

Karting Mall (Hong Kong) Limited

Karting Mall at Kai Tak Environmental Impact Assessment Study

Project Profile for the Application for Permission to Apply Directly for Environmental Permit (21448-PP1)

November 2000

Westwood Hong & Associates Ltd.

A. BASIC INFORMATION

1. Project Title

Karting Mall at Kai Tak

2. Purpose and Nature of Project

The objective of this project is to provide a recreational karting mall at the Kai Tak Airport. The proposed karting mall is located at the departure Pit Lane of the former Kai Tak Airport (Figure 1). The proposed karting mall will have an indoor motor training track with indoor karts which are powered by electricity. The karting information and technical information on kart are given in Appendices 1 and 2.

The proposed karting mall involves the alterations to Zone A & B of the former Terminal Building at Kai Tak Airport. There are only renovation works and no demolition or other work in the premises which may disturb asbestos. The proposed mall will have an estimated maximum population of 110 instructors/assistants/technicians per hour and approximately 50-100 visitors per hour. Table 1 illustrates the provision of facilities inside the karting mall. Floor plan of the proposed mall is given in Appendix 3.

Table 1 Facility Provisions of the proposed karting mall

Facilities
Motor track area
Motor kart storage area
Washroom facilities
Maintenance area (including cleaning, changing tyres & wheels, brake pads and adjusting steering)
Light refreshment bar
Staff area
Administration office

Apart from the above facilities, the project also provides the following for mitigating adverse environmental impacts:-

- the provision of treatment facilities, including grease traps for each wash basins of the light refreshment bar
- the provision to collect all waste by disposal agent (Appendix 4)

3. Name of Project Proponent

Karting Mall (Hong Kong) Limited

4. Location and Scale of the Project

Location: The proposed site is located at Departure Pit Lane in Kai Tak Airport (Figure 1).

Site Area: 7,522 m² (Approximately)

Total GFA: 7,522 m² (Approximately)

5. History of Site

The site was used as a departure hall at the terminal building of the former Kai Tak Airport.

6. Number and Types of Designated Projects to be Covered

This project profile covers only one designated project, which falls in Item O.4 of Schedule 2 Part I of the Environmental Impact Assessment Ordinance.

7. Name and Telephone Number of Contact Person

B. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

The proposed project will be planned and designed by private consultants and contractors.

The envisaged construction period of the project will be from around September to November 2000. The karting mall is expected to be commissioned by mid November 2000.

No concurrent projects are known near the proposed site.

C. POSSIBLE IMPACTS ON THE ENVIRONMENT

The motor practicing and the light refreshment facilities are accommodated indoors. The activities do not generate significant amount of noise, air and waste. The games activities are similar to the adjoining bowling centre with games machines and P A system with a musical background. It should be noted that the battery re-charging generate no pollutants in terms of noise, air and waste. No re-fueling and washing are required within the proposed mall.

From the preliminary environmental study, no significant transient and permanent impacts of this project on the environment are identified. Details on the aspects of water quality, air quality, waste and noise impacts during construction and operational phases are given below.

Construction Phase

1. Construction Noise Impact

Construction noise will be strictly controlled on site. The dominant noise source will be from the use of the powered mechanical equipment (PME) for the fitting-out works. The store rooms and the offices on the floor below the Karting Mall with an occupancy rate of approximately 50 persons do not rely on open windows for ventilation and therefore noise impact is insignificant. The construction contractors will be required to implement good site practices to control construction site noise in order to minimize any adverse impacts.

2. Fugitive Dust Impact

Fugitive dust will be strictly controlled on site. The decorative work is simple requiring no demolition of any building structure. All works are to be carried indoors. The fugitive dust emission from the decorative work is minimal and there is no difference from any office fitting out works during the construction phase of the proposed mall. The store rooms and the offices on the floor below do not rely on open windows for ventilation and therefore fugitive dust impact is insignificant. The construction contractors will be required to implement good site practices to control fugitive dust in order to minimize any adverse impacts.

3. Water Quality Impact

Little or no wastewater will be generated during fitting out phase. The existing washing basins within the site are equipped with the necessary grease traps. No water pollution from site will result.

Operational Phase

4. Air Quality Impact

No air emission from karts will result from the fully battery-powered activities. The batteries have completely sealed housing and do not give out any fume when in use or during re-charging. No leakage will result no matter how the battery is fitted and handled in any position, even if turned up side down.

5. Noise Impact

No significant noise impact is expected. The battery-powered kart engines generate noise levels not greater than 56 dB(A) at 1m. The karting operation causes measured noise levels of 64 dB(A), which is considered as insignificantly low (Appendix 5). The dominant noise source will be from the use of the PA system for making announcement and playing of background music. Given that the concrete floor is not less than 200mm thick r.c. and the store rooms and the offices on the floor below do not rely on open windows for ventilation, noise impact is not significant.

The karting mall operators will be required to implement good practices to control PA noise to within 90 dB(A) Leq at the karting lanes, bar and audience areas in order to minimize any adverse impacts (Appendix 6). The store rooms and the offices on the floor below are not expected to be adversely affected.

6. Night-time operations

No adverse environmental impacts are expected from the indoor activities of the mall while the stores and offices on the floor below are not in use during night-time.

7. Water Quality & Waste Impact

Grease traps will be fitted to the sinks and washing basins. Domestic waste water generated from lavatories and washing basins will go through the built-in drainage system, which will divert the waste water into communal foul sewers for suitable treatment. No adverse impact is expected.

8. Generation of Chemical Waste

No generation of chemical waste is expected. The sealed battery units are maintenance free without any need for refill with water or other agents. The batteries will be replaced by new units after its serviceable life of about 1 year and the used unit will be shipped back to the manufacturer for recycling. No painting will be necessary as the parts such as bonnet or bumper will be replaced with the new units from the overseas manufacturer. No lubricants are required for the karts.

9. Risk of accident

The battery contains pure lead gel without any liquid run out and there is no danger of explosion or acid spilling.

The karting course are designed to meet the international standards of safety including the proper coating of the course surface and the fitting along the karting course with sand-filled plastic buffer blocks, which will be displaced on impact while cushioning the kart from any significant damage. Only the participants and the trainers will be allowed on the karting course. The karts are fully equipped with the bumpers to minimize damage on impact with the buffer blocks. Training courses will be given to the karting participants from experienced instructors. Together with the safety helmets and protective gears, it is not anticipated that the proposed project will cause hazardous impact to human life.

10. Visual impact

There are no significant visual effects and interference with the key views caused by the appearance of the indoor karting mall.

11. Ecological impact

The proposed site is considered as an ecologically unimportant area. The proposed project will not cause ecological impact within the former departure hall.

D. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

The terminal building of the former Kai Tak Airport is quite isolated from the surrounding areas including Kowloon City and Tokuawan.

The area adjoining the karting mall is occupied by a bowling centre with games halls, which are in itself a noise generator and are not considered as a sensitive receiver. The floor below the mall, formally the Arrival Hall of Kai Tak Airport, accommodates the stores of various Government departments for the major portion of the tenant area. The remaining area are used as offices for district representative offices.

The dominant noise sources in the vicinity are the adjoining bowling centre and games halls.

E. ENVIRONMENTAL PROTECTION MEASURES

Construction Phase

1. Protection measures

During the fitting-out period, all precautionary measures applicable to construction works such as dust suppression measures, noise control, drainage & waste management would be implemented. In particular the following control Ordinances and other relevant ProPECC Notes will be strictly followed to ensure compliance:

- Air Pollution Control (Construction Dust) Regulation
- Noise Control Ordinance
- Water Pollution Control Ordinance

2. General Management

As a general guidance, the emission of dust and noise should be controlled by providing a high standard of housekeeping. This can be done by adopting precautionary procedures to reduce the amount of dust and noise emission whilst carrying out loading, unloading, handling and storage of building materials and debris.

Operational Phase

3. Air Quality

An existing ventilation system will be adequate for providing the ventilation for the people present in the mall. An estimate of about 200 persons will be accommodated within the mall, mainly within the bar and training area.

4. Noise Impact

Although no noisy operations from the karting activities and inspection workshop, the PA system should be controlled not to generate excessive noise to the store rooms and the offices on the floor below. The karting mall operators will be required to implement good practices to control PA noise to within 90 dB(A) Leq at the karting lanes and bar in order to minimize any adverse impacts.

5. Water Quality

Wastewater generated from all operational processes including the bar should be treated before discharging into government sewers for ultimate disposal. The grease traps should be properly maintained.

6. Waste Management

Adequate, environmentally acceptable waste handling, storage, collection, transfer, treatment and disposal facilities should be provided to deal with the waste arising from the kart mall operation.

The waste should be treated to meet all the relevant requirements under the Waste Disposal Ordinance and its regulations.

Any chemical waste, if present, is required to be disposed of at the Chemical Waste Treatment Centre or other registered centres. Such waste should be separated from main stream wastes.

7. Site Layout and Building Design

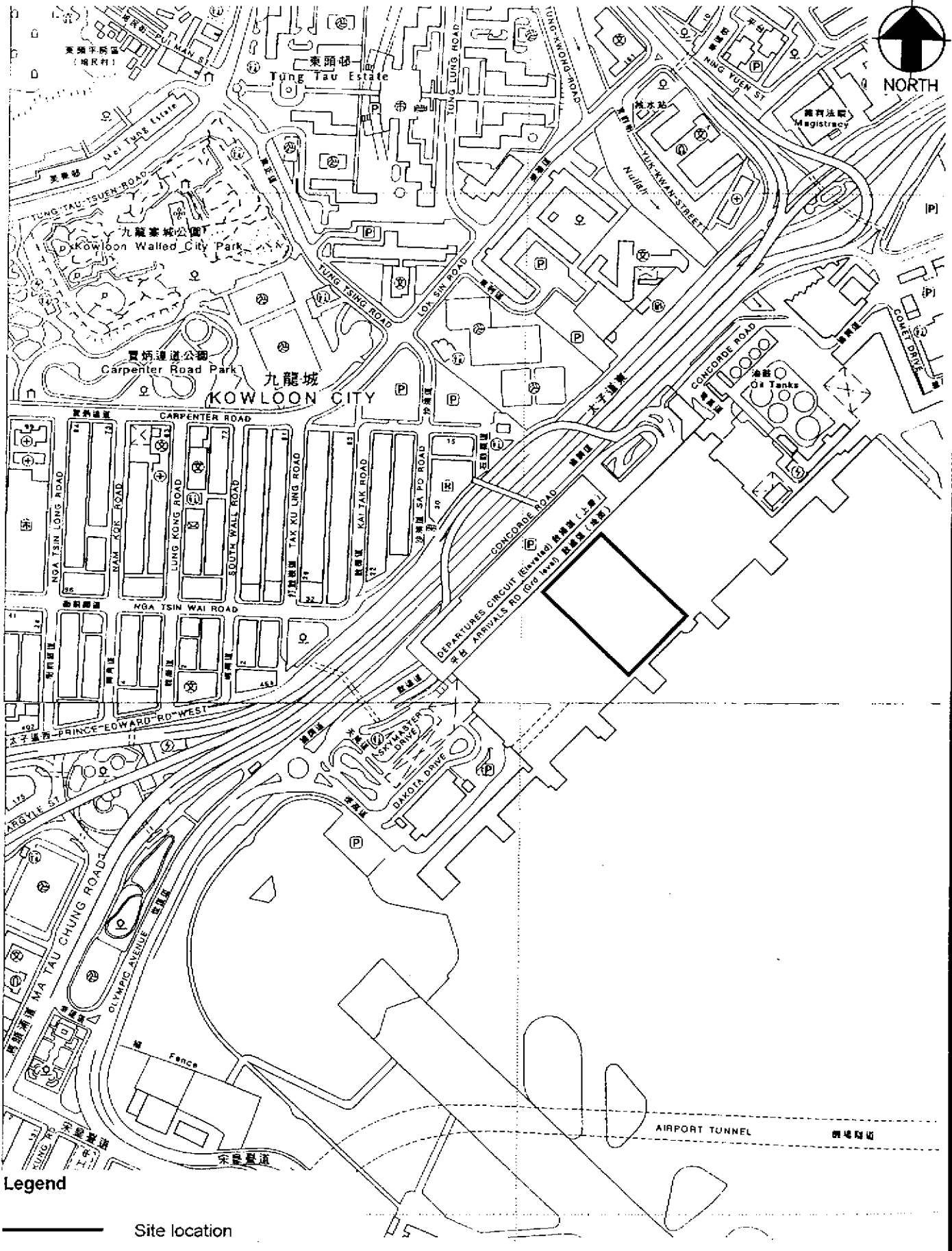
The proposed karting mall shall be designed in a way that adverse impacts on the environment can be minimised.

8. Hazard Impact

The proposed karting mall will be adequately equipped with fire fighting devices as per the FSD requirements to ensure the safety of individuals against the potential fire hazards.

F. USE OF PREVIOUSLY APPROVED EIA REPORTS

No previously approved EIA reports are found to be relevant to this proposed project.



Westwood Hong & Associates Ltd

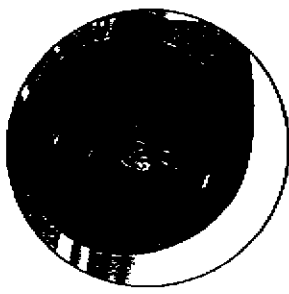
PROJECT : 21448
Karting Mall at Kai Tak

TITLE :
Site location

FIGURE
1

Appendix 1

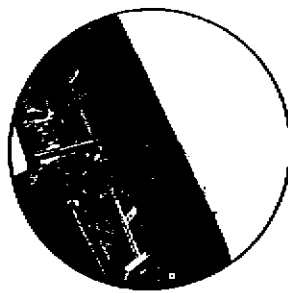
Karting Information



Integra velg
Jante integra
Integra rim



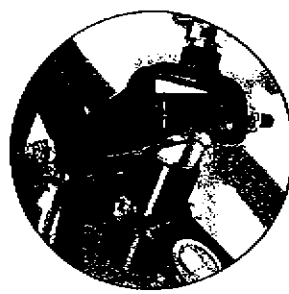
Microsinth voorbumper
Pare-chocs avant microsinth
Microsinth frontbumper



Microsinth achterbumper
Pare-chocs arrière microsinth
Microsinth rearbumper



Crash impact systeem
Système crash impact
Crash impact system



Afstelling caster
Caster réglable
Caster adjustment



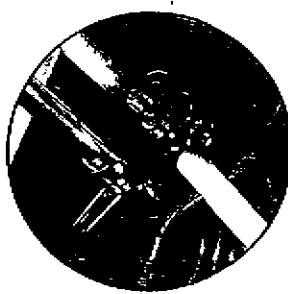
Afstelling achteras
Axe arrière réglable
Rearaxle adjustment



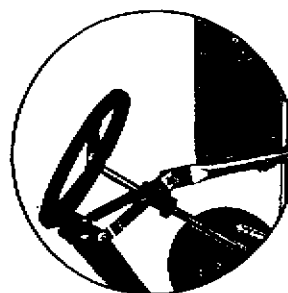
Zelfstellende rem pomp
Pompe de frein autorégulante
Self-adjustable master cylinder



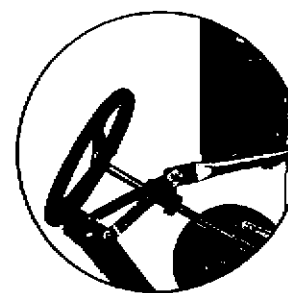
Snelwisselsysteem remblokken
Système changement
plaquettes de frein rapide
Quickrelease brakepads



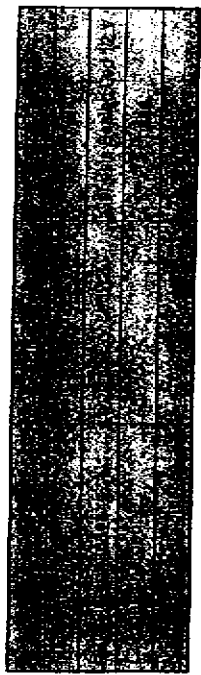
Stuurregeling
Direction réglable
Steering adjustment



Afstelling stuurkolom • Colonne de direction réglable • Adjustable steering column



Readpiece of speciale optielijst.
Consultez la liste options spéciales.
Consult the special options list.



Caliper steering wheel
Adjustable and demountable steering column
Available in black, red, yellow or blue
Patented by JB Kart

www.jb-kart.com/technical-specs

- Zelfstellend hydraulisch remsysteem
- Geperforeerde remschijf
- Plastiek stoel XL
- Integra nylonvelgen voor
- Nylonvelgen achter met wielnaven
- Heavy duty batterijcovers in polyester
- 100% gegoten en geëmailleerd op sub-frames

- 4000 rpm, 100% versnelling in 4e versnelling
- Emplacement 1080 mm
- Axe solide 30 mm
- 4 porte-roulements
- Frein hydraulique autorégulant
- Disque de frein perforé
- Siège plastique XL
- Jantes Integra, nylon avant
- Batteries en polyest. avec moyeux
- 100% coulé et émaillé

patented by JB Kart

patented by JB Kart

Appendix 2

Technical Information on Kart



JB-KART ELECTRIC ASMO

Motor

The LYNCH DC MOTOR is established as a world leader in the DC motor field, with its high power outputs and efficiencies. Designed and developed by Cedric Lynch, the new second generation Lemco Lynch motor is available with improvements in power, efficiencies, cooling, and lifespan, moving the standards of the motor even higher. The LYNCH DC MOTOR has proved itself through its use by ASMO Engineering in over 500 karts during the last three years. In addition, it has set many electric world records in both karting and boating.

The principle of the iron-less 'pancake' motor has been known for many years, but this model is the first to be developed for racing, giving power-to-weight ratios and efficiencies unmatched by conventional small traction motors and is therefore perfect for the electric kart.

In the application of concession karts it is oversized, which guarantees a longer life expectancy as well as a higher reliability. This is a motor with permanent magnets. There is no special 'commutator' and the eight brushes drive directly on the armature and have a lifetime of several thousand hours. As with most electrical motors, this one requires very little maintenance.

Technical Data :

Type	LEMCO 200
Continuous Power	8,5 kW
EMF	48V
Permanent Current	200A
RPM	78 U/V
Peak Efficiency	91% max.
Shaft	19mm., h7, 6mm wedge
Weight	27.6 lbs.

Key Features :

High Efficiency	High power to weight ratio
Simple electronic control	Rugged construction
Interchangeable shaft	Integral commutator
Long brush life	Speed proportional to voltage
C E marked	IP20 rating



Controller :

The DC controller is the 'brain' of every electric vehicle. It regulates not only the power of the motor but also the torque. Assisted by a potentiometer that functions via the gas pedal, the motor power can be adjusted between zero to the given maximum.

In addition, the controller protects the motor against high currents. Especially with the electric motors with high efficiency, there is the danger destruction from a high innush of current at the start (demagnetizing the permanent magnets, overheating, excessive wearing of the brushes). The controller can prevent these dangers from occurring.

The batteries are protected against high and low tension, voltage peaks and low discharge. The correct adjustment of these factors and the individual regulation will improve on the life expectancy of the batteries.

Technical Data :

Type	48V 200A
Max Motor Current	200A
Max Battery Current	180A
On-Resistance	7mOhm.
Min. Battery Voltage	24V
Max. Battery Voltage	48V
Weight	3.75 lbs.
Self Usage of Electricity ca.	18mA
Tact Frequency PWM	Over 18kHz
Measurements	7.8"x4.1"x3.1"
Over All	9.6"x5.6"x3.1"

Regulations :

- Over Tension Protection
- Low Tension Protection
- Motor Current
- Battery Current
- Adjustable Performance
- Pulse Modulation High Frequency
- Short-Cut Proofed



Batteries :

The batteries are the key to the success of every electric vehicle. They limit the performance of the kart and without correct management can become very quickly the most expensive parts of an indoor track (the cost of the electricity itself is very low)

The ASMO system gives the batteries optimum protection, our batteries can therefore not be replaced without losses of safety and life duration.

The Advantages of the Battery System Are :

- Completely sealed housing, so the battery can be fitted and handled in any position, even if turned up side down.
- Maintenance Free, no need to refill with water.
- Dry Led, so no liquid or gel can run out or explode in the event of a crash or other impact. In fact, the system can take an impact of over 25 mph without any danger of explosion or acid spilling.
- A High Recharge Current Capacity. This is an important feature of the ASMO concept (driving time equals charging time).

Technical Data :

Type	Optima Yellow Top Maintenance Free Dry Led Safety Battery
Capacity	52 Ah CS
Voltage	12V
Life Expectancy	5-10 months
Measurements	9.8"x6.7"x7.9" height w/poles
Weight	44.1 lbs.
Quantity per kart	4

Features :

- Leak Safe
- No Danger of Explosion
- Completely Sealed System (if used with the ASMO charging system)



Charging System :

Modern high frequency technology enable an easy, compact and efficient charger. The most important advantages for the battery are :

- Longer Life expectancy.
- Less deterioration of the plates in that the charge occurs at a continuous and not impulsive current. As well as the reduced accumulation of gas in the final charge phase.
- Reduced heating of the battery because the charge occurs at a controlled maximum current with RMS very similar to the average value.
- Respect for the thermal balance, avoiding shocks in the plates that make up the cells, which cause dissolution of active material.
- More complete daily charges as charging can be maintained for longer periods without damaging the battery.

The ASMO double charging system will optimize your charging times and make them automatically as short as possible. It allows charging current up to 100 Amps and lengthens the life of the battery. Thanks to a new automatic reset without any auxiliary contacts, the system becomes even more reliable and easier to handle.

Technical Data :

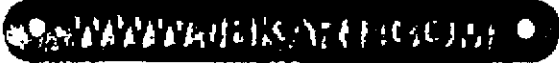
Type	NG3 48V/3kW
Capacity of charge	One kart 48V 100A Two karts 48V 50A
Charge duration	Depends on track design and performance settings
After 5 minutes	5-8 min.
After 8 minutes	8-12 min.
Power Supply	220-240V AC50-60Hz
Efficiency	85%
Output Voltage Accuracy	about 0.5%
Safety timer	Max. 14h
Weight	53 lbs. (complete with cable)
Dimensions	16.6"x8.4"x3.5" depth (incl. cover)
Mounting hole dimensions	18.6" Horizontal 12.6" Vertical

Safety Features :

- Thermal protection
- Self-switched On as the AC power supply is present
- Yellow Led shows that the output current has dropped at 1/3
- Max Battery is charged to 80%.



Peter Thompson



fax +852 23 83 88 90

18/10/00

concerning : noise levels ASMO-engine; ASMO powered karts

Mr Thompson,

Referring to our teleconversations of today, I hereby inform you on the noise levels :

The kart engines are no louder than 56dBa
The total karts have been measured with 64 dBa

Kind Regards,

Filip Van Fecke



Wevelgem, 31/10/2000



Dear Mr. Thompson,

Referring to our letter of 18th of October concerning the noise levels of the karts we herewith give you the specifications.

The Asmo Electric engine 8,8 HP is not louder than 56 dBa
The tires of the karts by heavy use on asphalt not louder than 64 dBa
The tires of the karts in your Karting Mall will be not louder than 55 dBa.

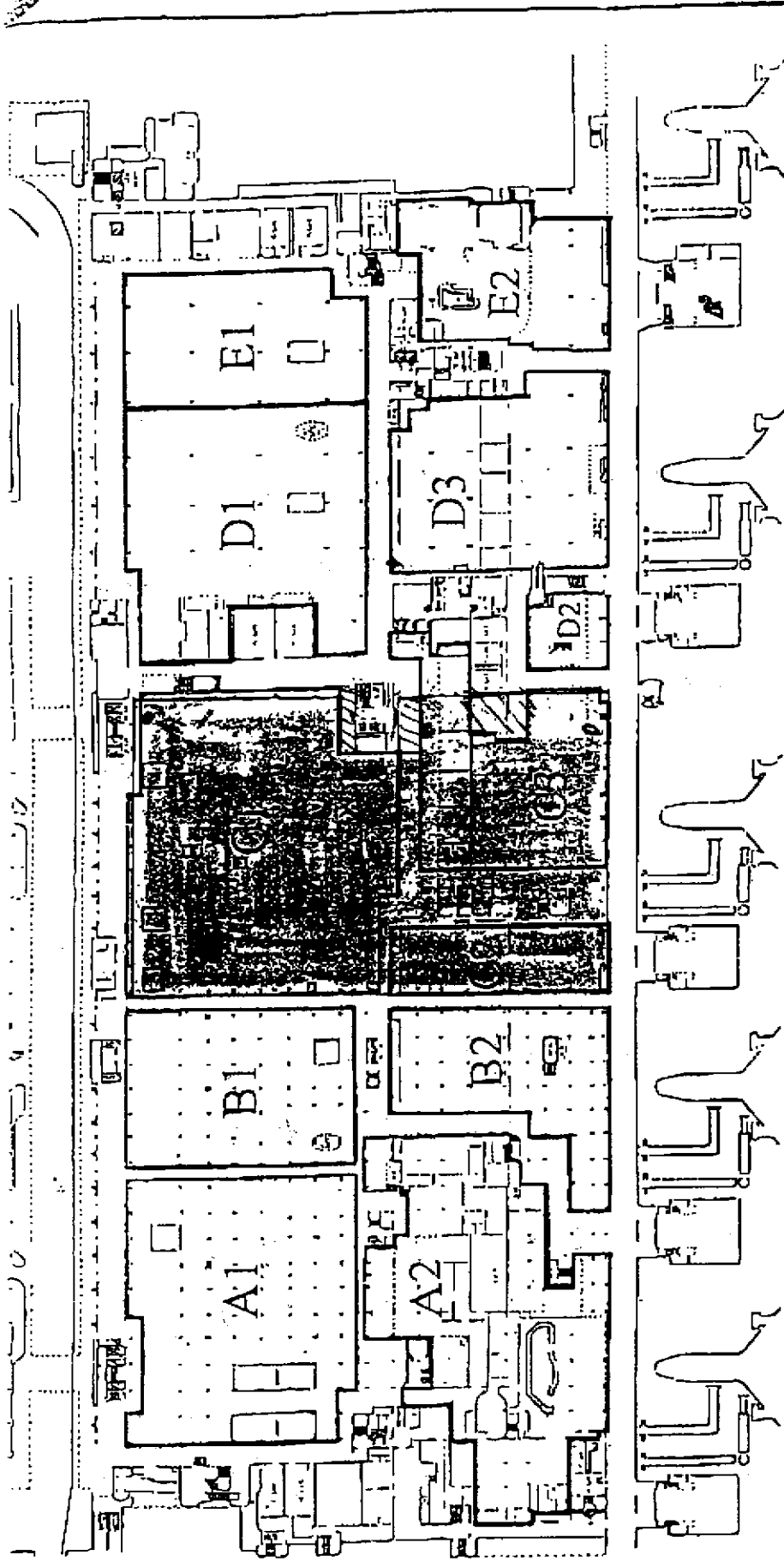
We have treated the surface with special paint on the pavement so this will reduce the tire noise. Maximum tire noise is on asphalt.

Kind regards,

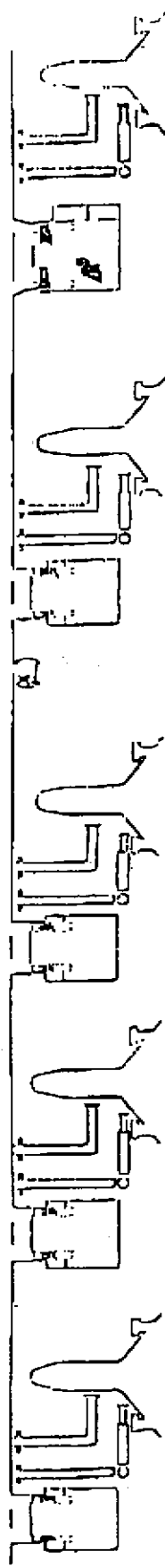
Joost Boxer
General Manager JBK

Appendix 3

Floor layout plan
of
the Proposed Karting Mall



HONG KONG INTERNATIONAL AIRPORT	
DATE APPROVED	
DATE DRAWN	
PROJECT NO.	
SCALE	



離境大堂 DEPARTURES

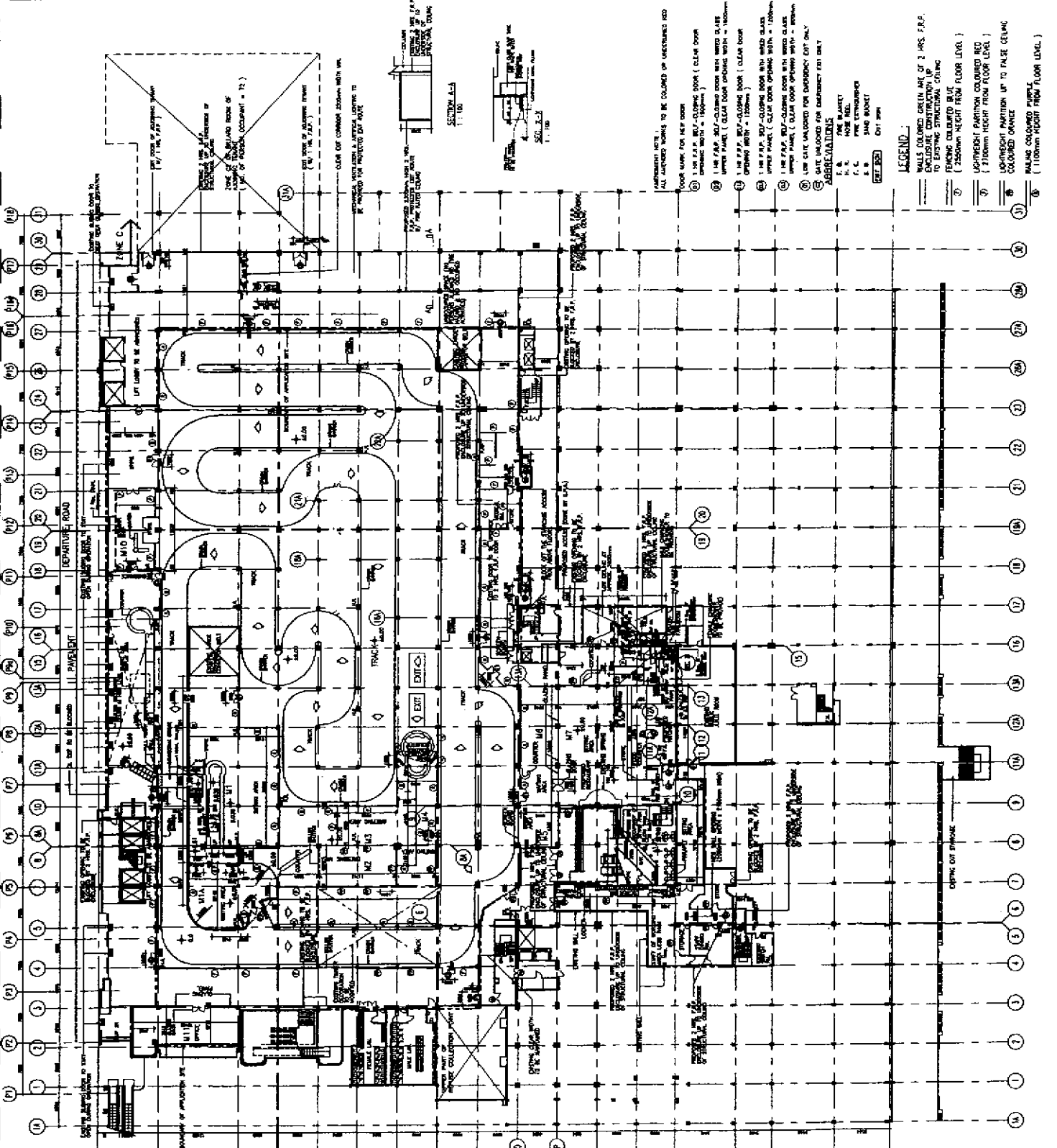
For identification purposes only

BLD. REF. 8/008 WAPUH
 FSD. REF. 3/007/002/08

1/10	1	REVISION	DATE
2/10	2	REVISION	DATE
3/10	3	REVISION	DATE
4/10	4	REVISION	DATE
5/10	5	REVISION	DATE
6/10	6	REVISION	DATE
7/10	7	REVISION	DATE
8/10	8	REVISION	DATE
9/10	9	REVISION	DATE
10/10	10	REVISION	DATE

L&T ARCHITECTS LTD.
 100-11000 HWY 101, SUITE 200
 VANCOUVER, BC V5P 1C1
 TEL: 604-271-1100
 FAX: 604-271-1101
 WWW: L&TARCHITECTS.COM

PROJECT	MARKING MALL LAYOUT PLAN
DATE	JULY 2008
SCALE	AS SHOWN
PROJECT NO.	0007/01
CLIENT	RM-02
DESIGNED BY	RM-02



SEE PLAN SHEET 8/008 WAPUH
 FOR THE MARKING MALL

ALLOCATED SHOWER STALLS FOR THE MARKING MALL

NO.	1	2	3	4	5	6	7	8	9	10	11	12
AREA	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	12											

SECTION A-A
 1:10

SECTION B-B
 1:10

MARKING MALL LAYOUT PLAN

LEGEND

- WALLS COLOURED GREEN ARE OF 2 HRS. F.R.P. EXCLUSIVE STRUCTURAL CEILING TO EXISTING STRUCTURAL CEILING
- WALLS COLOURED BLUE (2500mm HEIGHT FROM FLOOR LEVEL)
- LOWWEIGHT PARTITION COLOURED RED (2100mm HEIGHT FROM FLOOR LEVEL)
- LOWWEIGHT PARTITION UP TO FALSE CEILING COLOURED ORANGE
- WALLS COLOURED WHITE (1100mm HEIGHT FROM FLOOR LEVEL)

LIST OF MATERIALS

- 1. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 2. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 3. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 4. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 5. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 6. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 7. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 8. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 9. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 10. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 11. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS
- 12. 100 F.F.P. SELF-CLOSING DOOR WITH WET GLASS

ABBREVIATIONS

- F.R.P. FIRE RESISTANT PARTITION
- F.L. FIRE LINE
- S.H. SMOKE HOOD
- S.B. SMOKE BUCKET
- EXIT EXIT

MARKING MALL LAYOUT PLAN

Appendix 4

Information of Disposal Service for Karting Mall

FROM : WESL

PHONE NO. : +852 2362 4034

OCT. 19 2000 10:46AM P1



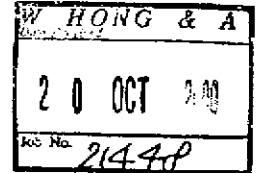
WORLD ENVIRONMENTAL SERVICES LTD.
世界環衛服務有限公司
Subsidiary of Associated Engineers, Ltd. 華亞工程有限公司附屬公司

9-11/F, Peninsula Tower
538 Castle Peak Road
Cheung Sha Wan, Kowloon
Hong Kong
Tel: 2718 0788
Fax: 2362 4034 / 2767 1678
E-mail: west@aehk.com.hk

QUOTATION / SERVICE AGREEMENT

Client: Karling Mall (Hong Kong) Ltd.
Departure Pit Lane,
Kei Tak Airport,
Kowloon Bay,
Kowloon.

Ref.No: PS10428
Date: 19 Oct, 2000



By Fax & By Mail
Fax: 2383-8890

Attn: Mr. Dave Babona

Dear Sir:

We refer to our recent discussion and are pleased to quote you the following :-

- Subject: General Waste Disposal Service
Service Location: Kei Tak Airport, Kowloon City.
Servicing Period: From _____ to _____
Scope of Services: Provision of (2)nos. of 240-litre refuse bins & (1)no. of 660-litre refuse bin.
Provision of Refuse Compaction Truck for the refuse transportation and disposal to Government's designated landfill daily.
Service Charges: HK\$2,300.-/month
Payment Terms: Full monthly payment should be made within 15 days from date of invoice.
Insurance: Employees' Compensation and Public Liabilities Insurance are undertaken by World Environmental Services Ltd. in compliance with Hong Kong Labour Ordinance.
Termination: Either party can terminate the agreement by serving the other one-month prior notice in writing.
Validity: Within one month from date of quotation issue.
Remarks: - It is the Government policy to impose disposal charges at the landfill, and any charges thereof will be at cost to Client's account.
- General waste does not include chemical waste, clinical waste, waste with over 70% liquid content, and special wastes classified by EPD.

To confirm your acceptance, please sign and return to us the duplicate copy at your earliest convenience. Should you have any queries, please feel free to contact the undersigned or our Ms. Alice Wong at 2718-0788.

Yours truly,

Agreed and Accepted by
Karling Mall (Hong Kong) Ltd.

For and on behalf of
World Environmental Services Ltd.

Handwritten signature of Kelly Kam
Authorized Signature(s)

Kelly Kam
General Manager

Authorized Signature(s)
with Company Chop

KKJAW

Form with checkboxes: WHA, For information only (checked), Action required, Ref: _____, Date: _____

Table with 2 columns: Action, M.D. (with handwritten initials)

Appendix 5

Kart Nose Calculation -
Kart Engine Noise to Adjoining Office Space Below

KART NOISE CALCULATION - KART ENGINE NOISE TO ADJOINING OFFICE SPACE BELOW

Project:	Karting Mall	Job:	21448
Title:	Karting engine noise to office below	Date:	18 Oct.00
EQUIPMENT :	Kart engine	AREA SERVED :	
CHECK POINT :	Office below	DESIGN NC :	40

		OCTAVE BAND CENTRE FREQ., Hz							
		63	125	250	500	1k	2k	4k	8k
SOUND PRESSURE LEVEL at ref dist. (1m)	64 dB(A)	74	70	65	62	58	54	52	50
Conversion from ref distance to 1m	0	0	0	0	0	0	0	0	0
Lp at 1m		74	70	65	62	58	54	52	50
REVERBERANT CALCULATION:									
Percentage Reaching Room (%) ^[1]	900	10	10	10	10	10	10	10	10
Room Volume (m ³) ^[2]	100	-6	-6	-6	-6	-6	-6	-6	-6
Reverberation Time (sec)		1.5	1.2	1.0	0.9	0.8	0.8	0.7	0.5
Reverberation Correction		2	1	0	0	-1	-1	-2	-3
REVERBERANT LEVEL		79	74	69	65	61	57	54	51
DIRECT CALCULATION :									
Percentage Leaving room (%)	900	10	10	10	10	10	10	10	10
No. of outlets within direct field	1	0	0	0	0	0	0	0	0
Distance from radiating surface (5m x 5m) (m)	2.5	-7	-7	-7	-7	-7	-7	-7	-7
Directivity		0	0	0	0	0	0	0	0
DIRECT NOISE LEVEL		77	73	68	65	61	57	55	53
RESULTANT SPL =		81	77	71	68	64	60	57	55
SRI of slab (Min. 200mm rc)		36	42	41	50	57	60	65	70
Correction for radiating surface ^[3] Area =	25	14	14	14	14	14	14	14	14
SPL in adjoining space		59	49	44	32	21	14	6	-1
NOISE CRITERION^[4] NC 40		64	57	50	45	41	39	38	37
ATTENUATION REQUIRED =		-5	-8	-6	-13	-20	-25	-32	-38
OFFICE FITTED WITH FALSE CEILING									
REF : Mineral fibre tile ceiling		2	3	5	6	8	10	10	10
COMBINED SRI OF FLOOR & FALSE CEILING		38	45	46	56	65	70	75	80
ADDITIONAL ATTENUATION REQUIRED =		-7	-11	-11	-19	-28	-35	-42	-48

Note: [1] Kart engines (9)
 [2] Assume room size: 5m(w) x 5m(l) x 4m(h)
 [3] Assume radiating surface: 5m x 5m
 [4] Criterion for General Office

Remark : NC40 noise criterion will be fully complied with for Office area below Karting Mall

Appendix 6

PA Noise Calculation -
PA Noise to Adjoining Office Space Below

PA NOISE CALCULATION - PA NOISE TO ADJOINING OFFICE SPACE BELOW

Project: Karting Mall Job: 21448
 Title: Karting Mall PA noise to office below Date: 18 Oct.00
 EQUIPMENT : PA AREA SERVED :
 CHECK POINT : Office below DESIGN NC : 40

		OCTAVE BAND CENTRE FREQ., Hz							
		63	125	250	500	1k	2k	4k	8k
SOUND PRESSURE LEVEL at ref dist. (1m)	90 dB(A)	87	83	80	83	83	85	82	76
Conversion from ref distance to 3m	-5	-5	-5	-5	-5	-5	-5	-5	-5
Lp at 3m		82	78	75	78	78	80	77	71
REVERBERANT CALCULATION:									
Percentage Reaching Room (%) ^[1]	100	0	0	0	0	0	0	0	0
Room Volume (m ³) ^[2]	100	-6	-6	-6	-6	-6	-6	-6	-6
Reverberation Time (sec)		1.5	1.2	1.0	0.9	0.8	0.8	0.7	0.5
Reverberation Correction		2	1	0	0	-1	-1	-2	-3
REVERBERANT LEVEL		78	73	69	72	71	73	69	62
DIRECT CALCULATION :									
Percentage Leaving room (%)	100	0	0	0	0	0	0	0	0
No. of outlets within direct field	1	0	0	0	0	0	0	0	0
Distance from radiating surface (5mx5m) (m)	2.5	-7	-7	-7	-7	-7	-7	-7	-7
Directivity		0	0	0	0	0	0	0	0
DIRECT NOISE LEVEL		75	71	68	71	71	73	70	64
RESULTANT SPL =		80	75	72	74	74	76	73	66
SRI of slab (Min. 200mm rc)		36	42	41	50	57	60	65	70
Correction for radiating surface ^[3]	Area = 25	14	14	14	14	14	14	14	14
SPL in adjoining space		58	47	45	38	31	30	22	10
NOISE CRITERION^[4]	NC 40	64	57	50	45	41	39	38	37
ATTENUATION REQUIRED =		-6	-10	-5	-7	-10	-9	-16	-27
OFFICE FITTED WITH FALSE CEILING									
REF : Mineral fibre tile ceiling		2	3	5	6	8	10	10	10
COMBINED SRI OF FLOOR & FALSE CEILING		38	45	46	56	65	70	75	80
ADDITIONAL ATTENUATION REQUIRED =		-8	-13	-10	-13	-18	-19	-26	-37

Note: [1] PA system
 [2] Assume room size: 5m(w) x 5m(l) x 4m(h)
 [3] Assume radiating surface: 5m x 5m
 [4] Criterion for General Office

Remark : NC40 noise criterion will be fully complied with for Office area below Karting Mall