	.111
260	15	-.330	.048	-.215	-.528
260	16	.330	.102	.692	.108
260	17	.410	.136	.927	.069
260	18	.340	.113	.771	.057
260	19	.305	.117	.796	-.092
260	20	.384	.127	.888	.062
260	21	.353	.115	.894	.102
260	22	.341	.110	.837	.093
260	23	.369	.118	.822	.101
270	1	-.334	.054	-.175	-.566
270	2	.347	.123	.822	.015
270	3	-.352	.057	-.187	-.576
270	4	.347	.126	.839	.004
270	5	-.325	.054	-.186	-.512
270	6	.341	.136	.897	-.015
270	7	-.352	.055	-.202	-.538
270	8	.334	.134	.828	-.010
270	9	-.359	.058	-.186	-.612
270	10	.349	.124	.757	.008
270	11	-.348	.042	-.224	-.501
270	12	.348	.127	.760	.002
270	13	-.344	.054	-.199	-.564
270	14	.289	.095	.640	.051
270	15	-.321	.046	-.196	-.501
270	16	.288	.097	.648	.044
270	17	.343	.124	.802	-.017
270	18	.281	.106	.768	-.003
270	19	.271	.114	.759	-.098
270	20	.324	.119	.783	-.032
270	21	.309	.132	.848	-.017
270	22	.309	.130	.802	-.008
270	23	.329	.142	.862	-.012
280	1	-.219	.032	-.119	-.326
280	2	.097	.077	.408	-.112
280	3	-.231	.034	-.136	-.354
280	4	.094	.079	.415	-.119
280	5	-.209	.031	-.098	-.345
280	6	.093	.082	.484	-.087

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
280	7	-.223	.032	-.109	-.333
280	8	.088	.082	.513	-.096
280	9	-.223	.041	-.098	-.427
280	10	.088	.076	.500	-.103
280	11	-.223	.029	-.138	-.357
280	12	.087	.078	.508	-.105
280	13	-.207	.037	-.087	-.345
280	14	.085	.082	.486	-.087
280	15	-.217	.033	-.119	-.333
280	16	.085	.084	.500	-.085
280	17	.125	.086	.475	-.111
280	18	.079	.080	.399	-.179
280	19	.073	.086	.402	-.166
280	20	.095	.090	.448	-.150
280	21	.088	.077	.395	-.109
280	22	.071	.073	.410	-.121
280	23	.080	.074	.430	-.119
290	1	-.209	.043	-.112	-.359
290	2	.210	.130	.681	-.079
290	3	-.219	.045	-.123	-.390
290	4	.209	.133	.693	-.086
290	5	-.201	.039	-.112	-.385
290	6	.182	.114	.715	-.066
290	7	-.203	.036	-.112	-.362
290	8	.172	.115	.762	-.057
290	9	-.206	.041	-.092	-.439
290	10	.182	.108	.572	-.066
290	11	-.205	.026	-.140	-.297
290	12	.182	.110	.584	-.066
290	13	-.198	.041	-.080	-.370
290	14	.146	.099	.480	-.052
290	15	-.201	.037	-.097	-.356
290	16	.146	.101	.490	-.057
290	17	.194	.126	.681	-.084
290	18	.157	.114	.594	-.095
290	19	.145	.116	.575	-.123
290	20	.185	.132	.771	-.109
290	21	.170	.122	.842	-.097
290	22	.166	.117	.818	-.095
290	23	.178	.125	.859	-.100
300	1	-.248	.052	-.106	-.554
300	2	.342	.117	.760	.047
300	3	-.258	.055	-.133	-.555
300	4	.342	.120	.771	.040
300	5	-.240	.047	-.119	-.448
300	6	.338	.125	.815	.003
300	7	-.236	.043	-.127	-.426
300	8	.328	.125	.756	-.001
300	9	-.241	.052	-.111	-.507
300	10	.332	.111	.811	.069

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
300	11	-.240	.034	-.158	-.353
300	12	.332	.114	.826	.064
300	13	-.242	.051	-.121	-.529
300	14	.296	.106	.654	.014
300	15	-.244	.048	-.133	-.490
300	16	.297	.108	.664	.010
300	17	.344	.139	.853	.010
300	18	.296	.123	.766	-.012
300	19	.283	.126	.771	-.042
300	20	.336	.142	.861	.003
300	21	.303	.130	.921	-.091
300	22	.300	.127	.888	-.096
300	23	.319	.134	.846	-.090
310	1	-.283	.066	-.111	-.595
310	2	.249	.121	.747	-.021
310	3	-.298	.069	-.123	-.631
310	4	.249	.124	.760	-.027
310	5	-.268	.058	-.128	-.554
310	6	.217	.107	.700	-.028
310	7	-.264	.055	-.134	-.532
310	8	.202	.107	.700	-.024
310	9	-.285	.081	-.096	-.891
310	10	.220	.111	.720	-.026
310	11	-.285	.053	-.161	-.513
310	12	.220	.114	.736	-.031
310	13	-.269	.060	-.083	-.512
310	14	.178	.087	.483	-.050
310	15	-.271	.055	-.096	-.513
310	16	.178	.089	.491	-.053
310	17	.230	.123	.780	-.049
310	18	.170	.104	.638	-.068
310	19	.150	.105	.623	-.109
310	20	.221	.129	.819	-.090
310	21	.185	.104	.645	-.173
310	22	.181	.102	.590	-.110
310	23	.209	.112	.713	-.123
320	1	-.274	.102	.055	-.938
320	2	.229	.098	.556	-.023
320	3	-.294	.105	.037	-.905
320	4	.227	.100	.565	-.027
320	5	-.290	.097	.032	-.784
320	6	.195	.089	.530	-.027
320	7	-.311	.095	.016	-.701
320	8	.183	.090	.521	-.073
320	9	-.315	.109	-.057	-.965
320	10	.186	.086	.543	-.032
320	11	-.321	.066	-.148	-.620
320	12	.186	.088	.550	-.038
320	13	-.317	.104	-.010	-.868
320	14	.174	.080	.446	-.040

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
320	15	-.314	.096	-.034	-.728
320	16	.174	.082	.454	-.042
320	17	.209	.101	.679	-.044
320	18	.163	.093	.633	-.067
320	19	.141	.095	.647	-.107
320	20	.204	.107	.679	-.062
320	21	.160	.091	.527	-.082
320	22	.161	.090	.512	-.091
320	23	.184	.099	.531	-.071
330	1	-.117	.059	.048	-.458
330	2	.079	.097	.580	-.107
330	3	-.121	.064	.107	-.464
330	4	.077	.100	.589	-.110
330	5	-.130	.062	.056	-.390
330	6	.080	.094	.476	-.100
330	7	-.159	.077	.044	-.538
330	8	.069	.092	.461	-.110
330	9	-.160	.091	.067	-.759
330	10	.090	.096	.425	-.113
330	11	-.162	.065	-.031	-.479
330	12	.089	.099	.430	-.119
330	13	-.159	.078	.088	-.623
330	14	.057	.075	.354	-.091
330	15	-.152	.068	.055	-.479
330	16	.054	.077	.360	-.097
330	17	.082	.093	.579	-.110

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
330	18	.055	.088	.421	-.122
330	19	.040	.091	.416	-.185
330	20	.066	.099	.572	-.148
330	21	.064	.095	.475	-.130
330	22	.063	.091	.456	-.124
330	23	.066	.095	.446	-.124
340	1	-.043	.043	.151	-.164
340	2	.023	.050	.234	-.100
340	3	-.028	.052	.260	-.159
340	4	.021	.051	.237	-.104
340	5	-.045	.041	.134	-.157
340	6	.005	.045	.189	-.120
340	7	-.043	.040	.113	-.208
340	8	-.016	.043	.151	-.137
340	9	-.052	.045	.229	-.331
340	10	-.009	.046	.205	-.138
340	11	-.046	.028	.077	-.214
340	12	-.008	.047	.210	-.142
340	13	-.052	.045	.128	-.213
340	14	-.016	.043	.218	-.131
340	15	-.047	.040	.130	-.176
340	16	-.015	.044	.224	-.135
340	17	.019	.056	.265	-.129
340	18	.003	.049	.229	-.127
340	19	.006	.050	.218	-.130
340	20	.017	.056	.264	-.131

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
340	21	.015	.057	.233	-.157
340	22	.005	.050	.196	-.151
340	23	-.001	.050	.201	-.144
350	1	.065	.058	.294	-.084
350	2	-.040	.055	.189	-.224
350	3	.119	.074	.419	-.059
350	4	-.041	.056	.195	-.231
350	5	.061	.060	.325	-.099
350	6	-.052	.055	.162	-.213
350	7	.105	.063	.335	-.080
350	8	-.085	.053	.140	-.290
350	9	.045	.058	.287	-.133
350	10	-.062	.051	.138	-.248
350	11	.064	.046	.214	-.043
350	12	-.062	.052	.149	-.251
350	13	.096	.074	.427	-.082
350	14	-.097	.057	.100	-.336
350	15	.096	.071	.375	-.072
350	16	-.096	.058	.107	-.343
350	17	-.036	.060	.217	-.215
350	18	-.046	.056	.237	-.226
350	19	-.036	.064	.235	-.214
350	20	-.043	.062	.214	-.224
350	21	-.032	.066	.251	-.224
350	22	-.034	.062	.242	-.235
350	23	-.044	.060	.208	-.306

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN	WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN	WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
0	1	.359	.092	.773	.100	60	5	.829	.149	1.424	.356	120	9	.361	.069	.636	.068
0	3	.534	.127	1.011	.147	60	7	.824	.147	1.302	.334	120	11	.448	.062	.664	.146
0	5	.429	.106	.861	.124	60	9	.809	.147	1.362	.350	120	13	.374	.072	.701	.027
0	7	.590	.125	1.108	.174	60	11	.828	.127	1.273	.317	120	15	.604	.127	1.115	.084
0	9	.390	.091	.711	.124	60	13	.828	.141	1.354	.299	130	1	.400	.085	.726	.174
0	11	.451	.088	.786	.140	60	15	.884	.150	1.404	.414	130	3	.376	.077	.653	.171
0	13	.586	.136	1.174	.203	70	1	.761	.140	1.265	.417	130	5	.406	.093	.765	.065
0	15	.576	.130	1.180	.185	70	3	.802	.149	1.401	.439	130	7	.313	.075	.598	.019
10	1	.470	.099	.876	.105	70	5	.770	.150	1.345	.428	130	9	.276	.079	.551	-.085
10	3	.607	.127	1.140	.297	70	7	.741	.141	1.275	.434	130	11	.370	.073	.613	-.011
10	5	.524	.103	.966	.190	70	9	.743	.146	1.269	.271	130	13	.295	.072	.574	.001
10	7	.667	.118	1.132	.265	70	11	.761	.126	1.121	.278	130	15	.510	.118	.938	.185
10	9	.503	.099	.889	.173	70	13	.759	.149	1.361	.321	140	1	.269	.064	.554	.022
10	11	.554	.090	.900	.255	70	15	.835	.162	1.478	.379	140	3	.249	.058	.516	-.018
10	13	.685	.141	1.200	.233	80	1	.731	.137	1.207	.409	140	5	.282	.072	.593	.087
10	15	.681	.133	1.113	.221	80	3	.767	.148	1.287	.432	140	7	.211	.060	.486	.011
20	1	.552	.102	1.049	.088	80	5	.770	.140	1.330	.379	140	9	.159	.056	.382	-.118
20	3	.649	.121	1.180	.183	80	7	.716	.128	1.138	.368	140	11	.256	.057	.474	-.008
20	5	.604	.101	.964	.214	80	9	.690	.130	1.227	.344	140	13	.200	.058	.440	.009
20	7	.718	.113	1.137	.266	80	11	.707	.109	1.102	.423	140	15	.357	.088	.739	.126
20	9	.588	.102	.923	.210	80	13	.666	.126	1.192	.258	150	1	.156	.052	.353	-.082
20	11	.632	.087	.927	.219	80	15	.768	.149	1.304	.402	150	3	.149	.045	.319	-.090
20	13	.708	.126	1.194	.166	90	1	.687	.144	1.290	.339	150	5	.160	.055	.381	-.021
20	15	.711	.120	1.159	.140	90	3	.716	.152	1.362	.362	150	7	.147	.047	.357	-.017
30	1	.643	.117	1.100	.360	90	5	.683	.139	1.259	.252	150	9	.125	.049	.311	-.069
30	3	.710	.122	1.180	.423	90	7	.616	.118	1.072	.222	150	11	.177	.043	.327	-.052
30	5	.654	.112	1.079	.312	90	9	.633	.120	1.047	.304	150	13	.156	.051	.353	-.082
30	7	.736	.123	1.163	.320	90	11	.662	.105	1.051	.392	150	15	.224	.069	.514	-.041
30	9	.647	.115	1.061	.196	90	13	.600	.117	1.049	.295	160	1	.004	.077	.264	-.350
30	11	.682	.099	1.045	.277	90	15	.731	.144	1.210	.365	160	3	.030	.066	.271	-.283
30	13	.748	.131	1.227	.233	100	1	.616	.117	1.059	.316	160	5	.039	.076	.307	-.331
30	15	.772	.132	1.248	.239	100	3	.619	.123	1.055	.324	160	7	.097	.070	.351	-.215
40	1	.722	.132	1.199	.397	100	5	.655	.123	1.167	.268	160	9	.055	.068	.296	-.329
40	3	.762	.133	1.235	.453	100	7	.560	.101	.965	.162	160	11	.063	.055	.278	-.127
40	5	.718	.127	1.129	.373	100	9	.493	.106	.851	.170	160	13	.096	.062	.371	-.117
40	7	.761	.130	1.179	.455	100	11	.558	.087	.855	.227	160	15	.103	.062	.398	-.133
40	9	.734	.127	1.166	.170	100	13	.482	.096	.987	.170	170	1	-.015	.109	.348	-.341
40	11	.765	.107	1.100	.294	100	15	.689	.136	1.196	.285	170	3	.008	.100	.350	-.286
40	13	.783	.135	1.284	.347	110	1	.561	.110	1.019	.240	170	5	.006	.113	.376	-.365
40	15	.825	.140	1.321	.423	110	3	.558	.109	1.046	.240	170	7	.062	.098	.464	-.248
50	1	.784	.142	1.299	.433	110	5	.570	.107	1.026	.149	170	9	-.006	.121	.402	-.514
50	3	.819	.147	1.335	.450	110	7	.480	.088	.884	.052	170	11	.010	.086	.309	-.307
50	5	.782	.143	1.334	.387	110	9	.442	.091	.776	.184	170	13	.063	.103	.482	-.320
50	7	.808	.142	1.234	.324	110	11	.508	.078	.799	.227	170	15	.057	.100	.426	-.290
50	9	.787	.135	1.251	.302	110	13	.427	.095	.830	.059	180	1	-.082	.106	.318	-.518
50	11	.814	.119	1.164	.366	110	15	.619	.133	1.135	.115	180	3	-.066	.101	.312	-.414
50	13	.783	.143	1.395	.254	120	1	.484	.085	.894	.150	180	5	-.062	.111	.414	-.358
50	15	.830	.155	1.438	.309	120	3	.461	.078	.817	.114	180	7	-.042	.115	.432	-.366
60	1	.828	.148	1.373	.275	120	5	.509	.100	.848	.163	180	9	-.076	.125	.363	-.634
60	3	.868	.157	1.406	.282	120	7	.412	.075	.662	.118	180	11	-.058	.102	.306	-.334

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN	WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN	WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
180	13	-.054	.113	.420	-.559	240	9	-.589	.116	-.278	-1.174	300	5	-.561	.164	-.109	-1.098
180	15	-.056	.110	.422	-.533	240	11	-.569	.111	-.288	-1.113	300	7	-.532	.163	-.084	-1.055
190	1	-.174	.090	.150	-.424	240	13	-.581	.121	-.254	-.991	300	9	-.553	.146	-.152	-1.053
190	3	-.158	.090	.156	-.433	240	15	-.558	.121	-.268	-.975	300	11	-.535	.134	-.189	-1.019
190	5	-.179	.086	.210	-.459	250	1	-.661	.131	-.331	-1.176	300	13	-.512	.142	-.159	-1.040
190	7	-.176	.096	.268	-.460	250	3	-.646	.133	-.328	-1.150	300	15	-.500	.142	-.133	-.996
190	9	-.180	.091	.266	-.467	250	5	-.661	.134	-.359	-1.191	310	1	-.532	.155	-.169	-1.144
190	11	-.166	.081	.232	-.387	250	7	-.655	.135	-.339	-1.114	310	3	-.531	.160	-.146	-1.178
190	13	-.194	.106	.183	-.564	250	9	-.691	.135	-.344	-1.161	310	5	-.488	.142	-.093	-1.044
190	15	-.195	.106	.179	-.558	250	11	-.666	.128	-.334	-1.116	310	7	-.457	.135	-.062	-.975
200	1	-.297	.077	.063	-.560	250	13	-.601	.115	-.346	-.967	310	9	-.491	.144	-.088	-1.129
200	3	-.283	.078	.082	-.535	250	15	-.575	.113	-.326	-.927	310	11	-.477	.121	-.161	-.954
200	5	-.273	.072	-.063	-.560	260	1	-.708	.148	-.347	-1.229	310	13	-.428	.128	-.122	-.890
200	7	-.295	.079	-.048	-.663	260	3	-.691	.149	-.343	-1.219	310	15	-.415	.128	-.090	-.878
200	9	-.286	.076	-.031	-.560	260	5	-.675	.157	-.270	-1.370	320	1	-.495	.170	-.086	-1.190
200	11	-.281	.074	-.034	-.562	260	7	-.665	.160	-.288	-1.278	320	3	-.501	.178	-.082	-1.163
200	13	-.334	.092	.028	-.666	260	9	-.722	.161	-.327	-1.285	320	5	-.497	.168	-.033	-1.279
200	15	-.329	.091	.051	-.647	260	11	-.696	.154	-.311	-1.191	320	7	-.503	.164	-.112	-1.211
210	1	-.397	.077	-.165	-.680	260	13	-.642	.135	-.340	-1.152	320	9	-.503	.163	-.091	-1.120
210	3	-.383	.077	-.150	-.667	260	15	-.615	.132	-.320	-1.090	320	11	-.498	.122	-.187	-1.000
210	5	-.379	.080	-.107	-.740	270	1	-.764	.142	-.335	-1.262	320	13	-.471	.154	-.082	-1.173
210	7	-.403	.084	-.171	-.777	270	3	-.762	.144	-.351	-1.246	320	15	-.456	.150	-.034	-1.023
210	9	-.391	.080	-.150	-.703	270	5	-.757	.142	-.363	-1.290	330	1	-.251	.161	.117	-.921
210	11	-.383	.075	-.205	-.671	270	7	-.750	.142	-.395	-1.231	330	3	-.248	.168	.144	-.955
210	13	-.466	.094	-.215	-.940	270	9	-.825	.163	-.288	-1.410	330	5	-.265	.160	.138	-1.041
210	15	-.453	.094	-.203	-.900	270	11	-.802	.149	-.328	-1.328	330	7	-.283	.176	.142	-1.082
220	1	-.457	.084	-.239	-.758	270	13	-.682	.128	-.348	-1.076	330	9	-.272	.184	.074	-1.127
220	3	-.442	.084	-.235	-.744	270	15	-.663	.125	-.342	-1.040	330	11	-.263	.142	.030	-.803
220	5	-.476	.095	-.267	-.914	280	1	-.221	.080	.010	-.508	330	13	-.290	.182	.083	-.942
220	7	-.496	.098	-.269	-.900	280	3	-.221	.083	.007	-.534	330	15	-.266	.173	.090	-.873
220	9	-.498	.094	-.256	-.822	280	5	-.229	.088	-.027	-.630	340	1	-.040	.064	.176	-.303
220	11	-.482	.088	-.265	-.778	280	7	-.232	.090	-.031	-.676	340	3	-.017	.069	.256	-.299
220	13	-.528	.096	-.303	-.865	280	9	-.232	.099	-.033	-.847	340	5	-.019	.063	.274	-.270
220	15	-.510	.095	-.286	-.833	280	11	-.218	.092	-.027	-.735	340	7	.003	.069	.343	-.299
230	1	-.567	.109	-.299	-.988	280	13	-.222	.081	-.029	-.615	340	9	-.017	.068	.317	-.354
230	3	-.550	.109	-.288	-.987	280	15	-.211	.079	-.022	-.600	340	11	-.003	.057	.195	-.236
230	5	-.570	.108	-.274	-.949	290	1	-.427	.134	-.057	-.847	340	13	-.014	.074	.255	-.487
230	7	-.581	.109	-.280	-.981	290	3	-.426	.135	-.061	-.856	340	15	-.002	.069	.282	-.345
230	9	-.592	.107	-.317	-1.001	290	5	-.404	.131	-.083	-.875	350	1	.115	.091	.436	-.216
230	11	-.563	.100	-.314	-.932	290	7	-.385	.129	-.049	-.867	350	3	.177	.101	.648	-.206
230	13	-.575	.104	-.310	-1.022	290	9	-.392	.135	-.068	-.897	350	5	.130	.093	.453	-.178
230	15	-.554	.102	-.293	-1.017	290	11	-.377	.126	-.093	-.814	350	7	.214	.098	.515	-.097
240	1	-.585	.118	-.271	-1.030	290	13	-.355	.119	-.063	-.774	350	9	.122	.084	.557	-.156
240	3	-.568	.120	-.260	-1.022	290	15	-.346	.119	-.057	-.789	350	11	.153	.070	.462	-.055
240	5	-.569	.121	-.302	-1.045	300	1	-.582	.158	-.198	-1.135	350	13	.205	.110	.602	-.085
240	7	-.568	.123	-.309	-1.062	300	3	-.578	.160	-.186	-1.160	350	15	.214	.104	.614	-.057