WIND-TUNNEL MODELLING OF HILL AND VEGETATION INFLUENCE ON WIND POWER AVAILABILITY

TASK 2: Winds Over Two Dimensional Hills

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1 INTRODUCTION

US Wind Power Corporation contracted Dr. Robert N. Meroney and Dr. David E. Neff of Colorado State University to forecast wind turbine power performance in forested regions. The primary focus being the potential power benefits of cutting trees near wind turbine sites located on a variety of hill shapes and slopes. This project consisted of three different studies (tasks), each being summarized in a separate report. Task 1 reviews the literature database on analytical, numerical and empirical models suitable for describing potential wind generation benefits in forested environments. Task 2, the subject the this report, uses a physical model (wind tunnel simulation) to estimate wind turbine power availability on two dimensional ridges with various forest clearings, ridge shapes and slopes. Task 3 physical models the complex topography of a potential wind turbine site area to determine the effect of forest clearing on wind turbine power availability for several hilltops within the site area.

This Task 2 report describes the experimental methodology and measurement results obtained in physical modeling a 200 foot high ridge (two dimensional) for a variety of forest clearings, tree heights, ridge shapes and slopes. A model scale of 1:1000 was chosen to be representative of the atmospheric boundary layer winds. Measurements of wind speed at several different heights above the hill crest were obtained for 96 different run conditions consisting of;

i) both triangular and sinusoidal ridge shapes,
ii) ridge slopes of 1:2, 1:3, 1:5 and 1:10,
iii) tree heights of 20, 40 and 60 feet, and
iv) forest clearings of no tree removal, highest tree top being level with hill top ground level, highest tree top being 100 feet lower than hill top ground level and all trees removed to the base of the hill.

These measured wind velocities are then normalized appropriately for comparative analysis of fractional speed ups and wind power availability.

2 EXPERIMENTAL SETUP

2.1 Model Specifications

Modeling 200 foot high ridges at a 1:1000 length scale ratio resulted in 6.1 centimeters (cm) high model ridges. Eight model ridges were constructed out of wood and plastic products, four sinusoidal and four triangular ridges at ridges slopes of 1:2, 1:3, 1:5 and 1:10 (height:half base). The full width of the 1:2, 1:3, 1:5 and 1:10 sloped ridges were 24.4, 36.6, 61.0 and 122.0 cm respectively. The wind tunnel into which these model ridges were placed limited all ridge lengths to 183 cm. The aspect ratio, i.e. ridge length to ridge full width, for each of these ridge slopes was 7.5, 5.0, 3.0 and 1.5. Figure 1 shows the cross sectional shapes of these eight model ridges.

The tree cover was simulated with an Astroturf product manufactured by Monsanto for door mats and walkways. The Astroturf, made of polyethylene, consisted of vertical bristle groups (8 bristles per group, group spacing of 1.14 cm), 1.8 cm tall, connected to flexible matting, 0.15 cm thick. At a length scale ratio of 1:1000 these 1.8 cm tall bristles are representative of the 60 foot tall trees. To simulate 40 and 20 foot tall trees sheep shears were use to cut these bristles down to 1.2 cm and 0.6 cm respectively. Figure 2 displays photographs of these three simulated forest models. Accurate multiple measurements of the three forest cover mats found that the mean tree heights were 23', 41' and 56' rather than the design heights of 20', 40' and 60'. The design heights of 20', 40' and 60' will be how these different forest covers are specified in this report.

Measurements of the percent open volume for these three forest covers were 63% for 20' trees, 82% for 40' trees and 89% for 60' trees. The bristle, which simulate the trees, on the matting were always perpendicular to the mat backing thus when the matting was stapled to the model ridge contour the simulated trees were not in a vertical position. Figure 3 shows a series of four drawings of the 60' trees on the 1:3 sloped sine ridge.

2.2 Wind Tunnel Configuration

The experiments were performed in the Meterological Wind Tunnel (MET) facility at Colorado State Unversity's Engineering Research Center. Figure 4 displays a schematic detailing the major features of this facility. This wind tunnel has a speed range of 0 to 40 m/s. The 9:1 contraction ratio upwind of the test section produces a stable, uniform flow with low turbulence (~0.1%). The test section length upwind (~20 meters) of the model site area has sufficient fetch for the natural development of simulated atmospheric boundary layer winds. The test section has a cross-sectional size of 183 cm x 183 cm. The model ridges were always 6.1 cm tall thus the wind tunnel flow blockage ratio was ~ 3.3 percent.

The MET's test section entrance did not have any turbulence conditioning spires. The initial twelve meters of the test section floor was covered with thin carpet type roughness, this was followed by six meters of Commercial Grade Astroturf with a bristle height of ~1.2 cm. These sections of ground roughness were present during all test measurements. Following these fixed ground roughness conditions, two tree height specific roughness mats of 183 cm wide by 152 cm long were placed end to end on the tunnel floor. The different model ridges were placed underneath and centered in-between these two mats. The placement of the model ridge and the downwind mat was adjusting dependent on the specific tree clearing on the ridge top being tested. Staples were used to insure that these roughness mats followed the surface contour of the different model ridges.

2.3 Velocity Profile Measurements

Pitot-static probes were used as a velocity standard during the calibration of the hot film velocity measurement system and to provide two reference velocity measurement points for each hot film measurement point within all vertical velocity profiles. The principles of operation of pitot-static probes are described in any fundamental text on fluid mechanics and will not be discussed in detail here. The operational relationship for these probes is $U = (2g_c\Delta P/\rho)^{1/2}$, where U = velocity, g_c = gravitational conversion constant, ΔP = difference between static and dynamic pressures, and ρ is the air density. The air density, ρ, is calculated from the ideal gas law and ΔP is measured using an electronic manometer.

Single-hot-film (TSI 1210 Sensor) measurements were used to document the longitudinal mean velocities and the longitudinal turbulence levels for all velocity profiles in this test program. During calibration the hot film probe voltage was recorded at several velocities covering the range of interest. These voltage-velocity (E,U) pairs are then regressed to the equation $E^2 = A + BU^c$ via a least squares approach for various assumed values of the exponent c. Convergence to the minimum residual error was accelerated by using the secant method to find the best new estimate for the exponent c.

The hot-film-probe was mounted on a vertical traverse and positioned over the desired profile location in the wind tunnel. The anemometer's output voltages was digitized and stored within an IBM AT® computer. This voltage time series was converted to a velocity time series using the

inverse of the calibration equation; $U = [(E^2 - A)/B]^{1/c}$. The velocity time series was then analyzed for pertinent statistical quantities, such as mean velocity and root-mean-square turbulent velocity fluctuations. The computer system moves the velocity probe to a vertical position, acquires and reduces the data, then moves on to the next vertical position, thus obtaining an entire vertical velocity profile automatically. Wind tunnel reference velocities, one at the top of each profile and one at an upwind location, (-200,15,6.1) cm, were obtained via a pitot-static probe for each hot film velocity measurement point. These reference velocities were used to normalize out any wind tunnel speed variations that existed between the different runs tested and during the acquisition of individual vertical profiles.

2.3.1 Error Statement

Pitot-static probe measurements have an absolute accuracy to within ±2 percent of the actual velocity. Test conditions within the wind tunnel were always maintained to within ±1.5 degrees centigrade and ±3 mmHg atmospheric pressure variation. This variation in test temperature and pressure along with analog to digital conversion errors results in a relative error in pitot probe measurements of less than ±1.0 percent.

The analytic curve fit between hot wire voltage and a velocity standard based on pitot probe measurements along with analog to digital conversion resulted in random errors of within ±1.0 percent. Testing temperature and pressure variations (similar to those stated above) on the hot wire measurement system resulted in random errors of ±2.3 percent. Thus the hot wire measurement system was accurate to within ±2.5 percent of the pitot probes reported velocity. Since all hot wire measurements are normalized by a pitot probe measurement over the same time record and the hot wire velocity was calibrated against the pitot probe, the pitot probes bias errors of ±2 percent of actual velocity does not affect the normalized velocity value.

The error introduced in a velocity measurement as the result of probe vertical positioning errors vary with the magnitude of the velocity gradient at the measurement location over the ridge. The velocity gradient is greatest at the lower measurement points thus this is where the resultant error in velocity would be the greatest. Absolute vertical positioning error was estimated to be ±1 mm. Surveying the data shows that the error in velocity due to random positioning errors of this magnitude is usually less than 1.5 percent but can be as high as 3 percent.

The total error in normalized velocity values is estimated to be less than ±2.9 percent for the majority of data values but can be as high as 3.8 percent for a few select low height values. When one cubes the velocity values to look at power changes these errors become ±8.7 and ±11.4 percent errors in power values respectively.

3 TEST PROGRAM SPECIFICATIONS

3.1 Model Validation Tests

To insure that the selected wind tunnel ridge model was accurate a series of model validation tests were performed prior to the requested model ridge measurements. Table 1 summarizes the run conditions for five different model validation and model reference test series. The A series tests the Reynolds number invariance of the wind tunnel flow field over the 60' simulated tree cover without the presence of the model ridge. The B series tests looks at the uniformity of the wind tunnel velocity profile for these same conditions in both the lateral and longitudinal directions. The C series

tests provides reference velocity profiles for the different tree heights tested (0', 20', 40' and 60') at the ridge crest location but without the model ridge present. The D series tests measure a series of velocity profiles, longitudinally down the wind tunnel, passing over a step change in roughness from simulated 60' tree cover to no tree cover conditions. The E series tests the Reynolds number invariance of the wind tunnel flow field over the 60' simulated tree cover with the 1:2 slope, triangular model ridge present.

3.2 Model Ridge Tests

Table 2 lists the run number and run conditions for the 96 requested model test conditions. These tests cover two hill shapes (triangular and sinusoidal), four hill slopes (1:2, 1:3, 1:5 and 1:10), three tree cover heights (20', 40' and 60') and four hilltop clearing configurations (all trees removed, highest tree top being 100 feet lower than hill top ground level, highest tree top being level with hill top ground level and no tree removal. Also listed in Table 2 are the distances along the ridge contour from the hill crest to the location of the simulated forest cover matting.

4 TEST PROGRAM DATA

4.1 Model Validation Velocity Profile Data (A To E Series)

Table 1 lists the specific run conditions for the velocity profiles obtained in the A through E test series. The wind speed and the profile positions, downwind and lateral, listed in this Table are in model units.

4.1.1 Approach Flow Reynolds Number Invariance Tests (A Series)

Table 3 summarizes the model velocity profiles obtained in the A test series, Runs A00 to A05. In Table 3, and subsequent tables of the similar type, the column labeled "Velocity @ 76.2 cm" is the pitot probe velocity measured 76.2 cm above ground level at the current profile position (alternatively, this column may be labeled "Velocity @ 30.5 cm" in which case the measurement height was 30.5 cm). The column labeled "Velocity @ 6.1 cm" is the pitot probe velocity measured 6.1 cm above ground level upwind ~200 cm of the location of the model ridge crest.

Table 4 displays both tabularly and graphically the comparisons of normalized velocity profiles and local turbulent intensity profiles for these six runs. The normalized height is the measurement height divided by a reference height of 30.5 cm (this is the equivalent of 305 meters in field units). The normalized velocity for this test series is defined as $(U_i/U_H)/(U_{ref1,i}/U_{ref1,H})$ where *ref1* indicates the pitot probe velocity at 76.2 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height and *H* indicates the velocities obtain while the hot film probe was at the height, $H = 30.5$ cm.

4.1.2 Wind Tunnel Flow Uniformity Tests (B Series)

4.1.2.1 Lateral Uniformity

Table 5 summarizes a series of velocity profiles obtained in the B test series, Runs B01 to B05, that were at different lateral positions in the wind tunnel. Table 6 displays both tabularly and graphically the comparisons of normalized velocity profiles and local turbulent intensity profiles for these runs. Normalized velocity for this test sequence is defined as $(U_i/U_{B03,H})/(U_{ref2,i}/U_{B03,ref2,i})$ where *B03* represents the velocity

profile obtain at tunnel centerline, *ref2* indicates the upwind pitot probe velocity at 6.1 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height and *H* indicates the velocities obtain while the hot film probe was at the height, $H = 30.5$ cm.

4.1.2.2 Longitudinal Uniformity

Table 7 summarizes a series of velocity profiles obtained in the B test series, Runs B06 to B10, that were at different longitudinal positions in the wind tunnel. Table 8 displays both tabularly and graphically the comparisons of normalized velocity profiles and local turbulent intensity profiles for these runs. Normalized velocity for this test sequence is defined as $(U_i/U_{B10,H})/(U_{ref2,i}/U_{B10,ref2,i})$ where *B10* represents the velocity profile obtain at model ridge crest position in the wind tunnel, *ref2* indicates the up-wind pitot probe velocity at 6.1 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height and *H* indicates the velocities obtain while the hot film probe was at the height, $H = 30.5$ cm. Run B06 was normalized by only its own velocity at height, *H,* since the traverse supporting the hot wire probe was up-wind of the *ref2* pitot probe, thus affecting its readings.

4.1.3 Tree Cover Reference Profile Tests (C Series)

Table 9 summarizes a series of velocity profiles obtained in the C test series, Runs C01 to C05, that document wind profiles over the different tree height simulation mats without the presents of the model ridge. Table 10 displays both tabularly and graphically the comparisons of normalized velocity profiles and local turbulent intensity profiles for these runs. Normalized velocity for this test sequence is defined as $(U_i/U_H)/(U_{ref1,i}/U_{ref1,H})$ where *ref1* indicates the pitot probe velocity at 30.5 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height and *H* indicates the velocities obtain while the hot film probe was at the height, $H = 30.5$ cm. Table 11 lists these profiles in field units scaled to a 10 m/s velocity at 305 meter height. Table 11 also shows the results of a regression analysis determining the equivalent field displacement height, d, roughness length, z_o, friction velocity, u_*, and power law index, p.

4.1.4 Tree Cover Change Reference Profiles (D Series)

Table 12 summarizes a series of velocity profiles obtained in the D test series, Runs D01 to D05, that document wind profiles over the different tree height simulation mats without the presents of the model ridge. Table 13 displays both tabularly and graphically the comparisons of normalized velocity profiles and local turbulent intensity profiles for these runs. Normalized velocity for this test sequence is defined as $(U_i/U_H)/(U_{ref1,i}/U_{ref1,H})$ where *ref1* indicates the pitot probe velocity at 76.2 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height and *H* indicates the velocities obtain while the hot film probe was at the height, $H = 30.5$ cm.

4.1.5 Model Ridge Reynolds Number Invariance Tests (E Series)

Table 14 summarizes the model velocity profiles obtained in the E test series, Runs E01 to E06. Table 15 displays both tabularly and graphically the comparisons of normalized velocity profiles and local turbulent intensity profiles for these six runs. Normalized velocity for this test series is defined as $(U_i/U_H)/(U_{ref1,i}/U_{ref1,H})$ where *ref1* indicates the pitot probe velocity at

30.5 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height and *H* indicates the velocities obtain while the hot film probe was at the height, *H* = 30.5 cm.

4.2 Model Ridge Velocity Profile Data (F To M Series)

Table 2 lists the specific run conditions for velocity profiles obtained over the 96 different model ridge setups used in the F through M test series. Included in this Table are the ground surface distances from the hill crest to the base of the nearest trees for each run condition.

4.2.1 Triangular Ridge With 1:2 Slope (F Series)

Table 16 lists the velocity profile data for the 20' high tree test cases, Runs F01 to F04. In Table 16, and subsequent tables of the similar type, the column labeled "Velocity @ 30.5 cm" is the pitot probe velocity measured 30.5 cm above ground level at the current profile position. The column labeled "Velocity @ 6.1 cm" is the pitot probe velocity measured 6.1 cm above ground level upwind ~200 cm of the location of the model ridge crest. The column labeled "Velocity Ratio" is the ratio of "Velocity @ 30.5 cm" divided by "Velocity @ 6.1 cm". Table 17 lists the velocity profile data for the 40' high tree test cases, Runs F05 to F08. Table 18 lists the velocity profile data for the 60' high tree test cases, Runs F09 to F12.

Table 19 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 20 displays both tabularly and graphically the comparisons of local turbulent intensity profiles. The normalized height is the measurement height divided by a reference height of 30.5 cm (this is the equivalent of 305 meters in field units). The normalized velocity in Table 19, and subsequent tables of the similar type in test series F through M, is defined as $(U_i/U_{ref1,i})$ where *ref1* indicates the pitot probe velocity at 30.5 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height.

4.2.2 Triangular Ridge With 1:3 Slope (G Series)

Table 21 lists the velocity profile data for the 20' high tree test cases, Runs G01 to G04. Table 22 lists the velocity profile data for the 40' high tree test cases, Runs G05 to G08. Table 23 lists the velocity profile data for the 60' high tree test cases, Runs G09 to G12. Table 24 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 25 displays both tabularly and graphically the comparisons of local turbulent intensity profiles.

4.2.3 Triangular Ridge With 1:5 Slope (H Series)

Table 26 lists the velocity profile data for the 20' high tree test cases, Runs H01 to H04. Table 27 lists the velocity profile data for the 40' high tree test cases, Runs H05 to H08. Table 28 lists the velocity profile data for the 60' high tree test cases, Runs H09 to H12. Table 29 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 30 displays both tabularly and graphically the comparisons of local turbulent intensity profiles.

4.2.4 Triangular Ridge With 1:10 Slope (I Series)

Table 31 lists the velocity profile data for the 20' high tree test cases, Runs I01 to I04. Table 32 lists the velocity profile data for the 40' high tree test cases, Runs I05 to I08. Table 33 lists the velocity profile data for the 60' high tree test cases, Runs I09 to I12. Table 34 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 35 displays both tabularly and graphically the comparisons of local turbulent intensity profiles.

4.2.5 Sinusoidal Ridge With 1:2 Slope (J Series)

Table 36 lists the velocity profile data for the 20' high tree test cases, Runs J01 to J04. Table 37 lists the velocity profile data for the 40' high tree test cases, Runs J05 to J08. Table 38 lists the velocity profile data for the 60' high tree test cases, Runs J09 to J12. Table 39 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 40 displays both tabularly and graphically the comparisons of local turbulent intensity profiles.

4.2.6 Sinusoidal Ridge With 1:3 Slope (K Series)

Table 41 lists the velocity profile data for the 20' high tree test cases, Runs K01 to K04. Table 42 lists the velocity profile data for the 40' high tree test cases, Runs K05 to K08. Table 43 lists the velocity profile data for the 60' high tree test cases, Runs K09 to K12. Table 44 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 45 displays both tabularly and graphically the comparisons of local turbulent intensity profiles.

4.2.7 Sinusoidal Ridge With 1:5 Slope (L Series)

Table 46 lists the velocity profile data for the 20' high tree test cases, Runs L01 to L04. Table 47 lists the velocity profile data for the 40' high tree test cases, Runs L05 to L08. Table 48 lists the velocity profile data for the 60' high tree test cases, Runs L09 to L12. Table 49 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 50 displays both tabularly and graphically the comparisons of local turbulent intensity profiles.

4.2.8 Sinusoidal Ridge With 1:10 Slope (M Series)

Table 51 lists the velocity profile data for the 20' high tree test cases, Runs M01 to M04. Table 52 lists the velocity profile data for the 40' high tree test cases, Runs M05 to M08. Table 53 lists the velocity profile data for the 60' high tree test cases, Runs M09 to M12. Table 54 displays both tabularly and graphically the comparisons of normalized velocity profiles for these runs. Table 55 displays both tabularly and graphically the comparisons of local turbulent intensity profiles.

5 TEST PROGRAM RESULTS

5.1 Model Validation Velocity Profile Results (A To E Series)

5.1.1 Approach Flow Reynolds Number Invariance Tests (A Series)

The graphs associated with Table 4 indicate that Reynolds number invariance in the approach flow existed for all velocities tested in this series with the possible exception of the lowest velocity test case, Run A00. It was decided that good model similarity would exist when the upwind pitot probe, at a height of 6.1 cm, registered a velocity of ~500 cm/s.

5.1.2 Wind Tunnel Flow Uniformity Tests (B Series)

5.1.2.1 Lateral Uniformity

The graphs associated with Table 6 indicate that the lateral uniformity in mean velocity profiles was ~6 percent at height, $H = 30.5$ cm. Since all test measurements for this entire study were to be at only one lateral position this lateral uniformity was considered acceptable. The lateral uniformity in turbulent intensity, particularly at the lower measurement heights, was good.

5.1.2.2 Longitudinal Uniformity

The graphs associated with Table 8 indicate that the longitudinal uniformity in mean velocity profiles was ~2 percent at height, $H = 30.5$ cm. The change in simulated forest cover matting from the fixed commercial Astroturf to the moveable 60' tree height Astroturf roughness at -152 cm is noticeable in both the mean velocity and turbulent intensity profiles at lower heights.

5.1.3 Tree Cover Reference Profile Tests (C Series)

The graphs associated with Table 10 and the values of the regression parameters in Table 11 indicate that the upwind, fixed commercial Astroturf matting was representative of ~30' high trees. The displacement heights were typically around 0.71 times the tree height. The roughness lengths vary from 0.11 m, for no trees, to 1.98 m, for 60' trees. The power law index vary from 0.19, for no trees, up to 0.32, for the 60' trees.

5.1.4 Tree Cover Change Reference Profiles (D Series)

The graphs associated with Table 13 show the progressive wind speed increase and turbulence decrease as the result of going from a simulated 60' tree cover out to a area where trees have been removed. This series of tests indicates the wind power generation benefit obtained by upwind clear cutting when located on flat terrain.

5.1.5 Model Ridge Reynolds Number Invariance Tests (E Series)

The graphs associated with Table 15 indicate that Reynolds number invariance in flow over 1:2 sloped triangular ridge existed for all velocities tested. It was decided that good model similarity would exist for all model ridges when the upwind pitot probe, at a height of 6.1 cm, registered a velocity of ~500 cm/s.

5.2 Model Ridge Velocity Profile Results (F To M Series)

5.2.1 Normalized Velocity Profile Comparisons

Table 56 presents a comparison of normalized velocity profile results for all the triangular shaped ridges. Table 57 presents a comparison of normalized velocity profile results for all the sinusoidal shaped ridges. Normalized velocity profile results for the reference profile tests (C series) are presented at the bottom of Table 57. These tables, 56 and 57, are just a representation of the velocity normalization data Tables 19, 24, 29, 34, 39, 44, 49 and 54 but the normalized height is scale to field values. This velocity normalization was defined as $(U_i/U_{ref1,i})$ where *ref1* indicates the pitot probe velocity at 30.5 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height.

5.2.2 Fractional Speed Up Factor Comparisons

Table 58 presents a comparison of percent fractional speed up factor profile results for all the triangular shaped ridges. Table 59 presents a comparison of percent fractional speed up factor profile results for all the sinusoidal shaped ridges. The percent fractional speed up factor was defined as $[\{(U_i/U_{ref2,i})/(U_{Cxx,i}/U_{Cxx,ref2,i})\}-1]*100$ where *Cxx* represents the appropriate reference profile (same tree height without the ridge present) in the C test series, *ref2* indicates the upwind pitot probe velocity at 6.1 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height.

5.2.3 Percent Power Decrease Comparisons

Table 60 presents a comparison of percent power decrease over full clear-cut option profile results for all the triangular shaped ridges. Table 61 presents a comparison of percent power decrease over full clear-cut option profile results for all the sinusoidal shaped ridges. The percent power decrease over full clear-cut option factor was defined as $[1-\{(U_i/U_{ref2,i})/(U_{Xxx,i}/U_{Xxx,ref2,i})\}^3]*100$ where *Xxx* represents the run number for the full clear-cut profile with the same ridge shape, ridge slope and tree height, *ref2* indicates the upwind pitot probe velocity at 6.1 cm height, *i* indicates the velocities obtain while the hot film probe was at a particular height.

Figures 5, 6 and 7 display bar charts of the percent power decrease results for a 40', 80' and 120' measurement heights respectively. Included in these figures are tables listing the data. The error bound for the power comparisons in these charts, as previously stated, is approximately ±10 percent. Trends seen within this error bound should only be consider lightly.

TABLES

USWP Task 2 Test Program

USW2_PRO.WK3 Sheet A: 02/18/93

Tunnel Boundary Layer Reynolds Number Invariance Tests

Run Number	Wind Speed @ 6.1 cm (cm/s)	Downwind Position (cm)	Lateral Position (cm)	Hill Shape	Hill Slope	Tree Height (ft)	Tree Cover
A00	231	0	0	No Hill	-	60	all trees
A01	311	0	0	No Hill	-	60	all trees
A02	413	0	0	No Hill	-	60	all trees
A03	533	0	0	No Hill	-	60	all trees
A04	626	0	0	No Hill	-	60	all trees
A05	728	0	0	No Hill	-	60	all trees

Tunnel Boundary Layer Uniformity Tests

Run Number	Wind Speed @ 6.1 cm (cm/s)	Downwind Position (cm)	Lateral Position (cm)	Hill Shape	Hill Slope	Tree Height (ft)	Tree Cover
B01	511	0	-30	No Hill	-	60	all trees
B02	506	0	-15	No Hill	-	60	all trees
B03	510	0	0	No Hill	-	60	all trees
B04	504	0	15	No Hill	-	60	all trees
B05	507	0	30	No Hill	-	60	all trees
B06	~491	-300	0	No Hill	-	60	all trees
B07	500	-200	0	No Hill	-	60	all trees
B08	503	-100	0	No Hill	-	60	all trees
B09	503	100	0	No Hill	-	60	all trees
B10	502	0	0	No Hill	-	60	all trees

Reference Profile Comparison Tests

Run Number	Wind Speed @ 6.1 cm (cm/s)	Downwind Position (cm)	Lateral Position (cm)	Hill Shape	Hill Slope	Tree Height (ft)	Tree Cover
C01	530	-200	0	No Hill	-	0	all trees
C02	521	0	0	No Hill	-	0	all trees
C03	510	0	0	No Hill	-	20	all trees
C04	498	0	0	No Hill	-	40	all trees
C05	518	0	0	No Hill	-	60	all trees

Step Roughness Change Tests

Run Number	Wind Speed @ 6.1 cm (cm/s)	Downwind Position (cm)	Lateral Position (cm)	Hill Shape	Hill Slope	Tree Height (ft)	Tree Cover
D01	491	-10	0	No Hill	-	60	all trees
D02	490	0	0	No Hill	-	60	all trees
D03	487	10	0	No Hill	-	60	all trees
D04	487	20	0	No Hill	-	60	all trees
D05	492	40	0	No Hill	-	60	all trees
D06	490	60	0	No Hill	-	60	all trees

Prototype Hill Reynolds Number Invariance Tests

Run Number	Wind Speed @ 6.1 cm (cm/s)	Downwind Position (cm)	Lateral Position (cm)	Hill Shape	Hill Slope	Tree Height (ft)	Tree Cover
E01	409	0	0	Triangular	1:2	0	no trees
E02	512	0	0	Triangular	1:2	0	no trees
E03	618	0	0	Triangular	1:2	0	no trees
E04	410	0	0	Triangular	1:2	60	all trees
E05	505	0	0	Triangular	1:2	60	all trees
E06	592	0	0	Triangular	1:2	60	all trees

TABLE 1 Model Validation Test Specifications

USWP Task 2 Test Program

USW2_PRO.WK3 Sheet B: 02/18/93

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clear Cut Option	Cut Dist. (ft)
F01	Triangle	1:2	20	all cut	448
F02	Triangle	1:2	20	-100' cut	302
F03	Triangle	1:2	20	hilltop cut	72
F04	Triangle	1:2	20	no cut	0
F05	Triangle	1:2	40	all cut	448
F06	Triangle	1:2	40	-100' cut	344
F07	Triangle	1:2	40	hilltop cut	118
F08	Triangle	1:2	40	no cut	0
F09	Triangle	1:2	60	all cut	448
F10	Triangle	1:2	60	-100' cut	371
F11	Triangle	1:2	60	hilltop cut	128
F12	Triangle	1:2	60	no cut	0
G01	Triangle	1:3	20	all cut	633
G02	Triangle	1:3	20	-100' cut	433
G03	Triangle	1:3	20	hilltop cut	112
G04	Triangle	1:3	20	no cut	0
G05	Triangle	1:3	40	all cut	633
G06	Triangle	1:3	40	-100' cut	476
G07	Triangle	1:3	40	hilltop cut	148
G08	Triangle	1:3	40	no cut	0
G09	Triangle	1:3	60	all cut	633
G10	Triangle	1:3	60	-100' cut	512
G11	Triangle	1:3	60	hilltop cut	187
G12	Triangle	1:3	60	no cut	0
H01	Triangle	1:5	20	all cut	1020
H02	Triangle	1:5	20	-100' cut	738
H03	Triangle	1:5	20	hilltop cut	213
H04	Triangle	1:5	20	no cut	0
H05	Triangle	1:5	40	all cut	1020
H06	Triangle	1:5	40	-100' cut	797
H07	Triangle	1:5	40	hilltop cut	282
H08	Triangle	1:5	40	no cut	0
H09	Triangle	1:5	60	all cut	1020
H10	Triangle	1:5	60	-100' cut	843
H11	Triangle	1:5	60	hilltop cut	305
H12	Triangle	1:5	60	no cut	0
I01	Triangle	1:10	20	all cut	2011
I02	Triangle	1:10	20	-100' cut	1499
I03	Triangle	1:10	20	hilltop cut	384
I04	Triangle	1:10	20	no cut	0
I05	Triangle	1:10	40	all cut	2011
I06	Triangle	1:10	40	-100' cut	1539
I07	Triangle	1:10	40	hilltop cut	509
I08	Triangle	1:10	40	no cut	0
I09	Triangle	1:10	60	all cut	2011
I10	Triangle	1:10	60	-100' cut	1575
I11	Triangle	1:10	60	hilltop cut	627
I12	Triangle	1:10	60	no cut	0

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clear Cut Option	Cut Dist. (ft)
J01	Sine	1:2	20	all cut	453
J02	Sine	1:2	20	-100' cut	292
J03	Sine	1:2	20	hilltop cut	128
J04	Sine	1:2	20	no cut	0
J05	Sine	1:2	40	all cut	453
J06	Sine	1:2	40	-100' cut	305
J07	Sine	1:2	40	hilltop cut	135
J08	Sine	1:2	40	no cut	0
J09	Sine	1:2	60	all cut	453
J10	Sine	1:2	60	-100' cut	338
J11	Sine	1:2	60	hilltop cut	154
J12	Sine	1:2	60	no cut	0
K01	Sine	1:3	20	all cut	640
K02	Sine	1:3	20	-100' cut	381
K03	Sine	1:3	20	hilltop cut	171
K04	Sine	1:3	20	no cut	0
K05	Sine	1:3	40	all cut	640
K06	Sine	1:3	40	-100' cut	440
K07	Sine	1:3	40	hilltop cut	217
K08	Sine	1:3	40	no cut	0
K09	Sine	1:3	60	all cut	640
K10	Sine	1:3	60	-100' cut	459
K11	Sine	1:3	60	hilltop cut	233
K12	Sine	1:3	60	no cut	0
L01	Sine	1:5	20	all cut	1026
L02	Sine	1:5	20	-100' cut	614
L03	Sine	1:5	20	hilltop cut	305
L04	Sine	1:5	20	no cut	0
L05	Sine	1:5	40	all cut	1026
L06	Sine	1:5	40	-100' cut	646
L07	Sine	1:5	40	hilltop cut	331
L08	Sine	1:5	40	no cut	0
L09	Sine	1:5	60	all cut	1026
L10	Sine	1:5	60	-100' cut	728
L11	Sine	1:5	60	hilltop cut	374
L12	Sine	1:5	60	no cut	0
M01	Sine	1:10	20	all cut	2011
M02	Sine	1:10	20	-100' cut	1247
M03	Sine	1:10	20	hilltop cut	646
M04	Sine	1:10	20	no cut	0
M05	Sine	1:10	40	all cut	2011
M06	Sine	1:10	40	-100' cut	1404
M07	Sine	1:10	40	hilltop cut	682
M08	Sine	1:10	40	no cut	0
M09	Sine	1:10	60	all cut	2011
M10	Sine	1:10	60	-100' cut	1476
M11	Sine	1:10	60	hilltop cut	791
M12	Sine	1:10	60	no cut	0

Notes: 1) Wind direction is always perpendicular to the 2D hill
2) Vertical profile location is always at hill crest, centertunnel
3) Vertical profile measurement heights are up to 30 cm

TABLE 2 Test Program Specifications

USWP Task 2 Test Results A Series Tests

USW_VELA.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run A00 No Hill; 60' Trees: B.L. Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	138	32.1	418	230
3.7	186	25.1	418	221
4.9	199	24.2	418	233
6.1	215	22.5	421	236
9.1	261	18.2	420	230
12.9	291	14.0	421	233
18.3	314	11.9	421	229
24.4	346	10.1	420	234
30.5	367	8.2	420	230
Average =			420	231

Velocity Profile Data
Run A01 No Hill; 60' Trees: B.L. Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	189	35.8	612	307
3.7	249	28.5	610	318
4.9	281	24.1	610	309
6.1	318	23.5	611	315
9.1	361	17.1	610	308
12.9	392	14.9	611	319
18.3	437	12.5	611	309
24.4	475	11.0	610	306
30.5	506	10.2	610	312
Average =			610	311

Velocity Profile Data
Run A02 No Hill; 60' Trees: B.L. Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	251	35.5	805	405
3.7	321	29.3	804	409
4.9	371	24.0	805	416
6.1	402	23.2	804	414
9.1	477	18.1	804	409
12.9	517	16.2	804	410
18.3	570	13.4	804	422
24.4	617	12.4	804	422
30.5	659	10.8	804	412
Average =			804	413

Velocity Profile Data
Run A03 No Hill; 60' Trees: B.L. Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	319	36.4	1032	541
3.7	415	29.2	1030	539
4.9	477	25.8	1029	523
6.1	505	24.1	1030	544
9.1	584	19.8	1030	533
12.9	648	16.3	1029	522
18.3	724	13.3	1029	529
24.4	789	11.6	1029	530
30.5	845	10.2	1029	537
Average =			1030	533

Velocity Profile Data
Run A04 No Hill; 60' Trees: B.L. Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	380	36.0	1222	625
3.7	486	28.8	1222	625
4.9	552	25.6	1221	632
6.1	628	22.6	1221	621
9.1	721	18.5	1220	617
12.9	795	15.5	1219	632
18.3	864	13.2	1218	615
24.4	948	11.3	1218	636
30.5	1011	9.5	1217	632
Average =			1220	626

Velocity Profile Data
Run A05 No Hill; 60' Trees: B.L. Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	429	36.4	1415	746
3.7	570	29.4	1415	746
4.9	651	25.4	1414	715
6.1	715	22.0	1413	720
9.1	823	20.2	1414	719
12.9	914	15.4	1413	715
18.3	1018	13.3	1415	727
24.4	1093	11.7	1411	728
30.5	1161	9.8	1411	734
Average =			1413	728

TABLE 3 Approach Flow Reynolds Number Invariance Test Data

USWP Task 2 Test Results A Series Tests

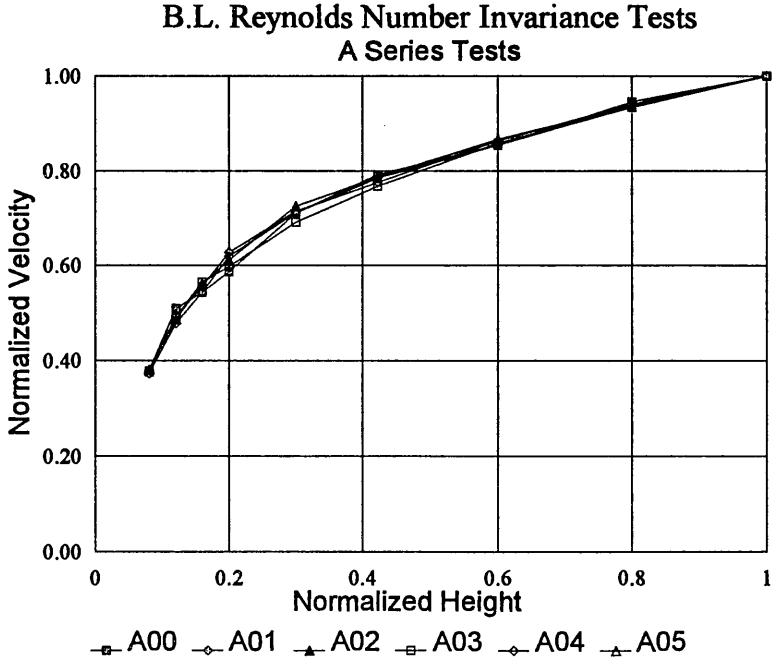
USW_VELA.WK3 Sheet B: 02/18/93

Velocity Profile Comparisons
No Hill; 60' Trees; B.L. Re# Tests

Height Norm.	Velocity Norm. A00	Velocity Norm. A01	Velocity Norm. A02	Velocity Norm. A03	Velocity Norm. A04	Velocity Norm. A05
0.08	0.38	0.37	0.38	0.38	0.37	0.37
0.12	0.51	0.49	0.49	0.49	0.48	0.49
0.16	0.54	0.56	0.56	0.57	0.54	0.56
0.20	0.59	0.63	0.61	0.60	0.62	0.62
0.30	0.71	0.71	0.72	0.69	0.71	0.71
0.42	0.79	0.77	0.79	0.77	0.78	0.79
0.60	0.85	0.86	0.87	0.86	0.85	0.87
0.80	0.94	0.94	0.94	0.93	0.94	0.94
1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ur@76.2cm =	420	610	804	1030	1220	1413
Ur@6.1cm =	231	311	413	533	626	728
Href (cm) =	30.5	30.5	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
No Hill; 60' Trees; B.L. Re# Tests

Height Norm.	Turb.Int. (%) A00	Turb.Int. (%) A01	Turb.Int. (%) A02	Turb.Int. (%) A03	Turb.Int. (%) A04	Turb.Int. (%) A05
0.08	32.1	35.8	35.5	36.4	36.0	36.4
0.12	25.1	28.5	29.3	29.2	28.8	29.4
0.16	24.2	24.1	24.0	25.8	25.6	25.4
0.20	22.5	23.5	23.2	24.1	22.6	22.0
0.30	18.2	17.1	18.1	19.8	18.5	20.2
0.42	14.0	14.9	16.2	16.3	15.5	15.4
0.60	11.9	12.5	13.4	13.3	13.2	13.3
0.80	10.1	11.0	12.4	11.6	11.3	11.7
1.00	8.2	10.2	10.8	10.2	9.5	9.8
Ur@76.2cm =	420	610	804	1030	1220	1413
Ur@6.1cm =	231	311	413	533	626	728
Href (cm) =	30.5	30.5	30.5	30.5	30.5	30.5



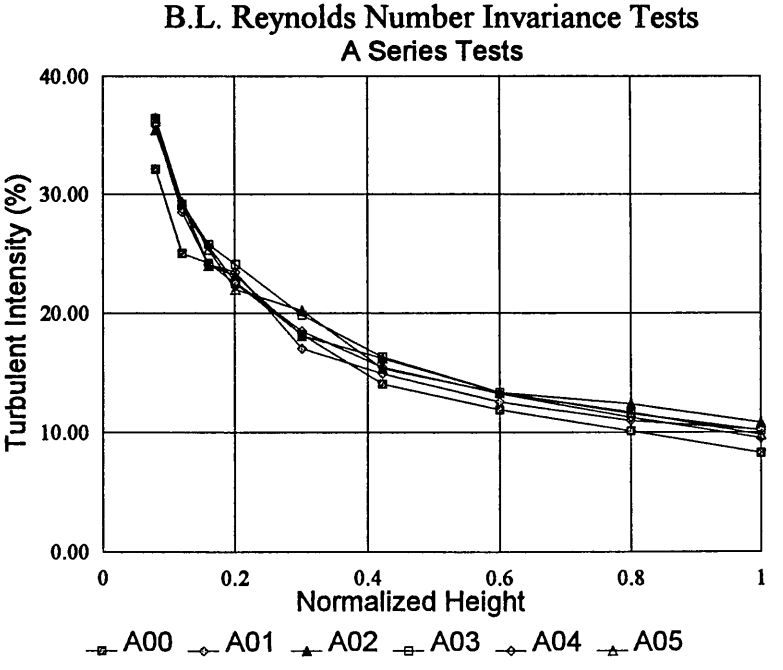


TABLE 4 Approach Flow Reynolds Number Invariance Test Results

USWP Task 2 Test Results B Series Tests

USW_VELB.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run B01 No Hill; 60' Trees; Lateral Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	294	38.1	916	512
3.7	396	29.7	915	515
4.9	475	26.1	916	512
6.1	527	23.7	916	518
9.1	616	18.6	915	511
12.9	690	14.7	914	505
18.3	762	12.0	916	511
24.4	822	10.2	914	511
30.5	873	8.0	915	506
Average =			915	511

Velocity Profile Data
Run B02 No Hill; 60' Trees; Lateral Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	314	35.3	981	502
3.7	396	29.0	981	505
4.9	462	25.8	981	505
6.1	504	23.1	981	507
9.1	582	19.0	982	507
12.9	648	15.9	980	503
18.3	713	13.2	980	511
24.4	781	10.8	980	507
30.5	835	9.0	982	510
Average =			981	506

Velocity Profile Data
Run B03 No Hill; 60' Trees; Lateral Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	305	35.9	988	526
3.7	394	29.1	987	504
4.9	456	25.4	987	511
6.1	491	23.9	987	504
9.1	565	19.6	985	507
12.9	625	15.9	984	507
18.3	693	13.7	988	513
24.4	756	11.5	987	512
30.5	802	10.4	985	502
Average =			986	510

Velocity Profile Data
Run B04 No Hill; 60' Trees; Lateral Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	269	36.3	918	504
3.7	361	29.3	921	504
4.9	421	25.9	921	506
6.1	452	23.5	916	500
9.1	522	20.8	915	500
12.9	594	16.6	915	512
18.3	645	13.8	917	496
24.4	716	12.1	916	511
30.5	770	10.9	915	501
Average =			917	504

Velocity Profile Data
Run B05 No Hill; 60' Trees; Lateral Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	285	37.1	905	517
3.7	390	29.6	904	501
4.9	463	25.1	903	499
6.1	514	23.6	904	507
9.1	593	19.0	904	501
12.9	660	16.3	904	501
18.3	725	12.4	903	508
24.4	776	11.1	904	514
30.5	820	9.6	903	507
Average =			904	506

TABLE 5 Wind Tunnel Lateral Uniformity Test Data

USWP Task 2 Test Results B Series Tests

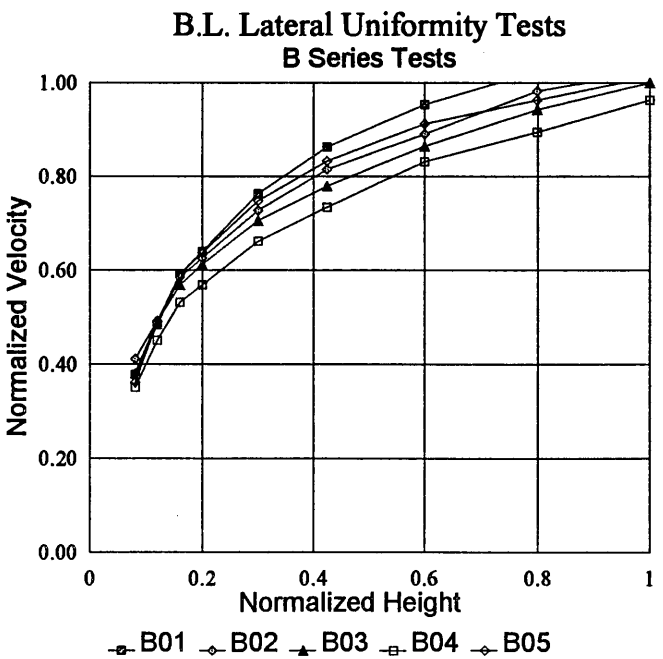
USW_VELB.WK3 Sheet B: 02/18/93

Velocity Profile Comparisons
No Hill; 60' Trees; Lateral Uniformity Test

Height Norm.	Velocity Norm. B01	Velocity Norm. B02	Velocity Norm. B03	Velocity Norm. B04	Velocity Norm. B05
0.08	0.38	0.41	0.38	0.35	0.36
0.12	0.48	0.49	0.49	0.45	0.49
0.16	0.59	0.58	0.57	0.53	0.59
0.20	0.64	0.63	0.61	0.57	0.64
0.30	0.76	0.73	0.70	0.66	0.75
0.42	0.86	0.81	0.78	0.73	0.83
0.60	0.95	0.89	0.86	0.83	0.91
0.80	1.02	0.98	0.94	0.89	0.96
1.00	1.08	1.03	1.00	0.96	1.01
Ur@76.2cm =	915	981	986	917	904
Ur@6.1cm =	511	506	510	504	506
Href (cm) =	30.5	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
No Hill; 60' Trees; Lateral Uniformity Test

Height Norm.	Turb.Int. (%) B01	Turb.Int. (%) B02	Turb.Int. (%) B03	Turb.Int. (%) B04	Turb.Int. (%) B05
0.08	38.1	35.3	35.9	36.3	37.1
0.12	29.7	29.0	29.1	29.3	29.6
0.16	26.1	25.8	25.4	25.9	25.1
0.20	23.7	23.1	23.9	23.5	23.6
0.30	18.6	19.0	19.6	20.8	19.0
0.42	14.7	15.9	15.9	16.6	16.3
0.60	12.0	13.2	13.7	13.8	12.4
0.80	10.2	10.8	11.5	12.1	11.1
1.00	8.0	9.0	10.4	10.9	9.6
Ur@76.2cm =	915	981	986	917	904
Ur@6.1cm =	511	506	510	504	506
Href (cm) =	30.5	30.5	30.5	30.5	30.5



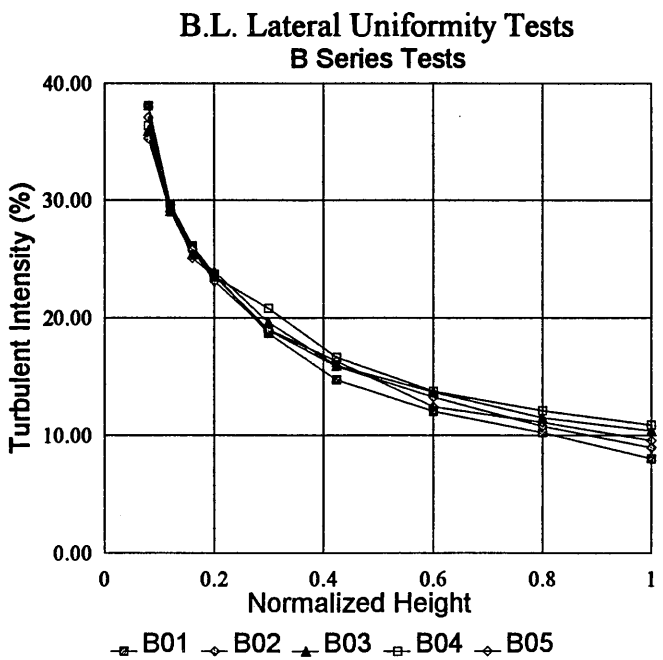


TABLE 6 Wind Tunnel Lateral Uniformity Test Results

USWP Task 2 Test Results B Series Tests

USW_VELB.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run B06 No Hill; 60' Trees; Longitudinal Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	314	31.9	960	~491
3.7	393	26.3	960	~491
4.9	460	22.3	960	~491
6.1	487	21.5	959	~491
9.1	558	18.2	958	~491
12.9	614	15.5	959	~491
18.3	682	13.6	958	~491
24.4	742	11.3	960	~491
30.5	799	9.4	958	~491
Average =			959	~491

Velocity Profile Data
Run B07 No Hill; 60' Trees; Longitudinal Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	338	28.2	992	493
3.7	412	23.6	991	494
4.9	477	22.5	992	497
6.1	513	19.7	991	504
9.1	570	18.0	990	504
12.9	635	15.0	992	491
18.3	693	13.3	992	512
24.4	750	11.9	992	502
30.5	812	9.7	991	500
Average =			991	500

Velocity Profile Data
Run B08 No Hill; 60' Trees; Longitudinal Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	289	37.4	983	510
3.7	388	28.3	983	501
4.9	454	23.0	983	504
6.1	493	21.2	982	506
9.1	573	17.6	981	501
12.9	629	15.4	981	510
18.3	695	13.5	983	497
24.4	751	11.5	980	505
30.5	800	10.0	978	494
Average =			982	503

Velocity Profile Data
Run B09 No Hill; 60' Trees; Longitudinal Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	290	35.8	983	498
3.7	372	29.1	984	497
4.9	437	25.7	983	502
6.1	467	23.7	984	512
9.1	546	19.6	983	500
12.9	606	17.1	983	505
18.3	670	14.9	982	509
24.4	737	12.1	982	504
30.5	786	10.9	982	502
Average =			983	503

Velocity Profile Data
Run B10 No Hill; 60' Trees; Longitudinal Uniformity Test

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	264	40.9	983	507
3.7	366	31.7	981	504
4.9	418	27.5	982	499
6.1	484	23.6	983	496
9.1	544	20.1	983	498
12.9	636	16.5	982	500
18.3	694	13.7	983	505
24.4	753	11.7	982	510
30.5	800	10.8	982	498
Average =			982	502

TABLE 7 Wind Tunnel Longitudinal Uniformity Test Data

USWP Task 2 Test Results B Series Tests

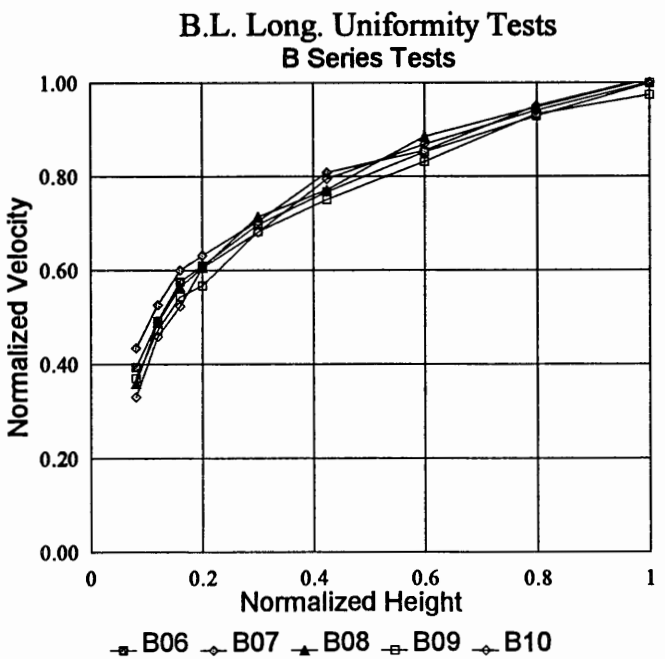
USW_VELB.WK3 Sheet B: 02/18/93

Velocity Profile Comparisons
No Hill; 60' Trees; Longitudinal Uniformity Test

Height Norm.	Velocity Norm. B06	Velocity Norm. B07	Velocity Norm. B08	Velocity Norm. B09	Velocity Norm. B10
0.08	0.39	0.43	0.36	0.37	0.33
0.12	0.49	0.53	0.49	0.47	0.46
0.16	0.57	0.60	0.56	0.54	0.52
0.20	0.61	0.63	0.60	0.57	0.61
0.30	0.70	0.70	0.71	0.68	0.68
0.42	0.77	0.81	0.77	0.75	0.79
0.60	0.85	0.85	0.88	0.83	0.87
0.80	0.93	0.95	0.95	0.93	0.94
1.00	1.00	1.01	1.01	0.97	1.00
Ur@76.2cm =	959	991	982	983	982
Ur@6.1cm =	~491	500	503	503	502
Href (cm) =	30.5	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
No Hill; 60' Trees; Longitudinal Uniformity Test

Height Norm.	Turb.Int. (%) B06	Turb.Int. (%) B07	Turb.Int. (%) B08	Turb.Int. (%) B09	Turb.Int. (%) B10
0.08	31.9	28.2	37.4	35.8	40.9
0.12	26.3	23.6	28.3	29.1	31.7
0.16	22.3	22.5	23.0	25.7	27.5
0.20	21.5	19.7	21.2	23.7	23.6
0.30	18.2	18.0	17.6	19.6	20.1
0.42	15.5	15.0	15.4	17.1	16.5
0.60	13.6	13.3	13.5	14.9	13.7
0.80	11.3	11.9	11.5	12.1	11.7
1.00	9.4	9.7	10.0	10.9	10.8
Ur@76.2cm =	959	991	982	983	982
Ur@6.1cm =	~491	500	503	503	502
Href (cm) =	30.5	30.5	30.5	30.5	30.5



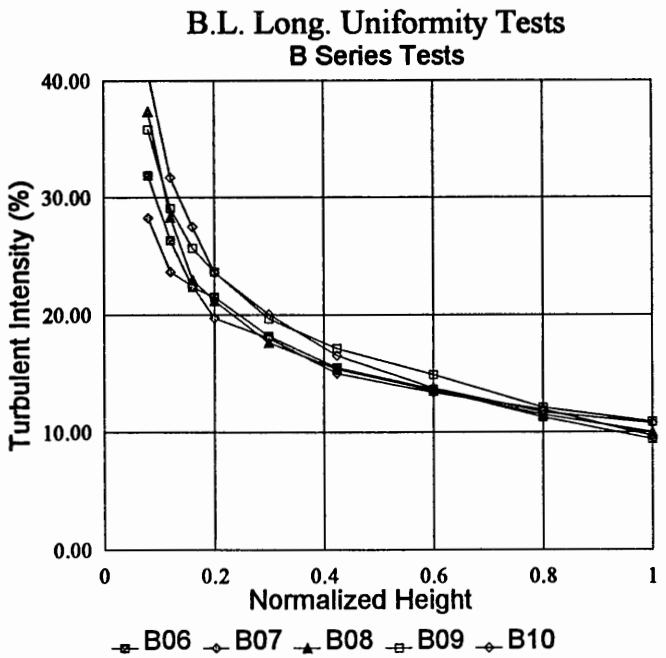


TABLE 8 Wind Tunnel Longitudinal Uniformity Test Results

USWP Task 2 Test Results C Series Tests

USW_VELC.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run C01 No Hill; No Trees; Upwind Position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2				
2.4	380	25.9	824	532
3.7	452	22.8	830	536
4.9	513	19.8	825	521
6.1	535	17.6	825	524
9.1	600	15.9	830	534
12.9	660	13.7	828	526
18.3	721	11.9	825	539
24.4	779	10.0	828	525
30.5	829	8.5	832	534
Average =			827	530

Velocity Profile Data
Run C02 No Hill; No Trees; Hill Center Position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2	463	19.3	819	520
2.4	514	16.9	821	511
3.7	540	16.0	817	521
4.9	564	16.7	820	517
6.1	586	15.6	820	522
9.1	629	14.3	816	525
12.9	669	13.3	822	517
18.3	719	12.3	813	526
24.4	769	10.4	813	523
30.5	828	8.5	826	528
Average =			819	521

Velocity Profile Data
Run C03 No Hill; 20' Trees; Hill Center Position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2	278	33.2	806	519
2.4	413	24.8	805	507
3.7	477	21.5	808	501
4.9	519	19.4	804	510
6.1	546	18.3	804	521
9.1	600	16.1	806	510
12.9	654	13.9	808	500
18.3	710	11.6	808	509
24.4	763	10.7	805	512
30.5	813	9.1	810	513
Average =			806	510

Velocity Profile Data
Run C04 No Hill; 40' Trees; Hill Center Position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	320	31.8	791	506
3.7	416	25.9	793	500
4.9	467	22.3	796	501
6.1	507	20.8	788	505
9.1	576	17.2	789	500
12.9	638	14.3	798	483
18.3	693	12.3	798	495
24.4	749	10.5	791	497
30.5	794	9.0	799	498
Average =			794	498

Velocity Profile Data
Run C05 No Hill; 60' Trees; Hill Center Position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	283	36.1	822	526
3.7	387	28.8	823	515
4.9	465	24.5	823	518
6.1	507	21.7	822	524
9.1	583	19.2	824	516
12.9	650	15.6	821	512
18.3	721	12.2	822	508
24.4	775	10.5	821	524
30.5	831	9.2	824	516
Average =			822	518

TABLE 9 Tree Cover Reference Profile Test Data

USWP Task 2 Test Results C Series Tests

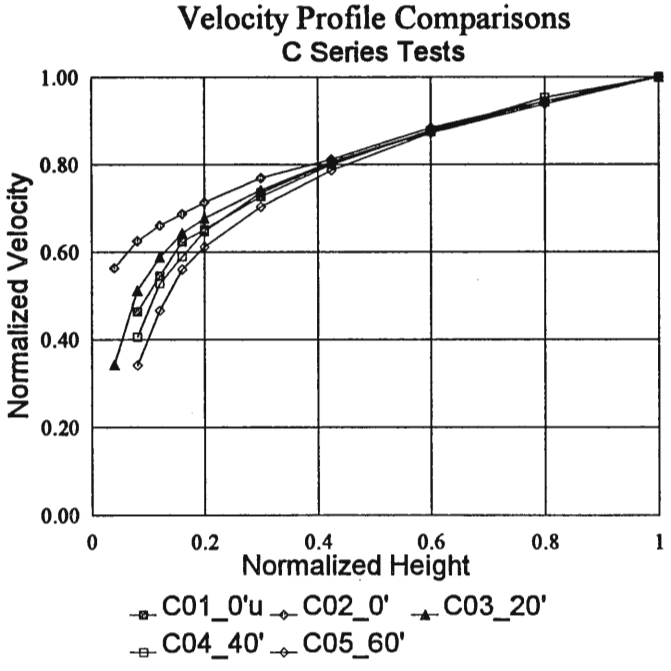
USW_VELC.WK3 Sheet B: 02/18/93

Velocity Profile Comparisons
No Hill; Reference Profile Tests

Height Norm.	Velocity Norm. C01 0'u	Velocity Norm. C02 0'	Velocity Norm. C03 20'	Velocity Norm. C04 40'	Velocity Norm. C05 60'
0.04		0.56	0.34		
0.08	0.46	0.63	0.51	0.41	0.34
0.12	0.55	0.66	0.59	0.53	0.47
0.16	0.62	0.69	0.64	0.59	0.56
0.20	0.65	0.71	0.68	0.65	0.61
0.30	0.73	0.77	0.74	0.73	0.70
0.42	0.80	0.81	0.81	0.80	0.79
0.60	0.88	0.88	0.88	0.87	0.87
0.80	0.94	0.94	0.94	0.95	0.94
1.00	1.00	1.00	1.00	1.00	1.00
Ur@30.5cm =	827	819	806	794	822
Ur@6.1cm =	530	521	510	498	518
Href (cm) =	30.5	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
No Hill; Reference Profile Tests

Height Norm.	Turb.Int. (%) C01 0'u	Turb.Int. (%) C02 0'	Turb.Int. (%) C03 20'	Turb.Int. (%) C04 40'	Turb.Int. (%) C05 60'
0.04		19.3	33.2		
0.08	25.9	16.9	24.8	31.8	36.1
0.12	22.8	16.0	21.5	25.9	28.8
0.16	19.8	16.7	19.4	22.3	24.5
0.20	17.6	15.6	18.3	20.8	21.7
0.30	15.9	14.3	16.1	17.2	19.2
0.42	13.7	13.3	13.9	14.3	15.6
0.60	11.9	12.3	11.6	12.3	12.2
0.80	10.0	10.4	10.7	10.5	10.5
1.00	8.5	8.5	9.1	9.0	9.2
Ur@30.5cm =	827	819	806	794	822
Ur@6.1cm =	530	521	510	498	518
Href (cm) =	30.5	30.5	30.5	30.5	30.5



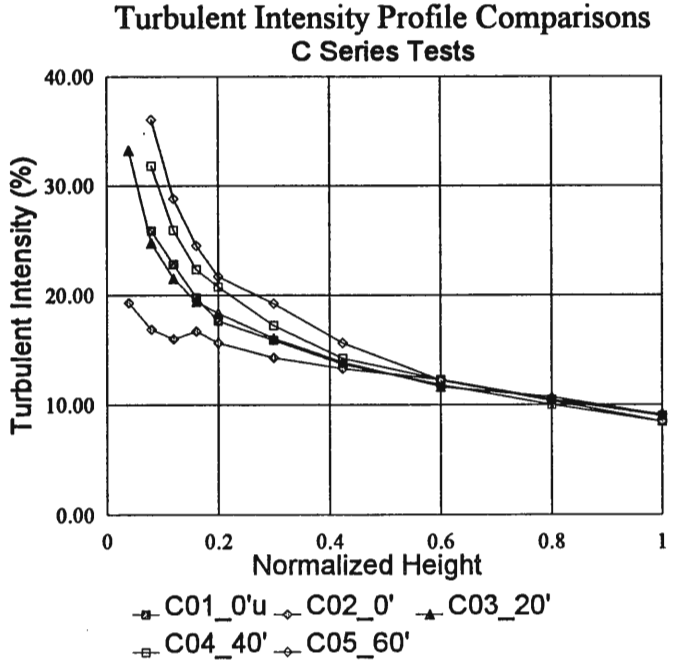


TABLE 10 Tree Cover Reference Profile Test Results

USWP Task 2 Test Results — C Series Tests

USW_VELC.WK3 Sheet C: 02/18/93

Reference Velocity Profile Comparisons

Height (m)	Velocity (m/s) C01 0'u	Velocity (m/s) C02 0'	Velocity (m/s) C03 20'	Velocity (m/s) C04 40'	Velocity (m/s) C05 60'
24.4	4.6	6.3	5.1	4.1	3.4
36.6	5.5	6.6	5.9	5.3	4.7
48.8	6.2	6.9	6.4	5.9	5.6
61.0	6.5	7.1	6.8	6.5	6.1
91.4	7.3	7.7	7.4	7.3	7.0
129.0	8.0	8.1	8.1	8.0	7.9
182.9	8.8	8.8	8.8	8.7	8.7
243.8	9.4	9.4	9.4	9.5	9.4
304.8	10.0	10.0	10.0	10.0	10.0
d (m) =	8.0	0.2	4.3	8.7	13.0
U* (m/s) =	0.67	0.45	0.64	0.78	0.77
Zo (m) =	1.04	0.11	0.80	1.90	1.98
p =	0.26	0.19	0.24	0.29	0.32

Model Conditions		Field Conditions	
Href (cm) =	30.48	Href (m) =	305
Uref (cm/s) =	800.0	Uref (m/s) =	10.0
Length Scale =	1000.0	Length Scale =	1.0

TABLE 11 Reference Profile Regression Analysis

USWP Task 2 Test Results D Series Tests

USW_VELD.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run D01 No Hill; 60' Trees; -10cm step position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	320	34.1	800	496
3.7	429	27.2	804	496
4.9	488	23.2	796	486
6.1	543	20.8	797	490
9.1	614	17.7	800	493
12.9	665	15.4	806	496
18.3	736	12.3	806	485
24.4	793	10.5	798	486
30.5	833	9.2	799	493
Average =			801	491

Velocity Profile Data
Run D02 No Hill; 60' Trees; 10cm step position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	363	31.0	802	488
3.7	447	25.7	800	488
4.9	494	22.1	804	494
6.1	545	20.3	803	493
9.1	607	17.4	800	491
12.9	680	14.0	801	492
18.3	738	12.1	797	491
24.4	792	10.7	800	488
30.5	832	9.6	799	485
Average =			801	490

Velocity Profile Data
Run D03 No Hill; 60' Trees; 40cm step position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	351	33.3	796	494
3.7	435	26.4	795	478
4.9	477	24.7	793	484
6.1	520	21.7	792	494
9.1	607	17.6	796	492
12.9	661	14.8	794	481
18.3	715	13.0	782	488
24.4	779	11.1	793	486
30.5	818	9.6	785	487
Average =			792	487

Velocity Profile Data
Run D04 No Hill; 60' Trees; 0cm step position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	383	29.8	802	489
3.7	436	27.0	793	481
4.9	491	23.5	797	490
6.1	532	21.5	792	488
9.1	604	17.8	788	474
12.9	663	15.6	794	498
18.3	736	11.9	805	486
24.4	788	11.0	798	495
30.5	834	9.4	799	485
Average =			796	487

Velocity Profile Data
Run D05 No Hill; 60' Trees; 20cm step position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	432	23.2	797	493
3.7	465	23.6	799	497
4.9	499	22.5	790	499
6.1	542	20.6	797	483
9.1	606	17.9	793	495
12.9	654	15.2	794	493
18.3	728	12.4	794	483
24.4	786	10.5	795	486
30.5	832	9.7	797	496
Average =			795	492

Velocity Profile Data
Run D06 No Hill; 60' Trees; 60cm step position

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @76.2cm (cm/s)	Velocity @6.1cm (cm/s)
2.4	457	21.4	798	489
3.7	485	20.6	796	492
4.9	523	21.7	795	495
6.1	539	20.2	797	494
9.1	593	18.4	792	491
12.9	669	14.6	792	489
18.3	725	13.1	798	493
24.4	786	10.5	800	490
30.5	836	9.4	801	478
Average =			797	490

TABLE 12 Tree Cover Step Roughness Change Test Data

USWP Task 2 Test Results D Series Tests

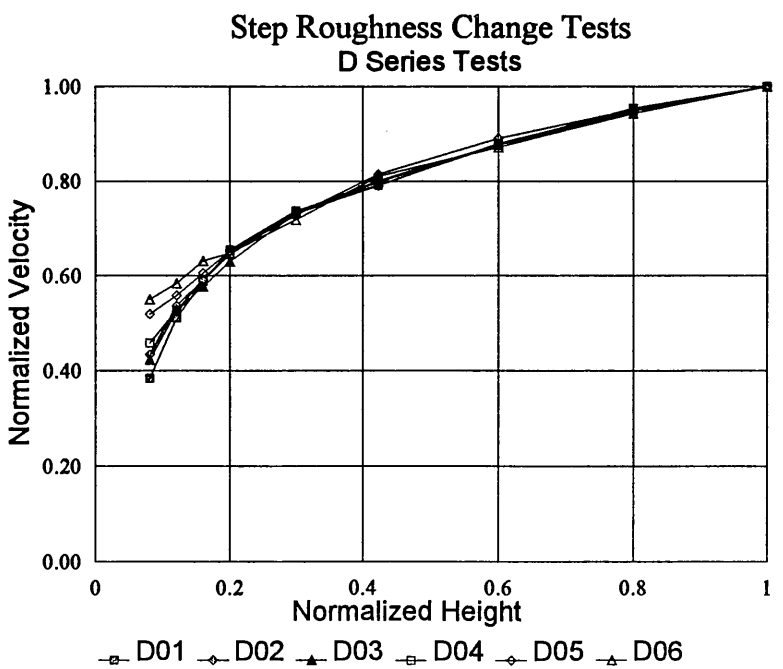
USW_VELD.WK3 Sheet B: 02/18/93

Velocity Profile Comparisons
No Hill; 60' Trees; Step Roughness Change Tests

Height Norm.	Velocity Norm. D01	Velocity Norm. D02	Velocity Norm. D03	Velocity Norm. D04	Velocity Norm. D05	Velocity Norm. D06
0.08	0.38	0.43	0.42	0.46	0.52	0.55
0.12	0.51	0.54	0.53	0.53	0.56	0.58
0.16	0.59	0.59	0.58	0.59	0.61	0.63
0.20	0.65	0.65	0.63	0.64	0.65	0.65
0.30	0.74	0.73	0.73	0.73	0.73	0.72
0.42	0.79	0.81	0.80	0.80	0.79	0.81
0.60	0.88	0.89	0.88	0.88	0.88	0.87
0.80	0.95	0.95	0.94	0.95	0.95	0.94
1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ur@76.2cm =	801	801	792	796	795	797
Ur@6.1cm =	491	490	487	487	492	490
Href (cm) =	30.5	30.5	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
No Hill; 60' Trees; Step Roughness Change Tests

Height Norm.	Turb.Int. (%) D01	Turb.Int. (%) D02	Turb.Int. (%) D03	Turb.Int. (%) D04	Turb.Int. (%) D05	Turb.Int. (%) D06
0.08	34.1	31.0	33.3	29.8	23.2	21.4
0.12	27.2	25.7	26.4	27.0	23.6	20.6
0.16	23.2	22.1	24.7	23.5	22.5	21.7
0.20	20.8	20.3	21.7	21.5	20.6	20.2
0.30	17.7	17.4	17.6	17.8	17.9	18.4
0.42	15.4	14.0	14.8	15.6	15.2	14.6
0.60	12.3	12.1	13.0	11.9	12.4	13.1
0.80	10.5	10.7	11.1	11.0	10.5	10.5
1.00	9.2	9.6	9.6	9.4	9.7	9.4
Ur@76.2cm =	801	801	792	796	795	797
Ur@6.1cm =	491	490	487	487	492	490
Href (cm) =	30.5	30.5	30.5	30.5	30.5	30.5



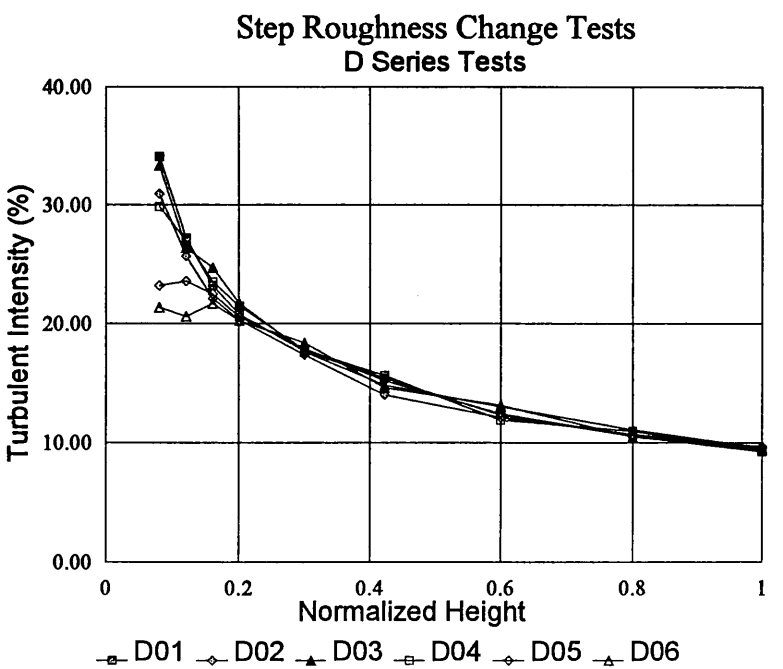


TABLE 13 Tree Cover Step Roughness Change Test Results

USWP Task 2 Test Results E Series Tests

USW_VELE.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run E01 Triangular Hill; 1:2 Slope; 0' Trees; Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2	502	10.7	692	407
2.4	514	11.6	695	405
3.7	513	12.2	684	414
4.9	526	12.8	688	407
6.1	533	12.7	687	404
9.1	551	12.6	690	410
12.9	576	12.4	694	413
18.3	616	10.2	690	410
24.4	654	9.1	694	408
30.5	684	7.9	695	410
Average =			691	409

Velocity Profile Data
Run E02 Triangular Hill; 1:2 Slope; 0' Trees; Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2	626	10.9	854	517
2.4	630	12.0	854	511
3.7	645	12.6	860	510
4.9	652	12.7	856	504
6.1	655	12.9	854	500
9.1	683	12.5	858	516
12.9	713	12.1	848	519
18.3	758	10.7	854	507
24.4	810	9.1	860	515
30.5	842	7.9	857	521
Average =			855	512

Velocity Profile Data
Run E03 Triangular Hill; 1:2 Slope; 0' Trees; Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2	752	10.4	1036	628
2.4	764	11.9	1038	622
3.7	771	11.9	1038	616
4.9	788	12.4	1031	618
6.1	800	12.3	1040	608
9.1	833	12.4	1038	605
12.9	874	11.7	1041	620
18.3	924	10.5	1038	620
24.4	981	9.0	1041	619
30.5	1025	7.9	1037	624
Average =			1038	618

Velocity Profile Data
Run E04 Triangular Hill; 1:2 Slope; 60' Trees; Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2				
2.4	493	15.3	694	406
3.7	501	15.7	696	409
4.9	522	15.7	696	412
6.1	534	15.7	698	407
9.1	564	14.0	696	412
12.9	591	12.5	695	412
18.3	630	10.5	698	410
24.4	666	9.5	695	412
30.5	701	7.8	702	414
Average =			697	410

Velocity Profile Data
Run E05 Triangular Hill; 1:2 Slope; 60' Trees; Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2				
2.4	594	15.4	854	494
3.7	614	15.3	855	514
4.9	634	15.9	860	503
6.1	638	15.8	854	505
9.1	695	13.5	852	508
12.9	728	12.0	855	507
18.3	772	10.7	852	508
24.4	823	9.4	862	498
30.5	857	8.1	857	510
Average =			856	505

Velocity Profile Data
Run E06 Triangular Hill; 1:2 Slope; 60' Trees; Re# Tests

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)
1.2				
2.4	698	15.2	1003	592
3.7	729	15.5	999	597
4.9	732	15.9	1000	592
6.1	765	15.5	1000	589
9.1	809	14.0	1002	600
12.9	856	12.1	994	590
18.3	911	10.5	1008	595
24.4	964	9.3	1010	584
30.5	1007	8.0	1007	588
Average =			1002	592

TABLE 14 Model Ridge Reynolds Number Invariance Test Data

USWP Task 2 Test Results E Series Tests

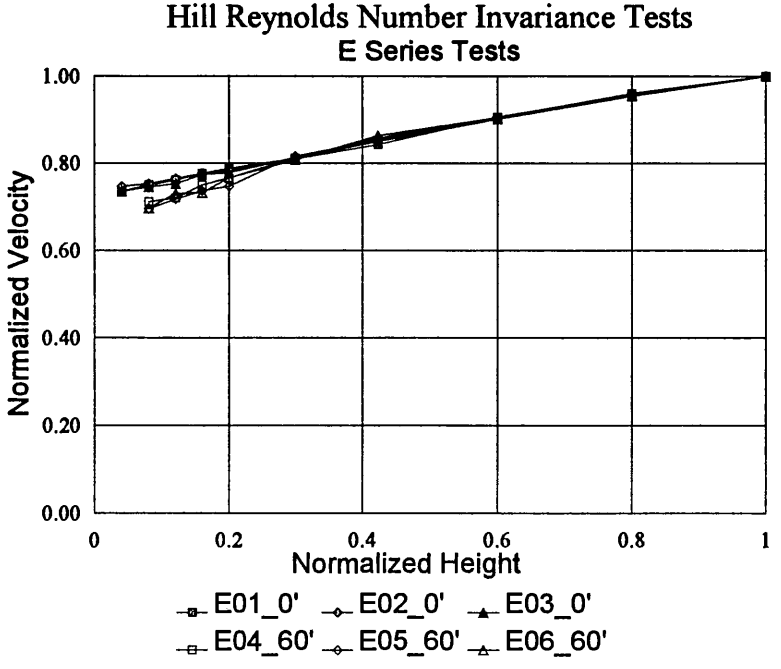
USW_VELE.WK3 Sheet B: 02/18/93

Velocity Profile Comparisons
Triangular Hill; 1:2 Slope; Re# Invariance Tests

Height Norm.	Velocity Norm. E01 0'	Velocity Norm. E02 0'	Velocity Norm. E03 0'	Velocity Norm. E04 60'	Velocity Norm. E05 60'	Velocity Norm. E06 60'
0.04	0.74	0.75	0.73			
0.08	0.75	0.75	0.74	0.71	0.70	0.70
0.12	0.76	0.76	0.75	0.72	0.72	0.73
0.16	0.78	0.78	0.77	0.75	0.74	0.73
0.20	0.79	0.78	0.78	0.77	0.75	0.77
0.30	0.81	0.81	0.81	0.81	0.82	0.81
0.42	0.84	0.86	0.85	0.85	0.85	0.86
0.60	0.91	0.90	0.90	0.90	0.90	0.90
0.80	0.96	0.96	0.95	0.96	0.95	0.95
1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ur@30.5cm =	691	855	1038	697	856	1002
Ur@6.1cm =	409	512	618	410	505	592
Href (cm) =	30.5	30.5	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:2 Slope; Re# Invariance Tests

Height Norm.	Turb.Int. (%) E01 0'	Turb.Int. (%) E02 0'	Turb.Int. (%) E03 0'	Turb.Int. (%) E04 60'	Turb.Int. (%) E05 60'	Turb.Int. (%) E06 60'
0.04	10.7	10.9	10.4			
0.08	11.6	12.0	11.9	15.3	15.4	15.2
0.12	12.2	12.6	11.9	15.7	15.3	15.5
0.16	12.8	12.7	12.4	15.7	15.9	15.9
0.20	12.7	12.9	12.3	15.7	15.8	15.5
0.30	12.6	12.5	12.4	14.0	13.5	14.0
0.42	12.4	12.1	11.7	12.5	12.0	12.1
0.60	10.2	10.7	10.5	10.5	10.7	10.5
0.80	9.1	9.1	9.0	9.5	9.4	9.3
1.00	7.9	7.9	7.9	7.8	8.1	8.0
Ur@30.5cm =	691	855	1038	697	856	1002
Ur@6.1cm =	409	512	618	410	505	592
Href (cm) =	30.5	30.5	30.5	30.5	30.5	30.5



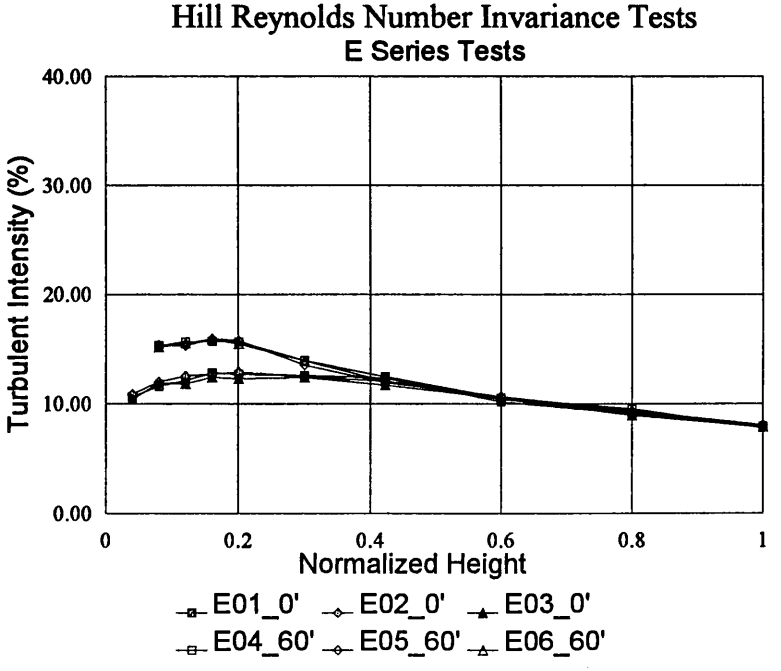


TABLE 15 Model Ridge Reynolds Number Invariance Test Results

USWP Task 2 Test Results F Series Tests

USW_VEL0.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run F01 Triangular Hill; 1:2 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	605	13.6	860	510	1.69
2.4	613	15.2	864	516	1.67
3.7	638	14.7	868	515	1.69
4.9	654	14.7	869	517	1.68
6.1	673	13.4	862	517	1.67
9.1	708	12.8	865	513	1.69
12.9	738	11.8	860	512	1.68
18.3	784	10.8	859	516	1.67
24.4	832	9.2	865	509	1.70
30.5	872	7.7	869	520	1.67
Average =			864	514	1.68

Velocity Profile Data
Run F02 Triangular Hill; 1:2 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	613	13.9	871	513	1.70
2.4	631	14.4	865	519	1.67
3.7	645	14.2	868	517	1.68
4.9	658	14.1	866	514	1.68
6.1	670	13.5	862	511	1.69
9.1	708	12.7	866	505	1.71
12.9	743	11.9	866	511	1.70
18.3	784	10.9	865	516	1.68
24.4	833	9.4	867	515	1.68
30.5	874	7.8	871	518	1.68
Average =			867	514	1.69

Velocity Profile Data
Run F03 Triangular Hill; 1:2 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	643	13.5	879	512	1.72
2.4	659	13.6	875	517	1.69
3.7	674	14.4	882	525	1.68
4.9	693	13.5	879	514	1.71
6.1	697	13.3	877	508	1.73
9.1	724	12.3	876	519	1.69
12.9	765	10.8	874	517	1.69
18.3	798	10.6	875	521	1.68
24.4	846	8.8	876	518	1.69
30.5	880	7.8	876	523	1.67
Average =			877	517	1.69

Velocity Profile Data
Run F04 Triangular Hill; 1:2 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	495	22.1	874	514	1.70
2.4	649	12.8	878	517	1.70
3.7	666	13.6	879	506	1.74
4.9	676	14.0	878	517	1.70
6.1	680	13.4	874	517	1.69
9.1	720	12.3	879	518	1.70
12.9	761	11.6	881	519	1.70
18.3	801	10.6	877	520	1.69
24.4	846	8.9	879	511	1.72
30.5	886	7.9	883	525	1.68
Average =			878	516	1.70

TABLE 16 Model Ridge Test Data; Triangular Shape, 1:2 Slope, 20' Trees

USWP Task 2 Test Results F Series Tests

USW_VEL0.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run F05 Triangular Hill; 1:2 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	596	14.3	873	520	1.68
2.4	612	15.7	876	514	1.70
3.7	628	16.2	877	514	1.71
4.9	657	15.3	868	519	1.67
6.1	659	14.8	868	526	1.65
9.1	711	13.2	866	510	1.70
12.9	753	11.4	875	510	1.72
18.3	788	10.7	868	515	1.69
24.4	831	9.1	864	515	1.68
30.5	867	8.2	867	520	1.67
Average =			870	516	1.69

Velocity Profile Data
Run F06 Triangular Hill; 1:2 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	593	14.7	865	510	1.70
2.4	609	15.3	861	511	1.68
3.7	629	15.6	858	505	1.70
4.9	641	15.5	857	511	1.68
6.1	658	15.0	858	514	1.67
9.1	699	13.3	856	510	1.68
12.9	736	12.1	865	513	1.69
18.3	777	10.4	858	507	1.69
24.4	825	9.1	860	501	1.72
30.5	859	7.9	862	502	1.72
Average =			860	508	1.69

Velocity Profile Data
Run F07 Triangular Hill; 1:2 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	583	17.0	875	515	1.70
2.4	623	15.8	871	522	1.67
3.7	642	15.8	866	519	1.67
4.9	669	15.1	871	512	1.70
6.1	681	14.1	874	520	1.68
9.1	715	13.2	875	515	1.70
12.9	750	11.7	875	511	1.71
18.3	793	10.2	873	515	1.70
24.4	840	8.9	874	516	1.69
30.5	880	7.8	877	518	1.69
Average =			873	516	1.69

Velocity Profile Data
Run F08 Triangular Hill; 1:2 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
2.4	611	14.6	870	516	1.69
3.7	629	14.4	868	524	1.66
4.9	656	15.1	876	507	1.73
6.1	671	14.5	871	516	1.69
9.1	702	13.7	870	516	1.69
12.9	743	12.1	874	516	1.69
18.3	795	10.7	874	512	1.71
24.4	838	9.3	872	525	1.66
30.5	877	8.2	872	518	1.68
Average =			872	517	1.69

TABLE 17 Model Ridge Test Data; Triangular Shape, 1:2 Slope, 40' Trees

USWP Task 2 Test Results F Series Tests

USW_VEL0.WK3 Sheet A: 02/18/93

Velocity Profile Data
Run F09 Triangular Hill; 1:2 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	579	14.5	860	509	
2.4	593	16.6	857	506	1.69
3.7	605	16.1	855	504	1.70
4.9	634	15.5	856	510	1.68
6.1	655	15.1	862	511	1.69
9.1	702	12.9	859	509	1.69
12.9	740	11.4	857	508	1.69
18.3	785	10.3	863	508	1.70
24.4	825	9.1	859	510	1.69
30.5	867	7.8	865	508	1.70
Average =			859	508	1.69

Velocity Profile Data
Run F10 Triangular Hill; 1:2 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	577	15.4	857	515	1.66
2.4	596	16.4	856	512	1.67
3.7	620	15.8	856	504	1.70
4.9	644	15.5	860	512	1.68
6.1	660	15.2	859	508	1.69
9.1	695	13.8	854	509	1.68
12.9	734	11.5	858	505	1.70
18.3	778	10.7	855	506	1.69
24.4	828	9.1	858	496	1.73
30.5	856	7.9	855	517	1.65
Average =			857	508	1.68

Velocity Profile Data
Run F11 Triangular Hill; 1:2 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	561	18.4	868	520	
2.4	607	16.2	864	514	1.68
3.7	627	16.2	864	515	1.68
4.9	651	15.9	862	511	1.69
6.1	675	14.5	860	502	1.71
9.1	712	13.1	865	511	1.69
12.9	750	11.8	859	505	1.70
18.3	785	10.6	864	502	1.72
24.4	830	8.9	859	505	1.70
30.5	858	7.9	856	504	1.70
Average =			862	509	1.69

Velocity Profile Data
Run F12 Triangular Hill; 1:2 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	586	17.4	865	514	1.68
3.7	614	15.1	861	516	1.67
4.9	637	15.5	864	508	1.70
6.1	653	15.5	861	514	1.67
9.1	698	14.2	864	508	1.70
12.9	744	11.6	863	503	1.72
18.3	785	10.7	866	510	1.70
24.4	830	9.0	866	503	1.72
30.5	869	8.2	869	518	1.68
Average =			864	510	1.69

TABLE 18 Model Ridge Test Data; Triangular Shape, 1:2 Slope, 60' Trees

USWP Task 2 Test Results F Series Tests

USW_VEL1.WK3 Sheet A: 02/18/93

Velocity Profile Comparisons
Triangular Hill; 1:2 Slope; 20' Tree Tests

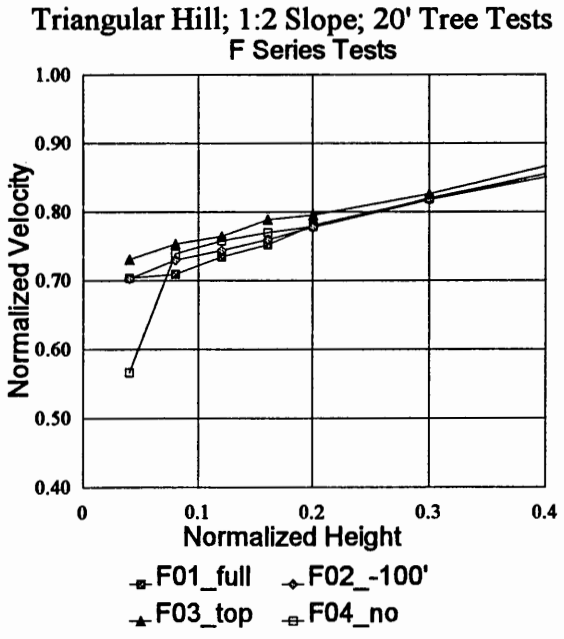
Height Norm.	Velocity Norm. F01 full	Velocity Norm. F02 -100'	Velocity Norm. F03 top	Velocity Norm. F04 no
0.04	0.70	0.70	0.73	0.57
0.08	0.71	0.73	0.75	0.74
0.12	0.73	0.74	0.76	0.76
0.16	0.75	0.76	0.79	0.77
0.20	0.78	0.78	0.80	0.78
0.30	0.82	0.82	0.83	0.82
0.42	0.86	0.86	0.88	0.86
0.60	0.91	0.91	0.91	0.91
0.80	0.96	0.96	0.97	0.96
1.00	1.00	1.00	1.01	1.00
Ur@30.5cm =	864	867	877	878
Ur@6.1cm =	514	514	517	516
Href (cm) =	30.5	30.5	30.5	30.5

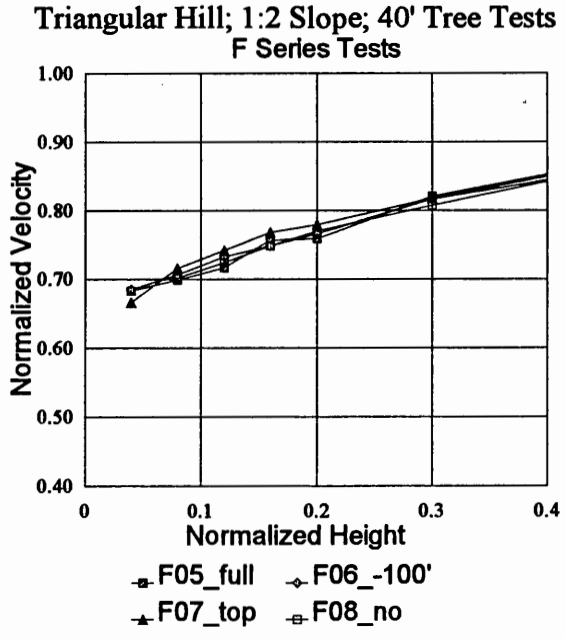
Velocity Profile Comparisons
Triangular Hill; 1:2 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. F05 full	Velocity Norm. F06 -100'	Velocity Norm. F07 top	Velocity Norm. F08 no
0.04	0.68	0.68	0.67	
0.08	0.70	0.71	0.72	0.70
0.12	0.72	0.73	0.74	0.72
0.16	0.76	0.75	0.77	0.75
0.20	0.76	0.77	0.78	0.77
0.30	0.82	0.82	0.82	0.81
0.42	0.86	0.85	0.86	0.85
0.60	0.91	0.91	0.91	0.91
0.80	0.96	0.96	0.96	0.96
1.00	1.00	1.00	1.00	1.01
Ur@30.5cm =	870	860	873	872
Ur@6.1cm =	516	508	516	517
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Triangular Hill; 1:2 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. F09 full	Velocity Norm. F10 -100'	Velocity Norm. F11 top	Velocity Norm. F12 no
0.04	0.67	0.67	0.65	
0.08	0.69	0.70	0.70	0.68
0.12	0.71	0.72	0.73	0.71
0.16	0.74	0.75	0.76	0.74
0.20	0.76	0.77	0.79	0.76
0.30	0.82	0.81	0.82	0.81
0.42	0.86	0.86	0.87	0.86
0.60	0.91	0.91	0.91	0.91
0.80	0.96	0.97	0.97	0.96
1.00	1.00	1.00	1.00	1.00
Ur@30.5cm =	859	857	862	864
Ur@6.1cm =	508	508	509	510
Href (cm) =	30.5	30.5	30.5	30.5





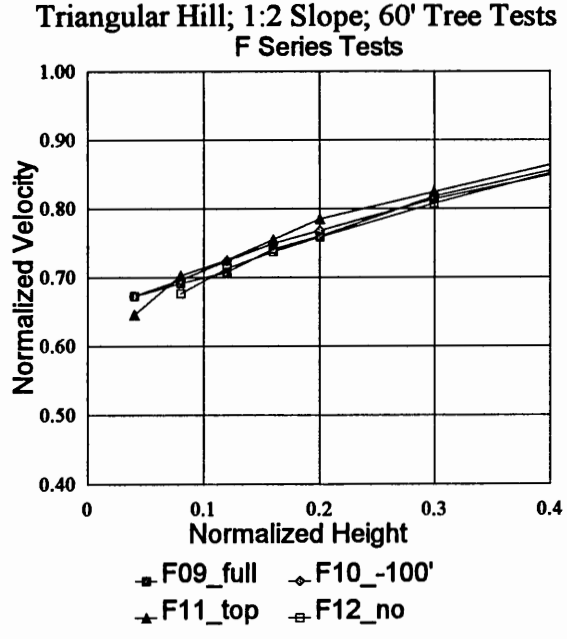


TABLE 19 Model Ridge Velocity Profile Test Results; Triangular Shape, 1:2 Slope

USWP Task 2 Test Results F Series Tests

USW_VEL2.WK3 Sheet A: 02/18/93

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:2 Slope; 20' Tree Tests

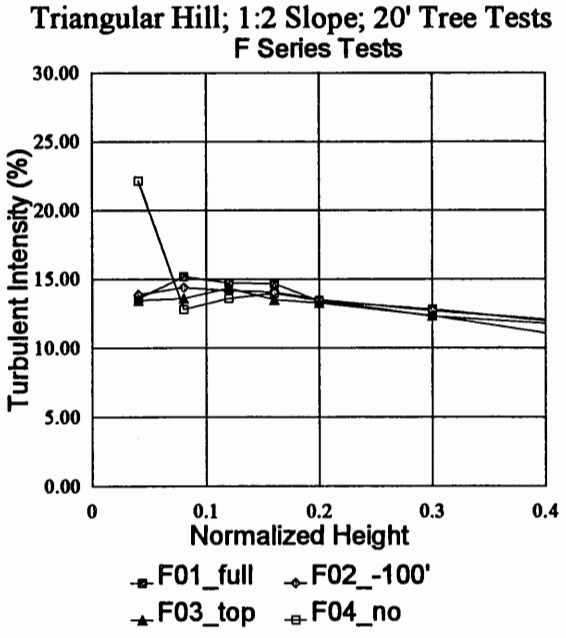
Height Norm.	Turb.Int. (%) F01 full	Turb.Int. (%) F02 -100'	Turb.Int. (%) F03 top	Turb.Int. (%) F04 no
0.04	13.6	13.9	13.5	22.1
0.08	15.2	14.4	13.6	12.8
0.12	14.7	14.2	14.4	13.6
0.16	14.7	14.1	13.5	14.0
0.20	13.4	13.5	13.3	13.4
0.30	12.8	12.7	12.3	12.3
0.42	11.8	11.9	10.8	11.6
0.60	10.8	10.9	10.6	10.6
0.80	9.2	9.4	8.8	8.9
1.00	7.7	7.8	7.8	7.9
Ur@30.5cm =	864	867	877	878
Ur@6.1cm =	514	514	517	516
Href (cm) =	30.5	30.5	30.5	30.5

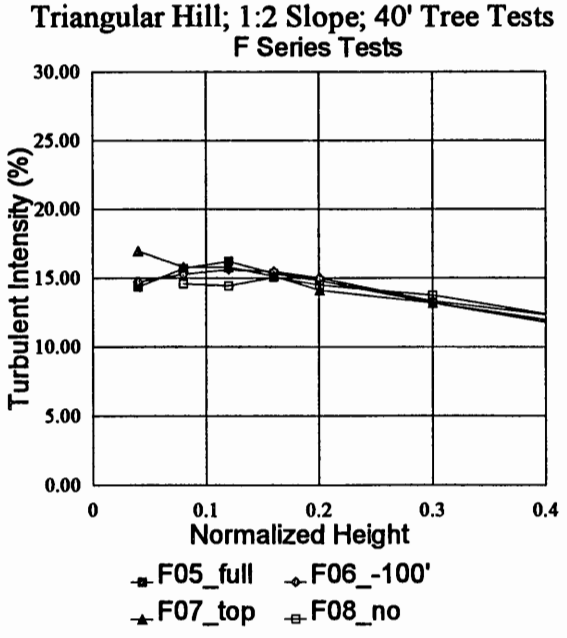
Turbulent Intensity Profile Comparisons
Triangular Hill; 1:2 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) F05 full	Turb.Int. (%) F06 -100'	Turb.Int. (%) F07 top	Turb.Int. (%) F08 no
0.04	14.3	14.7	17.0	
0.08	15.7	15.3	15.8	14.6
0.12	16.2	15.6	15.8	14.4
0.16	15.3	15.5	15.1	15.1
0.20	14.8	15.0	14.1	14.5
0.30	13.2	13.3	13.2	13.7
0.42	11.4	12.1	11.7	12.1
0.60	10.7	10.4	10.2	10.7
0.80	9.1	9.1	8.9	9.3
1.00	8.2	7.9	7.8	8.2
Ur@30.5cm =	870	860	873	872
Ur@6.1cm =	516	508	516	517
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:2 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) F09 full	Turb.Int. (%) F10 -100'	Turb.Int. (%) F11 top	Turb.Int. (%) F12 no
0.04	14.5	15.4	18.4	
0.08	16.6	16.4	16.2	17.4
0.12	16.1	15.8	16.2	15.1
0.16	15.5	15.5	15.9	15.5
0.20	15.1	15.2	14.5	15.5
0.30	12.9	13.8	13.1	14.2
0.42	11.4	11.5	11.8	11.6
0.60	10.3	10.7	10.6	10.7
0.80	9.1	9.1	8.9	9.0
1.00	7.8	7.9	7.9	8.2
Ur@30.5cm =	859	857	862	864
Ur@6.1cm =	508	508	509	510
Href (cm) =	30.5	30.5	30.5	30.5





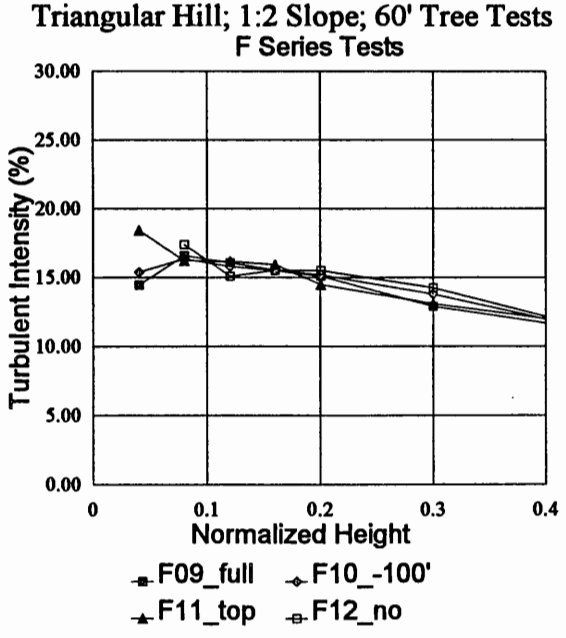


TABLE 20 Model Ridge Turbulence Profile Test Results; Triangular Shape, 1:2 Slope

USWP Task 2 Test Results G Series Tests

USW_VEL0.WK3 Sheet B: 02/18/93

Velocity Profile Data
Run G01 Triangular Hill; 1:3 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	632	12.8	858	506	1.70
2.4	640	14.1	855	515	1.66
3.7	650	14.1	851	512	1.66
4.9	679	13.5	857	518	1.65
6.1	674	13.5	860	513	1.68
9.1	710	12.3	853	511	1.67
12.9	746	11.5	855	502	1.70
18.3	782	10.3	855	510	1.68
24.4	827	9.0	858	506	1.70
30.5	868	7.9	863	507	1.70
Average =			857	510	1.68

Velocity Profile Data
Run G02 Triangular Hill; 1:3 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	637	13.6	854	512	1.67
2.4	654	13.6	852	513	1.66
3.7	670	14.0	860	502	1.71
4.9	678	14.1	859	512	1.68
6.1	701	12.8	857	513	1.67
9.1	717	12.4	856	510	1.68
12.9	757	11.1	856	510	1.68
18.3	795	10.0	861	506	1.70
24.4	827	9.4	853	508	1.68
30.5	870	7.5	863	507	1.70
Average =			857	509	1.68

Velocity Profile Data
Run G03 Triangular Hill; 1:3 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	655	13.6	862	509	1.69
2.4	669	13.6	867	519	1.67
3.7	683	13.8	865	525	1.65
4.9	694	13.6	865	521	1.66
6.1	704	13.3	872	515	1.69
9.1	740	11.9	872	515	1.69
12.9	761	11.2	868	510	1.70
18.3	793	10.2	864	513	1.69
24.4	846	8.7	871	511	1.71
30.5	878	7.4	867	507	1.71
Average =			867	514	1.69

Velocity Profile Data
Run G04 Triangular Hill; 1:3 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	612	14.7	869	513	1.69
2.4	646	13.3	863	513	1.68
3.7	667	13.6	867	516	1.68
4.9	677	13.7	867	517	1.68
6.1	692	13.6	865	506	1.71
9.1	728	12.3	864	505	1.71
12.9	752	11.4	863	511	1.69
18.3	795	10.3	867	512	1.69
24.4	841	8.8	870	508	1.71
30.5	875	7.5	868	502	1.73
Average =			866	510	1.70

TABLE 21 Model Ridge Test Data; Triangular Shape, 1:3 Slope, 20' Trees

USWP Task 2 Test Results G Series Tests

USW_VEL0.WK3 Sheet B: 02/18/93

Velocity Profile Data
Run G05 Triangular Hill; 1:3 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	626	14.2	863	505	1.71
2.4	630	15.4	857	513	1.67
3.7	648	15.5	859	515	1.67
4.9	667	14.6	860	508	1.69
6.1	691	13.8	864	501	1.73
9.1	713	12.8	856	499	1.71
12.9	749	11.6	862	509	1.69
18.3	782	10.7	855	511	1.67
24.4	837	9.0	863	502	1.72
30.5	877	7.6	865	510	1.70
Average =			860	507	1.70

Velocity Profile Data
Run G06 Triangular Hill; 1:3 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	633	14.5	854	508	1.68
2.4	649	14.8	847	510	1.66
3.7	663	15.0	858	505	1.70
4.9	674	14.3	854	506	1.69
6.1	697	14.0	857	506	1.69
9.1	728	12.4	856	486	1.76
12.9	749	11.2	848	504	1.68
18.3	794	10.3	857	504	1.70
24.4	834	8.9	855	504	1.70
30.5	873	7.9	859	504	1.70
Average =			855	504	1.70

Velocity Profile Data
Run G07 Triangular Hill; 1:3 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	602	17.2	856	501	1.71
2.4	646	15.1	855	503	1.70
3.7	655	14.8	850	501	1.70
4.9	683	14.3	851	495	1.72
6.1	681	13.9	848	487	1.74
9.1	726	12.2	850	495	1.72
12.9	750	11.4	851	501	1.70
18.3	789	10.3	851	504	1.69
24.4	830	9.2	846	503	1.68
30.5	865	7.8	854	493	1.73
Average =			851	498	1.71

Velocity Profile Data
Run G08 Triangular Hill; 1:3 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	608	14.7	848	500	1.70
3.7	628	14.8	847	500	1.69
4.9	651	14.6	854	510	1.67
6.1	676	14.1	857	502	1.71
9.1	705	13.5	850	503	1.69
12.9	747	11.2	852	497	1.71
18.3	782	10.4	847	496	1.71
24.4	832	9.1	853	497	1.71
30.5	860	8.0	850	499	1.70
Average =			851	501	1.70

TABLE 22 Model Ridge Test Data; Triangular Shape, 1:3 Slope, 40' Trees

USWP Task 2 Test Results G Series Tests

USW_VEL0.WK3 Sheet B: 02/18/93

Velocity Profile Data
Run G09 Triangular Hill; 1:3 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	607	14.7	860	507	1.69
2.4	613	15.2	857	509	1.68
3.7	625	15.7	855	507	1.69
4.9	661	15.5	861	504	1.71
6.1	669	14.9	860	507	1.70
9.1	703	12.9	861	508	1.70
12.9	742	11.9	856	500	1.71
18.3	785	10.5	859	510	1.68
24.4	832	9.4	862	513	1.68
30.5	871	7.9	864	497	1.74
Average =			859	506	1.70

Velocity Profile Data
Run G10 Triangular Hill; 1:3 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	618	16.0	861	513	1.68
3.7	641	15.9	858	507	1.69
4.9	657	14.8	856	502	1.71
6.1	682	14.7	857	509	1.68
9.1	714	13.3	864	503	1.72
12.9	753	11.9	862	512	1.68
18.3	791	10.5	860	503	1.71
24.4	832	9.1	863	509	1.70
30.5	868	8.1	865	507	1.71
Average =			861	507	1.70

Velocity Profile Data
Run G11 Triangular Hill; 1:3 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	568	18.7	848	506	1.68
2.4	611	15.5	854	505	1.69
3.7	633	16.7	854	509	1.68
4.9	655	16.0	859	504	1.70
6.1	673	15.3	854	502	1.70
9.1	698	13.4	855	497	1.72
12.9	744	12.0	853	495	1.72
18.3	779	10.5	854	497	1.72
24.4	824	9.0	855	500	1.71
30.5	866	7.6	865	497	1.74
Average =			855	501	1.71

Velocity Profile Data
Run G12 Triangular Hill; 1:3 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	591	16.1	853	509	1.68
3.7	621	14.9	854	501	1.70
4.9	634	15.7	852	500	1.70
6.1	652	14.7	851	494	1.72
9.1	699	13.6	861	506	1.70
12.9	734	12.2	857	508	1.69
18.3	780	10.5	860	503	1.71
24.4	825	9.0	857	498	1.72
30.5	860	8.3	861	502	1.71
Average =			856	502	1.70

TABLE 23 Model Ridge Test Data; Triangular Shape, 1:3 Slope, 60' Trees

USWP Task 2 Test Results G Series Tests

USW_VEL1.WK3 Sheet B: 02/18/93

Velocity Profile Comparisons
Triangular Hill; 1:3 Slope; 20' Tree Tests

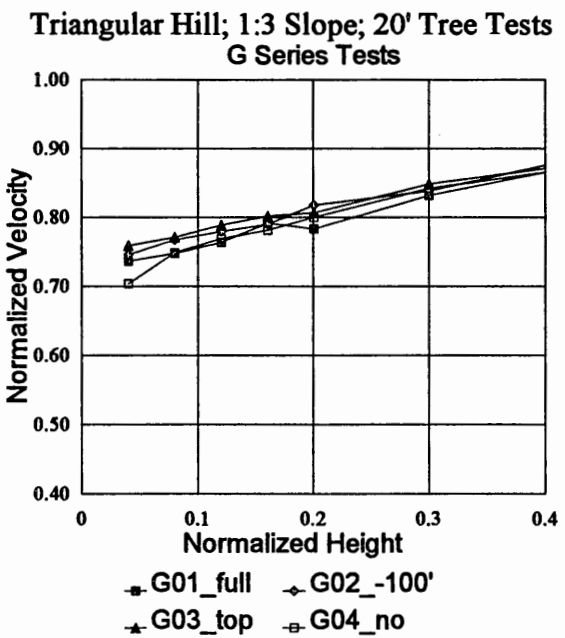
Height Norm.	Velocity Norm. G01 full	Velocity Norm. G02 -100'	Velocity Norm. G03 top	Velocity Norm. G04 no
0.04	0.74	0.75	0.76	0.70
0.08	0.75	0.77	0.77	0.75
0.12	0.76	0.78	0.79	0.77
0.16	0.79	0.79	0.80	0.78
0.20	0.78	0.82	0.81	0.80
0.30	0.83	0.84	0.85	0.84
0.42	0.87	0.88	0.88	0.87
0.60	0.91	0.92	0.92	0.92
0.80	0.96	0.97	0.97	0.97
1.00	1.01	1.01	1.01	1.01
Ur@30.5cm =	857	857	867	866
Ur@6.1cm =	510	509	514	510
Href (cm) =	30.5	30.5	30.5	30.5

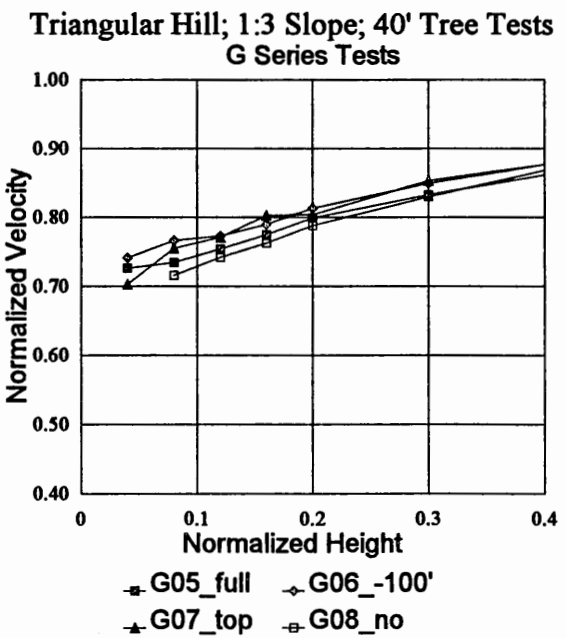
Velocity Profile Comparisons
Triangular Hill; 1:3 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. G05 full	Velocity Norm. G06 -100'	Velocity Norm. G07 top	Velocity Norm. G08 no
0.04	0.73	0.74	0.70	
0.08	0.74	0.77	0.75	0.72
0.12	0.75	0.77	0.77	0.74
0.16	0.77	0.79	0.80	0.76
0.20	0.80	0.81	0.80	0.79
0.30	0.83	0.85	0.85	0.83
0.42	0.87	0.88	0.88	0.88
0.60	0.91	0.93	0.93	0.92
0.80	0.97	0.98	0.98	0.98
1.00	1.01	1.02	1.01	1.01
Ur@30.5cm =	860	855	851	851
Ur@6.1cm =	507	504	498	501
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Triangular Hill; 1:3 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. G09 full	Velocity Norm. G10 -100'	Velocity Norm. G11 top	Velocity Norm. G12 no
0.04	0.71		0.67	
0.08	0.71	0.72	0.72	0.69
0.12	0.73	0.75	0.74	0.73
0.16	0.77	0.77	0.76	0.74
0.20	0.78	0.80	0.79	0.77
0.30	0.82	0.83	0.82	0.81
0.42	0.87	0.87	0.87	0.86
0.60	0.91	0.92	0.91	0.91
0.80	0.97	0.96	0.96	0.96
1.00	1.01	1.00	1.00	1.00
Ur@30.5cm =	859	861	855	856
Ur@6.1cm =	506	507	501	502
Href (cm) =	30.5	30.5	30.5	30.5





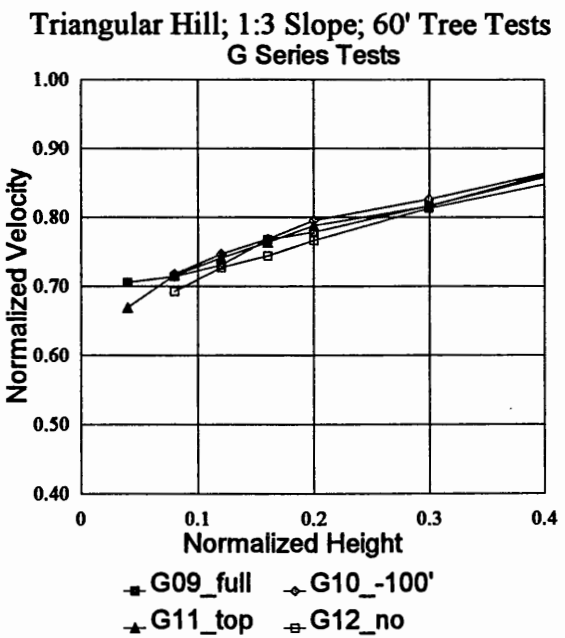


TABLE 24 Model Ridge Velocity Profile Test Results; Triangular Shape, 1:3 Slope

USWP Task 2 Test Results G Series Tests

USW_VEL2.WK3 Sheet B: 11/06/92

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:3 Slope; 20' Tree Tests

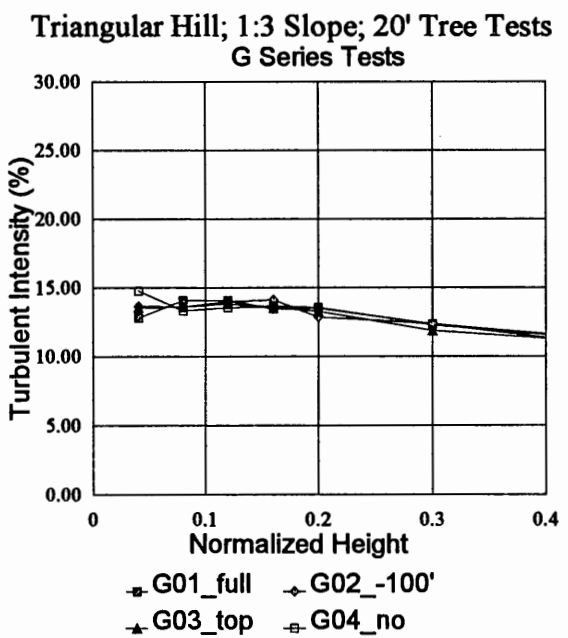
Height Norm.	Turb.Int. (%) G01 full	Turb.Int. (%) G02 -100'	Turb.Int. (%) G03 top	Turb.Int. (%) G04 no
0.04	12.8	13.6	13.6	14.7
0.08	14.1	13.6	13.6	13.3
0.12	14.1	14.0	13.8	13.6
0.16	13.5	14.1	13.6	13.7
0.20	13.5	12.8	13.3	13.6
0.30	12.3	12.4	11.9	12.3
0.42	11.5	11.1	11.2	11.4
0.60	10.3	10.0	10.2	10.3
0.80	9.0	9.4	8.7	8.8
1.00	7.9	7.5	7.4	7.5
Ur@30.5cm =	857	857	867	866
Ur@6.1cm =	510	509	514	510
Href (cm) =	30.5	30.5	30.5	30.5

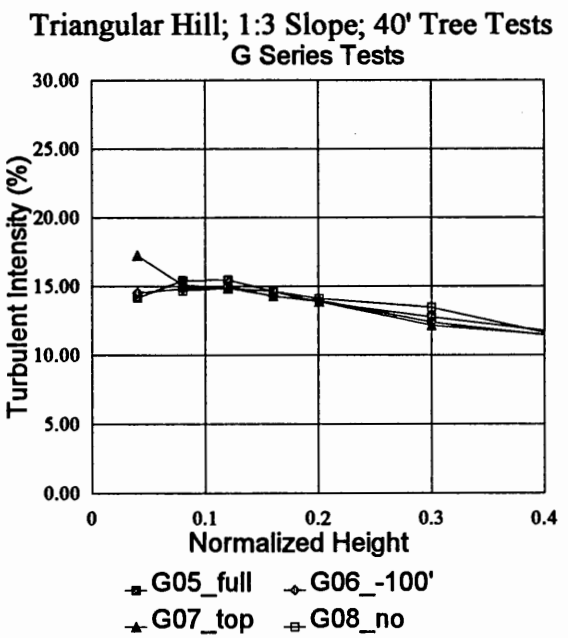
Turbulent Intensity Profile Comparisons
Triangular Hill; 1:3 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) G05 full	Turb.Int. (%) G06 -100'	Turb.Int. (%) G07 top	Turb.Int. (%) G08 no
0.04	14.2	14.5	17.2	
0.08	15.4	14.8	15.1	14.7
0.12	15.5	15.0	14.8	14.8
0.16	14.6	14.3	14.3	14.6
0.20	13.8	14.0	13.9	14.1
0.30	12.8	12.4	12.2	13.5
0.42	11.6	11.2	11.4	11.2
0.60	10.7	10.3	10.3	10.4
0.80	9.0	8.9	9.2	9.1
1.00	7.6	7.9	7.8	8.0
Ur@30.5cm =	860	855	851	851
Ur@6.1cm =	507	504	498	501
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:3 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) G09 full	Turb.Int. (%) G10 -100'	Turb.Int. (%) G11 top	Turb.Int. (%) G12 no
0.04	14.7		18.7	
0.08	15.2	16.0	15.5	16.1
0.12	15.7	15.9	16.7	14.9
0.16	15.5	14.8	16.0	15.7
0.20	14.9	14.7	15.3	14.7
0.30	12.9	13.3	13.4	13.6
0.42	11.9	11.9	12.0	12.2
0.60	10.5	10.5	10.5	10.5
0.80	9.4	9.1	9.0	9.0
1.00	7.9	8.1	7.6	8.3
Ur@30.5cm =	859	861	855	856
Ur@6.1cm =	506	507	501	502
Href (cm) =	30.5	30.5	30.5	30.5





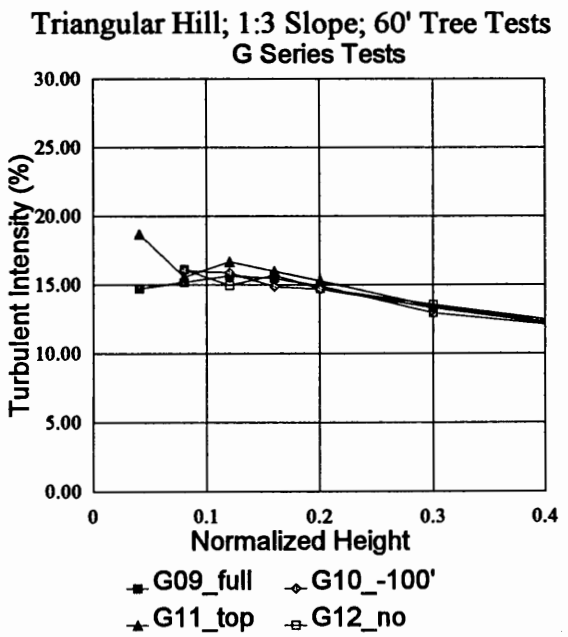


TABLE 25 Model Ridge Turbulence Profile Test Results; Triangular Shape, 1:3 Slope

USWP Task 2 Test Results H Series Tests

USW_VEL0.WK3 Sheet C: 02/18/93

Velocity Profile Data
Run H01 Triangular Hill; 1:5 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	678	12.9	854	501	1.70
2.4	676	13.7	857	518	1.66
3.7	689	13.8	859	505	1.70
4.9	700	13.3	856	498	1.72
6.1	707	12.9	855	508	1.68
9.1	742	12.0	856	509	1.68
12.9	751	11.5	854	511	1.67
18.3	784	10.4	851	499	1.71
24.4	822	9.1	847	501	1.69
30.5	855	7.8	852	500	1.71
Average =			854	505	1.69

Velocity Profile Data
Run H02 Triangular Hill; 1:5 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	642	13.5	844	494	1.71
2.4	671	13.5	845	511	1.66
3.7	677	13.5	846	504	1.68
4.9	686	13.1	848	506	1.68
6.1	706	12.8	849	503	1.69
9.1	724	11.8	853	512	1.67
12.9	751	11.4	851	494	1.72
18.3	780	10.3	846	502	1.69
24.4	822	8.8	848	506	1.68
30.5	854	7.6	850	509	1.67
Average =			848	504	1.68

Velocity Profile Data
Run H03 Triangular Hill; 1:5 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	612	15.5	857	502	1.71
2.4	659	14.2	861	511	1.69
3.7	668	13.9	864	508	1.70
4.9	686	14.1	864	513	1.68
6.1	698	13.8	867	515	1.68
9.1	732	12.1	866	507	1.71
12.9	755	11.1	863	507	1.70
18.3	793	10.2	865	509	1.70
24.4	836	8.6	864	510	1.69
30.5	866	7.5	865	510	1.70
Average =			864	509	1.70

Velocity Profile Data
Run H04 Triangular Hill; 1:5 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	543	16.9	858	509	1.68
2.4	638	13.2	854	509	1.68
3.7	653	13.9	858	503	1.71
4.9	676	12.8	859	503	1.71
6.1	689	12.8	861	504	1.71
9.1	715	12.0	860	513	1.68
12.9	760	11.2	868	511	1.70
18.3	792	10.2	863	507	1.70
24.4	831	8.5	865	508	1.70
30.5	864	7.7	868	497	1.75
Average =			861	506	1.70

TABLE 26 Model Ridge Test Data; Triangular Shape, 1:5 Slope, 20' Trees

USWP Task 2 Test Results H Series Tests

USW_VEL0.WK3 Sheet C: 02/18/93

Velocity Profile Data
Run H05 Triangular Hill; 1:5 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	646	13.6	844	506	1.67
2.4	651	14.2	847	506	1.67
3.7	656	14.1	840	500	1.68
4.9	668	14.1	842	504	1.67
6.1	680	14.7	841	500	1.68
9.1	717	12.3	846	494	1.71
12.9	733	11.9	840	501	1.68
18.3	773	10.3	839	504	1.67
24.4	813	9.1	849	497	1.71
30.5	849	7.8	852	498	1.71
Average =			844	501	1.68

Velocity Profile Data
Run H06 Triangular Hill; 1:5 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	638	15.0	861	510	1.69
2.4	654	15.2	860	511	1.68
3.7	660	14.7	859	513	1.67
4.9	690	13.5	867	507	1.71
6.1	686	14.2	857	506	1.69
9.1	716	12.7	864	512	1.69
12.9	742	11.9	863	498	1.73
18.3	779	10.4	856	517	1.66
24.4	821	9.3	861	497	1.73
30.5	858	7.6	861	507	1.70
Average =			861	508	1.70

Velocity Profile Data
Run H07 Triangular Hill; 1:5 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	533	21.4	856	502	1.71
2.4	618	15.7	860	498	1.73
3.7	642	15.2	852	502	1.70
4.9	657	15.3	858	496	1.73
6.1	673	14.6	857	507	1.69
9.1	696	13.1	854	507	1.68
12.9	749	11.4	857	500	1.71
18.3	782	10.5	857	497	1.72
24.4	823	9.2	857	507	1.69
30.5	855	7.8	856	500	1.71
Average =			856	502	1.71

Velocity Profile Data
Run H08 Triangular Hill; 1:5 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	592	16.4	850	501	1.70
3.7	639	15.1	850	496	1.71
4.9	659	14.0	853	496	1.72
6.1	681	13.5	856	492	1.74
9.1	715	12.6	852	495	1.72
12.9	739	11.4	848	499	1.70
18.3	781	10.2	851	500	1.70
24.4	829	8.5	855	494	1.73
30.5	859	7.8	858	490	1.75
Average =			853	496	1.72

TABLE 27 Model Ridge Test Data; Triangular Shape, 1:5 Slope, 40' Trees

USWP Task 2 Test Results H Series Tests

USW_VEL0.WK3 Sheet C: 02/18/93

Velocity Profile Data
Run H09 Triangular Hill; 1:5 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	626	14.3	865	506	1.71
2.4	646	15.2	856	504	1.70
3.7	661	15.1	852	511	1.67
4.9	673	14.7	858	497	1.73
6.1	683	14.7	851	494	1.72
9.1	714	13.2	855	505	1.69
12.9	752	11.6	857	509	1.68
18.3	785	10.7	858	512	1.68
24.4	827	9.2	859	514	1.67
30.5	870	7.6	866	500	1.73
Average =			858	505	1.70

Velocity Profile Data
Run H10 Triangular Hill; 1:5 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	623	15.7	859	502	1.71
2.4	626	16.3	856	501	1.71
3.7	648	16.1	851	508	1.68
4.9	663	14.8	854	512	1.67
6.1	678	14.6	854	512	1.67
9.1	701	13.4	856	509	1.68
12.9	736	11.8	855	496	1.72
18.3	778	10.3	851	505	1.69
24.4	823	9.0	855	496	1.72
30.5	857	7.6	858	503	1.70
Average =			855	504	1.69

Velocity Profile Data
Run H11 Triangular Hill; 1:5 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	525	21.1	846	500	1.69
2.4	591	17.0	852	508	1.67
3.7	617	16.8	846	497	1.70
4.9	645	15.7	857	503	1.70
6.1	648	15.5	850	511	1.66
9.1	683	14.2	852	500	1.70
12.9	730	12.1	844	514	1.64
18.3	771	10.4	851	509	1.67
24.4	821	9.1	852	503	1.69
30.5	864	8.1	860	500	1.72
Average =			851	505	1.69

Velocity Profile Data
Run H12 Triangular Hill; 1:5 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	581	17.5	841	500	1.68
3.7	621	14.7	840	503	1.67
4.9	642	14.8	848	494	1.72
6.1	656	15.1	847	497	1.70
9.1	700	13.1	847	498	1.70
12.9	729	11.6	849	497	1.71
18.3	766	10.3	841	496	1.69
24.4	821	9.2	848	493	1.72
30.5	851	8.1	851	492	1.73
Average =			846	497	1.70

TABLE 28 Model Ridge Test Data; Triangular Shape, 1:5 Slope, 60' Trees

USWP Task 2 Test Results H Series Tests

USW_VEL1.WK3 Sheet C: 02/18/93

Velocity Profile Comparisons
Triangular Hill; 1:5 Slope; 20' Tree Tests

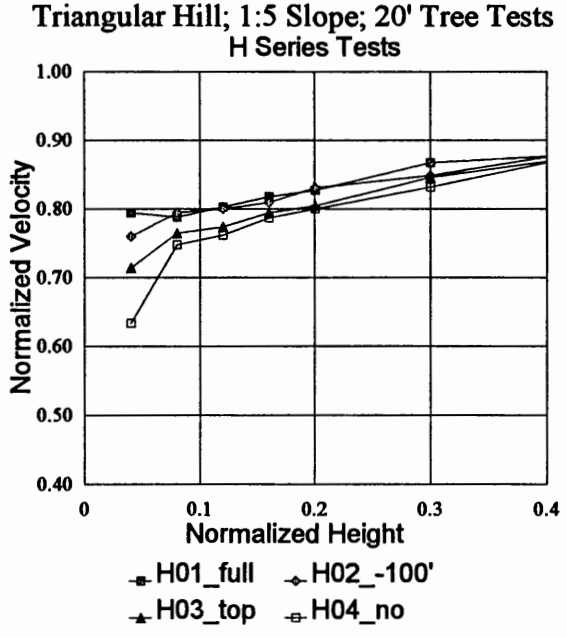
Height Norm.	Velocity Norm. H01 full	Velocity Norm. H02 -100'	Velocity Norm. H03 top	Velocity Norm. H04 no
0.04	0.79	0.76	0.71	0.63
0.08	0.79	0.79	0.76	0.75
0.12	0.80	0.80	0.77	0.76
0.16	0.82	0.81	0.79	0.79
0.20	0.83	0.83	0.80	0.80
0.30	0.87	0.85	0.85	0.83
0.42	0.88	0.88	0.88	0.88
0.60	0.92	0.92	0.92	0.92
0.80	0.97	0.97	0.97	0.96
1.00	1.00	1.01	1.00	1.00
Ur@30.5cm =	854	848	864	861
Ur@6.1cm =	505	504	509	506
Href (cm) =	30.5	30.5	30.5	30.5

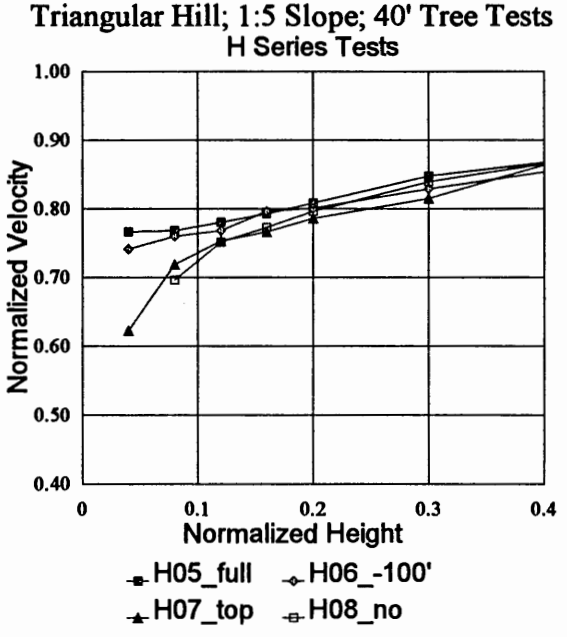
Velocity Profile Comparisons
Triangular Hill; 1:5 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. H05 full	Velocity Norm. H06 -100'	Velocity Norm. H07 top	Velocity Norm. H08 no
0.04	0.77	0.74	0.62	
0.08	0.77	0.76	0.72	0.70
0.12	0.78	0.77	0.75	0.75
0.16	0.79	0.80	0.77	0.77
0.20	0.81	0.80	0.79	0.80
0.30	0.85	0.83	0.81	0.84
0.42	0.87	0.86	0.87	0.87
0.60	0.92	0.91	0.91	0.92
0.80	0.96	0.95	0.96	0.97
1.00	1.00	1.00	1.00	1.00
Ur@30.5cm =	844	861	856	853
Ur@6.1cm =	501	508	502	496
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Triangular Hill; 1:5 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. H09 full	Velocity Norm. H10 -100'	Velocity Norm. H11 top	Velocity Norm. H12 no
0.04	0.72	0.72	0.62	
0.08	0.75	0.73	0.69	0.69
0.12	0.78	0.76	0.73	0.74
0.16	0.78	0.78	0.75	0.76
0.20	0.80	0.79	0.76	0.77
0.30	0.84	0.82	0.80	0.83
0.42	0.88	0.86	0.87	0.86
0.60	0.92	0.91	0.91	0.91
0.80	0.96	0.96	0.96	0.97
1.00	1.01	1.00	1.00	1.00
Ur@30.5cm =	858	855	851	846
Ur@6.1cm =	505	504	505	497
Href (cm) =	30.5	30.5	30.5	30.5





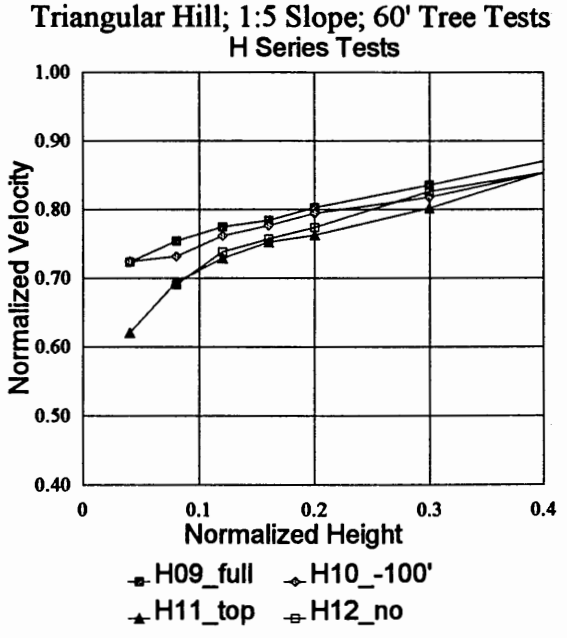


TABLE 29 Model Ridge Velocity Profile Test Results; Triangular Shape, 1:5 Slope

USWP Task 2 Test Results H Series Tests

USW_VEL2.WK3 Sheet C: 11/06/92

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:5 Slope; 20' Tree Tests

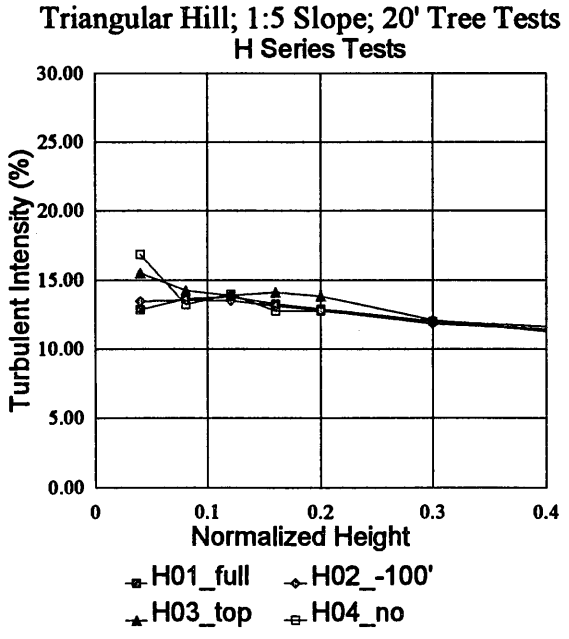
Height Norm.	Turb.Int. (%) H01 full	Turb.Int. (%) H02 -100'	Turb.Int. (%) H03 top	Turb.Int. (%) H04 no
0.04	12.9	13.5	15.5	16.9
0.08	13.7	13.5	14.2	13.2
0.12	13.8	13.5	13.9	13.9
0.16	13.3	13.1	14.1	12.8
0.20	12.9	12.8	13.8	12.8
0.30	12.0	11.8	12.1	12.0
0.42	11.5	11.4	11.1	11.2
0.60	10.4	10.3	10.2	10.2
0.80	9.1	8.8	8.6	8.5
1.00	7.8	7.6	7.5	7.7
Ur@30.5cm =	854	848	864	861
Ur@6.1cm =	505	504	509	506
Href (cm) =	30.5	30.5	30.5	30.5

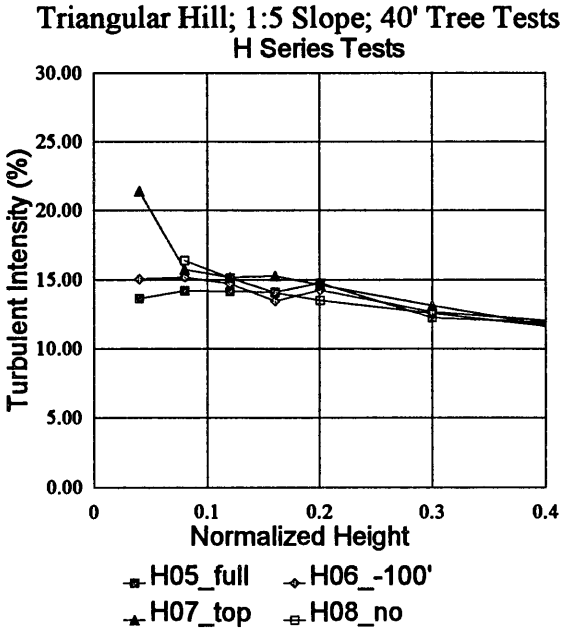
Turbulent Intensity Profile Comparisons
Triangular Hill; 1:5 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) H05 full	Turb.Int. (%) H06 -100'	Turb.Int. (%) H07 top	Turb.Int. (%) H08 no
0.04	13.6	15.0	21.4	
0.08	14.2	15.2	15.7	16.4
0.12	14.1	14.7	15.2	15.1
0.16	14.1	13.5	15.3	14.0
0.20	14.7	14.2	14.6	13.5
0.30	12.3	12.7	13.1	12.6
0.42	11.9	11.9	11.4	11.4
0.60	10.3	10.4	10.5	10.2
0.80	9.1	9.3	9.2	8.5
1.00	7.8	7.6	7.8	7.8
Ur@30.5cm =	844	861	856	853
Ur@6.1cm =	501	508	502	496
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:5 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) H09 full	Turb.Int. (%) H10 -100'	Turb.Int. (%) H11 top	Turb.Int. (%) H12 no
0.04	14.3	15.7	21.1	
0.08	15.2	16.3	17.0	17.5
0.12	15.1	16.1	16.8	14.7
0.16	14.7	14.8	15.7	14.8
0.20	14.7	14.6	15.5	15.1
0.30	13.2	13.4	14.2	13.1
0.42	11.6	11.8	12.1	11.6
0.60	10.7	10.3	10.4	10.3
0.80	9.2	9.0	9.1	9.2
1.00	7.6	7.6	8.1	8.1
Ur@30.5cm =	858	855	851	846
Ur@6.1cm =	505	504	505	497
Href (cm) =	30.5	30.5	30.5	30.5





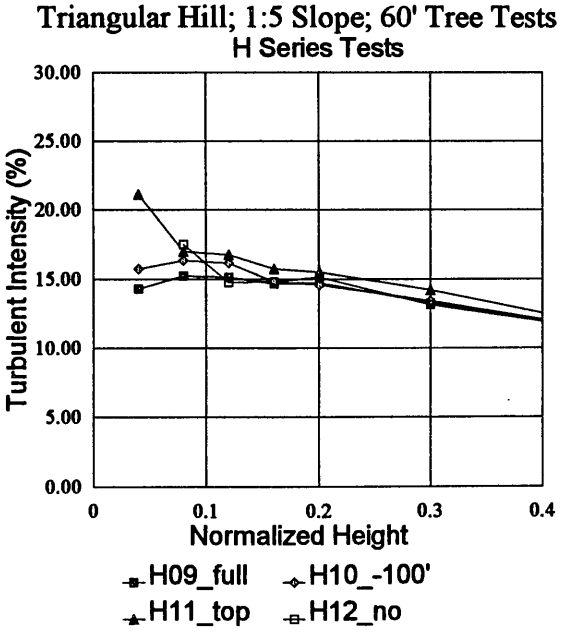


TABLE 30 Model Ridge Turbulence Profile Test Results; Triangular Shape, 1:5 Slope

USWP Task 2 Test Results I Series Tests

USW_VEL0.WK3 Sheet D: 02/18/93

Velocity Profile Data
Run I01 Triangular Hill; 1:10 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	637	13.6	852	513	1.66
2.4	659	13.2	849	509	1.67
3.7	673	13.4	851	505	1.68
4.9	676	13.8	853	506	1.69
6.1	684	13.2	856	518	1.65
9.1	718	12.3	858	516	1.66
12.9	742	11.7	851	511	1.67
18.3	782	10.3	856	506	1.69
24.4	822	9.3	856	508	1.68
30.5	860	7.7	860	507	1.70
Average =			854	510	1.68

Velocity Profile Data
Run I02 Triangular Hill; 1:10 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	616	13.9	852	508	1.68
2.4	634	14.3	850	512	1.66
3.7	664	13.5	851	505	1.68
4.9	671	13.5	853	511	1.67
6.1	692	13.5	853	505	1.69
9.1	712	12.5	848	511	1.66
12.9	740	11.6	853	515	1.66
18.3	785	10.3	854	508	1.68
24.4	821	9.3	851	510	1.67
30.5	854	8.6	855	511	1.67
Average =			852	510	1.67

Velocity Profile Data
Run I03 Triangular Hill; 1:10 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	528	19.3	856	501	1.71
2.4	623	15.4	863	510	1.69
3.7	647	14.1	862	512	1.68
4.9	653	14.4	860	514	1.67
6.1	676	13.4	861	507	1.70
9.1	706	12.2	861	502	1.71
12.9	742	11.9	863	505	1.71
18.3	783	10.3	863	507	1.70
24.4	827	9.6	863	525	1.65
30.5	863	7.8	864	512	1.69
Average =			862	509	1.69

Velocity Profile Data
Run I04 Triangular Hill; 1:10 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	436	22.7	855	505	1.69
2.4	620	15.5	862	503	1.71
3.7	658	13.8	861	511	1.68
4.9	680	13.5	861	509	1.69
6.1	680	13.2	859	515	1.67
9.1	722	12.7	864	508	1.70
12.9	738	12.0	854	504	1.69
18.3	777	11.0	852	508	1.68
24.4	818	9.2	848	502	1.69
30.5	859	7.7	857	496	1.73
Average =			857	506	1.69

TABLE 31 Model Ridge Test Data; Triangular Shape, 1:10 Slope, 20' Trees

USWP Task 2 Test Results I Series Tests

USW_VEL0.WK3 Sheet D: 02/18/93

Velocity Profile Data
Run I05 Triangular Hill; 1:10 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	612	14.9	852	510	1.67
2.4	646	14.0	854	492	1.74
3.7	662	14.7	857	504	1.70
4.9	673	14.2	858	505	1.70
6.1	686	14.0	861	508	1.69
9.1	712	13.2	856	507	1.69
12.9	750	11.8	851	505	1.69
18.3	790	10.4	854	503	1.70
24.4	831	9.1	856	495	1.73
30.5	868	8.1	859	507	1.69
Average =			856	504	1.70

Velocity Profile Data
Run I06 Triangular Hill; 1:10 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	612	15.9	860	499	1.72
2.4	630	15.4	861	513	1.68
3.7	652	15.8	858	499	1.72
4.9	673	14.3	861	506	1.70
6.1	678	14.8	857	508	1.69
9.1	721	12.6	861	503	1.71
12.9	758	11.6	860	513	1.68
18.3	795	10.1	860	504	1.71
24.4	835	8.8	861	509	1.69
30.5	867	8.2	859	507	1.69
Average =			860	506	1.70

Velocity Profile Data
Run I07 Triangular Hill; 1:10 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	480	22.5	844	497	1.70
2.4	558	19.1	849	496	1.71
3.7	607	16.7	849	503	1.69
4.9	641	15.0	849	499	1.70
6.1	648	15.0	851	495	1.72
9.1	693	13.3	847	496	1.71
12.9	735	11.8	847	494	1.71
18.3	770	10.5	843	505	1.67
24.4	817	9.2	845	502	1.68
30.5	857	8.0	850	504	1.69
Average =			847	499	1.70

Velocity Profile Data
Run I08 Triangular Hill; 1:10 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	562	18.7	859	499	1.72
3.7	624	15.4	853	501	1.70
4.9	653	14.2	849	502	1.69
6.1	681	14.3	859	503	1.71
9.1	720	12.6	858	509	1.69
12.9	743	11.8	849	511	1.66
18.3	794	10.0	858	508	1.69
24.4	830	9.1	859	503	1.71
30.5	872	7.7	864	506	1.71
Average =			856	505	1.70

TABLE 32 Model Ridge Test Data; Triangular Shape, 1:10 Slope, 40' Trees

USWP Task 2 Test Results I Series Tests

USW_VEL0.WK3 Sheet D: 02/18/93

Velocity Profile Data
Run I09 Triangular Hill; 1:10 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	616	15.5	853	506	1.69
2.4	636	14.7	859	508	1.69
3.7	650	15.0	858	503	1.70
4.9	663	15.1	857	506	1.69
6.1	672	14.8	849	501	1.69
9.1	708	13.8	857	505	1.70
12.9	741	12.0	860	509	1.69
18.3	789	10.1	857	504	1.70
24.4	828	9.2	855	495	1.73
30.5	871	7.7	863	507	1.70
Average =			857	504	1.70

Velocity Profile Data
Run I10 Triangular Hill; 1:10 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	584	16.2	853	503	1.69
2.4	613	15.4	850	508	1.67
3.7	628	15.0	857	505	1.70
4.9	651	15.2	851	506	1.68
6.1	661	14.8	853	511	1.67
9.1	689	13.7	840	500	1.68
12.9	737	12.1	847	491	1.72
18.3	778	10.2	841	505	1.66
24.4	816	9.4	842	514	1.64
30.5	858	7.6	852	493	1.73
Average =			849	504	1.68

Velocity Profile Data
Run I11 Triangular Hill; 1:10 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	482	21.0	843	505	1.67
2.4	554	19.8	849	504	1.68
3.7	601	17.9	848	504	1.68
4.9	616	16.6	841	496	1.70
6.1	644	15.3	845	496	1.70
9.1	684	14.0	843	501	1.68
12.9	716	12.9	838	502	1.67
18.3	767	10.7	842	500	1.68
24.4	814	9.1	841	495	1.70
30.5	851	8.2	845	501	1.69
Average =			844	500	1.69

Velocity Profile Data
Run I12 Triangular Hill; 1:10 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	509	22.6	859	511	1.68
3.7	604	18.0	859	511	1.68
4.9	654	15.4	858	509	1.69
6.1	675	14.8	862	498	1.73
9.1	712	13.4	868	518	1.68
12.9	761	11.5	871	504	1.73
18.3	807	10.2	876	508	1.72
24.4	841	9.1	868	504	1.72
30.5	880	7.7	873	511	1.71
Average =			866	508	1.70

TABLE 33 Model Ridge Test Data; Triangular Shape, 1:10 Slope, 60' Trees

USWP Task 2 Test Results I Series Tests

USW_VEL1.WK3 Sheet D: 02/18/93

Velocity Profile Comparisons
Triangular Hill; 1:10 Slope; 20' Tree Tests

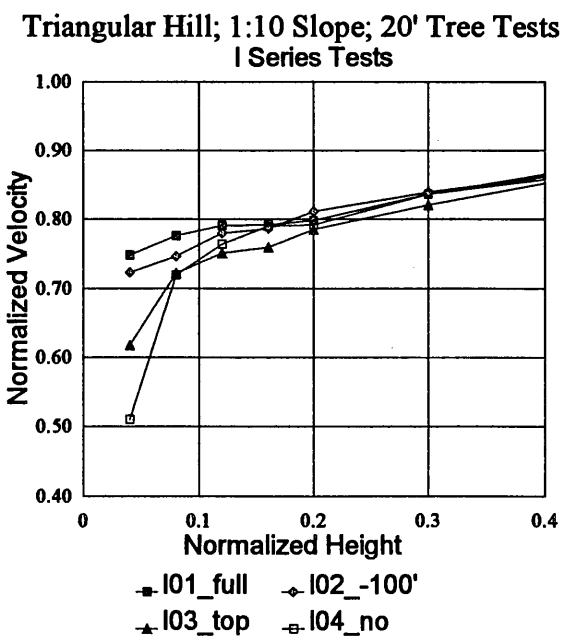
Height Norm.	Velocity Norm. I01 full	Velocity Norm. I02 -100'	Velocity Norm. I03 top	Velocity Norm. I04 no
0.04	0.75	0.72	0.62	0.51
0.08	0.78	0.75	0.72	0.72
0.12	0.79	0.78	0.75	0.76
0.16	0.79	0.79	0.76	0.79
0.20	0.80	0.81	0.79	0.79
0.30	0.84	0.84	0.82	0.84
0.42	0.87	0.87	0.86	0.86
0.60	0.91	0.92	0.91	0.91
0.80	0.96	0.96	0.96	0.96
1.00	1.00	1.00	1.00	1.00
Ur@30.5cm =	854	852	862	857
Ur@6.1cm =	510	510	509	506
Href (cm) =	30.5	30.5	30.5	30.5

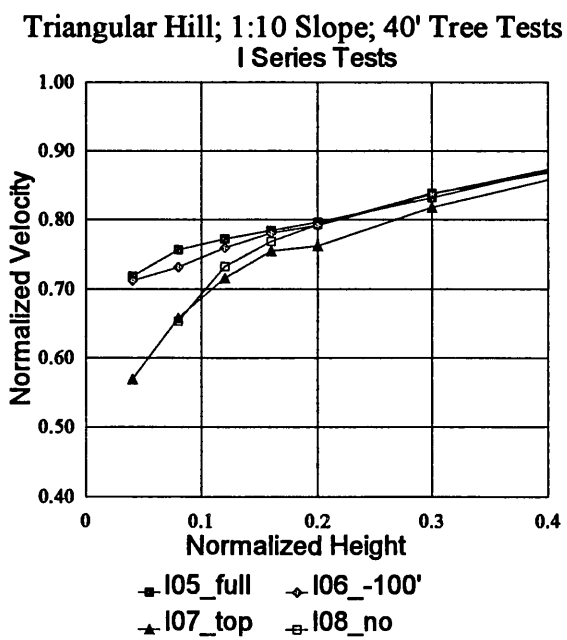
Velocity Profile Comparisons
Triangular Hill; 1:10 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. I05 full	Velocity Norm. I06 -100'	Velocity Norm. I07 top	Velocity Norm. I08 no
0.04	0.72	0.71	0.57	
0.08	0.76	0.73	0.66	0.65
0.12	0.77	0.76	0.72	0.73
0.16	0.78	0.78	0.75	0.77
0.20	0.80	0.79	0.76	0.79
0.30	0.83	0.84	0.82	0.84
0.42	0.88	0.88	0.87	0.88
0.60	0.93	0.92	0.91	0.93
0.80	0.97	0.97	0.97	0.97
1.00	1.01	1.01	1.01	1.01
Ur@30.5cm =	856	860	847	856
Ur@6.1cm =	504	506	499	505
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Triangular Hill; 1:10 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. I09 full	Velocity Norm. I10 -100'	Velocity Norm. I11 top	Velocity Norm. I12 no
0.04	0.72	0.69	0.57	
0.08	0.74	0.72	0.65	0.59
0.12	0.76	0.73	0.71	0.70
0.16	0.77	0.77	0.73	0.76
0.20	0.79	0.77	0.76	0.78
0.30	0.83	0.82	0.81	0.82
0.42	0.86	0.87	0.85	0.87
0.60	0.92	0.92	0.91	0.92
0.80	0.97	0.97	0.97	0.97
1.00	1.01	1.01	1.01	1.01
Ur@30.5cm =	857	849	844	866
Ur@6.1cm =	504	504	500	508
Href (cm) =	30.5	30.5	30.5	30.5





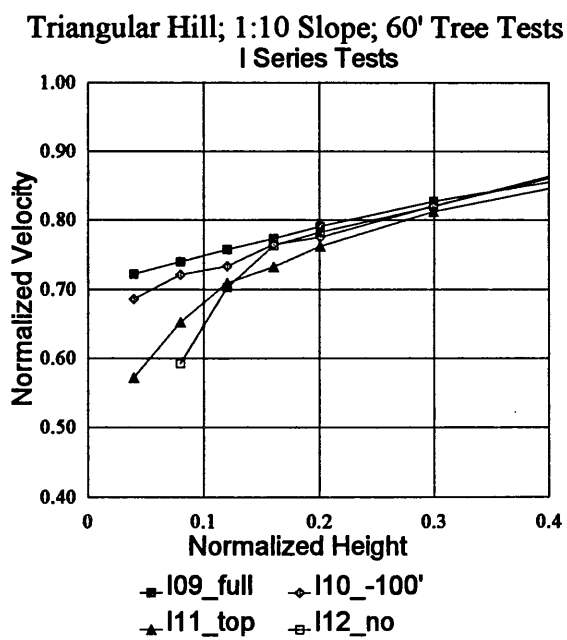


TABLE 34 Model Ridge Velocity Profile Test Results; Triangular Shape, 1:10 Slope

USWP Task 2 Test Results I Series Tests

USW_VEL2.WK3 Sheet D: 11/06/92

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:10 Slope; 20' Tree Tests

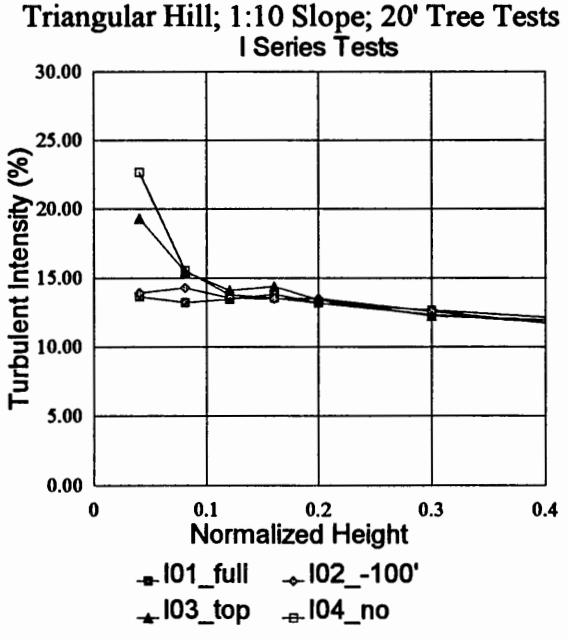
Height Norm.	Turb.Int. (%) I01 full	Turb.Int. (%) I02 -100'	Turb.Int. (%) I03 top	Turb.Int. (%) I04 no
0.04	13.6	13.9	19.3	22.7
0.08	13.2	14.3	15.4	15.5
0.12	13.4	13.5	14.1	13.8
0.16	13.8	13.5	14.4	13.5
0.20	13.2	13.5	13.4	13.2
0.30	12.3	12.5	12.2	12.7
0.42	11.7	11.6	11.9	12.0
0.60	10.3	10.3	10.3	11.0
0.80	9.3	9.3	9.6	9.2
1.00	7.7	8.6	7.8	7.7
Ur@30.5cm =	854	852	862	857
Ur@6.1cm =	510	510	509	506
Href (cm) =	30.5	30.5	30.5	30.5

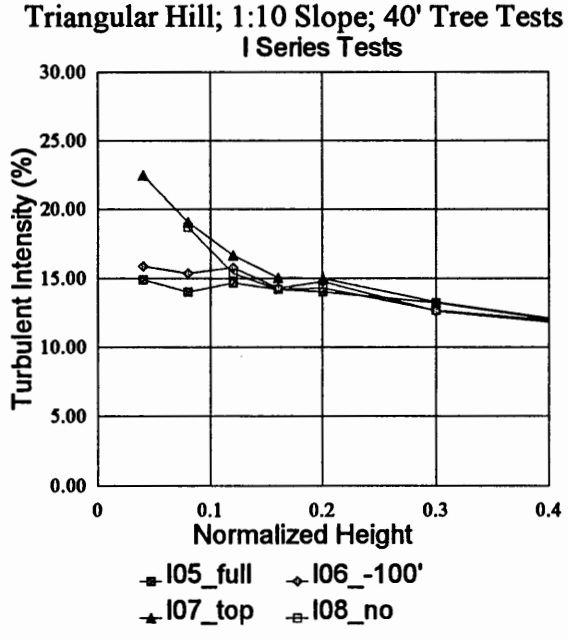
Turbulent Intensity Profile Comparisons
Triangular Hill; 1:10 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) I05 full	Turb.Int. (%) I06 -100'	Turb.Int. (%) I07 top	Turb.Int. (%) I08 no
0.04	14.9	15.9	22.5	
0.08	14.0	15.4	19.1	18.7
0.12	14.7	15.8	16.7	15.4
0.16	14.2	14.3	15.0	14.2
0.20	14.0	14.8	15.0	14.3
0.30	13.2	12.6	13.3	12.6
0.42	11.8	11.6	11.8	11.8
0.60	10.4	10.1	10.5	10.0
0.80	9.1	8.8	9.2	9.1
1.00	8.1	8.2	8.0	7.7
Ur@30.5cm =	856	860	847	856
Ur@6.1cm =	504	506	499	505
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Triangular Hill; 1:10 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) I09 full	Turb.Int. (%) I10 -100'	Turb.Int. (%) I11 top	Turb.Int. (%) I12 no
0.04	15.5	16.2	21.0	
0.08	14.7	15.4	19.8	22.6
0.12	15.0	15.0	17.9	18.0
0.16	15.1	15.2	16.6	15.4
0.20	14.8	14.8	15.3	14.8
0.30	13.8	13.7	14.0	13.4
0.42	12.0	12.1	12.9	11.5
0.60	10.1	10.2	10.7	10.2
0.80	9.2	9.4	9.1	9.1
1.00	7.7	7.6	8.2	7.7
Ur@30.5cm =	857	849	844	866
Ur@6.1cm =	504	504	500	508
Href (cm) =	30.5	30.5	30.5	30.5





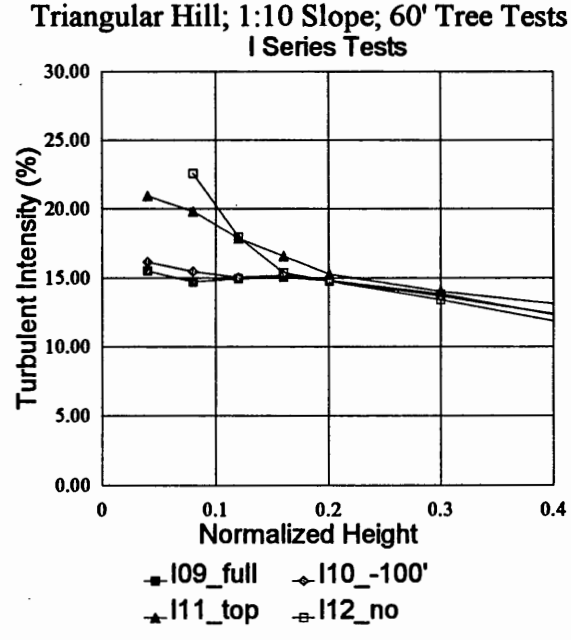


TABLE 35 Model Ridge Turbulence Profile Test Results; Triangular Shape, 1:10 Slope

USWP Task 2 Test Results J Series Tests

USW_VEL0.WK3 Sheet E: 02/18/93

Velocity Profile Data
Run J01 Sinusoidal Hill; 1:2 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	663	12.6	839	500	1.68
2.4	655	13.5	836	503	1.66
3.7	663	13.7	838	504	1.66
4.9	677	13.5	846	500	1.69
6.1	686	13.4	846	504	1.68
9.1	702	13.0	847	505	1.68
12.9	743	11.1	848	492	1.73
18.3	777	10.1	849	498	1.70
24.4	817	8.7	845	502	1.68
30.5	844	7.6	840	494	1.70
Average =			843	500	1.69

Velocity Profile Data
Run J02 Sinusoidal Hill; 1:2 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	644	13.1	849	501	1.69
2.4	672	13.2	855	505	1.69
3.7	668	13.4	849	506	1.68
4.9	684	13.5	857	511	1.68
6.1	688	13.2	860	506	1.70
9.1	718	12.5	859	507	1.69
12.9	745	11.6	857	507	1.69
18.3	786	10.2	858	512	1.68
24.4	828	8.9	855	505	1.69
30.5	859	7.7	855	507	1.69
Average =			855	507	1.69

Velocity Profile Data
Run J03 Sinusoidal Hill; 1:2 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	656	13.6	857	508	1.69
2.4	673	13.4	860	507	1.70
3.7	679	13.6	856	505	1.69
4.9	689	13.0	854	506	1.69
6.1	704	12.4	852	504	1.69
9.1	733	11.8	858	508	1.69
12.9	760	11.4	859	505	1.70
18.3	792	10.3	855	507	1.69
24.4	843	8.9	865	516	1.68
30.5	879	7.7	871	515	1.69
Average =			859	508	1.69

Velocity Profile Data
Run J04 Sinusoidal Hill; 1:2 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	617	15.0	858	516	1.66
2.4	654	12.9	856	509	1.68
3.7	657	13.7	855	496	1.73
4.9	668	13.3	855	513	1.67
6.1	681	13.5	852	504	1.69
9.1	715	12.1	854	498	1.72
12.9	742	11.4	858	507	1.69
18.3	781	10.2	855	504	1.70
24.4	832	8.8	859	502	1.71
30.5	868	7.6	865	508	1.70
Average =			857	506	1.69

TABLE 36 Model Ridge Test Data; Sinusoidal Shape, 1:2 Slope, 20' Trees

USWP Task 2 Test Results J Series Tests

USW_VEL0.WK3 Sheet E: 02/18/93

Velocity Profile Data
Run J05 Sinusoidal Hill; 1:2 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	648	14.0	855	513	1.67
2.4	649	15.4	865	508	1.70
3.7	671	15.3	869	513	1.69
4.9	681	14.3	868	511	1.70
6.1	701	13.5	865	507	1.71
9.1	731	12.5	867	507	1.71
12.9	755	12.1	865	507	1.71
18.3	793	10.4	860	511	1.68
24.4	838	9.1	865	506	1.71
30.5	879	7.9	868	515	1.68
Average =			865	510	1.70

Velocity Profile Data
Run J06 Sinusoidal Hill; 1:2 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	653	14.6	865	511	1.69
2.4	666	14.6	866	511	1.70
3.7	668	14.5	861	514	1.68
4.9	686	14.8	865	508	1.70
6.1	697	13.9	863	514	1.68
9.1	723	12.9	863	509	1.70
12.9	753	11.5	865	515	1.68
18.3	796	10.3	859	513	1.68
24.4	831	9.5	859	516	1.67
30.5	879	7.6	872	513	1.70
Average =			864	512	1.69

Velocity Profile Data
Run J07 Sinusoidal Hill; 1:2 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	582	19.0	858	505	1.70
2.4	637	14.7	860	508	1.69
3.7	659	14.8	859	510	1.68
4.9	666	15.3	854	514	1.66
6.1	689	13.9	852	507	1.68
9.1	716	13.0	855	509	1.68
12.9	758	11.3	863	512	1.69
18.3	791	10.6	859	505	1.70
24.4	828	9.2	855	509	1.68
30.5	876	7.6	865	509	1.70
Average =			858	509	1.69

Velocity Profile Data
Run J08 Sinusoidal Hill; 1:2 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	618	14.2	844	497	1.70
3.7	639	14.1	861	507	1.70
4.9	645	14.7	854	503	1.70
6.1	666	14.1	851	506	1.68
9.1	691	13.1	850	503	1.69
12.9	730	12.3	855	491	1.74
18.3	777	10.7	853	495	1.72
24.4	828	9.2	857	507	1.69
30.5	866	7.8	858	501	1.71
Average =			854	501	1.70

TABLE 37 Model Ridge Test Data; Sinusoidal Shape, 1:2 Slope, 40' Trees

USWP Task 2 Test Results J Series Tests

USW_VEL0.WK3 Sheet E: 02/18/93

Velocity Profile Data
Run J09 Sinusoidal Hill; 1:2 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	644	15.0	853	505	1.69
2.4	646	15.7	856	499	1.72
3.7	649	15.8	856	504	1.70
4.9	661	15.0	851	501	1.70
6.1	677	14.0	852	498	1.71
9.1	704	13.1	854	498	1.71
12.9	741	11.5	849	503	1.69
18.3	778	10.3	848	506	1.68
24.4	823	9.1	855	507	1.69
30.5	860	8.0	858	504	1.70
Average =			853	502	1.70

Velocity Profile Data
Run J10 Sinusoidal Hill; 1:2 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	653	14.9	855	506	1.69
2.4	659	15.4	853	493	1.73
3.7	656	15.6	852	506	1.68
4.9	675	14.7	851	497	1.71
6.1	679	14.6	846	502	1.69
9.1	713	13.1	854	505	1.69
12.9	755	11.1	855	504	1.70
18.3	790	10.3	853	501	1.70
24.4	831	9.2	855	508	1.68
30.5	864	7.6	857	499	1.72
Average =			853	502	1.70

Velocity Profile Data
Run J11 Sinusoidal Hill; 1:2 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	538	20.9	851	493	1.73
2.4	624	14.9	853	499	1.71
3.7	636	15.8	842	490	1.72
4.9	651	15.7	845	498	1.70
6.1	668	14.5	844	492	1.72
9.1	700	13.0	840	492	1.71
12.9	738	11.7	846	497	1.70
18.3	772	10.6	850	503	1.69
24.4	815	9.2	846	495	1.71
30.5	857	7.9	851	498	1.71
Average =			847	496	1.71

Velocity Profile Data
Run J12 Sinusoidal Hill; 1:2 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	606	15.3	848	504	1.68
3.7	626	14.8	854	495	1.72
4.9	635	14.9	852	503	1.69
6.1	647	14.5	856	499	1.72
9.1	694	13.6	848	489	1.73
12.9	737	11.5	850	493	1.72
18.3	773	10.4	846	491	1.72
24.4	820	9.0	856	493	1.73
30.5	853	8.0	850	497	1.71
Average =			851	496	1.72

TABLE 38 Model Ridge Test Data; Sinusoidal Shape, 1:2 Slope, 60' Trees

USWP Task 2 Test Results J Series Tests

USW_VEL1.WK3 Sheet E: 02/18/93

Velocity Profile Comparisons
Sinusoidal Hill; 1:2 Slope; 20' Tree Tests

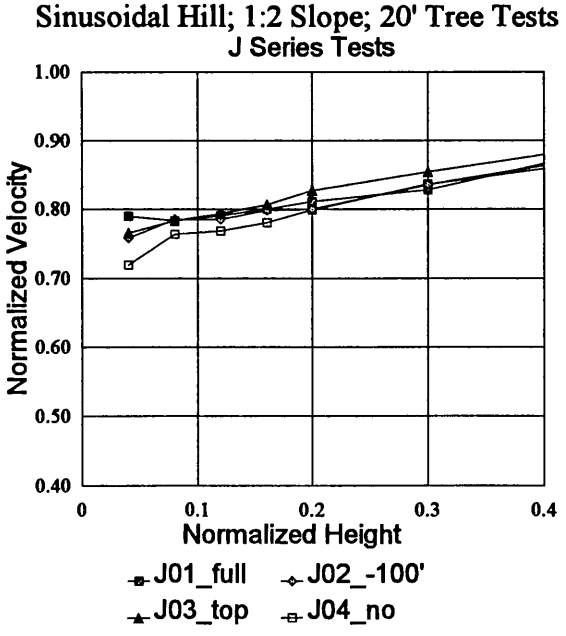
Height Norm.	Velocity Norm. J01 full	Velocity Norm. J02 -100'	Velocity Norm. J03 top	Velocity Norm. J04 no
0.04	0.79	0.76	0.77	0.72
0.08	0.78	0.79	0.78	0.76
0.12	0.79	0.79	0.79	0.77
0.16	0.80	0.80	0.81	0.78
0.20	0.81	0.80	0.83	0.80
0.30	0.83	0.84	0.85	0.84
0.42	0.88	0.87	0.89	0.86
0.60	0.92	0.92	0.93	0.91
0.80	0.97	0.97	0.97	0.97
1.00	1.00	1.00	1.01	1.00
Ur@30.5cm =	843	855	859	857
Ur@6.1cm =	500	507	508	506
Href (cm) =	30.5	30.5	30.5	30.5

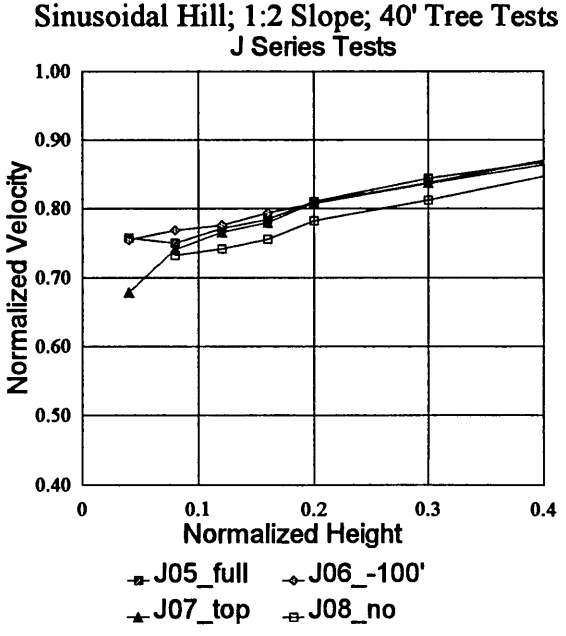
Velocity Profile Comparisons
Sinusoidal Hill; 1:2 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. J05 full	Velocity Norm. J06 -100'	Velocity Norm. J07 top	Velocity Norm. J08 no
0.04	0.76	0.75	0.68	
0.08	0.75	0.77	0.74	0.73
0.12	0.77	0.78	0.77	0.74
0.16	0.78	0.79	0.78	0.76
0.20	0.81	0.81	0.81	0.78
0.30	0.84	0.84	0.84	0.81
0.42	0.87	0.87	0.88	0.85
0.60	0.92	0.93	0.92	0.91
0.80	0.97	0.97	0.97	0.97
1.00	1.01	1.01	1.01	1.01
Ur@30.5cm =	865	864	858	854
Ur@6.1cm =	510	512	509	501
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Sinusoidal Hill; 1:2 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. J09 full	Velocity Norm. J10 -100'	Velocity Norm. J11 top	Velocity Norm. J12 no
0.04	0.75	0.76	0.63	
0.08	0.75	0.77	0.73	0.71
0.12	0.76	0.77	0.76	0.73
0.16	0.78	0.79	0.77	0.75
0.20	0.79	0.80	0.79	0.76
0.30	0.82	0.84	0.83	0.82
0.42	0.87	0.88	0.87	0.87
0.60	0.92	0.93	0.91	0.91
0.80	0.96	0.97	0.96	0.96
1.00	1.00	1.01	1.01	1.00
Ur@30.5cm =	853	853	847	851
Ur@6.1cm =	502	502	496	496
Href (cm) =	30.5	30.5	30.5	30.5





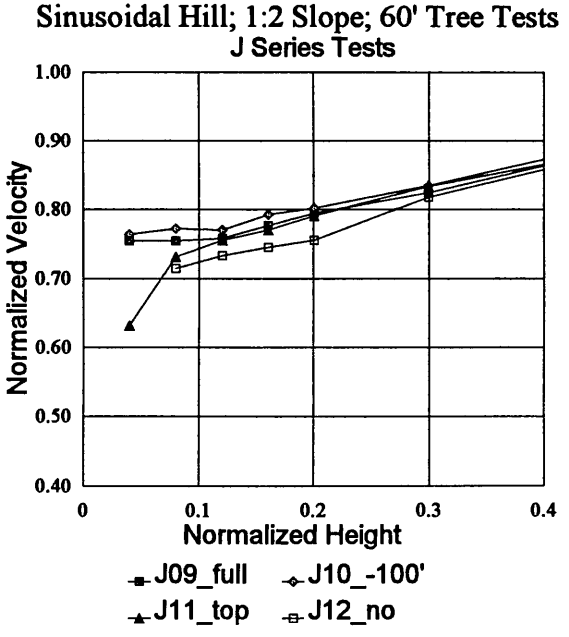


TABLE 39 Model Ridge Velocity Profile Test Results; Sinusoidal Shape, 1:2 Slope

USWP Task 2 Test Results J Series Tests

USW_VEL2.WK3 Sheet E: 11/06/92

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:2 Slope; 20' Tree Tests

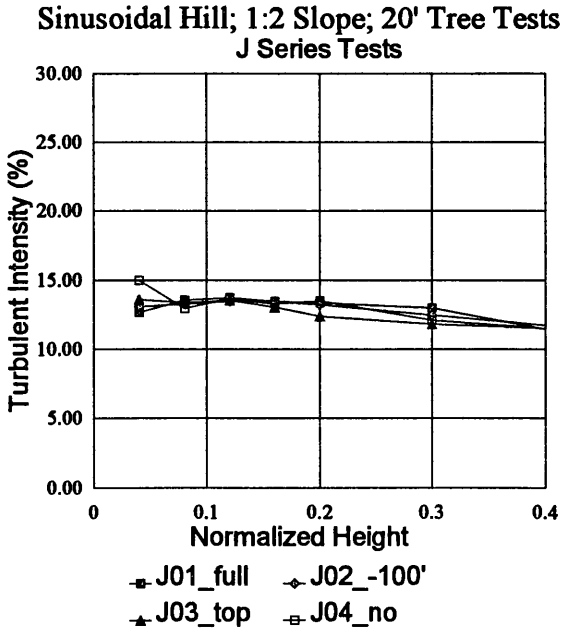
Height Norm.	Turb.Int. (%) J01 full	Turb.Int. (%) J02 -100'	Turb.Int. (%) J03 top	Turb.Int. (%) J04 no
0.04	12.6	13.1	13.6	15.0
0.08	13.5	13.2	13.4	12.9
0.12	13.7	13.4	13.6	13.7
0.16	13.5	13.5	13.0	13.3
0.20	13.4	13.2	12.4	13.5
0.30	13.0	12.5	11.8	12.1
0.42	11.1	11.6	11.4	11.4
0.60	10.1	10.2	10.3	10.2
0.80	8.7	8.9	8.9	8.8
1.00	7.6	7.7	7.7	7.6
Ur@30.5cm =	843	855	859	857
Ur@6.1cm =	500	507	508	506
Href (cm) =	30.5	30.5	30.5	30.5

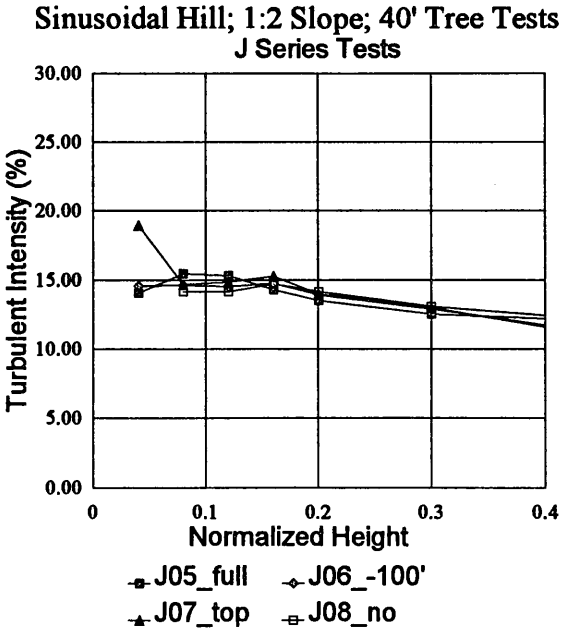
Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:2 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) J05 full	Turb.Int. (%) J06 -100'	Turb.Int. (%) J07 top	Turb.Int. (%) J08 no
0.04	14.0	14.6	19.0	
0.08	15.4	14.6	14.7	14.2
0.12	15.3	14.5	14.8	14.1
0.16	14.3	14.8	15.3	14.7
0.20	13.5	13.9	13.9	14.1
0.30	12.5	12.9	13.0	13.1
0.42	12.1	11.5	11.3	12.3
0.60	10.4	10.3	10.6	10.7
0.80	9.1	9.5	9.2	9.2
1.00	7.9	7.6	7.6	7.8
Ur@30.5cm =	865	864	858	854
Ur@6.1cm =	510	512	509	501
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:2 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) J09 full	Turb.Int. (%) J10 -100'	Turb.Int. (%) J11 top	Turb.Int. (%) J12 no
0.04	15.0	14.9	20.9	
0.08	15.7	15.4	14.9	15.3
0.12	15.8	15.6	15.8	14.8
0.16	15.0	14.7	15.7	14.9
0.20	14.0	14.6	14.5	14.5
0.30	13.1	13.1	13.0	13.6
0.42	11.5	11.1	11.7	11.5
0.60	10.3	10.3	10.6	10.4
0.80	9.1	9.2	9.2	9.0
1.00	8.0	7.6	7.9	8.0
Ur@30.5cm =	853	853	847	851
Ur@6.1cm =	502	502	496	496
Href (cm) =	30.5	30.5	30.5	30.5





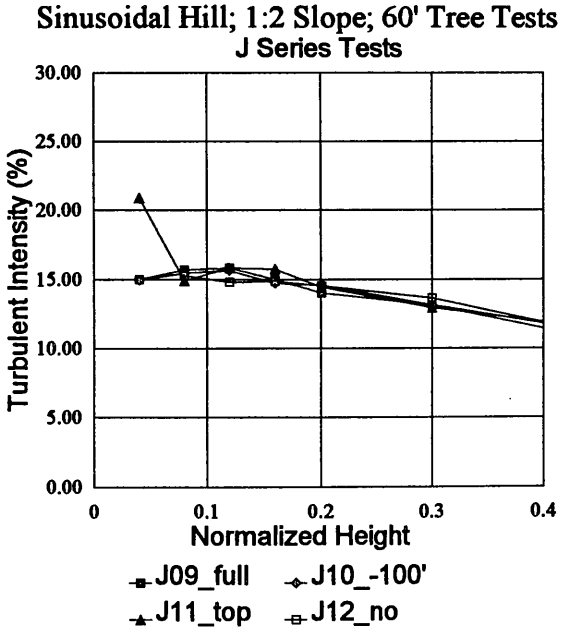


TABLE 40 Model Ridge Turbulence Profile Test Results; Sinusoidal Shape, 1:2 Slope

USWP Task 2 Test Results K Series Tests

USW_VEL0.WK3 Sheet F: 02/18/93

Velocity Profile Data
Run K01 Sinusoidal Hill; 1:3 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	659	13.5	851	500	1.70
2.4	673	13.6	840	502	1.68
3.7	678	14.4	847	507	1.67
4.9	697	13.0	846	504	1.68
6.1	692	13.1	844	503	1.68
9.1	718	11.9	848	509	1.67
12.9	743	11.2	851	511	1.67
18.3	772	10.4	844	512	1.65
24.4	824	8.6	850	504	1.69
30.5	855	7.8	849	512	1.66
Average =			847	506	1.67

Velocity Profile Data
Run K02 Sinusoidal Hill; 1:3 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	715	13.0	862	509	1.69
2.4	712	13.4	858	501	1.71
3.7	710	13.4	858	517	1.66
4.9	715	12.9	861	515	1.67
6.1	716	12.7	862	507	1.70
9.1	735	12.3	859	516	1.66
12.9	765	10.6	854	512	1.67
18.3	796	9.6	856	506	1.69
24.4	835	8.9	864	511	1.69
30.5	863	7.9	859	517	1.66
Average =			859	511	1.68

Velocity Profile Data
Run K03 Sinusoidal Hill; 1:3 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	632	15.7	854	510	1.68
2.4	672	13.5	851	514	1.66
3.7	677	13.6	853	506	1.69
4.9	687	13.2	854	508	1.68
6.1	703	12.5	850	520	1.64
9.1	718	12.3	854	504	1.69
12.9	750	11.1	851	495	1.72
18.3	783	9.9	854	511	1.67
24.4	820	8.8	854	502	1.70
30.5	856	7.8	859	510	1.68
Average =			853	508	1.68

Velocity Profile Data
Run K04 Sinusoidal Hill; 1:3 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	484	23.6	872	515	1.69
2.4	671	12.6	863	515	1.68
3.7	688	13.1	870	518	1.68
4.9	694	13.3	870	523	1.66
6.1	704	12.7	872	522	1.67
9.1	727	11.9	868	512	1.69
12.9	749	11.5	870	528	1.65
18.3	793	10.0	868	508	1.71
24.4	829	9.0	868	518	1.67
30.5	863	7.9	870	507	1.72
Average =			869	517	1.68

TABLE 41 Model Ridge Test Data; Sinusoidal Shape, 1:3 Slope, 20' Trees

USWP Task 2 Test Results K Series Tests

USW_VEL0.WK3 Sheet F: 02/18/93

Velocity Profile Data
Run K05 Sinusoidal Hill; 1:3 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	639	14.3	852	513	1.66
2.4	648	15.4	859	512	1.68
3.7	666	15.2	853	510	1.67
4.9	678	14.4	853	501	1.70
6.1	687	14.7	853	496	1.72
9.1	715	13.4	850	505	1.68
12.9	744	11.7	849	503	1.69
18.3	784	10.2	856	502	1.71
24.4	824	8.8	853	508	1.68
30.5	867	7.6	859	497	1.73
Average =			854	505	1.69

Velocity Profile Data
Run K06 Sinusoidal Hill; 1:3 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	658	15.0	843	504	1.67
2.4	672	14.7	847	504	1.68
3.7	687	13.7	844	501	1.69
4.9	693	14.5	844	499	1.69
6.1	696	14.2	850	498	1.71
9.1	719	12.4	845	500	1.69
12.9	744	11.5	844	494	1.71
18.3	795	9.9	850	505	1.68
24.4	827	9.2	853	501	1.70
30.5	864	7.8	856	504	1.70
Average =			848	501	1.69

Velocity Profile Data
Run K07 Sinusoidal Hill; 1:3 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	517	22.0	857	505	1.70
2.4	640	14.8	856	505	1.69
3.7	658	14.5	857	508	1.69
4.9	676	14.9	858	505	1.70
6.1	690	14.1	862	508	1.70
9.1	719	12.8	863	507	1.70
12.9	752	11.4	861	511	1.69
18.3	791	10.1	861	504	1.71
24.4	834	9.0	862	509	1.69
30.5	866	7.9	862	509	1.69
Average =			860	507	1.70

Velocity Profile Data
Run K08 Sinusoidal Hill; 1:3 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	569	19.1	853	505	1.69
3.7	635	14.1	857	505	1.70
4.9	648	14.7	848	505	1.68
6.1	677	14.5	852	501	1.70
9.1	704	13.0	854	502	1.70
12.9	741	11.6	850	499	1.70
18.3	783	9.8	855	502	1.70
24.4	814	9.0	851	501	1.70
30.5	855	7.7	855	497	1.72
Average =			853	502	1.70

TABLE 42 Model Ridge Test Data; Sinusoidal Shape, 1:3 Slope, 40' Trees

USWP Task 2 Test Results K Series Tests

USW_VEL0.WK3 Sheet F: 02/18/93

Velocity Profile Data
Run K09 Sinusoidal Hill; 1:3 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	623	15.6	844	503	1.68
2.4	628	16.1	838	508	1.65
3.7	636	16.0	843	509	1.66
4.9	647	15.8	844	494	1.71
6.1	675	14.2	847	506	1.67
9.1	710	13.4	841	495	1.70
12.9	732	11.7	842	509	1.65
18.3	771	10.1	849	503	1.69
24.4	809	9.6	845	509	1.66
30.5	849	8.0	847	501	1.69
Average =			844	504	1.68

Velocity Profile Data
Run K10 Sinusoidal Hill; 1:3 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	643	15.0	839	487	1.72
2.4	649	15.6	841	494	1.70
3.7	653	15.2	841	487	1.73
4.9	668	14.8	838	500	1.68
6.1	675	14.4	835	509	1.64
9.1	717	12.3	837	493	1.70
12.9	736	11.4	838	505	1.66
18.3	772	9.8	837	489	1.71
24.4	809	9.1	836	497	1.68
30.5	846	7.8	839	496	1.69
Average =			838	496	1.69

Velocity Profile Data
Run K11 Sinusoidal Hill; 1:3 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	506	22.6	882	528	1.67
2.4	653	15.7	879	514	1.71
3.7	663	15.5	879	523	1.68
4.9	684	15.1	879	511	1.72
6.1	698	14.5	881	523	1.68
9.1	733	13.3	879	524	1.68
12.9	763	11.9	884	527	1.68
18.3	811	10.1	879	519	1.69
24.4	848	9.3	885	519	1.71
30.5	890	7.8	888	516	1.72
Average =			882	520	1.69

Velocity Profile Data
Run K12 Sinusoidal Hill; 1:3 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	423	29.3	848	505	1.68
3.7	631	14.1	851	511	1.67
4.9	657	14.5	857	500	1.71
6.1	666	14.2	855	508	1.68
9.1	706	13.6	855	502	1.70
12.9	732	12.1	851	499	1.71
18.3	786	10.1	856	502	1.71
24.4	818	9.0	851	499	1.71
30.5	851	7.8	851	499	1.71
Average =			853	503	1.70

TABLE 43 Model Ridge Test Data; Sinusoidal Shape, 1:3 Slope, 60' Trees

USWP Task 2 Test Results K Series Tests

USW_VEL1.WK3 Sheet F: 02/18/93

Velocity Profile Comparisons
Sinusoidal Hill; 1:3 Slope; 20' Tree Tests

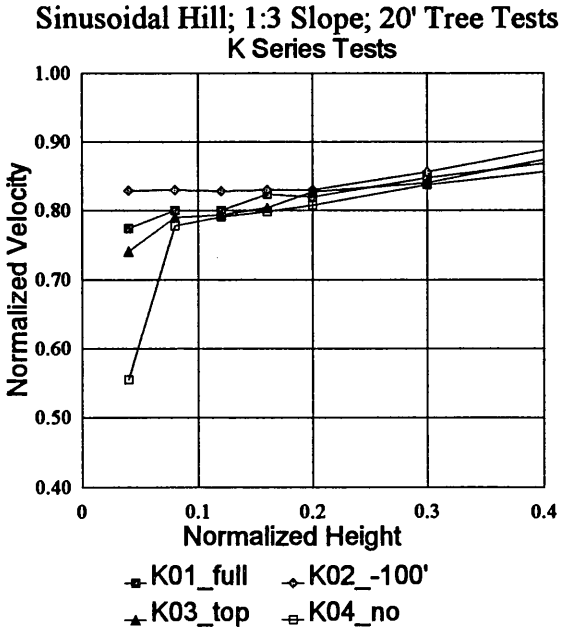
Height Norm.	Velocity Norm. K01 full	Velocity Norm. K02 -100'	Velocity Norm. K03 top	Velocity Norm. K04 no
0.04	0.77	0.83	0.74	0.55
0.08	0.80	0.83	0.79	0.78
0.12	0.80	0.83	0.79	0.79
0.16	0.82	0.83	0.80	0.80
0.20	0.82	0.83	0.83	0.81
0.30	0.85	0.86	0.84	0.84
0.42	0.87	0.90	0.88	0.86
0.60	0.91	0.93	0.92	0.91
0.80	0.97	0.97	0.96	0.96
1.00	1.01	1.00	1.00	0.99
Ur@30.5cm =	847	859	853	869
Ur@6.1cm =	506	511	508	517
Href (cm) =	30.5	30.5	30.5	30.5

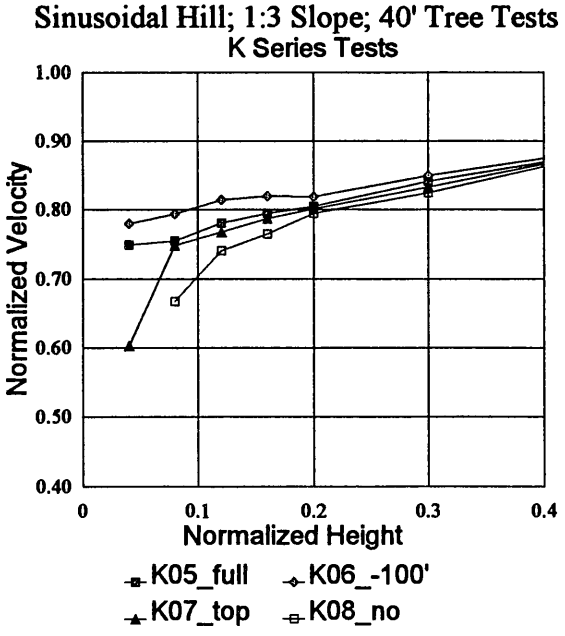
Velocity Profile Comparisons
Sinusoidal Hill; 1:3 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. K05 full	Velocity Norm. K06 -100'	Velocity Norm. K07 top	Velocity Norm. K08 no
0.04	0.75	0.78	0.60	
0.08	0.75	0.79	0.75	0.67
0.12	0.78	0.81	0.77	0.74
0.16	0.79	0.82	0.79	0.76
0.20	0.81	0.82	0.80	0.80
0.30	0.84	0.85	0.83	0.82
0.42	0.88	0.88	0.87	0.87
0.60	0.92	0.93	0.92	0.92
0.80	0.97	0.97	0.97	0.96
1.00	1.01	1.01	1.00	1.00
Ur@30.5cm =	854	848	860	853
Ur@6.1cm =	505	501	507	502
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Sinusoidal Hill; 1:3 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. K09 full	Velocity Norm. K10 -100'	Velocity Norm. K11 top	Velocity Norm. K12 no
0.04	0.74	0.77	0.57	
0.08	0.75	0.77	0.74	0.50
0.12	0.75	0.78	0.75	0.74
0.16	0.77	0.80	0.78	0.77
0.20	0.80	0.81	0.79	0.78
0.30	0.84	0.86	0.83	0.83
0.42	0.87	0.88	0.86	0.86
0.60	0.91	0.92	0.92	0.92
0.80	0.96	0.97	0.96	0.96
1.00	1.00	1.01	1.00	1.00
Ur@30.5cm =	844	838	882	853
Ur@6.1cm =	504	496	520	503
Href (cm) =	30.5	30.5	30.5	30.5





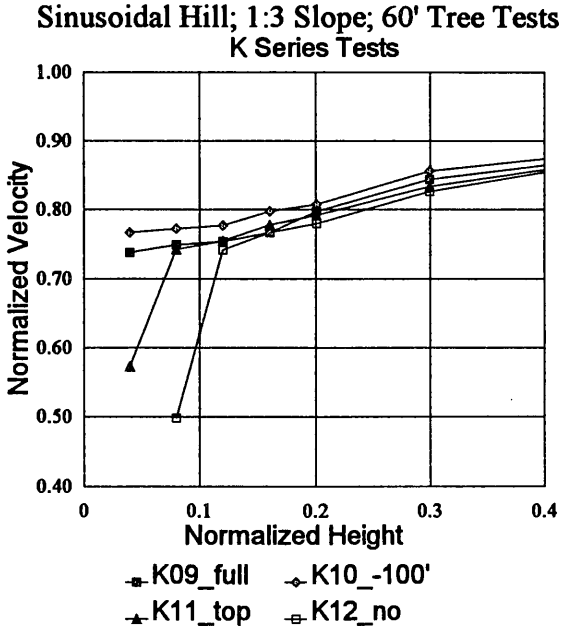


TABLE 44 Model Ridge Velocity Profile Test Results; Sinusoidal Shape, 1:3 Slope

USWP Task 2 Test Results K Series Tests

USW_VEL2.WK3 Sheet F: 11/06/92

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:3 Slope; 20' Tree Tests

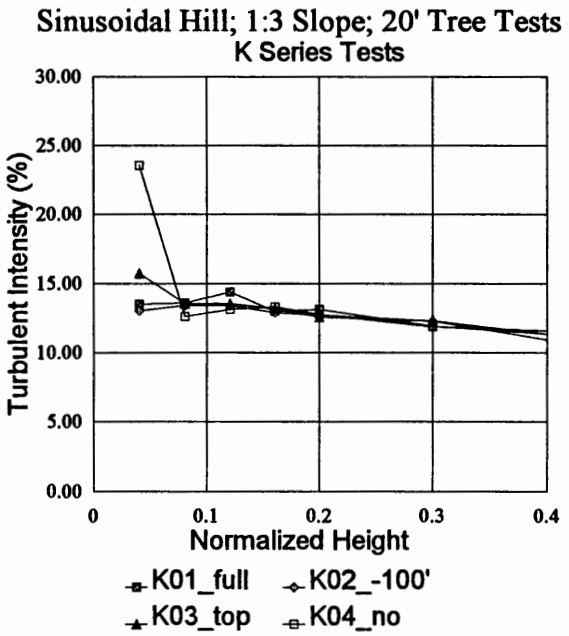
Height Norm.	Turb.Int. (%) K01 full	Turb.Int. (%) K02 -100'	Turb.Int. (%) K03 top	Turb.Int. (%) K04 no
0.04	13.5	13.0	15.7	23.6
0.08	13.6	13.4	13.5	12.6
0.12	14.4	13.4	13.6	13.1
0.16	13.0	12.9	13.2	13.3
0.20	13.1	12.7	12.5	12.7
0.30	11.9	12.3	12.3	11.9
0.42	11.2	10.6	11.1	11.5
0.60	10.4	9.6	9.9	10.0
0.80	8.6	8.9	8.8	9.0
1.00	7.8	7.9	7.8	7.9
Ur@30.5cm =	847	859	853	869
Ur@6.1cm =	506	511	508	517
Href (cm) =	30.5	30.5	30.5	30.5

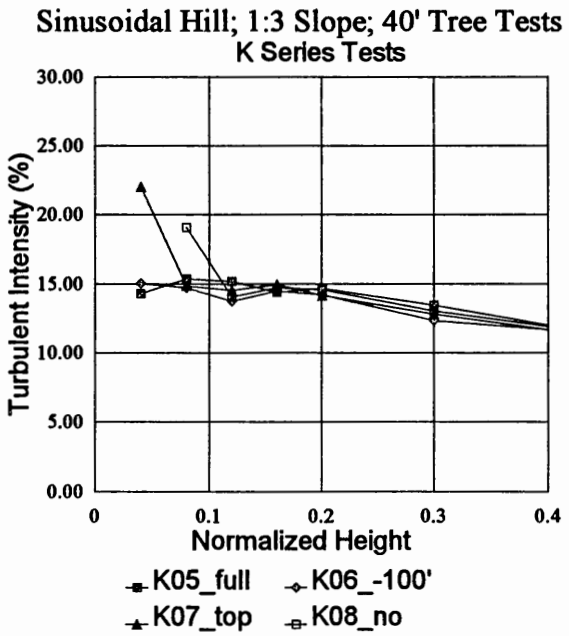
Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:3 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) K05 full	Turb.Int. (%) K06 -100'	Turb.Int. (%) K07 top	Turb.Int. (%) K08 no
0.04	14.3	15.0	22.0	
0.08	15.4	14.7	14.8	19.1
0.12	15.2	13.7	14.5	14.1
0.16	14.4	14.5	14.9	14.7
0.20	14.7	14.2	14.1	14.5
0.30	13.4	12.4	12.8	13.0
0.42	11.7	11.5	11.4	11.6
0.60	10.2	9.9	10.1	9.8
0.80	8.8	9.2	9.0	9.0
1.00	7.6	7.8	7.9	7.7
Ur@30.5cm =	854	848	860	853
Ur@6.1cm =	505	501	507	502
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:3 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) K09 full	Turb.Int. (%) K10 -100'	Turb.Int. (%) K11 top	Turb.Int. (%) K12 no
0.04	15.6	15.0	22.6	
0.08	16.1	15.6	15.7	29.3
0.12	16.0	15.2	15.5	14.1
0.16	15.8	14.8	15.1	14.5
0.20	14.2	14.4	14.5	14.2
0.30	13.4	12.3	13.3	13.6
0.42	11.7	11.4	11.9	12.1
0.60	10.1	9.8	10.1	10.1
0.80	9.6	9.1	9.3	9.0
1.00	8.0	7.8	7.8	7.8
Ur@30.5cm =	844	838	882	853
Ur@6.1cm =	504	496	520	503
Href (cm) =	30.5	30.5	30.5	30.5





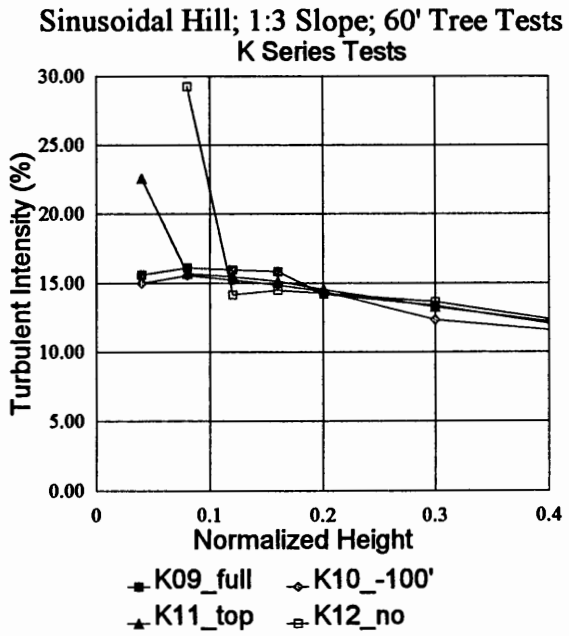


TABLE 45 Model Ridge Turbulence Profile Test Results; Sinusoidal Shape, 1:3 Slope

USWP Task 2 Test Results L Series Tests

USW_VEL0.WK3 Sheet G: 02/18/93

Velocity Profile Data
Run L01 Sinusoidal Hill; 1:5 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	651	13.1	848	511	1.66
2.4	674	13.3	842	513	1.64
3.7	679	12.9	850	510	1.67
4.9	687	13.5	844	498	1.69
6.1	702	13.3	850	510	1.67
9.1	722	12.1	848	506	1.68
12.9	746	11.9	846	509	1.66
18.3	785	10.1	855	505	1.69
24.4	822	8.9	856	505	1.70
30.5	855	7.7	856	508	1.68
Average =			850	508	1.67

Velocity Profile Data
Run L02 Sinusoidal Hill; 1:5 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	662	13.6	866	514	1.68
2.4	679	13.4	866	517	1.68
3.7	699	13.4	864	517	1.67
4.9	700	13.5	863	518	1.67
6.1	719	13.1	861	515	1.67
9.1	741	12.4	863	511	1.69
12.9	764	10.7	858	519	1.65
18.3	795	10.2	866	517	1.68
24.4	833	9.0	858	504	1.70
30.5	864	7.8	860	515	1.67
Average =			863	515	1.68

Velocity Profile Data
Run L03 Sinusoidal Hill; 1:5 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	597	16.0	838	493	1.70
2.4	649	14.0	837	493	1.70
3.7	664	13.9	845	499	1.69
4.9	678	13.7	839	494	1.70
6.1	689	12.7	841	490	1.71
9.1	714	11.9	843	500	1.69
12.9	732	11.3	839	498	1.68
18.3	769	10.8	838	497	1.68
24.4	811	8.9	842	501	1.68
30.5	850	7.5	848	496	1.71
Average =			841	496	1.69

Velocity Profile Data
Run L04 Sinusoidal Hill; 1:5 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	494	21.0	849	501	1.69
2.4	660	13.0	850	502	1.69
3.7	672	13.0	852	501	1.70
4.9	687	12.8	858	500	1.72
6.1	701	12.9	853	509	1.67
9.1	731	11.9	858	502	1.71
12.9	755	11.1	851	499	1.70
18.3	780	10.3	851	504	1.69
24.4	822	8.8	848	500	1.69
30.5	857	8.1	855	494	1.73
Average =			852	501	1.70

TABLE 46 Model Ridge Test Data; Sinusoidal Shape, 1:5 Slope, 20' Trees

USWP Task 2 Test Results L Series Tests

USW_VEL0.WK3 Sheet G: 02/18/93

Velocity Profile Data
Run L05 Sinusoidal Hill; 1:5 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	629	14.4	849	502	1.69
2.4	650	14.8	848	513	1.65
3.7	663	14.9	853	511	1.67
4.9	672	14.3	845	504	1.67
6.1	678	14.2	851	517	1.65
9.1	702	13.1	847	508	1.67
12.9	733	12.0	846	506	1.67
18.3	780	9.9	852	510	1.67
24.4	813	9.1	852	508	1.68
30.5	855	7.7	857	505	1.70
Average =			850	508	1.67

Velocity Profile Data
Run L06 Sinusoidal Hill; 1:5 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	627	14.7	855	509	1.68
2.4	650	14.8	860	510	1.69
3.7	673	14.6	857	516	1.66
4.9	686	14.3	857	510	1.68
6.1	696	13.9	856	514	1.66
9.1	726	13.0	856	511	1.67
12.9	758	11.2	858	505	1.70
18.3	791	10.0	855	507	1.69
24.4	833	9.1	861	507	1.70
30.5	863	8.0	859	511	1.68
Average =			857	510	1.68

Velocity Profile Data
Run L07 Sinusoidal Hill; 1:5 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	549	19.4	842	505	1.67
2.4	620	15.4	847	499	1.70
3.7	642	14.4	848	498	1.70
4.9	669	14.7	848	496	1.71
6.1	675	14.3	849	506	1.68
9.1	707	13.0	848	496	1.71
12.9	740	11.4	847	501	1.69
18.3	774	10.0	844	506	1.67
24.4	820	9.0	852	501	1.70
30.5	852	7.8	848	495	1.71
Average =			847	500	1.69

Velocity Profile Data
Run L08 Sinusoidal Hill; 1:5 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	584	17.0	838	500	1.67
3.7	655	13.8	838	487	1.72
4.9	673	13.8	842	497	1.69
6.1	666	14.2	842	504	1.67
9.1	705	13.0	844	503	1.68
12.9	738	11.4	850	499	1.70
18.3	780	10.1	848	504	1.68
24.4	816	9.0	852	499	1.71
30.5	846	7.8	851	497	1.71
Average =			845	499	1.69

TABLE 47 Model Ridge Test Data; Sinusoidal Shape, 1:5 Slope, 40' Trees

USWP Task 2 Test Results L Series Tests

USW_VEL0.WK3 Sheet G: 02/18/93

Velocity Profile Data
Run L09 Sinusoidal Hill; 1:5 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	614	14.9	849	522	1.63
2.4	640	15.6	850	505	1.68
3.7	651	15.4	848	503	1.69
4.9	664	15.2	848	509	1.66
6.1	672	15.1	852	511	1.67
9.1	706	13.1	849	507	1.67
12.9	737	11.7	855	506	1.69
18.3	776	10.4	854	511	1.67
24.4	810	9.0	849	501	1.70
30.5	849	7.9	854	501	1.71
Average =			851	508	1.68

Velocity Profile Data
Run L10 Sinusoidal Hill; 1:5 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	603	15.7	855	514	1.66
2.4	643	15.6	855	510	1.68
3.7	663	15.6	855	501	1.71
4.9	674	14.6	855	514	1.66
6.1	696	14.3	851	511	1.66
9.1	719	13.2	856	503	1.70
12.9	753	11.7	861	510	1.69
18.3	788	10.1	860	508	1.69
24.4	828	9.0	860	500	1.72
30.5	868	7.5	864	511	1.69
Average =			857	508	1.69

Velocity Profile Data
Run L11 Sinusoidal Hill; 1:5 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	541	20.0	852	505	1.69
2.4	608	16.3	857	510	1.68
3.7	639	15.3	849	505	1.68
4.9	654	15.5	851	514	1.66
6.1	680	14.3	851	500	1.70
9.1	711	13.0	859	499	1.72
12.9	742	11.7	853	505	1.69
18.3	777	10.6	857	504	1.70
24.4	823	9.0	857	509	1.68
30.5	859	7.8	857	505	1.70
Average =			854	506	1.69

Velocity Profile Data
Run L12 Sinusoidal Hill; 1:5 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	491	23.2	840	486	1.73
3.7	629	15.1	841	490	1.71
4.9	656	14.0	833	493	1.69
6.1	676	14.3	843	498	1.69
9.1	708	12.9	846	492	1.72
12.9	741	11.6	849	493	1.72
18.3	780	10.2	846	494	1.71
24.4	817	8.9	844	492	1.71
30.5	854	7.5	850	492	1.73
Average =			844	492	1.71

TABLE 48 Model Ridge Test Data; Sinusoidal Shape, 1:5 Slope, 60' Trees

USWP Task 2 Test Results L Series Tests

USW_VEL1.WK3 Sheet G: 02/18/93

Velocity Profile Comparisons
Sinusoidal Hill; 1:5 Slope; 20' Tree Tests

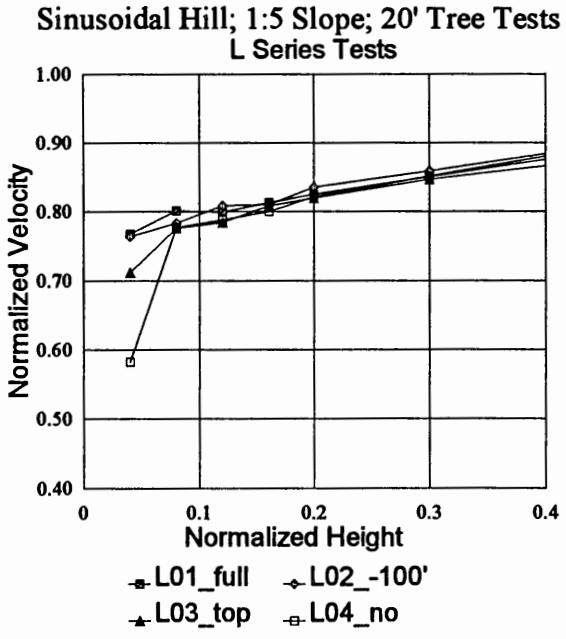
Height Norm.	Velocity Norm. L01 full	Velocity Norm. L02 -100'	Velocity Norm. L03 top	Velocity Norm. L04 no
0.04	0.77	0.76	0.71	0.58
0.08	0.80	0.78	0.78	0.78
0.12	0.80	0.81	0.78	0.79
0.16	0.81	0.81	0.81	0.80
0.20	0.83	0.84	0.82	0.82
0.30	0.85	0.86	0.85	0.85
0.42	0.88	0.89	0.87	0.89
0.60	0.92	0.92	0.92	0.92
0.80	0.96	0.97	0.96	0.97
1.00	1.00	1.01	1.00	1.00
Ur@30.5cm =	850	863	841	852
Ur@6.1cm =	508	515	496	501
Href (cm) =	30.5	30.5	30.5	30.5

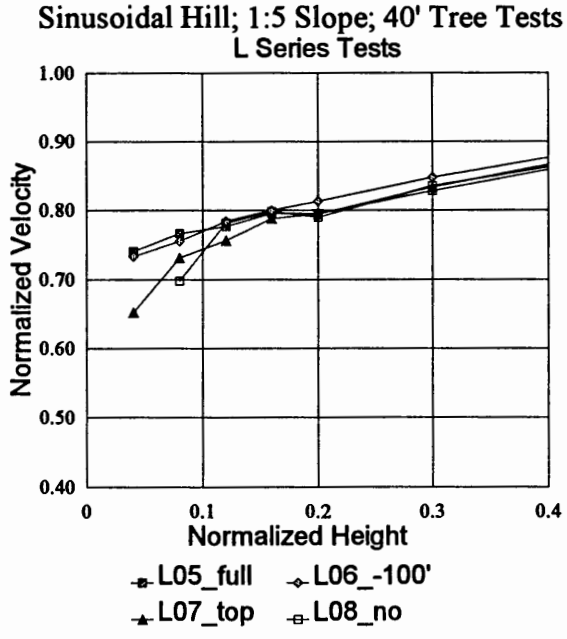
Velocity Profile Comparisons
Sinusoidal Hill; 1:5 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. L05 full	Velocity Norm. L06 -100'	Velocity Norm. L07 top	Velocity Norm. L08 no
0.04	0.74	0.73	0.65	
0.08	0.77	0.76	0.73	0.70
0.12	0.78	0.78	0.76	0.78
0.16	0.80	0.80	0.79	0.80
0.20	0.80	0.81	0.79	0.79
0.30	0.83	0.85	0.83	0.84
0.42	0.87	0.88	0.87	0.87
0.60	0.92	0.92	0.92	0.92
0.80	0.95	0.97	0.96	0.96
1.00	1.00	1.00	1.00	0.99
Ur@30.5cm =	850	857	847	845
Ur@6.1cm =	508	510	500	499
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Sinusoidal Hill; 1:5 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. L09 full	Velocity Norm. L10 -100'	Velocity Norm. L11 top	Velocity Norm. L12 no
0.04	0.72	0.70	0.63	
0.08	0.75	0.75	0.71	0.58
0.12	0.77	0.78	0.75	0.75
0.16	0.78	0.79	0.77	0.79
0.20	0.79	0.82	0.80	0.80
0.30	0.83	0.84	0.83	0.84
0.42	0.86	0.87	0.87	0.87
0.60	0.91	0.92	0.91	0.92
0.80	0.95	0.96	0.96	0.97
1.00	0.99	1.00	1.00	1.00
Ur@30.5cm =	851	857	854	844
Ur@6.1cm =	508	508	506	492
Href (cm) =	30.5	30.5	30.5	30.5





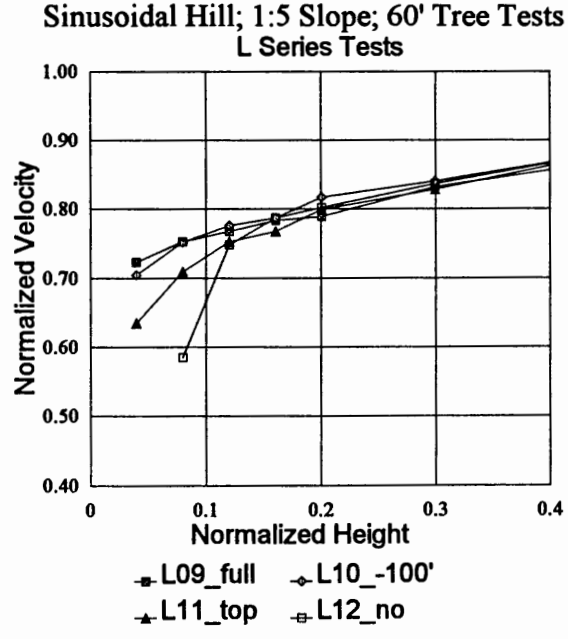


TABLE 49 Model Ridge Velocity Profile Test Results; Sinusoidal Shape, 1:5 Slope

USWP Task 2 Test Results L Series Tests

USW_VEL2.WK3 Sheet G: 11/06/92

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:5 Slope; 20' Tree Tests

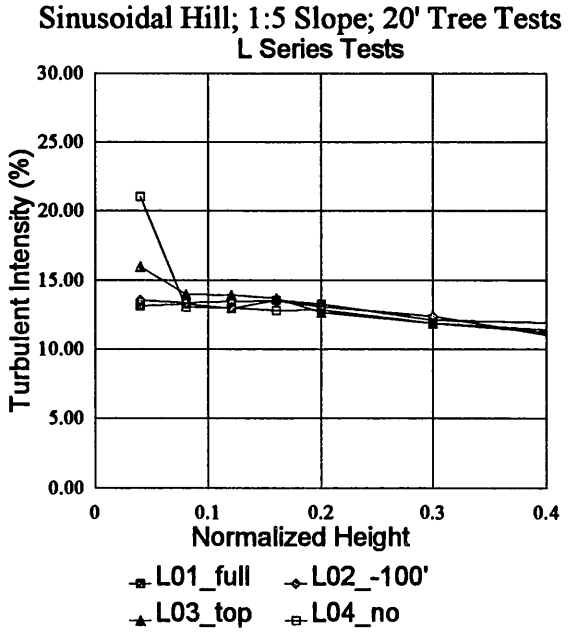
Height Norm.	Turb.Int. (%) L01 full	Turb.Int. (%) L02 -100'	Turb.Int. (%) L03 top	Turb.Int. (%) L04 no
0.04	13.1	13.6	16.0	21.0
0.08	13.3	13.4	14.0	13.0
0.12	12.9	13.4	13.9	13.0
0.16	13.5	13.5	13.7	12.8
0.20	13.3	13.1	12.7	12.9
0.30	12.1	12.4	11.9	11.9
0.42	11.9	10.7	11.3	11.1
0.60	10.1	10.2	10.8	10.3
0.80	8.9	9.0	8.9	8.8
1.00	7.7	7.8	7.5	8.1
Ur@30.5cm =	850	863	841	852
Ur@6.1cm =	508	515	496	501
Href (cm) =	30.5	30.5	30.5	30.5

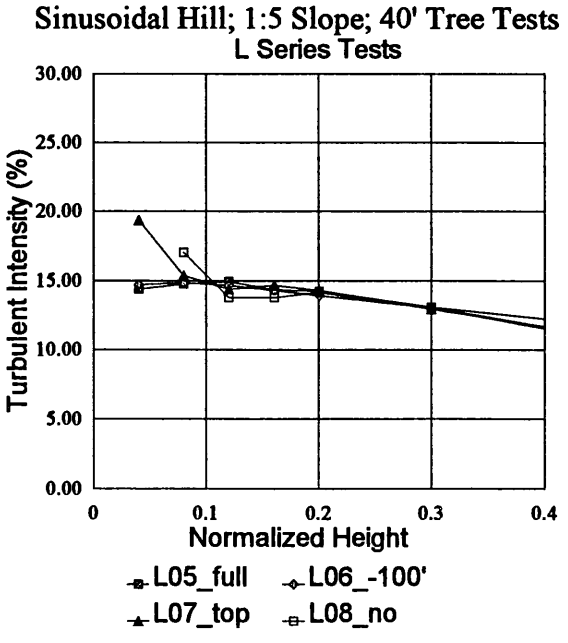
Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:5 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) L05 full	Turb.Int. (%) L06 -100'	Turb.Int. (%) L07 top	Turb.Int. (%) L08 no
0.04	14.4	14.7	19.4	
0.08	14.8	14.8	15.4	17.0
0.12	14.9	14.6	14.4	13.8
0.16	14.3	14.3	14.7	13.8
0.20	14.2	13.9	14.3	14.2
0.30	13.1	13.0	13.0	13.0
0.42	12.0	11.2	11.4	11.4
0.60	9.9	10.0	10.0	10.1
0.80	9.1	9.1	9.0	9.0
1.00	7.7	8.0	7.8	7.8
Ur@30.5cm =	850	857	847	845
Ur@6.1cm =	508	510	500	499
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:5 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) L09 full	Turb.Int. (%) L10 -100'	Turb.Int. (%) L11 top	Turb.Int. (%) L12 no
0.04	14.9	15.7	20.0	
0.08	15.6	15.6	16.3	23.2
0.12	15.4	15.6	15.3	15.1
0.16	15.2	14.6	15.5	14.0
0.20	15.1	14.3	14.3	14.3
0.30	13.1	13.2	13.0	12.9
0.42	11.7	11.7	11.7	11.6
0.60	10.4	10.1	10.6	10.2
0.80	9.0	9.0	9.0	8.9
1.00	7.9	7.5	7.8	7.5
Ur@30.5cm =	851	857	854	844
Ur@6.1cm =	508	508	506	492
Href (cm) =	30.5	30.5	30.5	30.5





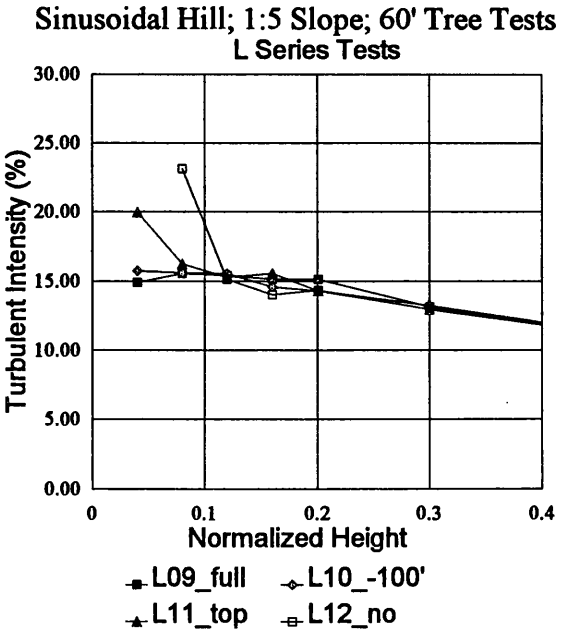


TABLE 50 Model Ridge Turbulence Profile Test Results; Sinusoidal Shape, 1:5 Slope

USWP Task 2 Test Results M Series Tests

USW_VEL0.WK3 Sheet H: 02/18/93

Velocity Profile Data
Run M01 Sinusoidal Hill; 1:10 Slope; 20' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	578	15.4	850	503	1.69
2.4	635	14.1	848	508	1.67
3.7	658	13.3	842	502	1.68
4.9	673	13.6	845	508	1.66
6.1	683	13.3	848	502	1.69
9.1	708	12.5	851	504	1.69
12.9	743	11.5	850	504	1.69
18.3	780	10.3	852	503	1.70
24.4	820	9.2	850	506	1.68
30.5	862	7.8	859	508	1.69
Average =			849	505	1.68

Velocity Profile Data
Run M02 Sinusoidal Hill; 1:10 Slope; 20' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	567	16.1	844	501	1.69
2.4	612	14.4	837	502	1.67
3.7	636	14.3	836	494	1.69
4.9	653	13.7	837	496	1.69
6.1	668	13.6	843	496	1.70
9.1	706	12.4	837	491	1.71
12.9	741	11.3	837	495	1.69
18.3	775	10.6	839	495	1.69
24.4	809	9.1	839	503	1.67
30.5	845	7.7	843	498	1.69
Average =			839	497	1.69

Velocity Profile Data
Run M03 Sinusoidal Hill; 1:10 Slope; 20' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	499	19.9	854	504	1.69
2.4	610	15.3	858	510	1.68
3.7	640	13.9	852	499	1.71
4.9	658	14.0	857	508	1.69
6.1	669	14.1	857	501	1.71
9.1	703	12.6	855	505	1.70
12.9	735	12.1	852	509	1.67
18.3	782	10.2	855	503	1.70
24.4	824	9.0	858	500	1.72
30.5	863	7.6	864	500	1.73
Average =			856	504	1.70

Velocity Profile Data
Run M04 Sinusoidal Hill; 1:10 Slope; 20' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	600	16.0	864	511	1.69
3.7	651	14.0	857	509	1.68
4.9	671	13.2	867	514	1.69
6.1	694	13.3	864	501	1.73
9.1	723	12.3	860	503	1.71
12.9	751	11.4	859	495	1.73
18.3	792	10.3	863	514	1.68
24.4	832	8.9	861	509	1.69
30.5	865	8.0	861	504	1.71
Average =			862	507	1.70

TABLE 51 Model Ridge Test Data; Sinusoidal Shape, 1:10 Slope, 20' Trees

USWP Task 2 Test Results M Series Tests

USW_VEL0.WK3 Sheet H: 02/18/93

Velocity Profile Data
Run M05 Sinusoidal Hill; 1:10 Slope; 40' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	557	16.3	844	507	1.66
2.4	617	15.1	846	509	1.66
3.7	640	14.2	848	510	1.66
4.9	654	14.5	847	501	1.69
6.1	673	14.4	843	502	1.68
9.1	698	13.3	842	510	1.65
12.9	739	12.4	849	497	1.71
18.3	773	10.5	851	508	1.68
24.4	823	9.2	853	513	1.67
30.5	851	8.5	850	509	1.67
Average =			848	507	1.67

Velocity Profile Data
Run M06 Sinusoidal Hill; 1:10 Slope; 40' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	545	16.8	848	504	1.68
2.4	597	15.4	848	506	1.68
3.7	623	15.1	846	501	1.69
4.9	646	14.9	851	504	1.69
6.1	662	14.7	846	500	1.69
9.1	698	12.9	847	497	1.70
12.9	733	12.0	843	505	1.67
18.3	766	11.2	848	504	1.68
24.4	816	9.4	849	505	1.68
30.5	853	8.3	850	501	1.70
Average =			848	503	1.69

Velocity Profile Data
Run M07 Sinusoidal Hill; 1:10 Slope; 40' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	485	20.4	836	493	1.70
2.4	558	16.9	830	485	1.71
3.7	594	15.5	834	497	1.68
4.9	620	15.1	837	506	1.65
6.1	639	14.8	830	507	1.64
9.1	670	13.9	836	498	1.68
12.9	711	11.7	830	488	1.70
18.3	755	11.0	838	495	1.69
24.4	798	9.4	832	491	1.69
30.5	842	7.8	840	489	1.72
Average =			834	495	1.69

Velocity Profile Data
Run M08 Sinusoidal Hill; 1:10 Slope; 40' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	456	26.4	859	507	1.69
3.7	598	17.0	864	508	1.70
4.9	649	14.7	863	506	1.70
6.1	666	13.7	856	499	1.72
9.1	717	12.9	864	504	1.71
12.9	741	11.9	861	509	1.69
18.3	784	10.8	859	504	1.71
24.4	825	9.0	860	508	1.69
30.5	857	8.3	860	499	1.72
Average =			861	505	1.70

TABLE 52 Model Ridge Test Data; Sinusoidal Shape, 1:10 Slope, 40' Trees

USWP Task 2 Test Results M Series Tests

USW_VEL0.WK3 Sheet H: 02/18/93

Velocity Profile Data
Run M09 Sinusoidal Hill; 1:10 Slope; 60' Trees; Full Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	570	16.1	842	501	1.68
2.4	605	14.5	847	509	1.66
3.7	625	15.0	849	507	1.68
4.9	645	14.7	848	505	1.68
6.1	660	14.1	847	511	1.66
9.1	697	13.8	847	508	1.67
12.9	736	12.2	843	490	1.72
18.3	776	10.2	843	499	1.69
24.4	814	9.2	843	506	1.67
30.5	856	8.0	851	499	1.71
Average =			846	503	1.68

Velocity Profile Data
Run M10 Sinusoidal Hill; 1:10 Slope; 60' Trees; -100' Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	534	17.4	842	511	1.65
2.4	592	16.4	847	504	1.68
3.7	624	15.3	850	510	1.66
4.9	633	15.1	850	499	1.70
6.1	657	14.5	850	508	1.67
9.1	701	13.4	851	497	1.71
12.9	726	12.5	847	507	1.67
18.3	782	10.4	850	503	1.69
24.4	817	9.6	849	502	1.69
30.5	860	8.3	858	503	1.71
Average =			849	504	1.68

Velocity Profile Data
Run M11 Sinusoidal Hill; 1:10 Slope; 60' Trees; Top Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2	480	20.6	851	506	1.68
2.4	554	19.2	848	504	1.68
3.7	603	17.2	851	504	1.69
4.9	615	15.5	851	508	1.67
6.1	653	15.0	847	496	1.71
9.1	698	13.5	849	507	1.67
12.9	721	12.3	849	499	1.70
18.3	769	10.7	847	502	1.69
24.4	820	9.2	852	492	1.73
30.5	856	8.2	854	503	1.70
Average =			850	502	1.69

Velocity Profile Data
Run M12 Sinusoidal Hill; 1:10 Slope; 60' Trees; No Cut

Height (cm)	Velocity HW (cm/s)	Turbulent Intensity (%)	Velocity @30.5cm (cm/s)	Velocity @6.1cm (cm/s)	Velocity Ratio
1.2					
2.4	414	28.3	854	504	1.69
3.7	577	18.5	856	500	1.71
4.9	635	15.2	853	498	1.71
6.1	656	14.6	852	493	1.73
9.1	699	13.4	856	503	1.70
12.9	734	12.3	853	495	1.72
18.3	780	10.6	857	499	1.72
24.4	820	9.1	856	487	1.76
30.5	859	7.8	861	502	1.72
Average =			855	498	1.72

TABLE 53 Model Ridge Test Data; Sinusoidal Shape, 1:10 Slope, 60' Trees

USWP Task 2 Test Results M Series Tests

USW_VEL1.WK3 Sheet H: 02/18/93

Velocity Profile Comparisons
Sinusoidal Hill; 1:10 Slope; 20' Tree Tests

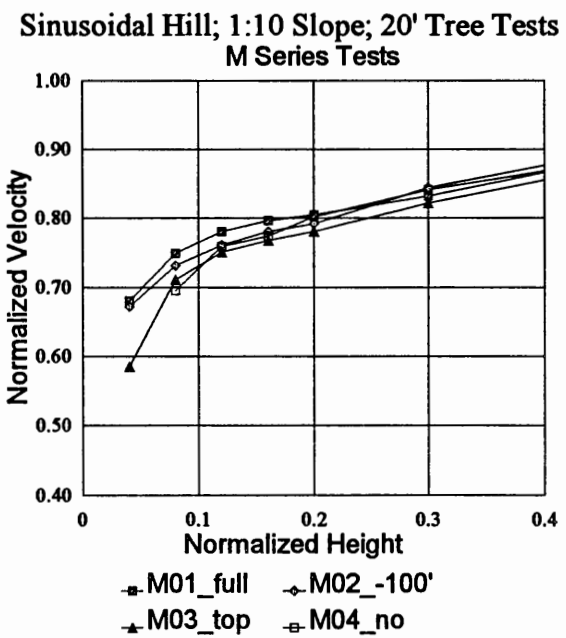
Height Norm.	Velocity Norm. M01 full	Velocity Norm. M02 -100'	Velocity Norm. M03 top	Velocity Norm. M04 no
0.04	0.68	0.67	0.58	
0.08	0.75	0.73	0.71	0.69
0.12	0.78	0.76	0.75	0.76
0.16	0.80	0.78	0.77	0.77
0.20	0.81	0.79	0.78	0.80
0.30	0.83	0.84	0.82	0.84
0.42	0.87	0.88	0.86	0.87
0.60	0.92	0.92	0.91	0.92
0.80	0.96	0.96	0.96	0.97
1.00	1.00	1.00	1.00	1.00
Ur@30.5cm =	849	839	856	862
Ur@6.1cm =	505	497	504	507
Href (cm) =	30.5	30.5	30.5	30.5

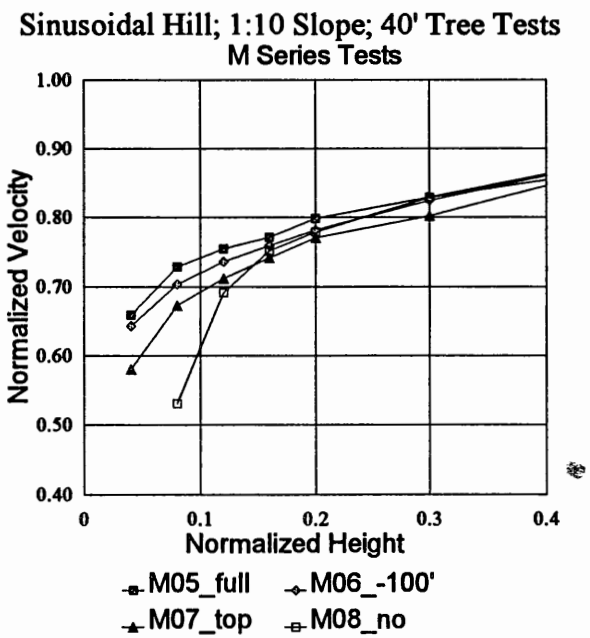
Velocity Profile Comparisons
Sinusoidal Hill; 1:10 Slope; 40' Tree Tests

Height Norm.	Velocity Norm. M05 full	Velocity Norm. M06 -100'	Velocity Norm. M07 top	Velocity Norm. M08 no
0.04	0.66	0.64	0.58	
0.08	0.73	0.70	0.67	0.53
0.12	0.75	0.74	0.71	0.69
0.16	0.77	0.76	0.74	0.75
0.20	0.80	0.78	0.77	0.78
0.30	0.83	0.82	0.80	0.83
0.42	0.87	0.87	0.86	0.86
0.60	0.91	0.90	0.90	0.91
0.80	0.96	0.96	0.96	0.96
1.00	1.00	1.00	1.00	1.00
Ur@30.5cm =	848	848	834	861
Ur@6.1cm =	507	503	495	505
Href (cm) =	30.5	30.5	30.5	30.5

Velocity Profile Comparisons
Sinusoidal Hill; 1:10 Slope; 60' Tree Tests

Height Norm.	Velocity Norm. M09 full	Velocity Norm. M10 -100'	Velocity Norm. M11 top	Velocity Norm. M12 no
0.04	0.68	0.63	0.56	
0.08	0.71	0.70	0.65	0.48
0.12	0.74	0.73	0.71	0.67
0.16	0.76	0.74	0.72	0.74
0.20	0.78	0.77	0.77	0.77
0.30	0.82	0.82	0.82	0.82
0.42	0.87	0.86	0.85	0.86
0.60	0.92	0.92	0.91	0.91
0.80	0.97	0.96	0.96	0.96
1.00	1.01	1.00	1.00	1.00
Ur@30.5cm =	846	849	850	855
Ur@6.1cm =	503	504	502	498
Href (cm) =	30.5	30.5	30.5	30.5





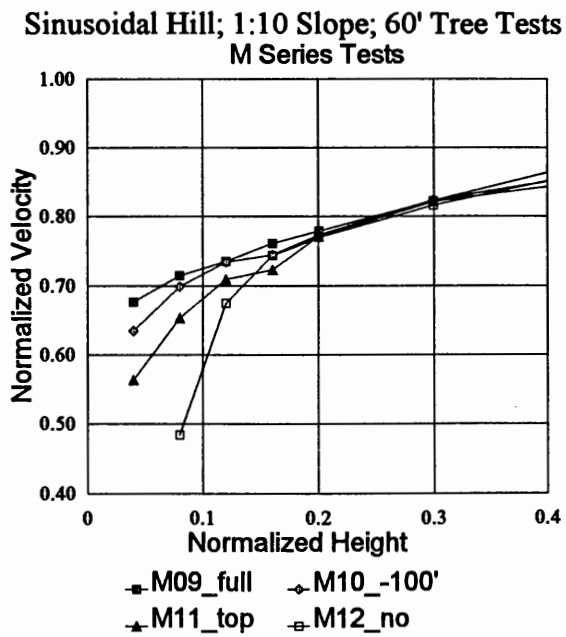


TABLE 54 Model Ridge Velocity Profile Test Results; Sinusoidal Shape, 1:10 Slope

USWP Task 2 Test Results M Series Tests

USW_VEL2.WK3 Sheet H: 11/06/92

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:10 Slope; 20' Tree Tests

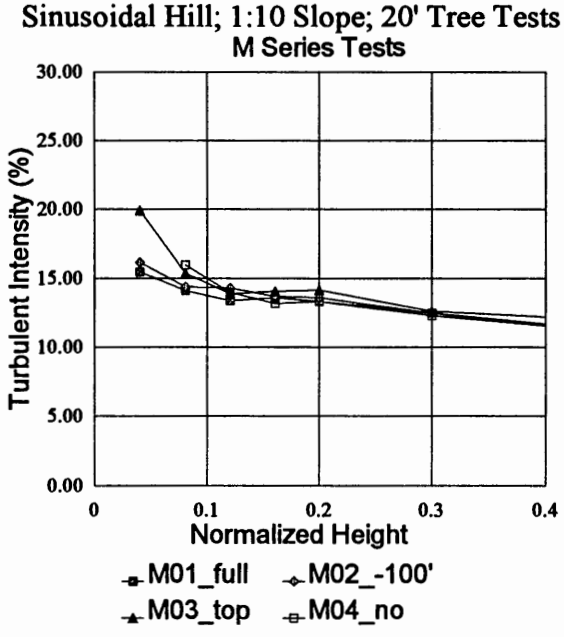
Height Norm.	Turb.Int. (%) M01 full	Turb.Int. (%) M02 -100'	Turb.Int. (%) M03 top	Turb.Int. (%) M04 no
0.04	15.4	16.1	19.9	
0.08	14.1	14.4	15.3	16.0
0.12	13.3	14.3	13.9	14.0
0.16	13.6	13.7	14.0	13.2
0.20	13.3	13.6	14.1	13.3
0.30	12.5	12.4	12.6	12.3
0.42	11.5	11.3	12.1	11.4
0.60	10.3	10.6	10.2	10.3
0.80	9.2	9.1	9.0	8.9
1.00	7.8	7.7	7.6	8.0
Ur@30.5cm =	849	839	856	862
Ur@6.1cm =	505	497	504	507
Href (cm) =	30.5	30.5	30.5	30.5

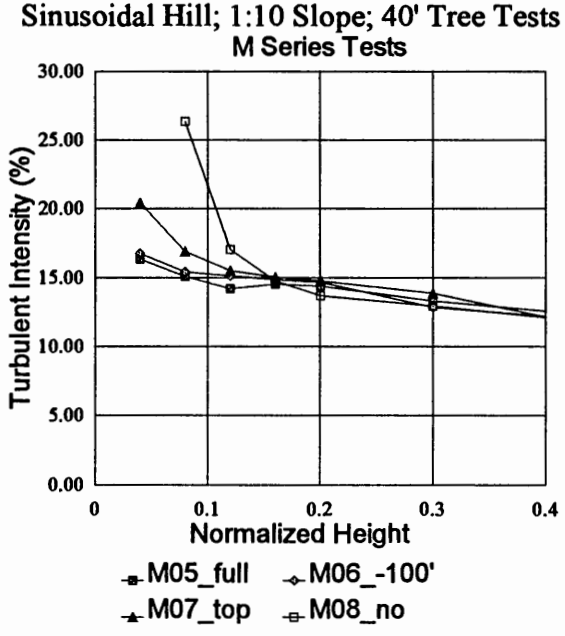
Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:10 Slope; 40' Tree Tests

Height Norm.	Turb.Int. (%) M05 full	Turb.Int. (%) M06 -100'	Turb.Int. (%) M07 top	Turb.Int. (%) M08 no
0.04	16.3	16.8	20.4	
0.08	15.1	15.4	16.9	26.4
0.12	14.2	15.1	15.5	17.0
0.16	14.5	14.9	15.1	14.7
0.20	14.4	14.7	14.8	13.7
0.30	13.3	12.9	13.9	12.9
0.42	12.4	12.0	11.7	11.9
0.60	10.5	11.2	11.0	10.8
0.80	9.2	9.4	9.4	9.0
1.00	8.5	8.3	7.8	8.3
Ur@30.5cm =	848	848	834	861
Ur@6.1cm =	507	503	495	505
Href (cm) =	30.5	30.5	30.5	30.5

Turbulent Intensity Profile Comparisons
Sinusoidal Hill; 1:10 Slope; 60' Tree Tests

Height Norm.	Turb.Int. (%) M09 full	Turb.Int. (%) M10 -100'	Turb.Int. (%) M11 top	Turb.Int. (%) M12 no
0.04	16.1	17.4	20.6	
0.08	14.5	16.4	19.2	28.3
0.12	15.0	15.3	17.2	18.5
0.16	14.7	15.1	15.5	15.2
0.20	14.1	14.5	15.0	14.6
0.30	13.8	13.4	13.5	13.4
0.42	12.2	12.5	12.3	12.3
0.60	10.2	10.4	10.7	10.6
0.80	9.2	9.6	9.2	9.1
1.00	8.0	8.3	8.2	7.8
Ur@30.5cm =	846	849	850	855
Ur@6.1cm =	503	504	502	498
Href (cm) =	30.5	30.5	30.5	30.5





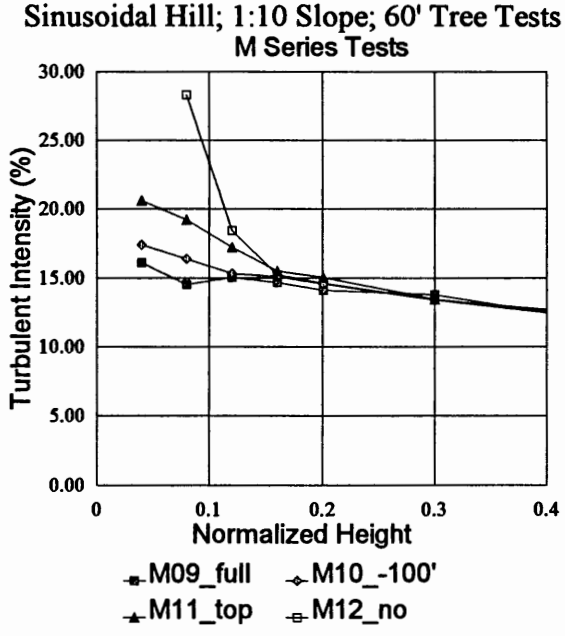


TABLE 55 Model Ridge Turbulence Profile Test Results; Sinusoidal Shape, 1:10 Slope

USWP Task 2 Test Results

USW_VEL3.WK3 Sheet A: 02/18/93

Normalized Velocity Test Results

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clearcut Type	Measurement Height Above the Hill Crest 40 (ft)	80 (ft)	120 (ft)	160 (ft)	200 (ft)	300 (ft)	423 (ft)	600 (ft)	800 (ft)	1000 (ft)	Upwind Ur@6.1cm (cm/s)	Profile Ur @30.5cm (cm/s)
F01	Triang	1:2	20	full	0.70	0.71	0.73	0.75	0.78	0.82	0.86	0.91	0.96	1.00	514	864
F02	Triang	1:2	20	-100'	0.70	0.73	0.74	0.76	0.78	0.82	0.86	0.91	0.96	1.00	514	867
F03	Triang	1:2	20	top	0.73	0.75	0.76	0.79	0.80	0.83	0.88	0.91	0.97	1.01	517	877
F04	Triang	1:2	20	no	0.57	0.74	0.76	0.77	0.78	0.82	0.86	0.91	0.96	1.00	516	878
F05	Triang	1:2	40	full	0.68	0.70	0.72	0.76	0.76	0.82	0.86	0.91	0.96	1.00	516	870
F06	Triang	1:2	40	-100'	0.68	0.71	0.73	0.75	0.77	0.82	0.85	0.91	0.96	1.00	508	860
F07	Triang	1:2	40	top	0.67	0.72	0.74	0.77	0.78	0.82	0.86	0.91	0.96	1.00	516	873
F08	Triang	1:2	40	no		0.70	0.72	0.75	0.77	0.81	0.85	0.91	0.96	1.01	517	872
F09	Triang	1:2	60	full	0.67	0.69	0.71	0.74	0.76	0.82	0.86	0.91	0.96	1.00	508	859
F10	Triang	1:2	60	-100'	0.67	0.70	0.72	0.75	0.77	0.81	0.86	0.91	0.97	1.00	508	857
F11	Triang	1:2	60	top	0.65	0.70	0.73	0.76	0.79	0.82	0.87	0.91	0.97	1.00	509	862
F12	Triang	1:2	60	no		0.68	0.71	0.74	0.76	0.81	0.86	0.91	0.96	1.00	510	864
G01	Triang	1:3	20	full	0.74	0.75	0.76	0.79	0.78	0.83	0.87	0.91	0.96	1.01	510	857
G02	Triang	1:3	20	-100'	0.75	0.77	0.78	0.79	0.82	0.84	0.88	0.92	0.97	1.01	509	857
G03	Triang	1:3	20	top	0.76	0.77	0.79	0.80	0.81	0.85	0.88	0.92	0.97	1.01	514	867
G04	Triang	1:3	20	no	0.70	0.75	0.77	0.78	0.80	0.84	0.87	0.92	0.97	1.01	510	866
G05	Triang	1:3	40	full	0.73	0.74	0.75	0.77	0.80	0.83	0.87	0.91	0.97	1.01	507	860
G06	Triang	1:3	40	-100'	0.74	0.77	0.77	0.79	0.81	0.85	0.88	0.93	0.98	1.02	504	855
G07	Triang	1:3	40	top	0.70	0.75	0.77	0.80	0.80	0.85	0.88	0.93	0.98	1.01	498	851
G08	Triang	1:3	40	no		0.72	0.74	0.76	0.79	0.83	0.88	0.92	0.98	1.01	501	851
G09	Triang	1:3	60	full	0.71	0.71	0.73	0.77	0.78	0.82	0.87	0.91	0.97	1.01	506	859
G10	Triang	1:3	60	-100'		0.72	0.75	0.77	0.80	0.83	0.87	0.92	0.96	1.00	507	861
G11	Triang	1:3	60	top	0.67	0.72	0.74	0.76	0.79	0.82	0.87	0.91	0.96	1.00	501	855
G12	Triang	1:3	60	no		0.69	0.73	0.74	0.77	0.81	0.86	0.91	0.96	1.00	502	856
H01	Triang	1:5	20	full	0.79	0.79	0.80	0.82	0.83	0.87	0.88	0.92	0.97	1.00	505	854
H02	Triang	1:5	20	-100'	0.76	0.79	0.80	0.81	0.83	0.85	0.88	0.92	0.97	1.01	504	848
H03	Triang	1:5	20	top	0.71	0.76	0.77	0.79	0.80	0.85	0.88	0.92	0.97	1.00	509	864
H04	Triang	1:5	20	no	0.63	0.75	0.76	0.79	0.80	0.83	0.88	0.92	0.96	1.00	506	861
H05	Triang	1:5	40	full	0.77	0.77	0.78	0.79	0.81	0.85	0.87	0.92	0.96	1.00	501	844
H06	Triang	1:5	40	-100'	0.74	0.76	0.77	0.80	0.80	0.83	0.86	0.91	0.95	1.00	508	861
H07	Triang	1:5	40	top	0.62	0.72	0.75	0.77	0.79	0.81	0.87	0.91	0.96	1.00	502	856
H08	Triang	1:5	40	no		0.70	0.75	0.77	0.80	0.84	0.87	0.92	0.97	1.00	496	853
H09	Triang	1:5	60	full	0.72	0.75	0.78	0.78	0.80	0.84	0.88	0.92	0.96	1.01	505	858
H10	Triang	1:5	60	-100'	0.72	0.73	0.76	0.78	0.79	0.82	0.86	0.91	0.96	1.00	504	855
H11	Triang	1:5	60	top	0.62	0.69	0.73	0.75	0.76	0.80	0.87	0.91	0.96	1.00	505	851
H12	Triang	1:5	60	no		0.69	0.74	0.76	0.77	0.83	0.86	0.91	0.97	1.00	497	846
I01	Triang	1:10	20	full	0.75	0.78	0.79	0.79	0.80	0.84	0.87	0.91	0.96	1.00	510	854
I02	Triang	1:10	20	-100'	0.72	0.75	0.78	0.79	0.81	0.84	0.87	0.92	0.96	1.00	510	852
I03	Triang	1:10	20	top	0.62	0.72	0.75	0.76	0.79	0.82	0.86	0.91	0.96	1.00	509	862
I04	Triang	1:10	20	no	0.51	0.72	0.76	0.79	0.79	0.84	0.86	0.91	0.96	1.00	506	857
I05	Triang	1:10	40	full	0.72	0.76	0.77	0.78	0.80	0.83	0.88	0.93	0.97	1.01	504	856
I06	Triang	1:10	40	-100'	0.71	0.73	0.76	0.78	0.79	0.84	0.88	0.92	0.97	1.01	506	860
I07	Triang	1:10	40	top	0.57	0.66	0.72	0.75	0.76	0.82	0.87	0.91	0.97	1.01	499	847
I08	Triang	1:10	40	no		0.65	0.73	0.77	0.79	0.84	0.88	0.93	0.97	1.01	505	856
I09	Triang	1:10	60	full	0.72	0.74	0.76	0.77	0.79	0.83	0.86	0.92	0.97	1.01	504	857
I10	Triang	1:10	60	-100'	0.69	0.72	0.73	0.77	0.77	0.82	0.87	0.92	0.97	1.01	504	849
I11	Triang	1:10	60	top	0.57	0.65	0.71	0.73	0.76	0.81	0.85	0.91	0.97	1.01	500	844
I12	Triang	1:10	60	no		0.59	0.70	0.76	0.78	0.82	0.87	0.92	0.97	1.01	508	866

TABLE 56 Model Ridge Normalized Velocity Profile Comparisons; Triangular Shape

USWP Task 2 Test Results

USW_VEL3.WK3 Sheet A: 02/18/93

Normalized Velocity Test Results

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clearcut Type	Measurement Height Above the Hill Crest 40 (ft)	80 (ft)	120 (ft)	160 (ft)	200 (ft)	300 (ft)	423 (ft)	600 (ft)	800 (ft)	1000 (ft)	Upwind Ur@6.1cm (cm/s)	Profile Ur @30.5cm (cm/s)
J01	Sine	1:2	20	full	0.79	0.78	0.79	0.80	0.81	0.83	0.88	0.92	0.97	1.00	500	843
J02	Sine	1:2	20	-100'	0.76	0.79	0.79	0.80	0.80	0.84	0.87	0.92	0.97	1.00	507	855
J03	Sine	1:2	20	top	0.77	0.78	0.79	0.81	0.83	0.85	0.89	0.93	0.97	1.01	508	859
J04	Sine	1:2	20	no	0.72	0.76	0.77	0.78	0.80	0.84	0.86	0.91	0.97	1.00	506	857
J05	Sine	1:2	40	full	0.76	0.75	0.77	0.78	0.81	0.84	0.87	0.92	0.97	1.01	510	865
J06	Sine	1:2	40	-100'	0.75	0.77	0.78	0.79	0.81	0.84	0.87	0.93	0.97	1.01	512	864
J07	Sine	1:2	40	top	0.68	0.74	0.77	0.78	0.81	0.84	0.88	0.92	0.97	1.01	509	858
J08	Sine	1:2	40	no		0.73	0.74	0.76	0.78	0.81	0.85	0.91	0.97	1.01	501	854
J09	Sine	1:2	60	full	0.75	0.75	0.76	0.78	0.79	0.82	0.87	0.92	0.96	1.00	502	853
J10	Sine	1:2	60	-100'	0.76	0.77	0.77	0.79	0.80	0.84	0.88	0.93	0.97	1.01	502	853
J11	Sine	1:2	60	top	0.63	0.73	0.76	0.77	0.79	0.83	0.87	0.91	0.96	1.01	496	847
J12	Sine	1:2	60	no		0.71	0.73	0.75	0.76	0.82	0.87	0.91	0.96	1.00	496	851
K01	Sine	1:3	20	full	0.77	0.80	0.80	0.82	0.82	0.85	0.87	0.91	0.97	1.01	506	847
K02	Sine	1:3	20	-100'	0.83	0.83	0.83	0.83	0.83	0.86	0.90	0.93	0.97	1.00	511	859
K03	Sine	1:3	20	top	0.74	0.79	0.79	0.80	0.83	0.84	0.88	0.92	0.96	1.00	508	853
K04	Sine	1:3	20	no	0.55	0.78	0.79	0.80	0.81	0.84	0.86	0.91	0.96	0.99	517	869
K05	Sine	1:3	40	full	0.75	0.75	0.78	0.79	0.81	0.84	0.88	0.92	0.97	1.01	505	854
K06	Sine	1:3	40	-100'	0.78	0.79	0.81	0.82	0.82	0.85	0.88	0.93	0.97	1.01	501	848
K07	Sine	1:3	40	top	0.60	0.75	0.77	0.79	0.80	0.83	0.87	0.92	0.97	1.00	507	860
K08	Sine	1:3	40	no		0.67	0.74	0.76	0.80	0.82	0.87	0.92	0.96	1.00	502	853
K09	Sine	1:3	60	full	0.74	0.75	0.75	0.77	0.80	0.84	0.87	0.91	0.96	1.00	504	844
K10	Sine	1:3	60	-100'	0.77	0.77	0.78	0.80	0.81	0.86	0.88	0.92	0.97	1.01	496	838
K11	Sine	1:3	60	top	0.57	0.74	0.75	0.78	0.79	0.83	0.86	0.92	0.96	1.00	520	882
K12	Sine	1:3	60	no		0.50	0.74	0.77	0.78	0.83	0.86	0.92	0.96	1.00	503	853
L01	Sine	1:5	20	full	0.77	0.80	0.80	0.81	0.83	0.85	0.88	0.92	0.96	1.00	508	850
L02	Sine	1:5	20	-100'	0.76	0.78	0.81	0.81	0.84	0.86	0.89	0.92	0.97	1.01	515	863
L03	Sine	1:5	20	top	0.71	0.78	0.78	0.81	0.82	0.85	0.87	0.92	0.96	1.00	496	841
L04	Sine	1:5	20	no	0.58	0.78	0.79	0.80	0.82	0.85	0.89	0.92	0.97	1.00	501	852
L05	Sine	1:5	40	full	0.74	0.77	0.78	0.80	0.80	0.83	0.87	0.92	0.95	1.00	508	850
L06	Sine	1:5	40	-100'	0.73	0.76	0.78	0.80	0.81	0.85	0.88	0.92	0.97	1.00	510	857
L07	Sine	1:5	40	top	0.65	0.73	0.76	0.79	0.79	0.83	0.87	0.92	0.96	1.00	500	847
L08	Sine	1:5	40	no		0.70	0.78	0.80	0.79	0.84	0.87	0.92	0.96	0.99	499	845
L09	Sine	1:5	60	full	0.72	0.75	0.77	0.78	0.79	0.83	0.86	0.91	0.95	0.99	508	851
L10	Sine	1:5	60	-100'	0.70	0.75	0.78	0.79	0.82	0.84	0.87	0.92	0.96	1.00	508	857
L11	Sine	1:5	60	top	0.63	0.71	0.75	0.77	0.80	0.83	0.87	0.91	0.96	1.00	506	854
L12	Sine	1:5	60	no		0.58	0.75	0.79	0.80	0.84	0.87	0.92	0.97	1.00	492	844
M01	Sine	1:10	20	full	0.68	0.75	0.78	0.80	0.81	0.83	0.87	0.92	0.96	1.00	505	849
M02	Sine	1:10	20	-100'	0.67	0.73	0.76	0.78	0.79	0.84	0.88	0.92	0.96	1.00	497	839
M03	Sine	1:10	20	top	0.58	0.71	0.75	0.77	0.78	0.82	0.86	0.91	0.96	1.00	504	856
M04	Sine	1:10	20	no		0.69	0.76	0.77	0.80	0.84	0.87	0.92	0.97	1.00	507	862
M05	Sine	1:10	40	full	0.66	0.73	0.75	0.77	0.80	0.83	0.87	0.91	0.96	1.00	507	848
M06	Sine	1:10	40	-100'	0.64	0.70	0.74	0.76	0.78	0.82	0.87	0.90	0.96	1.00	503	848
M07	Sine	1:10	40	top	0.58	0.67	0.71	0.74	0.77	0.80	0.86	0.90	0.96	1.00	495	834
M08	Sine	1:10	40	no		0.53	0.69	0.75	0.78	0.83	0.86	0.91	0.96	1.00	505	861
M09	Sine	1:10	60	full	0.68	0.71	0.74	0.76	0.78	0.82	0.87	0.92	0.97	1.01	503	846
M10	Sine	1:10	60	-100'	0.63	0.70	0.73	0.74	0.77	0.82	0.86	0.92	0.96	1.00	504	849
M11	Sine	1:10	60	top	0.56	0.65	0.71	0.72	0.77	0.82	0.85	0.91	0.96	1.00	502	850
M12	Sine	1:10	60	no		0.48	0.67	0.74	0.77	0.82	0.86	0.91	0.96	1.00	498	855
														Average (all tests) =	506	856

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clearcut Type	Measurement Height Above the Ground Level 40 (ft)	80 (ft)	120 (ft)	160 (ft)	200 (ft)	300 (ft)	423 (ft)	600 (ft)	800 (ft)	1000 (ft)	Upwind Ur@6.1cm (cm/s)	Profile Ur @30.5cm (cm/s)
C01	No Hill	-	0	all		0.46	0.54	0.62	0.65	0.72	0.80	0.87	0.94	1.00	530	827
C02	No Hill	-	0	all	0.56	0.63	0.66	0.69	0.71	0.77	0.81	0.89	0.95	1.00	521	819
C03	No Hill	-	20	no	0.35	0.51	0.59	0.65	0.68	0.74	0.81	0.88	0.95	1.00	510	806
C04	No Hill	-	40	no		0.40	0.52	0.59	0.64	0.73	0.80	0.87	0.95	0.99	498	794
C05	No Hill	-	60	no		0.34	0.47	0.56	0.62	0.71	0.79	0.88	0.94	1.01	518	822

Note: Run C01 was at - 200 cm upwind

TABLE 57 Model Ridge Normalized Velocity Profile Comparisons; Sinusoidal Shape

USWP Task 2 Test Results

USW_VEL3.WK3 Sheet B: 02/18/93

Fractional Speedup Factor Test Results (percent values)

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clearcut Type	Measurement Height Above the Hill Crest									
					40 (ft)	80 (ft)	120 (ft)	160 (ft)	200 (ft)	300 (ft)	423 (ft)	600 (ft)	800 (ft)	1000 (ft)
F01	Triang	1:2	20	full	117	47	32	24	22	17	13	10	8	6
F02	Triang	1:2	20	-100'	118	52	34	26	22	17	13	10	8	7
F03	Triang	1:2	20	top	127	57	39	31	26	19	16	11	9	7
F04	Triang	1:2	20	no	77	55	38	28	23	19	15	12	9	8
F05	Triang	1:2	40	full		83	45	37	25	19	14	11	8	6
F06	Triang	1:2	40	-100'		86	48	35	27	19	13	11	8	7
F07	Triang	1:2	40	top		88	50	39	29	19	14	11	8	7
F08	Triang	1:2	40	no		84	46	35	27	17	13	11	8	7
F09	Triang	1:2	60	full		114	60	40	31	23	16	10	8	6
F10	Triang	1:2	60	-100'		115	64	41	32	22	15	10	8	5
F11	Triang	1:2	60	top		118	65	43	36	24	18	10	9	6
F12	Triang	1:2	60	no		110	62	39	31	22	16	10	8	6
G01	Triang	1:3	20	full	127	55	37	30	23	19	15	11	8	7
G02	Triang	1:3	20	-100'	130	59	40	30	28	20	16	12	9	7
G03	Triang	1:3	20	top	135	60	43	33	27	22	16	11	9	8
G04	Triang	1:3	20	no	119	57	40	30	27	22	16	12	10	8
G05	Triang	1:3	40	full		94	53	41	32	21	16	12	9	9
G06	Triang	1:3	40	-100'		102	57	43	35	24	18	14	10	9
G07	Triang	1:3	40	top		100	58	47	34	25	18	15	11	9
G08	Triang	1:3	40	no		89	51	39	31	21	17	14	10	9
G09	Triang	1:3	60	full		122	66	45	35	23	17	11	9	7
G10	Triang	1:3	60	-100'		123	70	45	38	25	18	12	9	7
G11	Triang	1:3	60	top		123	69	45	37	24	18	12	10	7
G12	Triang	1:3	60	no		116	66	41	34	23	16	11	9	6
H01	Triang	1:5	20	full	146	64	45	36	31	25	16	12	10	7
H02	Triang	1:5	20	-100'	135	65	44	33	30	21	16	12	9	7
H03	Triang	1:5	20	top	122	60	40	32	27	22	16	12	9	7
H04	Triang	1:5	20	no	98	57	39	31	27	20	17	12	9	7
H05	Triang	1:5	40	full		101	57	43	33	23	15	12	7	6
H06	Triang	1:5	40	-100'		100	56	45	33	21	15	12	7	7
H07	Triang	1:5	40	top		91	54	40	31	20	17	13	9	8
H08	Triang	1:5	40	no		86	55	42	34	24	18	14	11	9
H09	Triang	1:5	60	full		134	76	49	39	26	19	11	9	7
H10	Triang	1:5	60	-100'		127	73	47	38	23	16	11	9	6
H11	Triang	1:5	60	top		114	65	42	31	20	16	10	8	6
H12	Triang	1:5	60	no		115	69	44	35	25	16	11	10	6
I01	Triang	1:10	20	full	130	60	42	30	25	19	14	10	7	6
I02	Triang	1:10	20	-100'	122	54	40	29	26	19	13	11	8	5
I03	Triang	1:10	20	top	92	50	36	26	24	18	14	10	8	6
I04	Triang	1:10	20	no	59	50	39	31	25	21	14	11	9	7
I05	Triang	1:10	40	full		100	57	43	32	22	18	14	9	9
I06	Triang	1:10	40	-100'		93	55	42	31	22	18	14	10	8
I07	Triang	1:10	40	top		74	45	37	26	20	16	12	9	8
I08	Triang	1:10	40	no		72	49	40	31	22	17	14	9	8
I09	Triang	1:10	60	full		130	72	47	37	25	16	12	10	7
I10	Triang	1:10	60	-100'		122	66	44	33	23	17	12	9	6
I11	Triang	1:10	60	top		101	60	38	31	22	15	10	9	6
I12	Triang	1:10	60	no		85	61	45	36	24	18	13	10	7

TABLE 58 Model Ridge Fractional Speed Up Profile Comparisons; Triangular Shape

USWP Task 2 Test Results

USW_VEL3.WK3 Sheet B: 02/18/93

Fractional Speedup Factor Test Results (percent values)

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clearcut Type	Measurement Height Above the Hill Crest									
					40 (ft)	80 (ft)	120 (ft)	160 (ft)	200 (ft)	300 (ft)	423 (ft)	600 (ft)	800 (ft)	1000 (ft)
J01	Sine	1:2	20	full	144	63	43	32	28	19	15	11	9	7
J02	Sine	1:2	20	-100'	135	63	42	32	26	20	15	11	9	7
J03	Sine	1:2	20	top	137	63	44	34	30	23	17	13	10	7
J04	Sine	1:2	20	no	123	59	40	30	26	21	15	11	10	7
J05	Sine	1:2	40	full		98	57	42	34	23	16	13	9	8
J06	Sine	1:2	40	-100'		102	57	43	33	21	15	13	8	7
J07	Sine	1:2	40	top		94	55	41	33	22	16	12	8	8
J08	Sine	1:2	40	no		94	51	38	30	19	14	12	9	9
J09	Sine	1:2	60	full		134	73	47	38	25	18	12	9	6
J10	Sine	1:2	60	-100'		140	75	50	39	26	19	13	10	7
J11	Sine	1:2	60	top		129	73	47	38	27	19	11	10	8
J12	Sine	1:2	60	no		124	69	43	33	25	18	12	10	8
K01	Sine	1:3	20	full	138	65	43	35	28	21	14	10	8	6
K02	Sine	1:3	20	-100'	156	72	49	37	30	22	18	13	9	6
K03	Sine	1:3	20	top	128	64	43	32	30	20	16	11	8	6
K04	Sine	1:3	20	no	71	61	42	32	27	20	13	11	7	5
K05	Sine	1:3	40	full		98	58	44	33	22	17	12	8	8
K06	Sine	1:3	40	-100'		109	65	49	35	24	17	14	9	8
K07	Sine	1:3	40	top		97	56	43	33	22	17	13	9	8
K08	Sine	1:3	40	no		76	51	39	32	20	16	13	8	7
K09	Sine	1:3	60	full		129	69	43	36	26	16	9	7	5
K10	Sine	1:3	60	-100'		139	76	50	40	29	18	12	9	7
K11	Sine	1:3	60	top		130	71	47	37	26	16	12	8	6
K12	Sine	1:3	60	no		55	69	45	35	25	16	12	9	6
L01	Sine	1:5	20	full	136	65	43	33	29	21	16	11	7	5
L02	Sine	1:5	20	-100'	135	62	45	33	31	22	17	11	9	6
L03	Sine	1:5	20	top	121	62	42	34	30	22	16	12	9	7
L04	Sine	1:5	20	no	82	63	43	33	30	23	18	12	10	7
L05	Sine	1:5	40	full		99	56	42	30	19	14	11	6	5
L06	Sine	1:5	40	-100'		97	58	44	33	23	17	12	8	7
L07	Sine	1:5	40	top		93	53	43	31	22	16	12	8	7
L08	Sine	1:5	40	no		84	58	45	31	22	16	13	8	6
L09	Sine	1:5	60	full		131	72	47	35	24	15	9	7	4
L10	Sine	1:5	60	-100'		132	75	48	41	26	17	11	8	6
L11	Sine	1:5	60	top		119	70	45	38	24	17	10	8	6
L12	Sine	1:5	60	no		83	72	50	40	28	19	13	11	8
M01	Sine	1:10	20	full	110	55	41	31	26	19	15	11	8	6
M02	Sine	1:10	20	-100'	108	52	38	29	25	21	17	12	9	7
M03	Sine	1:10	20	top	82	49	37	28	24	19	15	12	9	7
M04	Sine	1:10	20	no		46	38	29	27	22	16	12	10	8
M05	Sine	1:10	40	full		89	51	38	30	19	14	10	7	6
M06	Sine	1:10	40	-100'		84	49	37	29	20	15	10	8	7
M07	Sine	1:10	40	top		76	44	34	27	16	14	10	7	7
M08	Sine	1:10	40	no		41	41	37	30	22	15	13	8	7
M09	Sine	1:10	60	full		120	66	43	34	23	17	11	8	6
M10	Sine	1:10	60	-100'		115	66	40	33	23	15	11	8	6
M11	Sine	1:10	60	top		102	61	36	33	24	14	10	9	6
M12	Sine	1:10	60	no		52	55	43	35	25	17	12	10	7

TABLE 59 Model Ridge Fractional Speed Up Profile Comparisons; Sinusoidal Shape

USWP Task 2 Test Results

USW_VEL3.WK3 Sheet E: 02/18/93

Percent Power Decrease Over Full Clearcut Option Test Results (Positive values are a power decrease)

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clearcut Type	Measurement Height Above the Hill Crest									
					40 (ft)	80 (ft)	120 (ft)	160 (ft)	200 (ft)	300 (ft)	423 (ft)	600 (ft)	800 (ft)	1000 (ft)
F01	Triang	1:2	20	full	0	0	0	0	0	0	0	0	0	0
F02	Triang	1:2	20	-100'	-1	-10	-5	-4	-0	-1	-1	1	-1	-1
F03	Triang	1:2	20	top	-15	-23	-15	-18	-9	-6	-9	-3	-4	-3
F04	Triang	1:2	20	no	46	-18	-14	-11	-3	-4	-6	-4	-4	-4
F05	Triang	1:2	40	full	0	0	0	0	0	0	0	0	0	0
F06	Triang	1:2	40	-100'	-2	-4	-8	2	-4	0	2	-0	-0	-0
F07	Triang	1:2	40	top	6	-8	-12	-6	-9	0	0	-1	-1	-2
F08	Triang	1:2	40	no		-2	-3	3	-5	4	3	-1	-0	-2
F09	Triang	1:2	60	full	0	0	0	0	0	0	0	0	0	0
F10	Triang	1:2	60	-100'	1	-1	-6	-2	-3	3	4	1	-0	2
F11	Triang	1:2	60	top	11	-5	-8	-7	-11	-3	-4	-0	-2	-0
F12	Triang	1:2	60	no		6	-3	1	-0	3	0	0	-0	1
G01	Triang	1:3	20	full	0	0	0	0	0	0	0	0	0	0
G02	Triang	1:3	20	-100'	-4	-9	-7	0	-15	-3	-5	-3	-2	-1
G03	Triang	1:3	20	top	-11	-11	-12	-5	-11	-8	-3	-2	-3	-3
G04	Triang	1:3	20	no	10	-4	-6	1	-10	-7	-3	-4	-4	-4
G05	Triang	1:3	40	full	0	0	0	0	0	0	0	0	0	0
G06	Triang	1:3	40	-100'	-6	-13	-8	-6	-5	-6	-5	-4	-2	-1
G07	Triang	1:3	40	top	7	-11	-9	-14	-4	-10	-7	-7	-5	-2
G08	Triang	1:3	40	no		7	4	4	3	0	-4	-4	-2	-0
G09	Triang	1:3	60	full	0	0	0	0	0	0	0	0	0	0
G10	Triang	1:3	60	-100'		-1	-7	-0	-6	-3	-2	-1	1	1
G11	Triang	1:3	60	top	14	-2	-6	0	-5	-1	-3	-1	-1	1
G12	Triang	1:3	60	no		8	0	8	4	0	3	1	-0	2
H01	Triang	1:5	20	full	0	0	0	0	0	0	0	0	0	0
H02	Triang	1:5	20	-100'	14	-1	3	5	0	8	1	2	2	1
H03	Triang	1:5	20	top	27	8	10	8	7	6	1	1	1	-0
H04	Triang	1:5	20	no	48	13	13	10	8	10	-0	-0	2	1
H05	Triang	1:5	40	full	0	0	0	0	0	0	0	0	0	0
H06	Triang	1:5	40	-100'	8	1	3	-3	1	4	2	2	-1	-2
H07	Triang	1:5	40	top	44	15	6	6	4	7	-5	-1	-5	-5
H08	Triang	1:5	40	no		21	5	2	-2	-3	-6	-5	-10	-8
H09	Triang	1:5	60	full	0	0	0	0	0	0	0	0	0	0
H10	Triang	1:5	60	-100'	-0	9	6	3	4	7	6	1	1	2
H11	Triang	1:5	60	top	38	24	19	13	16	13	6	5	2	2
H12	Triang	1:5	60	no		23	13	9	9	2	5	0	-2	1
I01	Triang	1:10	20	full	0	0	0	0	0	0	0	0	0	0
I02	Triang	1:10	20	-100'	10	12	5	3	-4	-1	2	-2	-1	1
I03	Triang	1:10	20	top	42	17	12	9	2	3	1	-1	-2	-2
I04	Triang	1:10	20	no	67	18	7	-2	-1	-3	-0	-3	-5	-4
I05	Triang	1:10	40	full	0	0	0	0	0	0	0	0	0	0
I06	Triang	1:10	40	-100'	3	10	5	1	2	-2	-0	0	-0	0
I07	Triang	1:10	40	top	50	34	21	11	13	5	5	4	1	1
I08	Triang	1:10	40	no		36	15	6	2	-2	3	0	2	1
I09	Triang	1:10	60	full	0	0	0	0	0	0	0	0	0	0
I10	Triang	1:10	60	-100'	17	10	11	6	8	5	-0	1	2	3
I11	Triang	1:10	60	top	51	33	20	17	12	8	5	5	3	3
I12	Triang	1:10	60	no		48	19	3	2	1	-5	-1	-1	-0

TABLE 60 Model Ridge Percent Power Decrease Profile Comparisons; Triangular Shape

USWP Task 2 Test Results

USW_VEL3.WK3 Sheet E: 02/18/93

Percent Power Decrease Over Full Clearcut Option Test Results (Positive values are a power decrease)

Run No.	Hill Shape	Hill Slope	Tree Height (ft)	Clearcut Type	Measurement Height Above the Hill Crest									
					40 (ft)	80 (ft)	120 (ft)	160 (ft)	200 (ft)	300 (ft)	423 (ft)	600 (ft)	800 (ft)	1000 (ft)
J01	Sine	1:2	20	full	0	0	0	0	0	0	0	0	0	0
J02	Sine	1:2	20	-100'	11	-1	2	1	4	-3	2	-0	-1	-0
J03	Sine	1:2	20	top	8	-1	-2	-3	-7	-11	-4	-4	-3	-2
J04	Sine	1:2	20	no	24	6	7	6	3	-5	2	-1	-2	-1
J05	Sine	1:2	40	full	0	0	0	0	0	0	0	0	0	0
J06	Sine	1:2	40	-100'	3	-6	0	-2	3	4	3	0	2	3
J07	Sine	1:2	40	top	30	5	4	3	2	4	0	2	2	2
J08	Sine	1:2	40	no		6	10	9	9	10	5	2	-0	-0
J09	Sine	1:2	60	full	0	0	0	0	0	0	0	0	0	0
J10	Sine	1:2	60	-100'	-4	-8	-5	-7	-3	-4	-4	-3	-4	-2
J11	Sine	1:2	60	top	40	7	-1	1	-0	-5	-2	1	-3	-3
J12	Sine	1:2	60	no		12	7	9	11	-1	-1	-2	-2	-4
K01	Sine	1:3	20	full	0	0	0	0	0	0	0	0	0	0
K02	Sine	1:3	20	-100'	-25	-13	-12	-4	-5	-5	-10	-7	-1	-1
K03	Sine	1:3	20	top	11	3	1	6	-4	1	-4	-2	1	2
K04	Sine	1:3	20	no	63	7	2	7	3	2	3	-1	3	3
K05	Sine	1:3	40	full	0	0	0	0	0	0	0	0	0	0
K06	Sine	1:3	40	-100'	-13	-16	-14	-10	-5	-3	-2	-6	-1	-0
K07	Sine	1:3	40	top	47	2	4	2	1	2	-0	-1	-2	1
K08	Sine	1:3	40	no		30	13	10	2	5	0	-1	1	2
K09	Sine	1:3	60	full	0	0	0	0	0	0	0	0	0	0
K10	Sine	1:3	60	-100'	-15	-13	-12	-16	-7	-7	-6	-8	-6	-5
K11	Sine	1:3	60	top	52	-1	-4	-8	-1	0	-1	-9	-3	-3
K12	Sine	1:3	60	no		69	1	-4	3	3	-1	-8	-5	-3
L01	Sine	1:5	20	full	0	0	0	0	0	0	0	0	0	0
L02	Sine	1:5	20	-100'	1	6	-4	1	-4	-3	-3	-0	-4	-2
L03	Sine	1:5	20	top	17	6	2	-2	-2	-2	-0	-4	-5	-5
L04	Sine	1:5	20	no	54	4	-1	0	-3	-5	-7	-4	-8	-6
L05	Sine	1:5	40	full	0	0	0	0	0	0	0	0	0	0
L06	Sine	1:5	40	-100'	1	2	-5	-4	-8	-9	-8	-5	-6	-4
L07	Sine	1:5	40	top	29	10	4	-1	-3	-6	-7	-4	-7	-6
L08	Sine	1:5	40	no		22	-6	-5	-2	-7	-4	-5	-5	-3
L09	Sine	1:5	60	full	0	0	0	0	0	0	0	0	0	0
L10	Sine	1:5	60	-100'	6	-2	-5	-3	-13	-5	-6	-4	-5	-5
L11	Sine	1:5	60	top	31	15	4	4	-6	-1	-5	-2	-4	-5
L12	Sine	1:5	60	no		50	1	-8	-12	-9	-11	-12	-11	-10
M01	Sine	1:10	20	full	0	0	0	0	0	0	0	0	0	0
M02	Sine	1:10	20	-100'	2	6	6	5	4	-5	-4	-4	-1	-0
M03	Sine	1:10	20	top	34	12	8	8	6	1	1	-3	-1	-1
M04	Sine	1:10	20	no		17	5	5	-2	-7	-3	-4	-4	-4
M05	Sine	1:10	40	full	0	0	0	0	0	0	0	0	0	0
M06	Sine	1:10	40	-100'	5	8	5	2	4	-1	-2	-1	-1	-3
M07	Sine	1:10	40	top	30	20	14	9	8	7	2	-0	-0	-3
M08	Sine	1:10	40	no		59	18	2	2	-6	-2	-8	-4	-4
M09	Sine	1:10	60	full	0	0	0	0	0	0	0	0	0	0
M10	Sine	1:10	60	-100'	17	6	0	6	2	-1	5	-0	0	1
M11	Sine	1:10	60	top	41	22	9	12	1	-2	6	2	-1	-1
M12	Sine	1:10	60	no		67	18	0	-3	-4	-2	-3	-4	-4

Note: Model Average Reference Velocity was 506 cm/s at 6.1 cm Height, 200 cm upwind of hill

TABLE 61 Model Ridge Percent Power Decrease Profile Comparisons; Sinusoidal Shape

FIGURES

200' Ridge Height (field units)
61mm " " (model scale)
1:10 Plot:Model scale

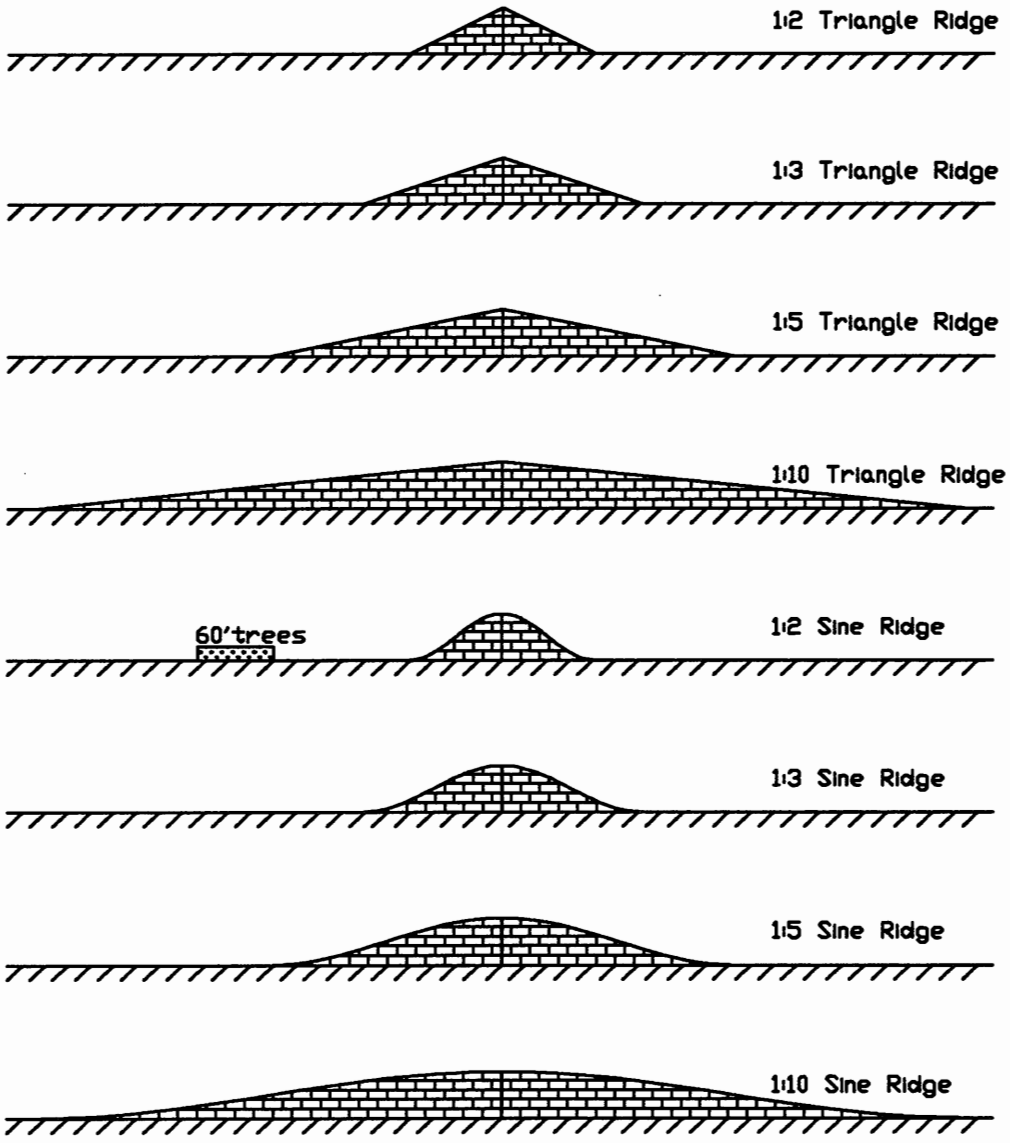


FIGURE 1 Model Ridge Cross-Sectional Profiles

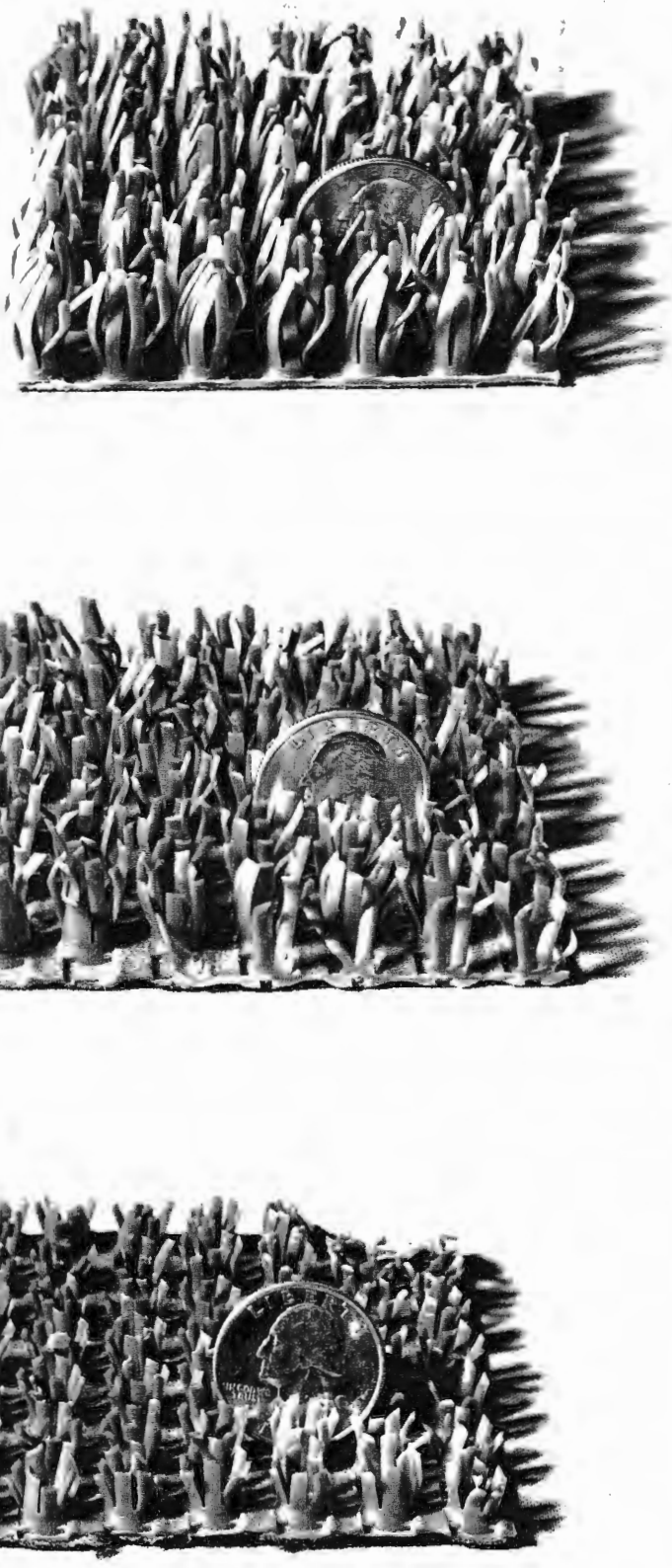


FIGURE 2 Model Forest Matting For 60, 40 And 20 Foot High Trees

1:3 Sine Ridge

200' Ridge Height (field units)

61mm " " (model scale)

1:5 Plot:Model scale

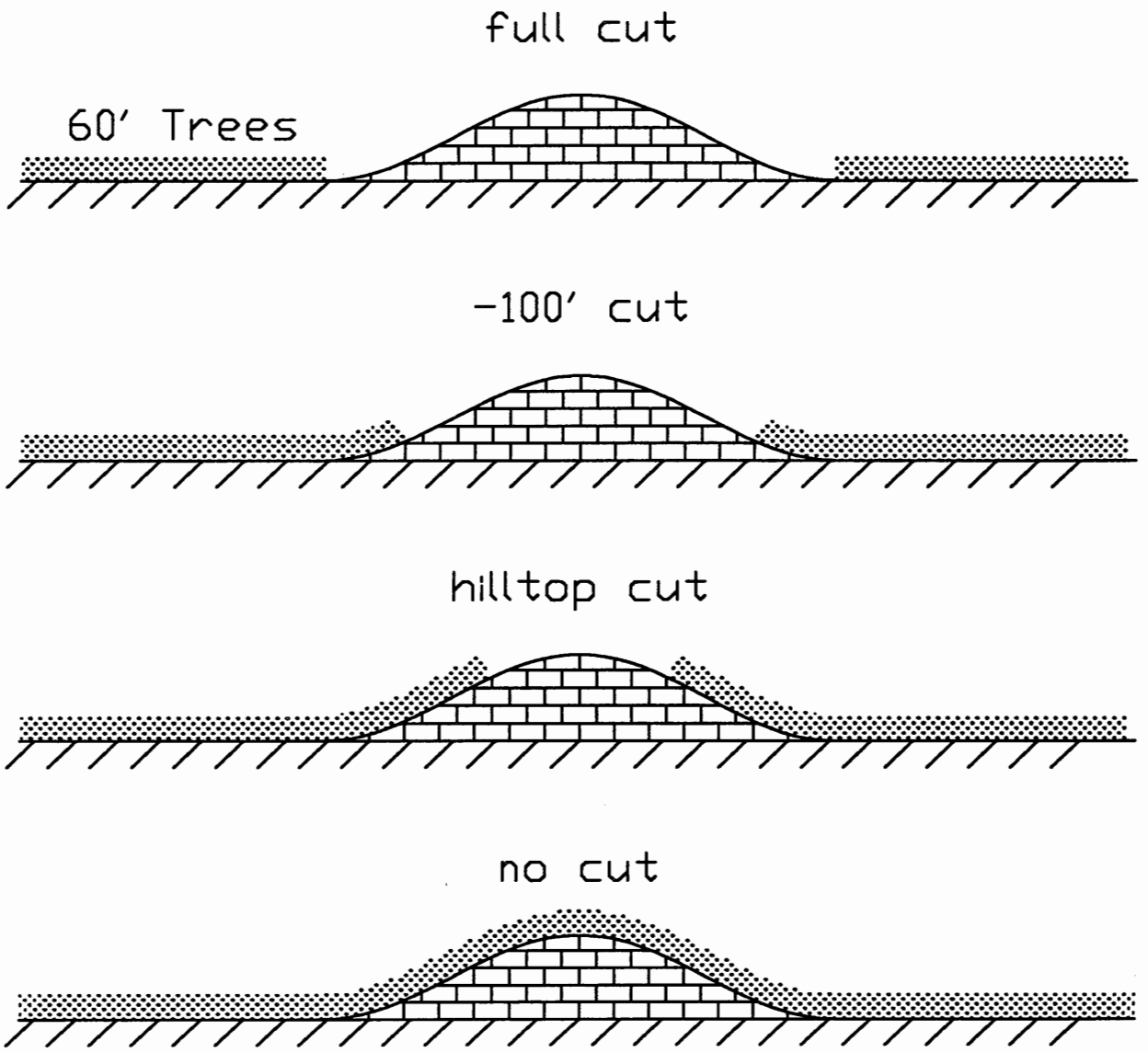


FIGURE 3 Model Forest Clearings For 60' Trees On 1:3 Slope Sine Ridge

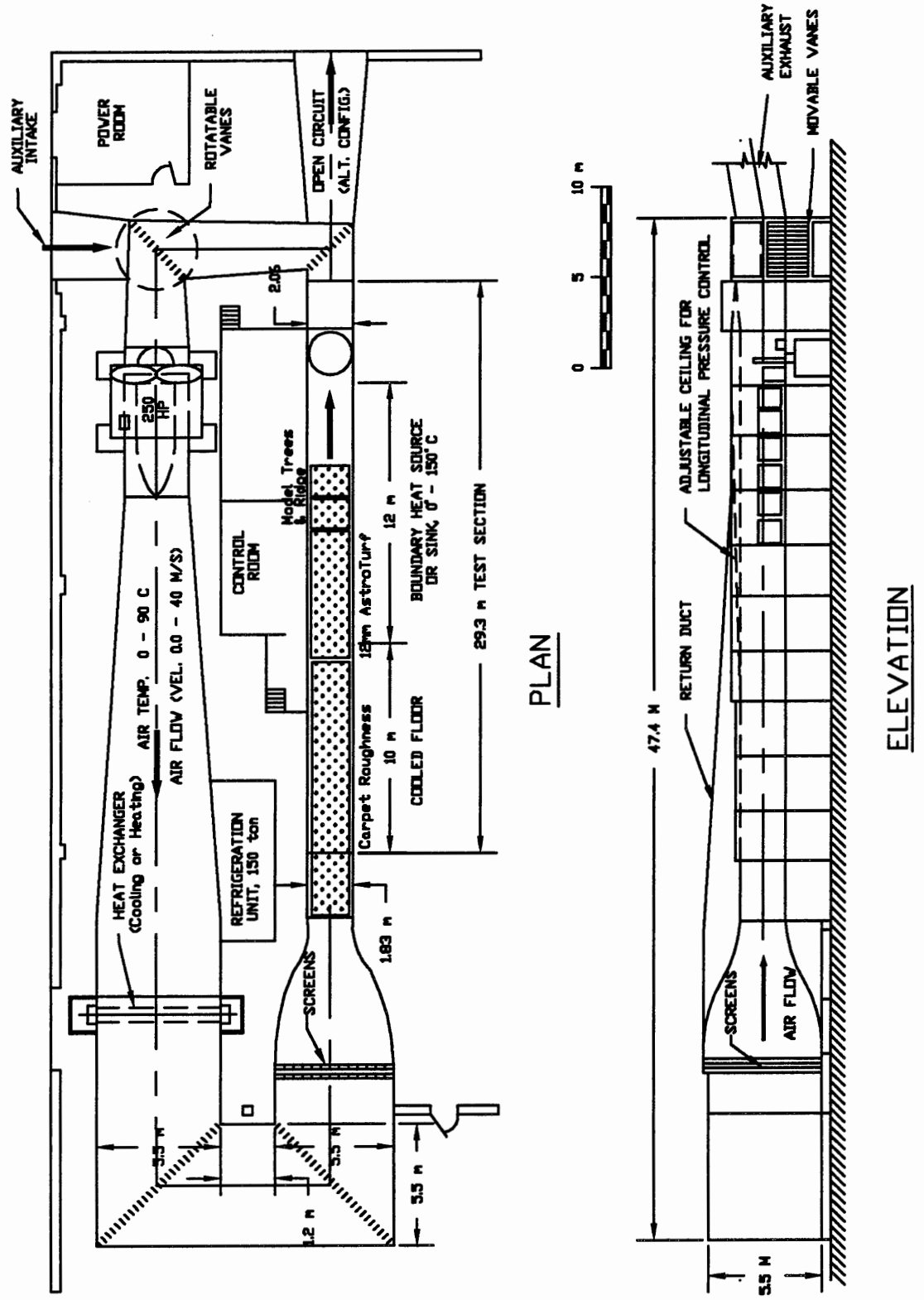


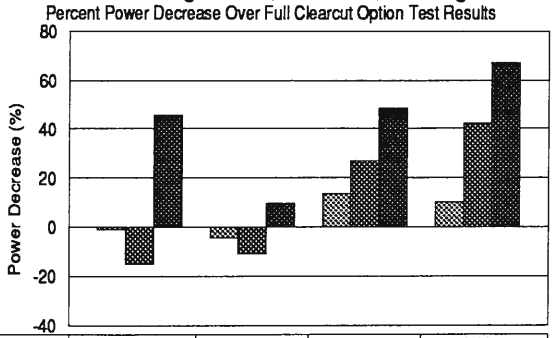
FIGURE 4 Meterological Wind Tunnel Facility

USWP Task 2 Test Results

USW_VEL4.WK3 Sheet C: 02/18/93

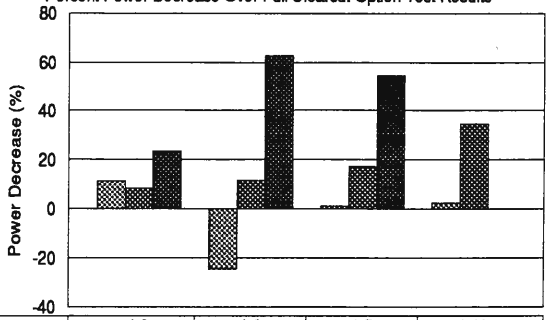
Percent Power Decrease Over Full Clearcut Option Test Results

Triangular Hill; 20' Trees; 40' Height



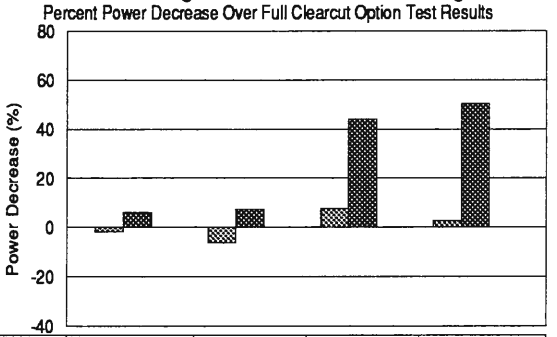
Hill Slope	1:2	1:3	1:5	1:10
-100'	-1	-4	14	10
top	-15	-11	27	42
no	46	10	48	67

Sinusoidal Hill; 20' Trees; 40' Height



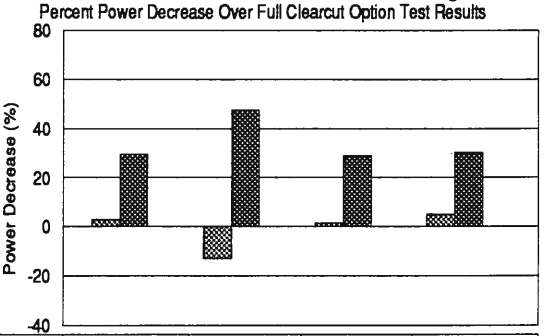
Hill Slope	1:2	1:3	1:5	1:10
-100'	11	-25	1	2
top	8	11	17	34
no	24	63	54	

Triangular Hill; 40' Trees; 40' Height



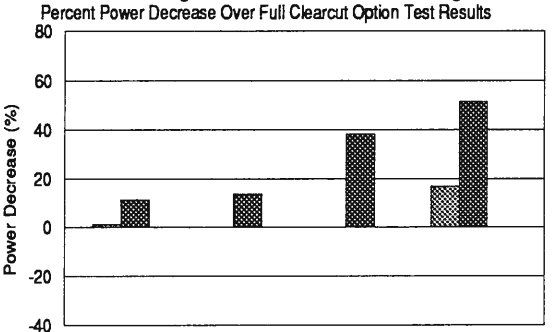
Hill Slope	1:2	1:3	1:5	1:10
-100'	-2	-6	8	3
top	6	7	44	50
no				

Sinusoidal Hill; 40' Trees; 40' Height



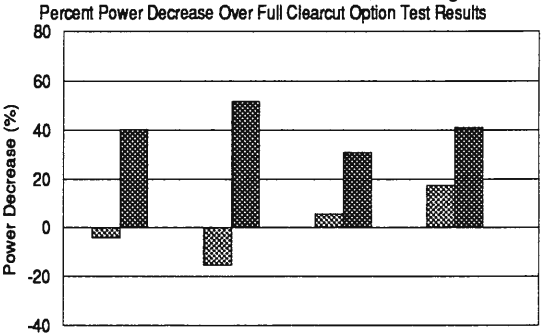
Hill Slope	1:2	1:3	1:5	1:10
-100'	3	-13	1	5
top	30	47	29	30
no				

Triangular Hill; 60' Trees; 40' Height



Hill Slope	1:2	1:3	1:5	1:10
-100'	1		-0	17
top	11	14	38	51
no				

Sinusoidal Hill; 60' Trees; 40' Height



Hill Slope	1:2	1:3	1:5	1:10
-100'	-4	-15	6	17
top	40	52	31	41
no				

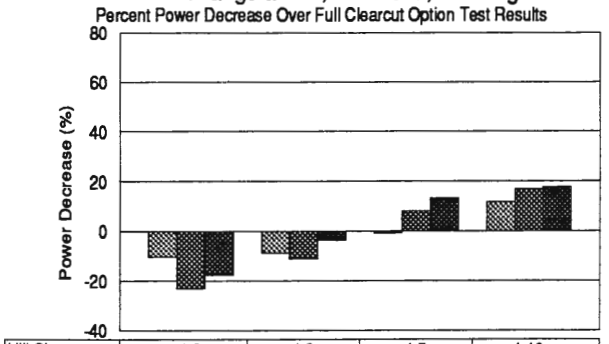
FIGURE 5 Model Ridge Percent Power Decrease Comparisons; 40' Measurement Height

USWP Task 2 Test Results

USW_VEL4.WK3 Sheet B: 02/18/93

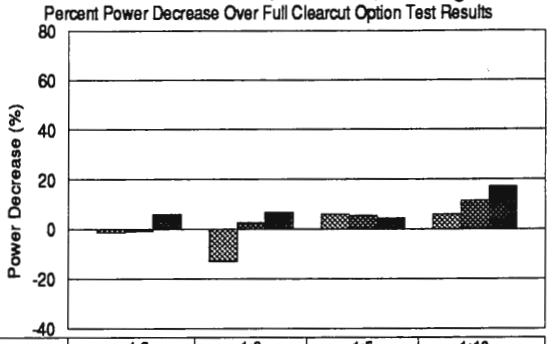
Percent Power Decrease Over Full Clearcut Option Test Results

Triangular Hill; 20' Trees; 80' Height



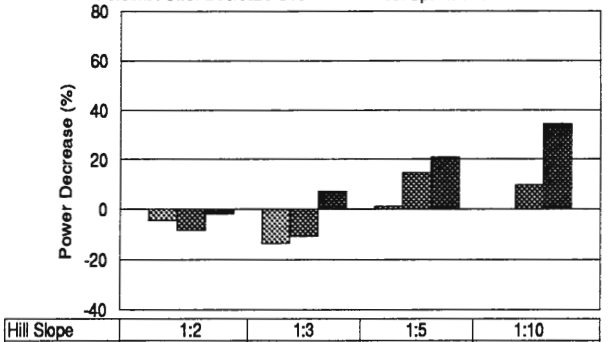
Hill Slope	1:2	1:3	1:5	1:10
-100'	-10	-9	-1	12
top	-23	-11	8	17
no	-18	-4	13	18

Sinusoidal Hill; 20' Trees; 80' Height



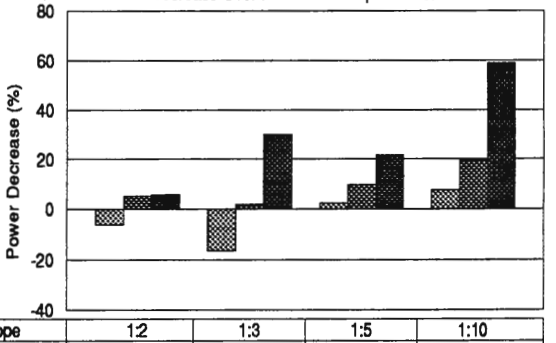
Hill Slope	1:2	1:3	1:5	1:10
-100'	-1	-13	6	6
top	-1	3	6	12
no	6	7	4	17

Triangular Hill; 40' Trees; 80' Height



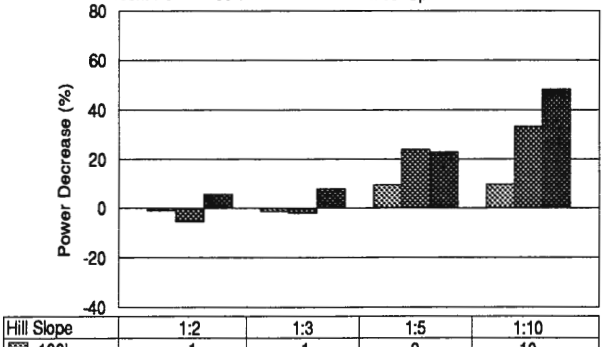
Hill Slope	1:2	1:3	1:5	1:10
-100'	-4	-13	1	0
top	-8	-11	15	10
no	-2	7	21	34

Sinusoidal Hill; 40' Trees; 80' Height



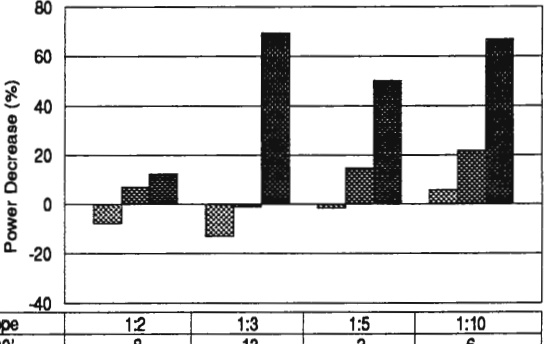
Hill Slope	1:2	1:3	1:5	1:10
-100'	-6	-16	2	8
top	5	2	10	20
no	6	30	22	59

Triangular Hill; 60' Trees; 80' Height



Hill Slope	1:2	1:3	1:5	1:10
-100'	-1	-1	9	10
top	-5	-2	24	33
no	6	8	23	48

Sinusoidal Hill; 60' Trees; 80' Height



Hill Slope	1:2	1:3	1:5	1:10
-100'	-8	-13	-2	6
top	7	-1	15	22
no	12	69	50	67

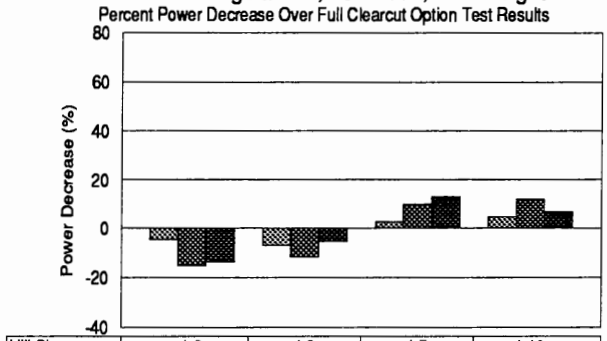
FIGURE 6 Model Ridge Percent Power Decrease Comparisons; 80' Measurement Height

USWP Task 2 Test Results

USW_VEL4.WK3 Sheet D: 02/18/93

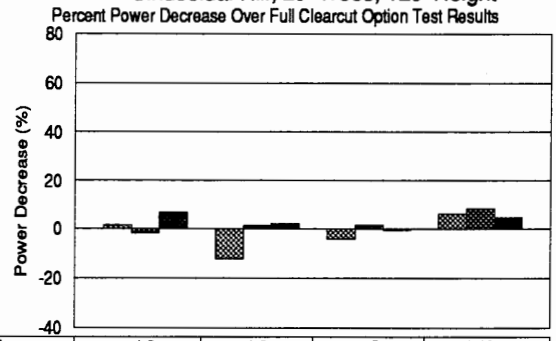
Percent Power Decrease Over Full Clearcut Option Test Results

Triangular Hill; 20' Trees; 120' Height



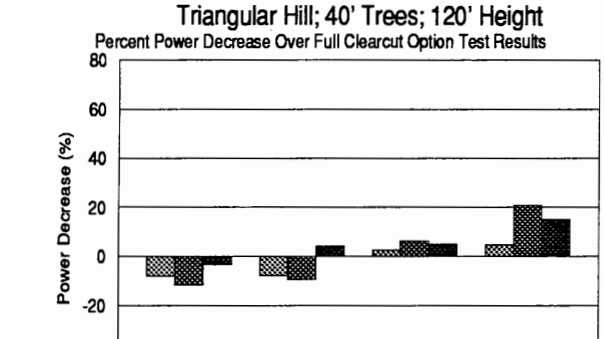
Hill Slope	1:2	1:3	1:5	1:10
-100'	-5	-7	3	5
top	-15	-12	10	12
no	-14	-6	13	7

Sinusoidal Hill; 20' Trees; 120' Height



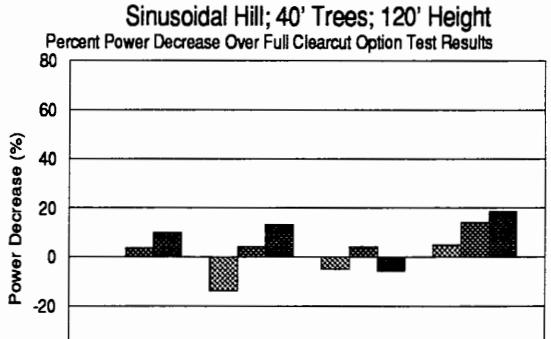
Hill Slope	1:2	1:3	1:5	1:10
-100'	2	-12	-4	6
top	-2	1	2	8
no	7	2	-1	5

Triangular Hill; 40' Trees; 120' Height



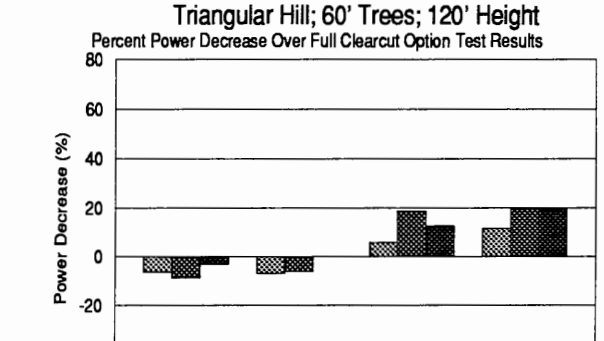
Hill Slope	1:2	1:3	1:5	1:10
-100'	-8	-8	3	5
top	-12	-9	6	21
no	-3	4	5	15

Sinusoidal Hill; 40' Trees; 120' Height



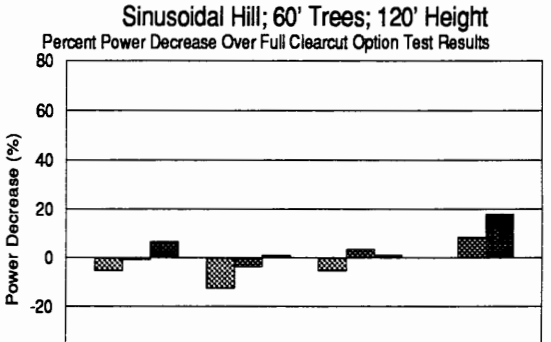
Hill Slope	1:2	1:3	1:5	1:10
-100'	0	-14	-5	5
top	4	4	4	14
no	10	13	-6	18

Triangular Hill; 60' Trees; 120' Height



Hill Slope	1:2	1:3	1:5	1:10
-100'	-6	-7	6	11
top	-8	-6	19	20
no	-3	0	13	19

Sinusoidal Hill; 60' Trees; 120' Height



Hill Slope	1:2	1:3	1:5	1:10
-100'	-5	-12	-5	0
top	-1	-4	4	9
no	7	1	1	18

FIGURE 7 Model Ridge Percent Power Decrease Comparisons; 120' Measurement Height