PLANNING AND
BUILDING CONTROL

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MR A KHAN

1042 STOCKPORT ROAD, MANCHESTER, NEW WORKSHOP

ACOUSTICS ASSESSMENT FOR PLANNING PURPOSES

27 November 2012

AEC REPORT: P2590/R1/AGB

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1.0 INTRODUCTION

1.1 Acoustic and Engineering Consultants Limited (AEC) has been instructed by Mr A Khan to undertake a noise assessment for planning purposes with regards to the proposed new workshop, to be located at the rear of 1042, Stockport Road, Levenshulme, Manchester.

1.2 Prior to undertaking this assessment, contact was made Richard Knightly of Manchester City Council's (MCC) Environmental Health Department, when the noise survey and assessment methodology was agreed. Based on these discussions it was confirmed that MCC require a noise assessment taking into account potential noise levels from the likely activities in the proposed workshop which could potentially impact on nearby residential properties.

1.3 In addition, a noise level limit for any atmospheric noise associated with mechanical services plant also needs to be set.

2.0 SITE AND PROPOSED DEVELOPMENT DESCRIPTION

2.1 The proposed location of the new workshop building is behind 1042 Stockport Road, Levenshulme as indicated on Figure 1.

2.2 The site will be bound to the north and south by existing single storey workshops, to the east by commercial properties and to the west by terraced houses situated on Pascal Street.

2.3 The proposed workshop will be over a single storey workshop with associated office, small kitchen and toilet facilities. It is understood that the workshop will be used independently of the commercial business (fast food takeaway) situated at 1042 Stockport Road and that it will only be for light industrial use, for instance, a woodworking shop.

2.4 The walls of the workshop will be cavity masonry and there are currently proposals for a roller shutter door, located at the western end of the building.

2.5 It is understood that the proposals are to operate the workshop during the normal working day only (i.e. between approximately 0800 and 1800h) and evening or night-time use is not being considered.

2.6 Details of the proposals for the workshop are included on the attached Figures 2 and 3, which are copies of the Alpha Design drawings that have been produced for the development.

3.0 NOISE LEVEL MEASUREMENTS

3.1 General ambient and background noise level measurements were undertaken by AEC on Wednesday 17 October 2012 between approximately 1030 and 1130 hours. This period was chosen to measure the likely lowest background noise levels during the normal working day – i.e. after rush hour but before lunchtime.

3.2 Full details of the measurement procedure are presented in the attached Appendix A, with the measured data presented in Table A1. Acoustic terminology used throughout this report is described in brief in Appendix B.

3.3 Measurements were undertaken at one location at the rear of the site, identified as location A on Figure 1 and described in Appendix A.

3.4 During the survey, the lowest measured background noise level was 46dBL_{A90}, which was mainly due to road traffic noise on the surrounding roads and has been taken to represent the lowest background noise over the period that the workshop could be operational.

4.0 ASSESSMENT CRITERIA

4.1 For noise from commercial developments the appropriate method of assessment is included in BS4142:1997 *'Method for rating industrial noise affecting mixed residential and industrial areas'*, which describes a method of assessing noise from industry based on the background noise levels in the area and the average (dBL_{Aeq}) industry noise levels, which is termed the 'specific noise' in BS4142. The assessment method also takes into consideration noise character associated with some sources, which can be deemed as more intrusive than noise with no character.

4.2 BS4142, in paragraphs 8.1 and 8.2, identifies that certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the specific noise level and the background noise level. Where present at the assessment location, such features are taken into account by adding a correction of 5dB to the specific noise level to obtain the rating level. A 5dB correction should be applied if one or more of the following features occur, or are expected to be present for new or modified noise sources:

- The noise contains a distinguishable, discrete, continuous note (whine, hiss, hum etc.)
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps);
- The noise is irregular enough to attract attention

4.3 The likelihood of complaints is indicated by the difference between the background noise level and the rating level. The greater this difference the greater the likelihood of complaints.

- A difference of around +10dB or more indicates that complaints are likely
- A difference of around +5dB is of marginal significance.

If the rating level is more than 10dB below the measured background noise level then this is a positive indication that complaints are unlikely.

4.4 With regards to noise from mechanical services plant, average (dBL_{Aeq}) noise levels need to be controlled to 5dB lower than the lowest measured background noise level (dBL_{90}) in each octave band centre frequency over the period that the plant would be operational, at the nearest noise sensitive property.

5.0 ASSESSMENT

General

5.1 As the precise activities that could occur in the workshop are currently unknown, it is proposed to assess the development by calculating the maximum internal noise levels that would be allowable in order that noise levels breaking out would meet an appropriate level at the nearby housing when assessed in terms of BS4142.

5.2 As indicated above, the lowest measured background noise level external to the housing was $46dBL_{A90}$. As there will be noise character associated with noise due to activities in the workshop (e.g. intermittent noise), with reference to BS4142, in order that the likelihood of complaints is of marginal significance (which is should be deemed acceptable, the maximum allowable noise levels external to the residential windows, as a result of activities from inside the workshop be $46dBL_{Aeq, 1, hour}$.

Sound Insulation Performance of External Envelope

5.1 The external walls of the building consist of cavity masonry and the roof is understood to be a concrete tiled construction. At this stage, AEC has assumed that the roof will be under drawn using a layer of 12.5mm thick plasterboard with 25mm thick mineral wool in the cavity. The emergency exit is located to the north of the workshop and will consist of lobbied doors and there is a roller shutter door proposed to the south of the building.

5.2 The sound insulation performance provided by the above constructions will be as indicated in Table 1, below.

Table 1: External Façade Elements and Anticipated Sound Insulation Performance

Details	Overall	Sound Insulation performance, dB @ Octave Band Centre Frequency, Hz						
		63	125	250	500	1K	2K	4K
Cavity Masonry Wall	54dBR'$_w$	32	37	42	52	60	63	68
Roof	45dBR'$_w$	18	30	40	45	50	50	50
Roller Shutter Door	20dBR'$_w$	8	8	13	17	21	17	17

Maximum Allowable Noise Levels in the Workshop

5.3 As the main entrance (the roller shutter doors) of the workshop will be located some 8m from the nearest residential window, to control noise break-out it will be necessary to keep the roller shutter doors closed whenever work is occurring. Although there will be first floor windows overlooking the workshop roof, the weakest element will be the roller shutter doors and as such the worst-case affected properties will be those on Pascal Street which are the subject of the assessment presented below.

5.4 Based on the above constructions and workshop dimensions of approximately 9m x 3m and a roller shutter door of 2.5m x 2m, the maximum allowable noise levels within the workshop have been calculated and are presented in Table 2, below.

5.5 These noise limits identified in Table 2 would result in noise break-out from the workshop controlled to no greater than the lowest measured background noise levels external to the rear windows of the terraced houses on Pascal Street, situated some 8m from the roller shutter doors.

Table 2: Allowable Noise Level in the Workshop

Overall, dBL$_{Aeq}$	Noise Level, dBL$_{Aeq}$ @ Octave Band Centre Frequency, Hz						
	63	125	250	500	1K	2K	4K
95	95	90	90	90	90	85	85

5.6 Based on AEC experience, it is unlikely that noise levels in small workshops would regularly be as high as 95dBL$_{Aeq,\ 1hour}$. Although, it is accepted that there could potentially be shorter periods when the noise levels could be this high, for instance if a very noisy machine was used, such as a band saw.

5.7 As an indication of this level of noise, it should be noted that the Noise at Work Regulations indicates that if noise levels are 90dBL$_{Aeq}$ you would have to shout at somebody from a distance of 1m in order to be understood.

5.8 It is important to note that the limit indicated in Table 2 is required in order to control noise break-out via the roller shutter doors, which are by far the weakest element in the workshop external

envelope construction. As such, should there be any concerns in relation to noise break-out from the workshop, or concerns that noise levels could potentially be higher than indicated in Table 2, the potential impact can be reduced significantly by installing a hinged solid core doorset, with acoustic seals to the head jambs and threshold, in place of the roller shutter doors. This type of doorset should provide a sound insulation performance of at least 30dBR_w, i.e. some 10dB higher than roller shutter doors.

Atmospheric Plant Noise Emissions

5.9 It is not currently known if there will be any mechanical services plant associated with the development. However, for completeness, a noise level limit for any potential future plant is presented in Table 3, below. The limit relates to the nearest affected residential window and is set to control plant to 5dB below the background noise level in each octave band over the daytime period.

5.10 The nearest residential to the plant would need to be identified based on the proposed location of the plant.

Table 3: External Plant Noise Level Limit at the Nearest Residential Properties to the Development

Overall, dBL_{Aeq}	Noise level limit, dBL_{90} @ Octave Band Centre Frequency, Hz						
	63	125	250	500	1K	2K	4K
41	56	48	44	40	40	35	26

6.0 CONCLUSIONS

6.1 In order to undertake an appropriate noise assessment for planning purposes, AEC has conducted a daytime ambient and background noise level survey with regards to the proposed new workshop, situated at the rear of 1042 Stockport Road, Levenshulme, Manchester.

6.2 The nearest and potentially 'worst case' affected noise sensitive properties to the development are existing terraced houses on Pascal Street.

6.3 Based on the proposed constructions an internal noise level limit has been identified for the workshop in order that noise break-out will result in a BS4142 'rated' noise level of 5dB above the lowest measured background noise, i.e. a BS4142 assessment would indicate that the likelihood of complaints is a marginal situation, which should be acceptable.

6.4 It is considered unlikely that the noise levels generated in the operational workshop would actually be as high as the specified internal noise limit, however, should there be any concerns relating to noise break-out, consideration could be given to installing a hinged double doorset in place of the roller shutter door. The performance of this door should be at least 30dBR_w i.e. around 10dB higher than the roller shutter door.

6.5 A mechanical services plant noise level limit has been specified to control noise levels from this potential source to 5dB below the lowest measured background noise level in each octave band centre frequency.

6.6 As demonstrated by the above, noise should not be a determining factor with regards to any planning permission being sought, and if necessary, appropriate planning conditions can be set in relation to noise break-out and mechanical services plant noise.

Andrew Burke

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FIGURE 1 – Site Location Plan Showing Monitoring Locations



FIGURE 2 – Example of Proposed Elevations

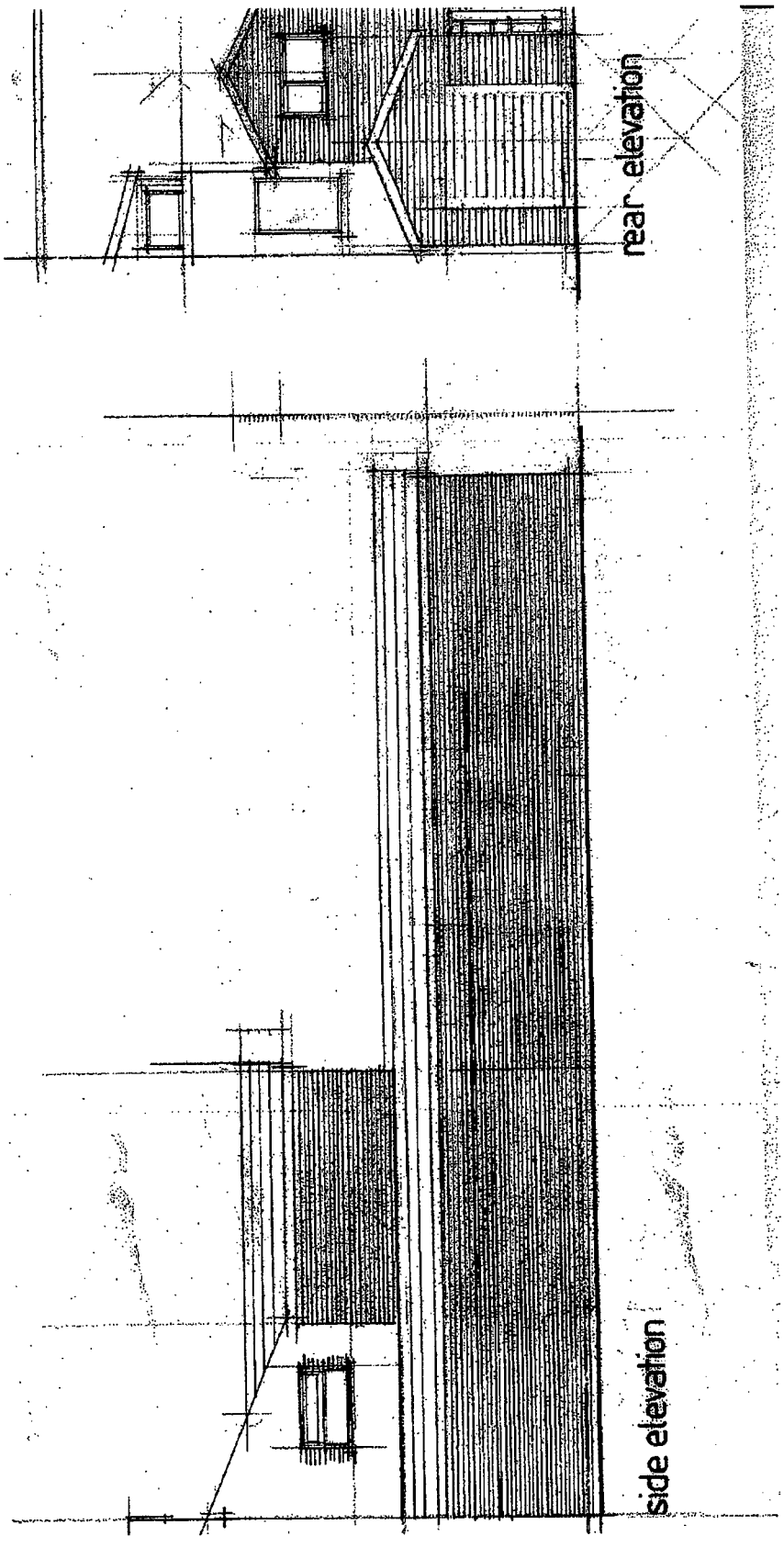
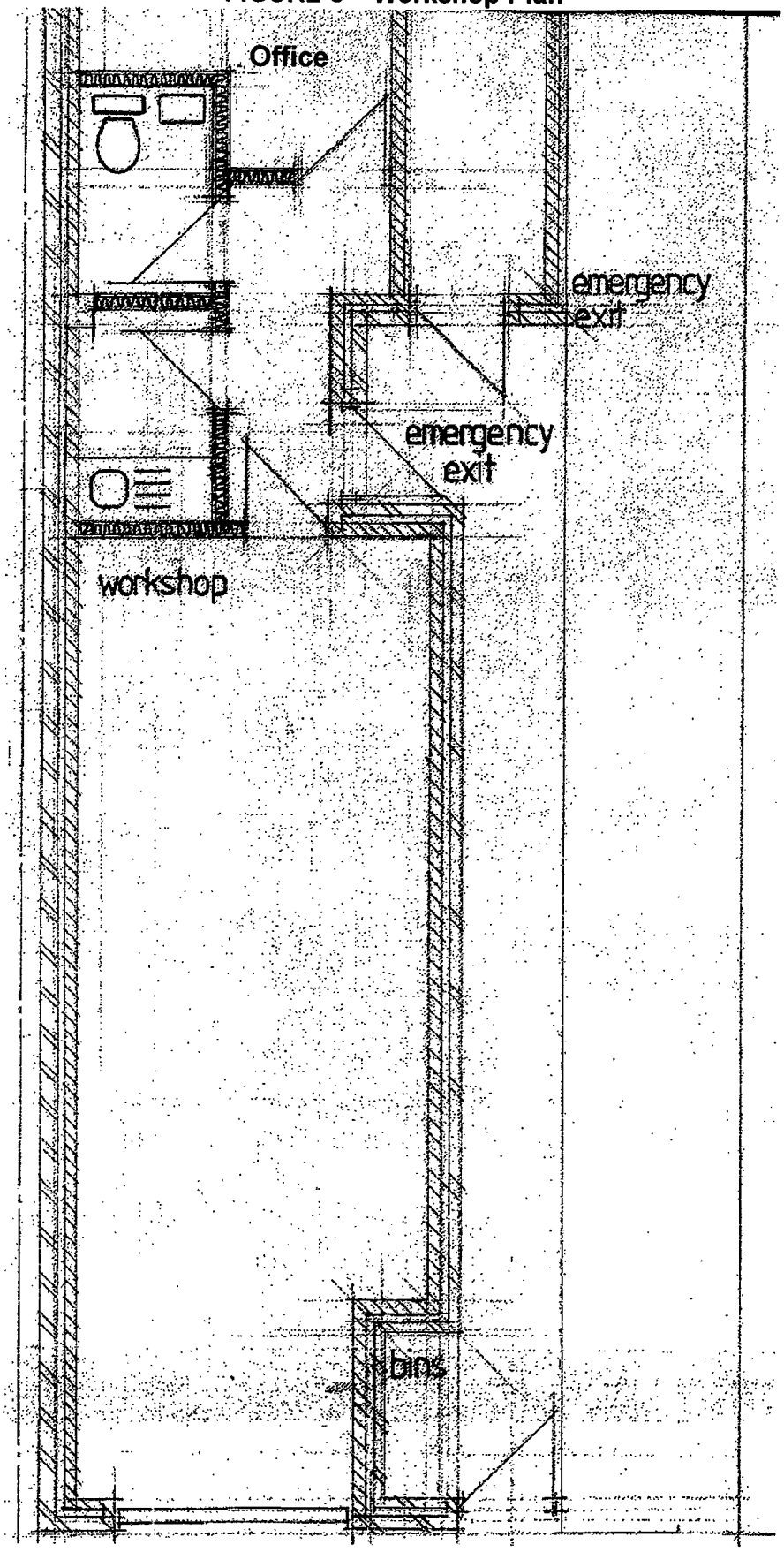


FIGURE 3 – Workshop Plan



APPENDIX A – Measurement Procedure

Date & Time of Survey:	Monday 17 October 2012, 1030 to 1130 Hours
Personnel Present:	Andy Burke (AEC)
Equipment Used:	B&K 2250 Real Time Analyser (AEC Kit 3)
Weather Conditions:	Sunny, Patchy cloud, 12°C, Little or no wind.
Measurement Procedure:	Noise levels were measured at a single location, adjacent to the location of the proposed workshop, identified as A on Figure 1. The measurement location was selected to measure background, general ambient and maximum noise levels, in terms of L_{A90}, L_{Aeq} and L_{Amax} typically over 10 minute periods. The measurements were taken in free-field at a height of 1.5m above ground. The sound level analyser, which conforms to BS EN 60651:1994 "Specification for sound level meters" and BS EN 60804:2001 "Integrating-averaging sound level meters" was in calibration and check calibrated before and after the measurement periods using a Bruel & Kjaer type 4231 (94dB) calibrator. There was no significant drift of calibration.
Measured Data:	Full results are given in Table A1

Table A1 – Measured General Ambient and Background Noise levels

Pos	Time	Noise Level, dB			Notes
		L_{Aeq}	L_{A90}	L_{Amax}	
A	1018-1028	52.7	49.9	63.7	Distant plant / machinery from south of site, traffic on Stockport Road, aircraft, birdsong, max due to local car
	1029-1034	53.1	50.2	62.2	As above, max due to traffic on Stockport Road
	1035-1047	52.3	47.5	66.8	As above
	1048-1101	54.1	48.4	70.8	As above, max due to aircraft
	1101-1114	51.0	46.7	72.3	As above, max due to activities in local garden
	1114-1124	48.9	45.7	58.0	As above, no plant or machinery audible

APPENDIX B – Acoustic Terminology in Brief

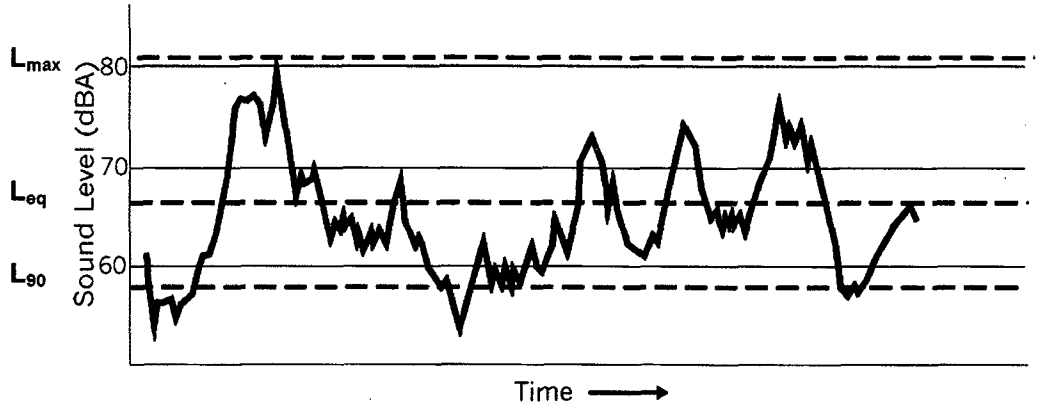
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz *(Hz)*, that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discreet frequency - a 'pure tone' - most noise is made up of many different frequencies.

The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA,* normally used to assess the effect of noise on people. The dBA weighting emphasises or reduces the importance of certain frequencies within the audible range.

Noise Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the noise.

The figure below shows an example of sound level varying with time. Because of this time variation the same period of noise can be described by several different levels. The most common of these are described below.



Example of Sound Level Varying With Time

$L_{Aeq,T}$ The equivalent continuous (A-weighted) sound level. May be thought of as the "average" sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the "ambient" noise level.

L_{A90} The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value used to represent a background level.

L_{Amax} The maximum (A-weighted) sound level during a given time. "Fast" or "Slow" response should be quoted.

Free-field Level This refers to the sound level measured outside, far away from reflecting surfaces

R_w Single number rating used to describe the on site airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.