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THE NOISE IMPACT OF PROPOSED RUNWAY ALTERNATIVES AT CRAIG AIRPORT

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SUMMARY

Four proposed runway alternatives for Craig Airport (Jacksonville, Florida) have been evaluated with respect to their potential noise impact on the community in the year 2005. The Fractional Impact Method for community noise impact assessment is used to augment a conventional noise footprint analysis, and the change in noise impact associated with each runway-change alternative is expressed in equivalent source noise reduction. It is concluded that each of the proposed runway alternatives requiring a change in the current runway configuration results in a slight noise benefit compared to the "do nothing" alternative, although the noise benefit is small and, therefore, may not be the most important factor in selecting one alternative over any of the others.

INTRODUCTION

A number of runway expansion alternatives are under consideration at Craig Airport, a general aviation airport serving Jacksonville, Florida. These runway alterations are being considered to cope with the increase in airport operations anticipated by the year 2005. This report analyzes the noise impact forecasted for the year 2005 for each of the runway expansion alternatives under consideration. The noise impact for the year 2005 is also forcasted assuming no runway changes are made. All analyses are based upon operating scenarios developed during an airfield facilities study and environmental impact assessment conducted at Craig Airport by Environmental Science and Engineering, Inc. in association with Landrum and Brown (ref. 1). These operating scenarios were provided to NASA in machine-readable format by Environmental Science and Engineering, Inc. The impact analysis reported here was conducted in cooperation with the FAA as a proof-of-concept study to evaluate the utility of an airport noise-impact assessment model recently developed at Langley Research Center. This model, called the Airport-noise Levels and Annoyance MOdel (ALAMO), extends the conventional noise "footprint" concept of impact analysis by explicitly accounting for the distribution of population around an airport. In addition, a weighting is included such that those people exposed to high levels of noise are counted more heavily than those exposed to low levels of noise. This weighting is based on a recent analysis of social survey data as reported in reference 2. A brief description of the ALAMO model is contained in this report. The impact assessment method implemented in ALAMO is fully described in reference 3.

DESCRIPTION OF AIRPORT OPERATIONS

Runway Alternatives

Figure 1 illustrates four runway plans being evaluated at Craig Airport to cope with the projected future demand in aircraft operations. Figure 1a represents the current runway configuration, which consists of two active runways (13/31 and 4/22) oriented northeast-southwest and northwest-southeast. Runway 13/31 is 4007 feet long, and runway 4/22 is 4000 feet long. This configuration (Alternative 1) represents the "no-action" alternative of maintaining the status quo and serves as a baseline for judging the noise impact of the other runway alternatives.

Alternative 2, illustrated in figure 1b, involves a 4000-feet extension of runway 13/31 to the southeast and a 2000-feet relocation of the northwest end the runway for noise abatement purposes. A new 3200-feet runway parallel to 13/31 is also included in this alternative. The net effect is to increase the length of runway 13/31 to about 6000 feet.

Alternative 3 (fig. 1c) is identical to alternative 2 except that runway 13/31 is only extended in length; it is not relocated to the southeast. Alternative 4 (fig. 1d) differs from alternative 3 only in that the 3200-feet new runway is oriented parallel to runway 4/22 instead of 13/31.

Several factors were considered in developing the four runway alternatives at Craig. These included wind coverage, airspace interaction with nearby civil and military airports, runway capacity, operational feasibility and efficiency, land acquisition requirements, topographical factors, and the identification of obstructions. The costs associated with implementing alternatives 2, 3, and 4 are summarized in table I (data from ref. 1). According to reference 1, the cost of the no-action alternative would be primarily in the form of increased operating costs associated with aircraft delays.

Fleet Mix and Schedules

Since a wide range of aircraft operate at Craig Airport, acoustically similar aircraft are clustered into categories for the purpose of assessing noise impact. Table II represents the generic categories of aircraft used in the Craig Airport analysis and gives representative aircraft in each category. The average number of daily operations (arrivals plus departures) of each aircraft type by time of day is also given in table II. Day operations occur between the hours of 7:00 a.m. and 10:00 p.m. while night operations occur between 10:00 p.m. and 7:00 a.m. In the data presented to NASA for analysis, the year 2005 fleet mix for each of the three proposed runway alternatives was presumed to be essentially the same as for the year 2005 baseline (no change) case. That is, the assumption is made implicitly that the operating scenario will be the same in the year 2005 whether the runway configuration is changed or not.

Ground Tracks

A large number of ground tracks was used in the description of the operating scenario for the baseline case and for each of the proposed alternatives. Each ground track represents the two-dimensional projection of a three-dimensional flight trajectory onto the ground. Most of the ground tracks for each runway alternative are assumed to be essentially the same as the baseline (no change) case. Representative tracks for Craig Airport are illustrated in figure 2. These ground tracks indicate a reasonably wide dispersion of flight operations consistent with the fact that the aircraft operating at Craig Airport are primarily general aviation aircraft.

Approach and Departure Profiles

In 1979, a touch-and-go profile, a 4-degree GA approach profile, and VOR approach profiles to runways 13 and 31 were used. These are illustrated in figure 3a. The 2005 baseline scenario added two F-27 approach profiles, illustrated in figure 3b. Each of the three nonbaseline runway configurations assume the same approach profiles, which consist of the 2005 baseline profiles plus an ILS approach to runway 31L, a three-degree GA approach to runway 31, and a touch-and-go pattern on 31R-13L. The approach profiles added to the 1979 baseline case for the year 2005 nonbaseline cases are illustrated in figure 3c.

The departure profiles used for the 1979 and 2005 baseline cases, as well as for each of the 2005 nonbaseline cases were based on default takeoff procedures contained within the INM noise prediction model. These pre-programmed departure profiles depend on aircraft type and stage-length (i.e. weight of aircraft, including fuel) and do not have to be defined explicitly by the user.

The user has the option of specifying departure profiles which differ from the default profiles, but this was not done in the operating scenario descriptions for Craig Airport provided to NASA for analysis.

IMPACT ASSESSMENT METHODOLOGY

The noise impact associated with each of the proposed runway alternatives at Craig Airport was assessed by means of the Fractional Impact Method (ref. 3). This method, which was developed by a special working group of the National Research Council's Committee on Hearing, Bioacoustics, and Biomechanics (CHABA), has been implemented at Langley Research Center in an impact assessment model called ALAMO (Airport-noise Levels and Annoyance MOdel). ALAMO represents an extension of the conventional noise footprint concept of assessment, in which noise is quantified primarily in terms of the area enclosed within contours of constant noise level surrounding the airport (ref. 4). ALAMO explicitly accounts for the population distribution within the airport community, as well as the distribution of noise levels which a conventional noise footprint represents. The noise impact is quantified in terms of Level Weighted Population (LWP). Those people exposed to very high levels of airport noise are weighted more heavily than those exposed to lower levels of noise. The weighting function which the NRC CHABA committee recommends is based upon a relationship between noise level and percentage of people "highly annoyed" with noise, as reported in reference 2. (See fig. 4.)

Level Weighted Population

To compute the Level Weighted Population, ALAMO first constructs a noise footprint in which contours of constant noise exposure are plotted in 5 decibel steps from 55 dB Ldn to 75 dB Ldn. To define the footprint, ALAMO uses the Integrated Noise Model (INM), a widely used noise prediction program developed and distributed by the FAA (ref. 5). INM, which comprises a major module within the ALAMO software system, bases the noise contours on a description of airport operations for a 24-hour period. Runway lengths and orientations, ground tracks, profiles, fleet mix, and flight schedules are all included in this description in a prescribed format required by INM.

After the noise contours are defined, they are passed to a second major component within the ALAMO model; namely, a large database management system called SITE II, which provides access to U.S. census data contained in its database (ref. 6). SITE II is capable of generating complete demographic reports which describe the population living within arbitrarily shaped closed contours anywhere in the United States. These contours can range in size from about a half mile square to the size of the entire United States. Thus, ALAMO passes the noise contours generated by INM to SITE II, which determines the number of people residing inside each noise contour from 55 dB Ldn to 75 dB Ldn. The number of people residing inside each 5 dB band (e.g. 65 dB-70 dB) around the airport is then computed. A weighting factor based upon the average of the two contour values defining each 5 dB band is then determined from a mathematical representation of the weighting function illustrated in figure 4. The population within each 5 dB band is multiplied by the corresponding level-dependent weighting factor and then summed. The resulting number, called the Level Weighted Population (LWP), is a single-number descriptor of noise impact which explicitly accounts for noise levels, population distribution, and human subjective response to noise. The LWP will increase if the population of the airport community increases, even if the noise levels remain the same. Likewise, the

LWP is larger for a population distribution with large concentrations of people in high noise levels, than for the case where most of the residents lived in lower noise levels, even if the total population is the same in both cases.

By taking population into account explicitly, and by weighting the population to reflect human subjective response to noise, the LWP numbers provide insights into the noise impact in an airport community which are difficult to perceive with a conventional noise footprint analysis, in which noise is assessed primarily in terms of footprint area. In order to cast the LWP numbers into terms which can be more readily understood, a method has been developed by which changes in LWP can be expressed as equivalent changes in aircraft source noise reduction.

Equivalent Source Noise Reduction

The NASA ALAMO model can express changes in noise impact in terms of the increase or decrease in average aircraft noise levels necessary to achieve a similar change in noise impact. This is usually easier to comprehend than an equivalent LWP analysis and may be more meaningful than expressing the noise impact only in terms of equivalent footprint area.

To determine the equivalent source noise reduction for a given change in operations, ALAMO first constructs what is called an "Airport Community Calibration Curve." To construct this curve the LWP is determined for a baseline operating scenario. Then the noise data for each aircraft in the fleet is adjusted slightly and a new LWP is constructed. This process is continued until there are enough points to construct a plot of LWP as a function of equivalent change in source noise level. Figure 5 is such a curve for Craig Airport. When the LWP for any proposed operating scenario is compared with the baseline scenario, the calibration curve, figure 5, can be used to find the change in source noise that would result in the same LWP.

RESULTS AND DISCUSSION

The runway alternatives proposed for Craig Airport are assessed in this section in a number of ways. First, a conventional footprint analysis is performed. Next, the Fractional Impact Method is employed to compute the Level Weighted Population for each runway alternative. Finally, the equivalent source noise change is determined for each of the runway-change alternatives.

Conventional Footprint Analysis

The INM component of the ALAMO model provides as a standard output the area contained within each noise contour. These data are presented in table III for each of the operating scenarios considered.

Direct comparison of table III with data from reference 1 is difficult, since only exposed areas of land used for residential purposes are reported in reference 1, while total area for each contour is reported herein. According to reference 1, no other noise-sensitive land use categories are impacted with noise except residential areas. That is, there are no schools, hospitals or similar such sensitive land use categories under the footprint.

The population forecasted to reside inside the various noise contours around Craig Airport is presented in table IV for each of the scenarios examined. As with the contour areas, direct comparison with the results presented in reference 1 are difficult to make, since reference 1 reports population in terms of dwelling units while table IV contains forcasts of the actual number of residents in the airport community. These data were obtained by extrapolating 1977 census data (contained within the SITE II database) to future years for the operating scenarios considered.

Forcasting population levels 25 to 30 years into the future is of course difficult to do with any real accuracy since actual population growth rates depend upon countless factors which cannot all be identified, much less taken into account. The best one can do is to select a reasonable methodology for extrapolating population levels and to apply that methodology uniformly. The population forcasting method applied in this analysis is as follows: First, an imaginary octant "compass rose" was overlaid upon each noise footprint, dividing it into eight sectors. See figures 6a-6d. This compass rose, combined with the 5-decibel-wide noise bands that comprised the footprint, subdivided the airport community into a number of "neighborhoods", according to noise exposure level and location relative to the airport. For example, the 55 dB-60 dB noise contour band to the north-northeast of the airport comprised one of the "neighborhoods" defined in this way, as did the 60 dB-65 dB band to the south-southeast of the airport, and so on.

For each of these "neighborhoods", a constant population growth rate, equal to the historical population growth rate from 1970-1977, was used to extrapolate the population to the year 2005. The 1970-1977 growth rates are contained within the SITE II demographic data retrieval module of ALAMO. See reference 6. These rates are higher in some areas of the airport community than others, ranging from a low of 3.2 percent per year to a high of 7.8 percent per year. There is a general correlation between population growth rate and noise level, with the larger growth rates occurring in the lower noise areas and smaller growth rates occurring in the higher noise areas. Populations forcasted in this way for each neighborhood are summed for table IV.

While a direct comparison of impacted population forecasts reported here and in reference 1 is difficult to make (ref. 1 reports impacted dwelling units instead of population) the present analysis seems to predict more impacted people in the year 2005 than reference 1, assuming a reasonable number of people per dwelling unit. Such differences can be explained in terms of the assumptions made about future growth rates. Reference 1 reports a projected 147 percent population growth rate between 1970 and 2005 for the population within a 5 mile radius of the control tower, which equates to an annual average compound growth rate of 2.6 percent per annum over this period. This is somewhat lower than the growth rates assumed in this study, which represent a simple extension of historical growth rates in various areas within the airport community.

The data in tables III and IV, which describe land areas and number of impacted people for each of the year 2005 runway alternatives, do not point unambiguously to the year 2005 alternative which is the most attractive from a noise standpoint. Consider the footprint area data, for example (table III). The area of the 55 dB contour is essentially constant across the four 2005 alternatives and therefore provides little insight. The 60 dB area is larger for the 2000 baseline ("do nothing") alternative than for either of the other alternatives, suggesting that each of the proposed changes would have some noise benefit, but the 60, 65, and 70 dB contour areas are so nearly the same for Alternatives 2-4 that little guidance is available from table III to suggest the best alternative.

The population data in table IV provide somewhat more insight than the contour area data of table III. Alternatives 3 and 4 seem to have more people exposed to levels above 65 dB than either the 2005 baseline case or Alternative 2, and Alternative 2 has a smaller portion of the total population exposed to higher noise levels than the baseline. This seems to suggest Alternative 2 as the noise-minimal choice, based on impacted population, and indeed it is Alternative 2 which is recommended in reference 1.

Fractional Impact Analysis

Population and footprint area data provide valuable information about the airport community noise impact associated with alternative operating scenarios, but such data can also be ambiguous. For example, one scenario may result in large numbers of people exposed to relatively low levels of noise while another exposes a smaller number of people to higher levels. The Fractional Impact Method, outlined earlier in this paper, addresses this trade-off between the intensity of noise (i.e. level of noise) and the extensity of the noise impact (i.e. number of exposed persons).

The data of tables V(A)-V(D) contain details of the LWP calculations by which exposed population is weighted by noise level. The total level-weighted-population for each alternative provides an unambiguous single-number measure of noise impact, in which the intensity-extensity trade-off between noise level and number of exposed people is explicitly included. The level-weighted-population is directly proportional to the number of people forecasted to be "highly annoyed," according to data presented in reference 2.

Note that the level-weighted-population for each of the runway-change alternatives (2-4) is less than for the "do-nothing" alternative (alternative 1). This suggests that no noise disbenefit is associated with any of the proposed runway-change alternatives, and that in fact, there may be some slight improvement in the community noise environment if one of the runway-change alternatives is adopted. Alternative 4 results in the lowest level-weighted-population, due to the distribution of population within noise bands.

The conclusion one might draw from the results of a Fractional Impact Analysis depends upon the way the airport community is defined. Following the example of reference 3, the airport community was defined in this analysis to include those residents exposed to noise levels in excess of 55 dB Ldn. The analysis reported in reference 1, on the other hand, focussed on noise levels of 65 dB Ldn and higher. It is beyond the scope of this paper to develop the arguments in favor of one definition of "airport community" over another, except to say that community leaders who rely upon noise-impact analyses to make decisions should understand the implications of how the community is defined. The "optimal" strategy of reference 1 may maximize the relief for those citizens exposed to the highest noise levels in the community, without making the largest possible reduction in the number of "highly annoyed" citizens in the total airport community. The "optimal" strategy suggested by the current analysis may reduce the total number of "highly annoyed" residents and still not provide the maximum attainable relief to those citizens who are exposed to the greatest noise. In the end, the strategy of choice (maximize total relief or the relief in the highest-impacted areas) requires a value judgment which science cannot provide, a judgment which community leaders must make as part of the total decision process.

Equivalent Source Noise Reduction

The concept of level-weighted-population as a noise impact metric has an important disadvantage; namely, that it is difficult to develop an intuitive notion for how much relief is associated with a given reduction in LWP. For example, it is not clear just how different the LWP numbers in tables V(A)-V(D) are from each other, and whether the strategy with the smallest LWP (alternative 4) will result in enough noise relief to make it an obvious choice over the other candidate alternatives. To address this problem, a method has been developed for converting changes in LWP to equivalent changes in aircraft source noise. By this method, described earlier in this paper, the LWP data in table V can be used to compare the various runway alternatives at Craig Airport in terms of source noise (decibels) instead of level-weighted-population (fig. 7). Expressed in this way the runway-change alternatives proposed for Craig Airport are expected to result in the equivalent of 0.2-1.4 dB change in aircraft noise level. These changes are small, and therefore may not be the most important factor in selecting one runway alternative over another.

CONCLUDING REMARKS

The year 2005 noise impact associated with four candidate runway alternatives at Craig Airport (Jacksonville, Florida) has been assessed by means of the National Research Council's Fractional Impact Method. The assessment is based upon airport operating scenarios developed by contractors to the Jacksonville Port Authority and upon population distributions forecasted by extrapolating 1977 population data using historical growth rates determined from U.S. Census data. It is concluded that each of the proposed runway alternatives which involves a change in the current runway configuration has a small noise benefit compared with the "do-nothing" alternative. The noise benefits are equivalent to less than a 2 dB reduction in source noise, however, and therefore may not be large enough to serve as the sole basis for selecting an alternative. Alternative 4, which results in an equivalent noise reduction of 1.4 dB, is identified as the impact-minimal alternative when the analysis accounts for all community residents exposed to more than 55 dB Ldn.

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4. DeLoach, Richard: An Airport Community Noise Impact Assessment Model. NASA TM 80198, July 1980.

5. Anon.: Integrated Noise Model Version 2 Users Guide. Dept. of Trans. FAA Report FAA-EE-79-09, Sept. 1979.

6. SITE II Users Manual. CACI, Inc., c. 1976.

TABLE I.- COSTS OF NOISE CONTROL OPTIONS

	COSTS (K$)		
	Alternative 2	Alternative 3	Alternative 4
Runway Relocation	1,600	-	-
Runway Extension	1,600	1,600	1,600
Runway Overlay	160	320	320
Parallel R/W	2,240	2,240	2,240
Taxiways	7,010	6,800	6,000
Land Acquisition	700	140	140
Instrumentation	300	300	300
Fees & Contingencies (20 %)	2,720	2,280	2,120
TOTAL	16,330	13,680	12,700

TABLE II.- CRAIG AIRPORT FLEET MIX

AIRCRAFT CLASS	GENERIC DESCRIPTION	REPRESENTATIVE AIRCRAFT	AVERAGE DAILY OPERATIONS DAY 1979	AVERAGE DAILY OPERATIONS DAY 2005	AVERAGE DAILY OPERATIONS NIGHT 1979	AVERAGE DAILY OPERATIONS NIGHT 2005
Single Engine Prop	Light Single Engine Piston, 2 Place	Cessna 150	69.2	102.0	2.5	7.1
	Light Single Engine Piston, 4 Place	Cessna 172, Piper 180	101.9	296.5	3.5	8.9
	Medium Single Engine Piston, 4-6 Place	Cessna 182, Piper Cherokee Six	43.5	135.2	1.3	4.1
Twin Engine Prop	Light Twin Piston 4-6 Place	Cessna 310	30.8	137.7	1.0	4.5
	Medium Twin Piston (Quiet) 6-10 Place	Commander 685	11.7	62.3	0.4	1.6
	Medium Twin Piston (Loud) 6-10 Place	Beech Queenair	16.6	29.2	0.6	0.3
	Medium Twin Turboprop	Twin Otter	16.6	63.7	0.6	1.6
	Large Twin Engine	F-27 Fokker	0	11.5	0	0
Jet	Light Turbojet	Lear 24/25	0.8	8.9	0	0
	Light Turbofan	Cessna Citation	2.0	15.1	0	0
	Medium Turbofan	Sabreliner 80	0	2.5	0	0
	Heavy Turbofan	Jetstar II, Gulfstream II	0.2	1.3	0	0

TABLE III.- TOTAL AREA WITHIN NOISE CONTOURS AT CRAIG AIRPORT (SQ. KM)

OPERATING SCENARIO	NOISE CONTOUR (dB Ldn)				
	55	60	65	70	75
2005 BASELINE (ALTERNATIVE 1)	56.39	20.71	5.10	1.84	-
ALTERNATIVE 2	58.17	17.37	5.07	0	-
ALTERNATIVE 3	57.58	18.07	5.05	0	-
ALTERNATIVE 4	57.04	17.57	4.94	1.79	-

TABLE IV.- POPULATION WITHIN NOISE CONTOURS AT CRAIG AIRPORT

OPERATING SCENARIO	NOISE CONTOUR (dB Ldn)			
	55	60	65	70
2005 BASELINE (ALTERNATIVE 1)	103480	84491	0	0
ALTERNATIVE 2	103480	67135	0	0
ALTERNATIVE 3	103480	61733	5401	0
ALTERNATIVE 4	103480	18694	5401	0

TABLE V(A).- LEVEL WEIGHTED POPULATION COMPUTATION FOR ALTERNATIVE 1

NOISE BAND dB, Ldn	MEDIAN LEVEL dB, Ldn	EXPOSED POPULATION	WEIGHTING FACTOR	LEVEL WEIGHTED POPULATION
55 - 60	57.5	18989	0.173	3285
60 - 65	62.5	84491	0.314	26530
65 - 70	67.5	-	0.528	-
TOTAL		103480		29815

TABLE V(B).- LEVEL WEIGHTED POPULATION COMPUTATION FOR ALTERNATIVE 2

NOISE BAND dB, Ldn	MEDIAN LEVEL dB, Ldn	EXPOSED POPULATION	WEIGHTING FACTOR	LEVEL WEIGHTED POPULATION
55 - 60	57.5	36345	0.173	6288
60 - 65	62.5	67135	0.314	21080
65 - 70	67.5	0	0.528	0
TOTAL		103480		27368

TABLE V(C).- LEVEL WEIGHTED POPULATION COMPUTATION FOR ALTERNATIVE 3

NOISE BAND dB, Ldn	MEDIAN LEVEL dB, Ldn	EXPOSED POPULATION	WEIGHTING FACTOR	LEVEL WEIGHTED POPULATION
55 - 60	57.5	36345	0.173	6288
60 - 65	62.5	61734	0.314	19384
65 - 70	67.5	5401	0.528	2852
TOTAL		103480		28524

TABLE V(D).- LEVEL WEIGHTED POPULATION COMPUTATION FOR ALTERNATIVE 4

NOISE BAND dB, Ldn	MEDIAN LEVEL dB, Ldn	EXPOSED POPULATION	WEIGHTING FACTOR	LEVEL WEIGHTED POPULATION
55 - 60	57.5	84785	0.173	14668
60 - 65	62.5	13294	0.314	4174
65 - 70	67.5	5401	0.528	2852
TOTAL		103480		21694

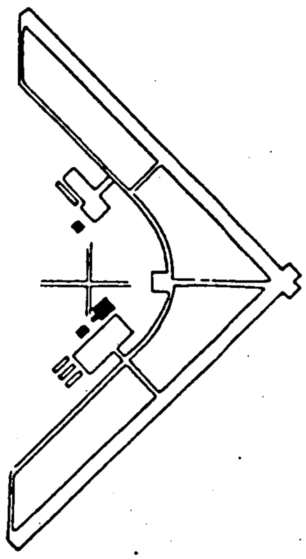

Figure 1(a).- Runway alternative 1 (no change).

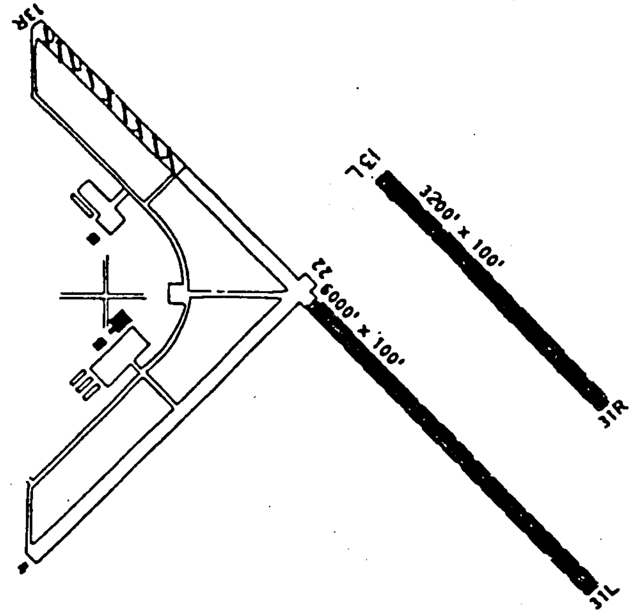

Figure 1(b).- Runway alternative 2.

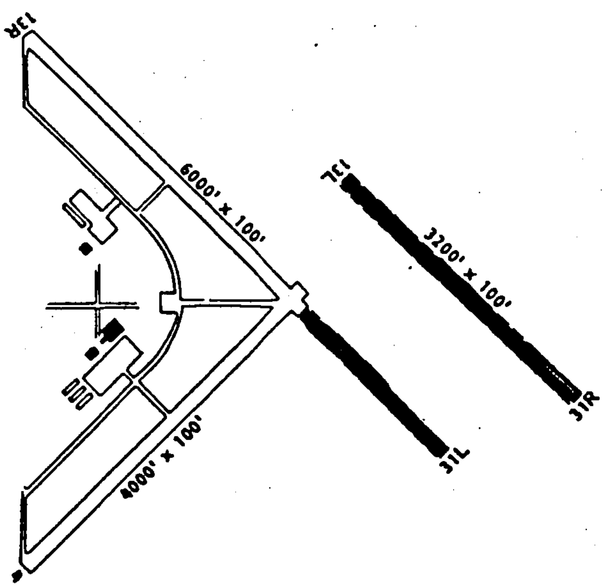

Figure 1(c).- Runway alternative 3.

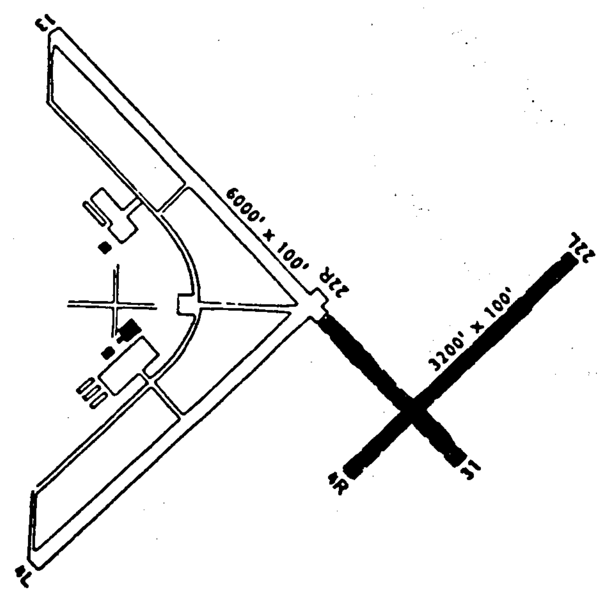

Figure 1(d).- Runway alternative 4.

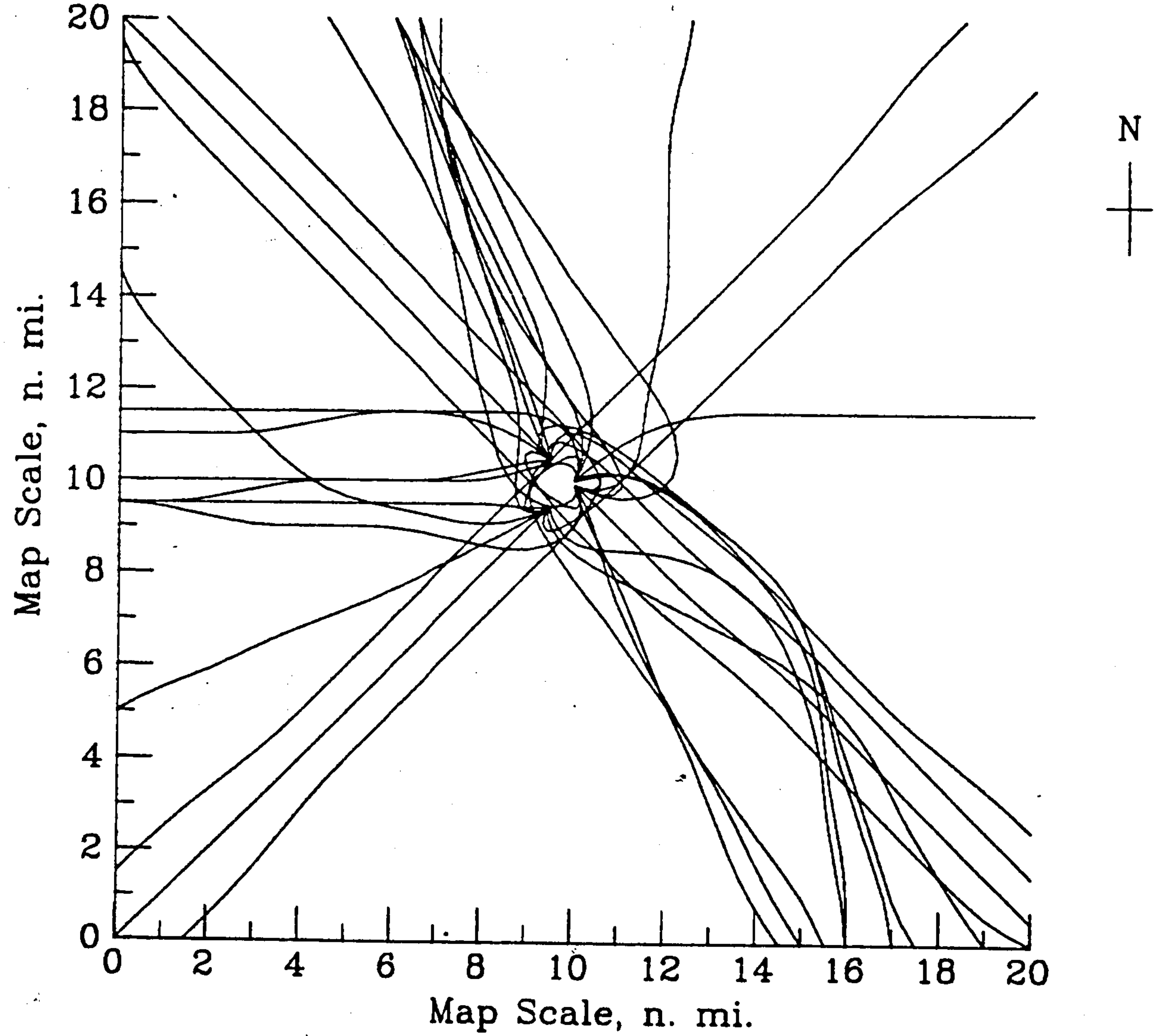

Figure 2.- Representative ground tracks at Craig Airport.

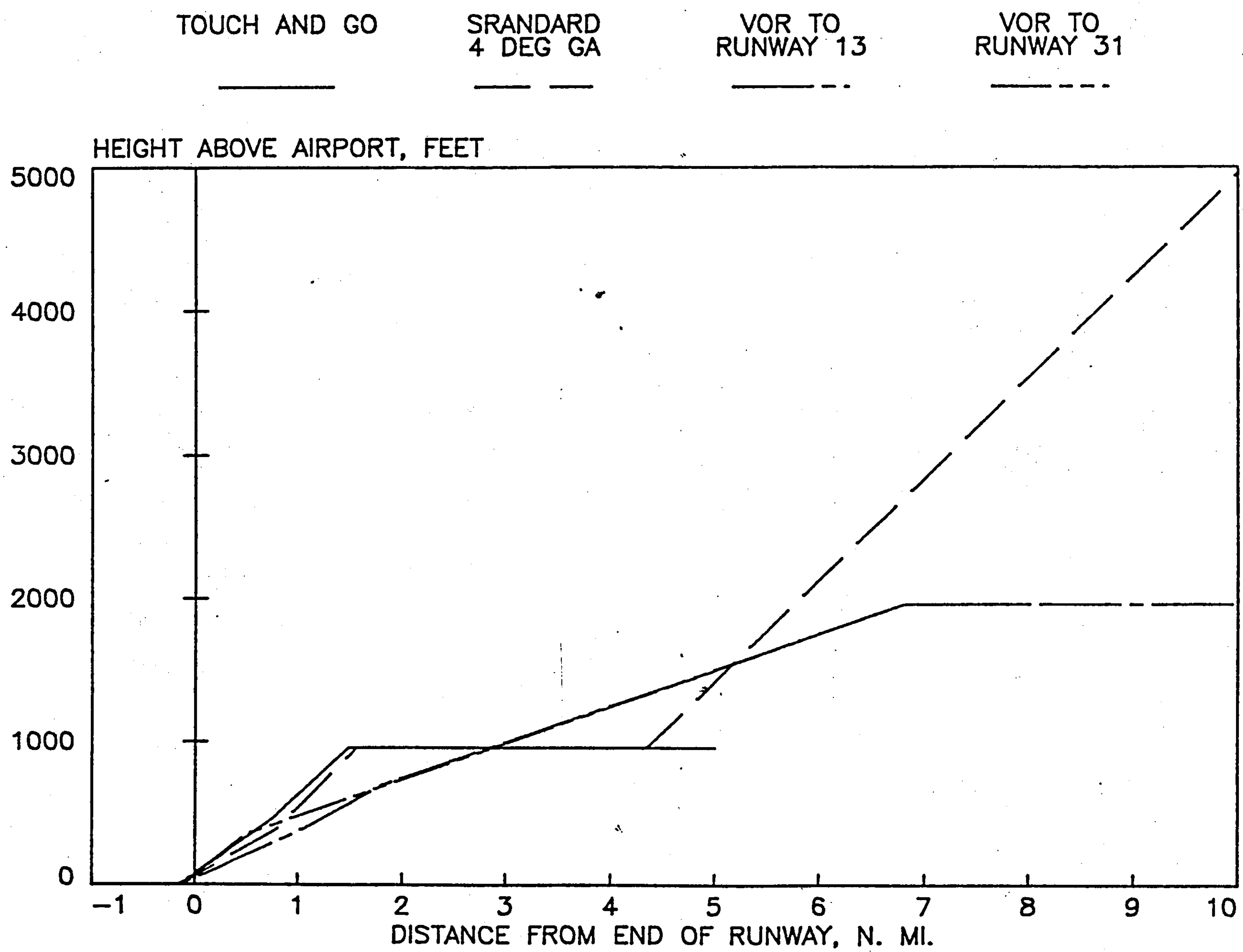

Figure 3(a).- 1979 approach profiles at Craig Airport.

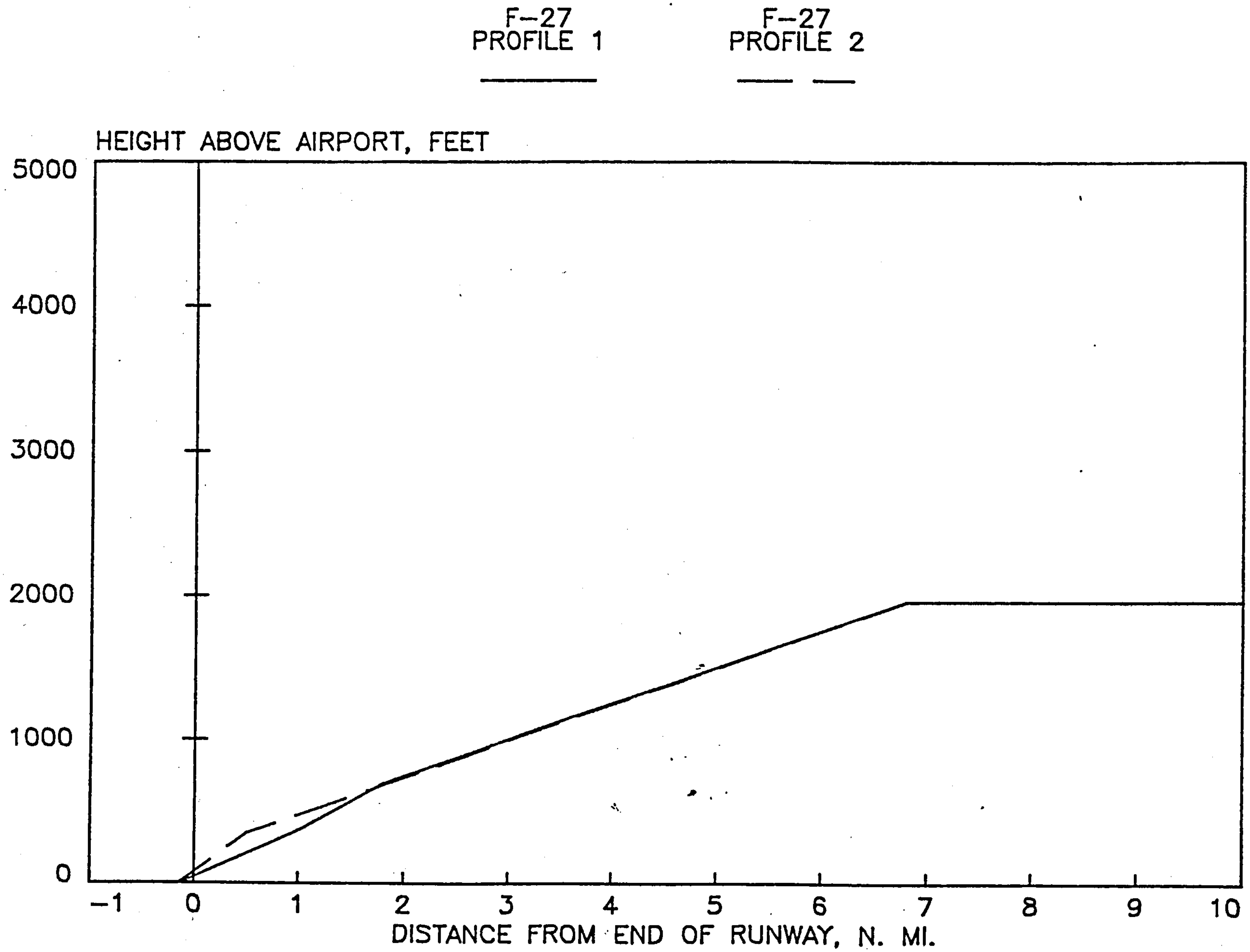

Figure 3(b).- New approach profiles in 2005, assuming no runway change.

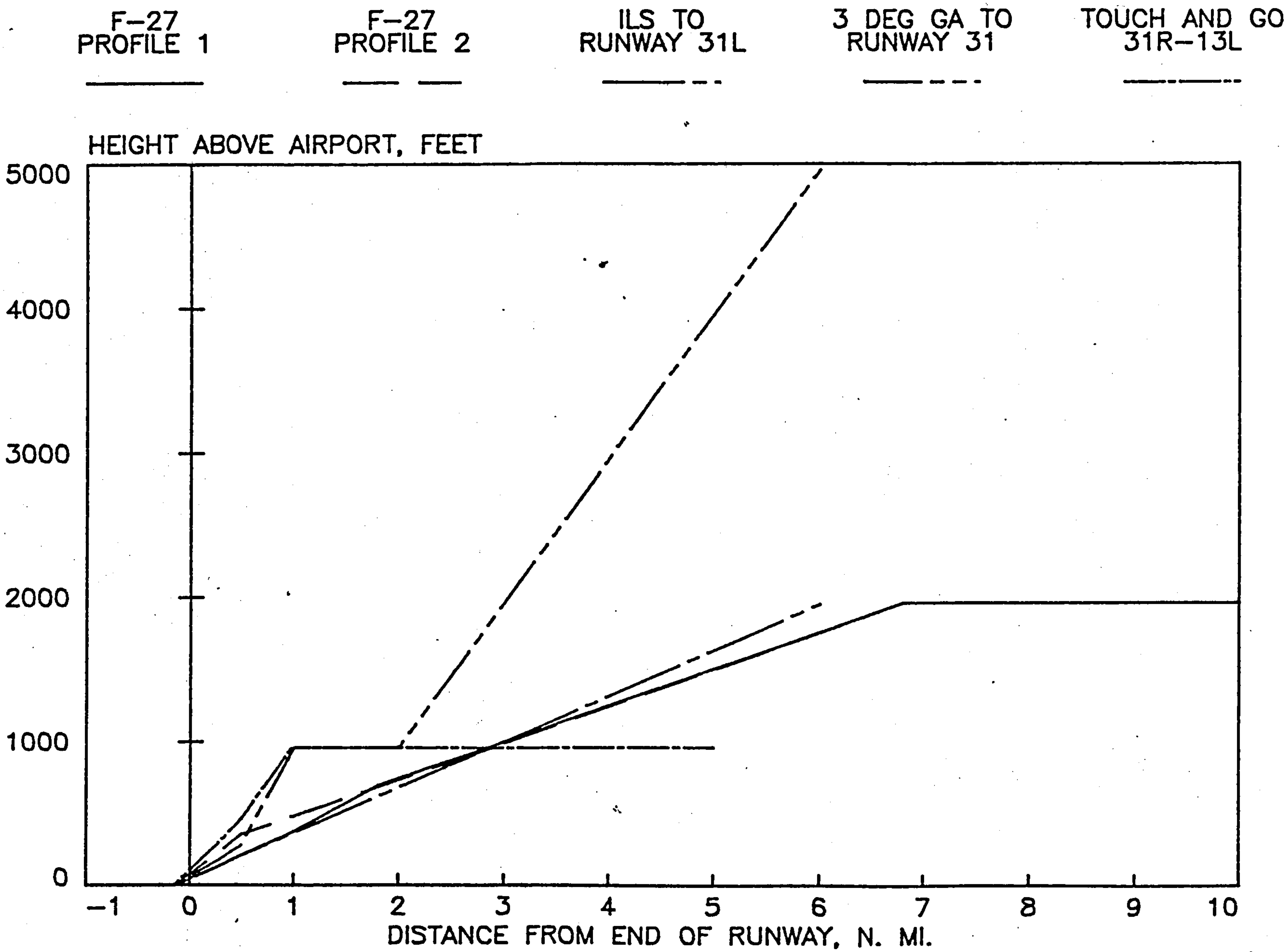

Figure 3(c).- New approach profiles in 2005, assuming a runway-change alternative is selected.

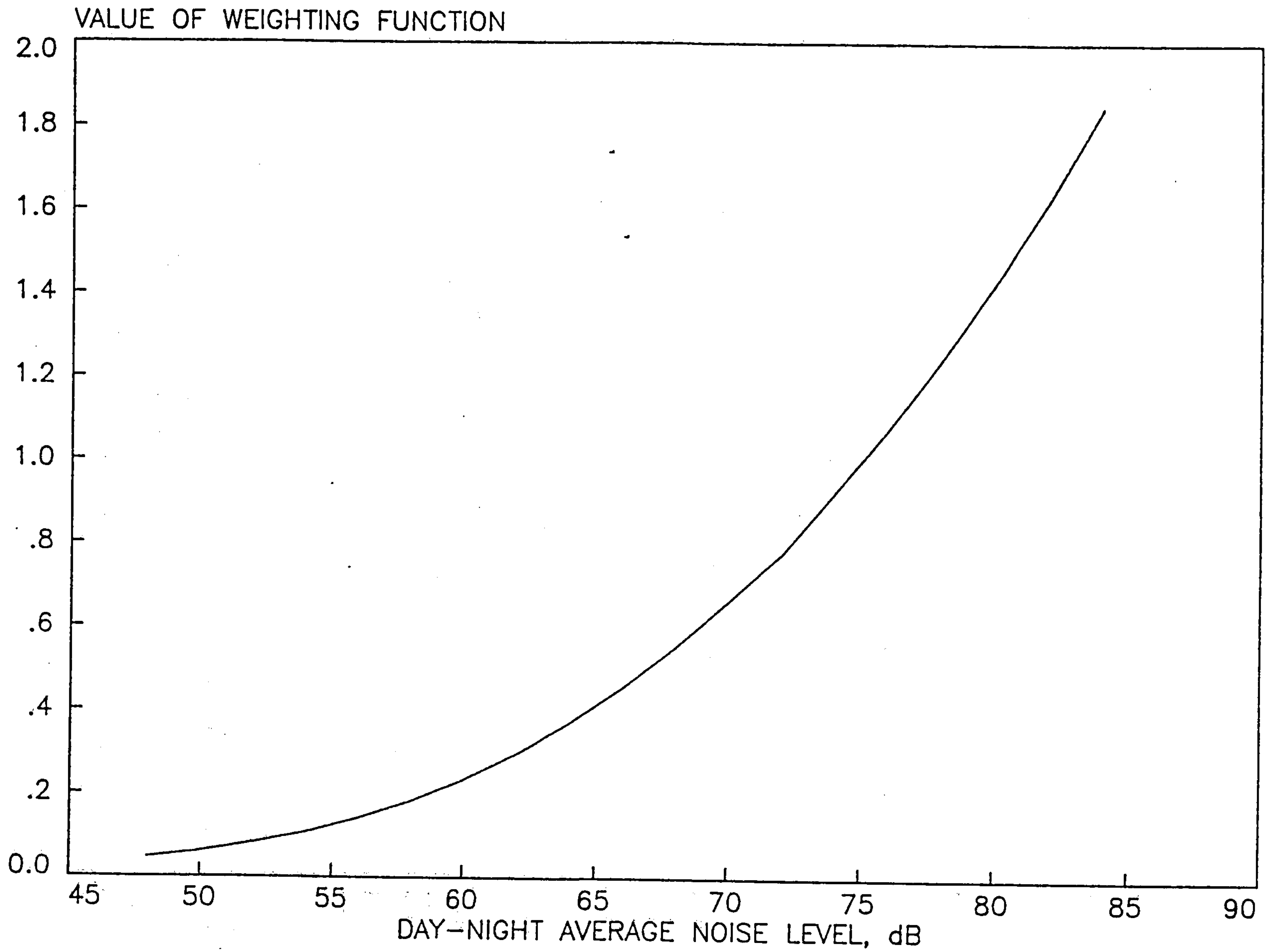

Figure 4.- Weighting function used in Fractional Impact Method.

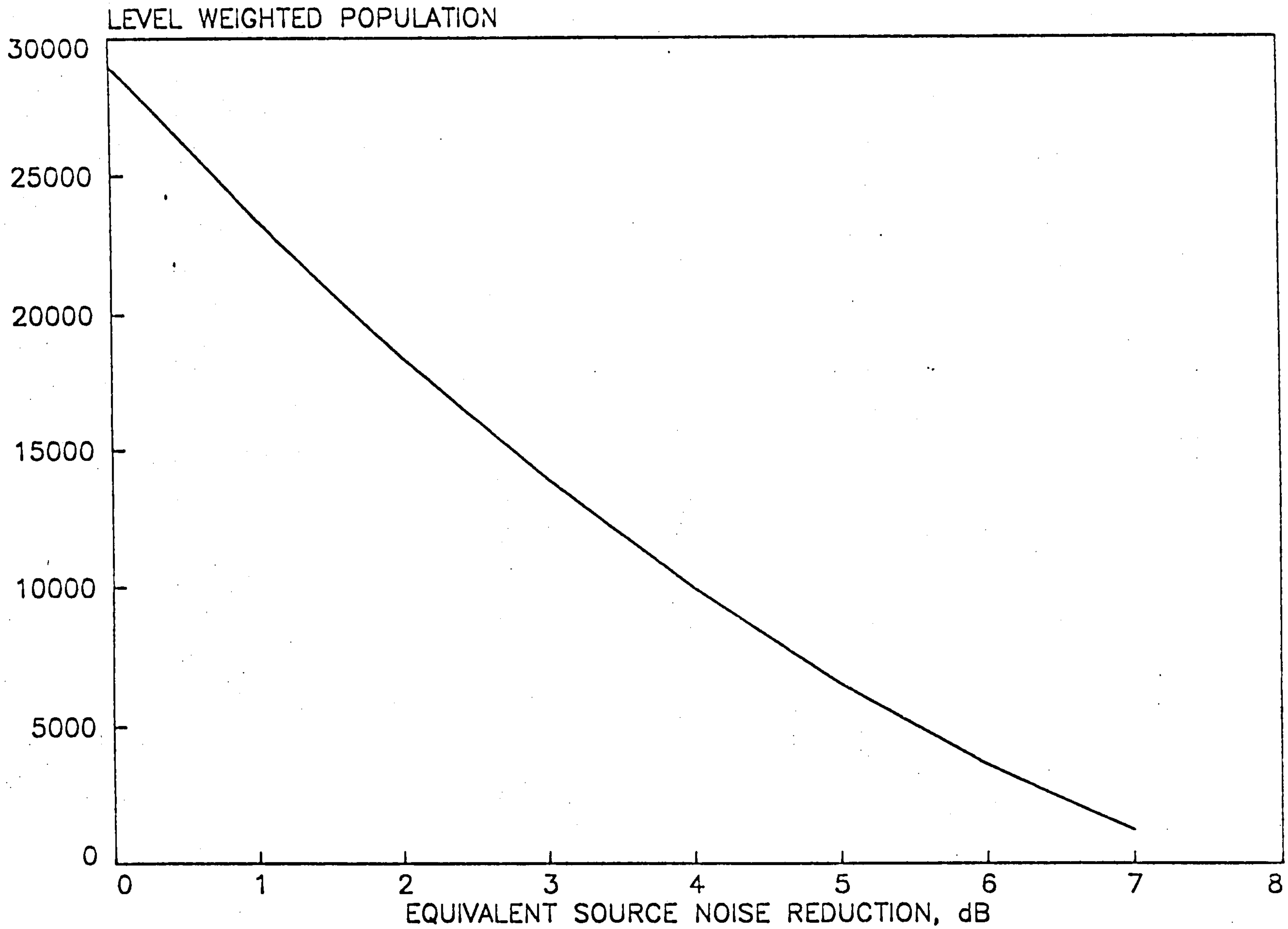

Figure 5.- Craig Airport community calibration curve.

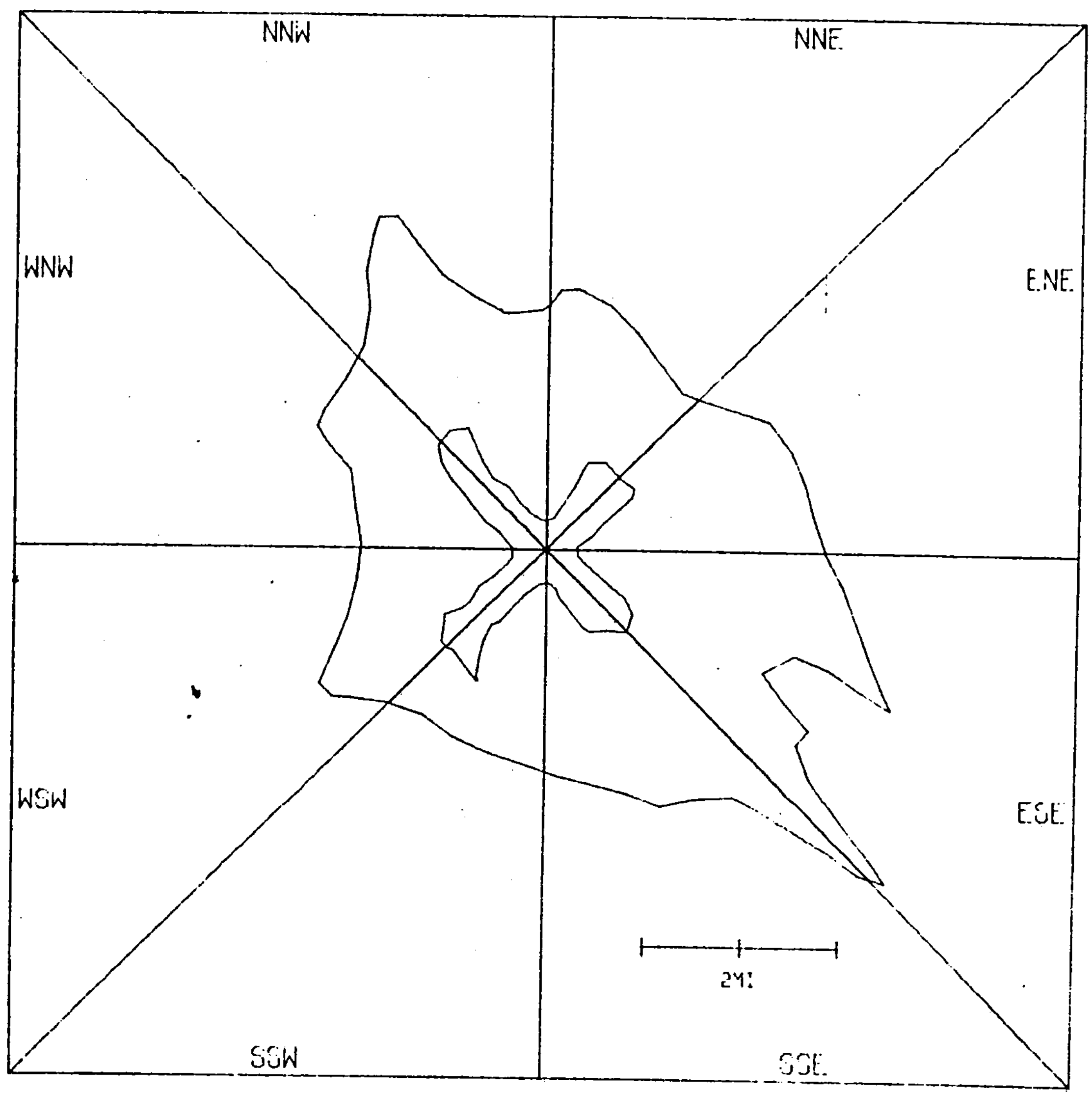

Figure 6(a).- 55 and 65 dBLdn footprint - 2005 alternative 1 (no change).

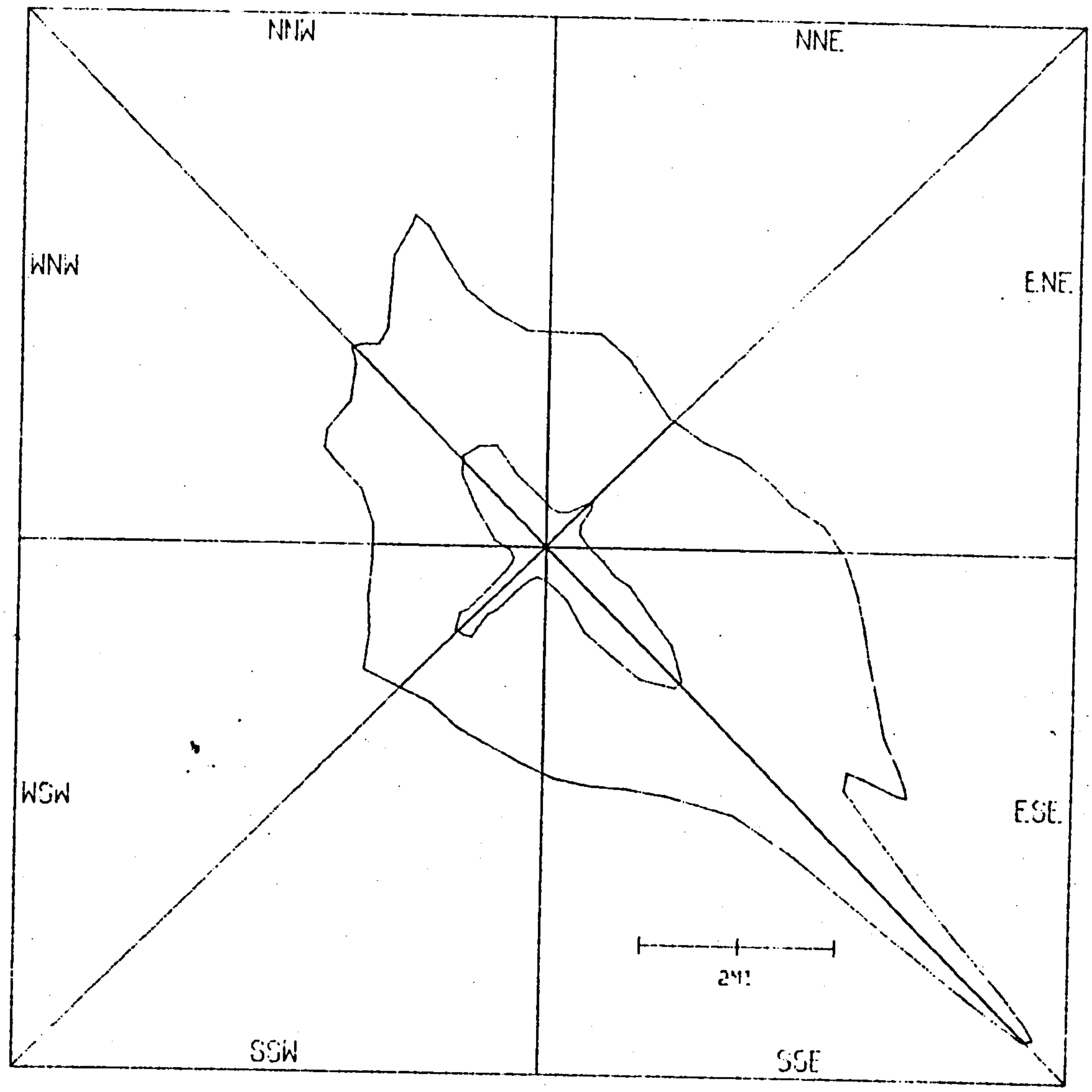

Figure 6(b).- 55 and 65 dBLdn footprint - 2005 alternative 2.

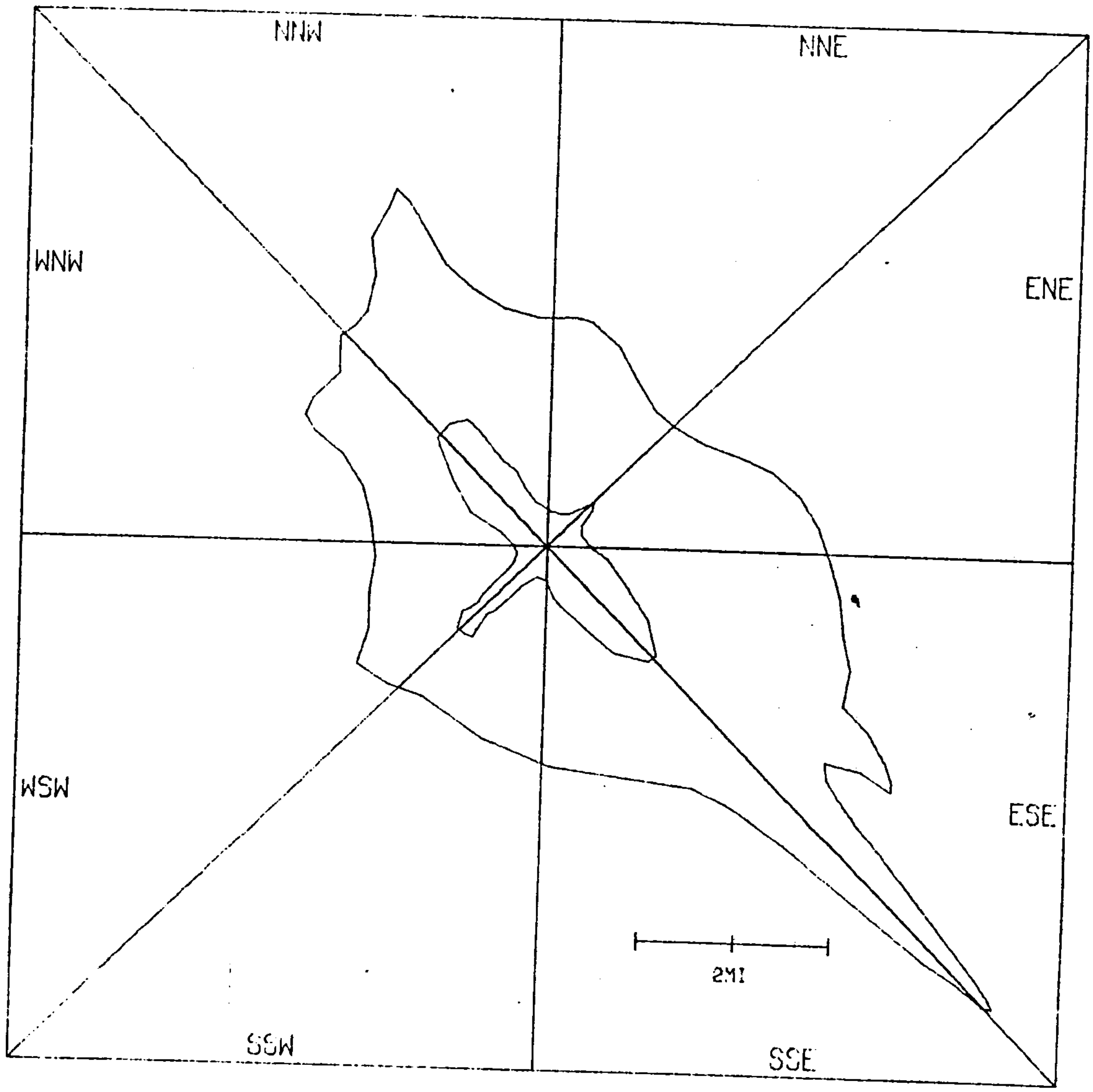

Figure 6(c).- 55 and 65 dBLdn footprint - 2005 alternative 3.

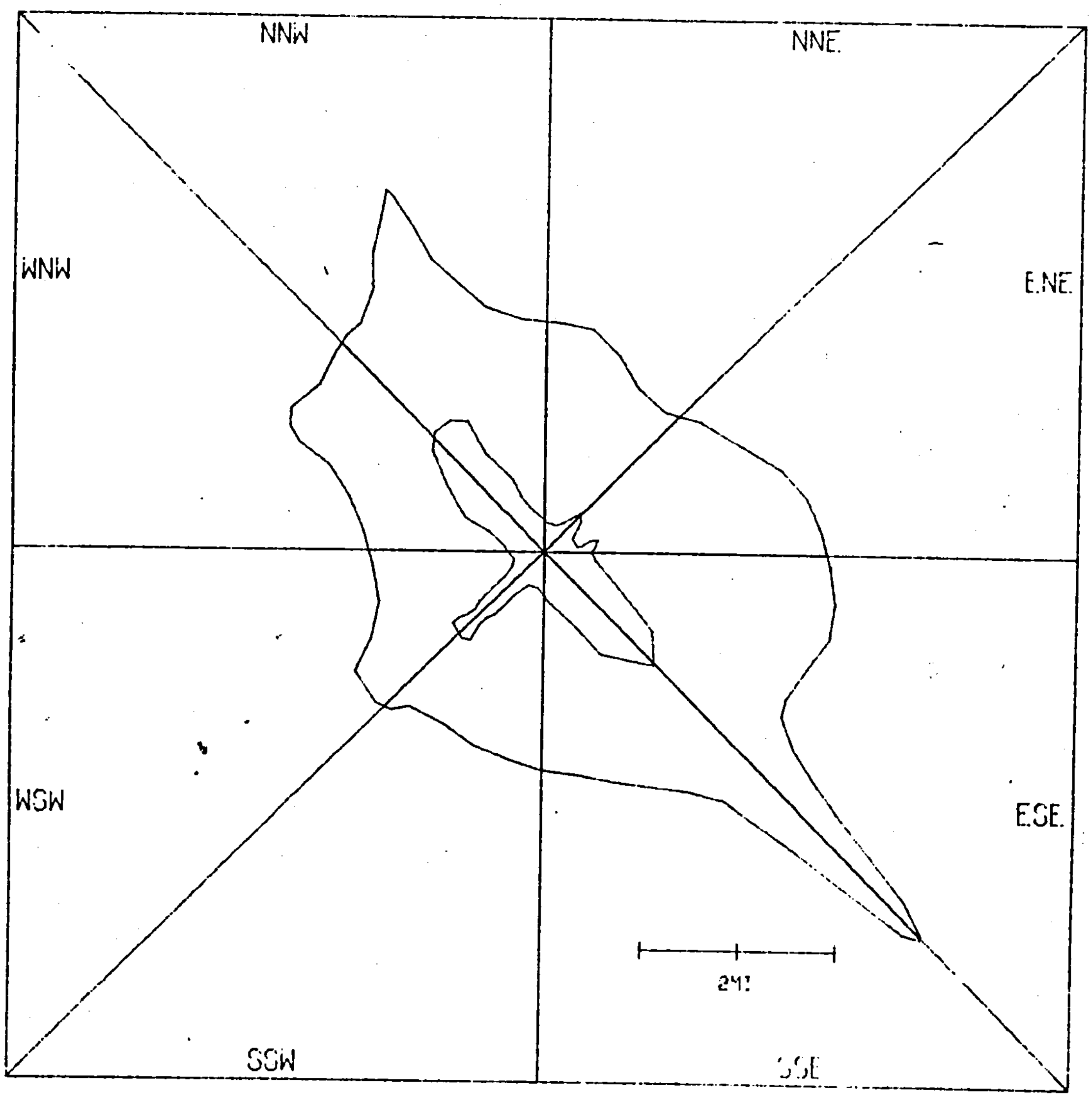

Figure 6(d).- 55 and 65 dBLdn footprint - 2005 alternative 4.

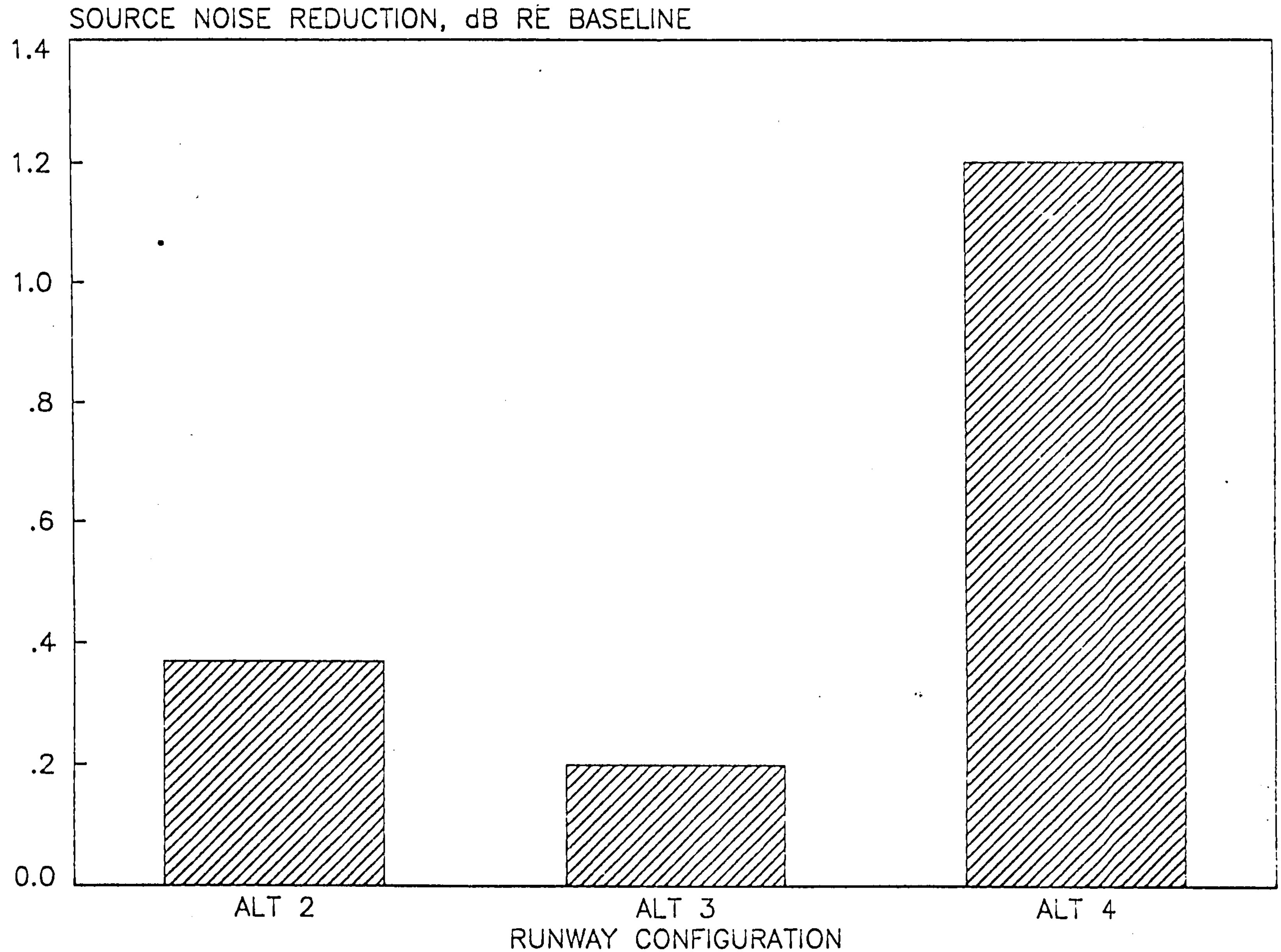

Figure 7.- Equivalent source noise reduction of each runway-change alternative compared with no-change alternative.

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16. Abstract

Four proposed runway expansion alternatives at Craig Airport in Jacksonville, Florida have been assessed with respect to their forcasted noise impact in the year 2005. The assessment accounts for population distributions around the airport and human subjective response to noise, as well as the distribution of noise levels in the surrounding community (footprints). The impact analysis was performed using the Airport-noise Levels and Annoyance MOdel (ALAMO), an airport community response model recently developed at Langley Research Center.

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