

BASIC INFORMATION

Project title
Construction and Operation of Temporary Bus Depot at Area 85 Tseung Kwan O
Purpose and nature of the project
The objective of the project is to construct and operate a temporary bus depot at Area 85 Tseung Kwan O (TKO) to replace the existing temporary bus depot at Area 13 TKO, which has to be vacated in early 2000 in order to mitigate noise nuisance to the neighbouring housing blocks.
Name of project proponent
The Kowloon Motor Bus (1933) Co Ltd. (KMB)
Location and scale of project (include plans) and history of site
<p>The Site, situated at Area 85, Wan Po Road, TKO, Sai Kung, Hong Kong, has an area of 18,800 m². The Site is bounded by Wan Po Road to the west. Some carparking spaces are located to the north of the Site. Further to the north is the Sewage Treatment Works. An industrial building is located to the south of the Site. The TKO landfill Stage II/III is situated to east of the Site. Further to the south of the Site is the TKO Industrial Area. On the opposite side of Wan Po Road are newly reclaimed lands for the future TKO Mass Transit Railway (MTR) Depot development. Figure 1 shows the location of the Site. The boundary of the study area for purposes of this designated project is shown in a heavy broken line on Figure 1.</p> <p>The proposed temporary bus depot will provide the same facilities as that of existing depot at Area 13 such as coin collection, refuelling, bus washing, maintenance and parking. Figure 2 presents a diagram of the proposed depot layout. Figures 3 & 4 show the details of structures. The temporary depot will includes the following construction works & facilities:-</p> <ol style="list-style-type: none">1. Depot ground floor slab2. Top covered oil refuelling area consisting of 4 refuelling lanes3. Top covered working bay with an air compressor for maintenance purposes4. Bus washing area accommodating four sets of washing machines5. Single storey structures such as guard room and toilet6. Water pump room7. Waste water treatment system8. Electrical and mechanical systems9. Fencing along boundary line10. Two fuel storage tanks above ground11. Traffic department office, coin collection office and service department office12. An underground drainage system (including manholes for inspection and maintenance purposes) <p>Majority of the site area is allocated for bus parking purposes.</p> <p>The site is currently used for handling scrapped metals but will be vacated for the intended use.</p>

Number and types of designated projects to be covered by the project profile

1 project under section A.6(a) of schedule 2, Environmental Impact Assessment Ordinance. i.e. a transport depot located less than 200m from the nearest boundary of an existing or planned residential area. The application is pursuant to Section 5(1)(b) and 5(11) of the EIA Ordinance for the purpose of applying for an Environmental Permit directly.

Name and telephone number of contact person(s)

OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

How will the project be planned and implemented

The Consultant (Atkins China Ltd) will design the Project. The construction works will be planned and implemented by contractor.

What is the project time table

The construction is expected to commence in September 1999 and will last for about 6 months, ending in March 2000. The estimated time to complete each component of major work is described below:

Site Mobilisation	1 week
Structure Formation	10 weeks
Building Services Work	9 weeks
Finishing Work	4 weeks

Figure 5 shows a tentative construction programme for the Project.

Are there any interactions with broader programme requirements or other that shall be considered

The proposed depot is intended to be temporary in nature. The Government of Hong Kong Special Administration Region (HKSAR) is about to lease the site to the project proponent, for a time period commencing from the date of possession of the Premises up to the 31st day of March 2003 and thereafter quarterly until such time as the tenancy is determined. According to the TKO Outline Zoning Plan (OZP) No. S/TKO/6 issued in February 1999, this site area is designated for sewage treatment works in the long term. It is likely that this site will have to be vacated for the extension of the sewage treatment works by 2003.

MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

Outline existing and planned sensitive receivers and sensitive parts of the natural environmental which might be affected by the proposed project

With reference to the TKO OZP No. S/TKO/6, a site in Area 86 (west of the Proposed Development Site across Wan Po Road) is zoned as "Comprehensive Development Area" (CDA). The CDA site in Area 86 is intended to facilitate comprehensive development including a MTR depot, station, associated property development and supporting community facilities. Development and redevelopment within this zone is restricted to a maximum total domestic gross floor area of 1,612,800 m² and a maximum total non-domestic gross floor area of 40,000 m² mainly for retail purpose. The CDA site will be developed in several phases. In its earlier stages, the CDA development will mainly be the MTR depot itself. It is expected that the first phase of the residential development of the CDA will be completed by 2003.

A site in the southern part of Area 86 is zoned as "Governmental, Institution or Community" and will be developed into a non-noise sensitive G/IC building of about 30m high and 160m long in order to screen any potential noise impact from the industrial estate to the south. Therefore the planned use under this zoning is unlikely to be affected by the proposed temporary bus depot.

Outline the major elements of the surrounding environment and existing and /or relevant past land use(s) on site which might affect the area in which the project is proposed to be located

The TKO Stage II/III landfill is situated to the east of the proposed site. This landfill was operated from 1988 to 1995, during which time approximately 17.5 M tonnes of waste were deposited. The approximate composition of the waste types is approximately 23% domestic, 18% commercial / industrial, 57 % construction and 2% special wastes. Depths of waste vary between 5 m and 70 m across the site. The landfill was formed in a natural steep sided valley facing seaward. The landfill design incorporated a partial lining in conjunction with the installation of a number of leachate collection systems within the various phases of landfilling. Leachate was discharged to the Tseung Kwan O Sewage Treatment Works prior to discharge via a long sea outfall. Prior to restoration the landfill was capped with CDV material of depths between 1 m and 3 m. A number of landfill gas and leachate monitoring drillholes were installed within the waste and around the landfill boundary.

Restoration works were completed at TKO Stage II/III landfill in early 1999. The purpose of the restoration works was to ensure the stability of wastes and also to provide comprehensive control systems to allow the effective management of landfill gas and leachate. The control system comprises the installation of 50 vertical landfill gas wells across the site. Following the completion of the restoration works the landfill will be subject to a thirty-year aftercare period during which a stringent monitoring programme will ensure the integrity of the restoration works.

Following the completion of the restoration works, and the expiration of the Defects Correction Period, the contractual Target limit concentration of the off-site migration of methane is 1%.

With respect to TKO Stage II/III the key restoration tasks comprised the design and construction of a new capping system, construction of a new landfill gas management and utilisation system, construction of a new surface water and groundwater management system, construction of a leachate management system and landscaping works.

Prior to the execution of restoration works, three monitoring wells had been installed to the seaward side of the Stage II/III Landfill on a plane between the landfill and the proposed temporary use site. These wells have now been in place for some years and were, until recently, the only source of gas monitoring data of relevance to the currently proposed temporary use. As a requirement of the recently completed restoration works, 16 new groundwater/gas monitoring wells were required to be installed around the entire perimeter of the landfill. Monitoring data are available from seven currently operational monitoring wells located to the western (seaward) side of the landfill. The locations of these monitoring points are presented in Figure 6, and the monitoring data are presented in Tables 1 & 2. The locations that are most representative of likely conditions within the proposed temporary bus depot are: 2DG1, 2DG2, and 2DG3.

The monitoring data indicate that since August 1998 the presence of methane has only been detected at one of the three wells (2DG3). The highest level of methane recently recorded at this well was 12% in October 1998. Since that time there has been a trend of decrease in concentration coinciding with the completion of the restoration works. The inference is that the restoration works are successfully controlling off-site gas migration. However, this can only be confidently confirmed as the monitoring programme continues. The last datum available indicates a concentration of 0% (zero) methane at well 2DG3 in April 1999.

An existing sewage treatment works is located to the north of the proposed site and is separated by an existing open carpark. During site visits no odour nuisance was present on the proposed site. Therefore, the sewage treatment works is unlikely to cause any adverse impact on the proposed temporary bus depot.

POSSIBLE IMPACT ON THE ENVIRONMENT

Outline any processes involved, including process flow diagrams, site plans, storage requirements and information on emissions and discharges

Construction Phase

The construction phase for the temporary bus depot will mainly consist of site mobilisation, structure formation, building service works and finishing works. At the commencement of the construction, the site will be cleared and some excavation/formation will be undertaken. Following the site clearance the structure formation will mainly include concrete work for the construction of the depot ground floor lab and structures such as pump room, main switch room and toilet. In addition, steel structures will be constructed at the refuelling area and working bay. After the construction of the main structures, the building service works will be carried out to provide the electricity, water supply and other utilities. Finishing works will complete the construction of the Project.

Operational Phase

After the normal service hours, service buses will return to the proposed temporary bus depot. After entering the proposed temporary depot, the buses will be marshalled to form 4 queues for coin collection, bus refuelling and bus washing. The waiting area in front of the refuelling aisles can accommodate 8 buses. The collection of coins from the coin boxes, the refuelling of buses and the washing of buses will take about 3 minutes. Buses will queue in pairs, in the waiting area and move to the refuelling aisle in pairs to maximise the refuelling rate (because the refuelling aisles can accommodate 2 buses in tandem). The buses will then manoeuvre to their designated parking bays. The working bay will be used for maintenance/checking. The buses will leave the proposed temporary bus depot early in the morning to provide services for the people living in the TKO area.

The operating parameters are summarised as below:

- 1) Approximate number of buses allocated in TKO, Area 85 temporary depot:

	End 1999	end 2000	end 2001	end 2002
Bus fleet				
Schedule	252	269	272	249
Allocation				

- 2) Traffic routing is referred to in the layout plan (Figure 2)
- 3) Bus fleet will mainly consist of air-conditioned and non air-conditioned double-deckers
- 4) Operation hour of the temporary bus depot is 24 hours
- 5) Operation pattern during peak period based on data collected in existing depot TKO area 13 on 19/4/99

Peak arrival period:	10:18 to 13:56	19:21 to 01:34
Number of buses:	77	207
Peak departure period:	05:15 to 08:04	14:52 to 17:18
Number of buses:	207	77

- 6) Bus speeds inside depot range from 8 to 10 km/hr
- 7) Two fuel storage tanks will be installed next to the refuelling area

Describe the environmental impacts or issues that arise during the construction and operation of the project

Construction Phase

Noise:- At the time of construction period, there will be no Noise Sensitive Receiver (NSR) within 300m of the proposed site boundary. The nearest existing NSR was identified as the Beverly Garden which is located over 2 km away. With reference to the scale of construction, only a small number of powered mechanical equipment such as excavator, compressor, dump truck, etc are likely to be involved. In the light of the lack of nearby NSR and small construction scale, no adverse construction noise impacts would be expected.

Dust:- During construction, potential dust impact may be expected on any nearby Air Sensitive Receivers (ASRs). The existing ASRs were identified as the industrial building (150m away) located to south of the proposed site and the sewage treatment work (90m away). The site mobilisation was considered as the major dust-generating activity. Since the site is flat on terrain, only small extent of excavation/site clearance will be anticipated. Therefore no significant dust impact would be expected on the surrounding ASRs.

Landfill Gas:- The qualitative landfill gas risk assessment (as detailed in Operation Phase) indicates that the risk of gas ingress into the proposed temporary landuse at Area 85 is low. Thus the landfill gas risk to the construction of the proposed temporary landuse is also low.

Operational Phase

Noise:- During the operation of the proposed temporary bus depot, the major noise sources are comprised of buses and fixed plant including pumps inside the pump house, an air compressor and sludge pump for the waste water system, and an air compressor for the working bay. Before the operation of the residential development in Area 86, there would be no existing noise sensitive receivers in the study area (i.e. 200 m from the site boundary). No adverse noise impacts would result from the operation of the proposed temporary bus depot. As and when the residential development in Area 86 is occupied, the buses entering or leaving the bus depot, manoeuvring and idling on site would cause adverse noise impact. Noise exceedance over the planning criterion would be expected at the nearest boundary of the CDA site in Area 86. The severity of noise impact on the residential development in Area 86 is mainly attributed to the night-time operating hours (23:00 to 07:00) and the shortest setback distance (about 50m). However, the occupation of the residential development in Area 86 (2003) is likely to be near or beyond the expiration of the lease for the proposed site. Therefore the NSRs may not be affected if the site has been vacated to make way for the expansion of the sewage treatment works.

Air Quality:- The parking bays are in open spaces and thus the vehicular emissions will be readily dispersed and are unlikely to accumulate to cause concern. The refuelling area will be covered at the top only for protection of refuelling facilities. Since the nearby ASRs (such as the industrial building and the sewage treatment work) are located at least 100m away from the refuelling area, there would be ample dispersion of any fumes and no significant odour impact would be expected to arise from the refuelling operation.

Water Quality:- For the purpose of bus/floor/parts washing, used waters are likely to be contaminated with fuel/lubricating oils. Such effluent will have potential impact on water quality. Therefore treatment of the effluent from the bus/floor/parts washing will be required. Before discharging into the sewer, effluent from the bus/parts washing and floor washing of refuelling station and maintenance bay will be properly collected by a drainage system and will be treated by a waste water treatment system. Treated effluent will comply with the requirements of the Technical Memorandum on standards for effluents discharged into drainage and sewerage systems, inland and coastal waters. With the provision of the proposed waste water treatment system, it is unlikely to have adverse impact on the water quality. Since the estimated water consumption is about 80 m³ per day, the installed capacity of the proposed waste water treatment system will be less than 5000 m³ per day and is not a designated project.

Waste:- The quantities of solid wastes generated during the operation of the temporary bus depot will be modest. However, some sludge will be produced from the filter press of the wastewater treatment system. Such solid waste should be properly handled and collected for disposal at the nearest landfill and in compliance with the requirement of the Waste Disposal Ordinance in order to avoid any nuisance to the surrounding.

Ecology:- There is no adverse ecological impact.

Visual:- Temporary structures/buildings on the site are few and low-rise. Therefore it is unlikely that a significant adverse visual impact would arise.

Landfill Gas:- The ground floor slab will prevent the upward migration of gas. The top covered refuelling area and working bay are not enclosed and are open at the sides. A further important feature of the bus depot will be the provision of two fuel storage tanks. These will be permanently raised above ground level to ensure free air circulation around the structures. This configuration, whilst being a requirement for other safety reasons, will have the significant benefit of eliminating the potential for accumulation of landfill gas around these structures. It is proposed that all offices will be raised above ground level, such that the free circulation of air will be facilitated, and the potential for the accumulation of landfill gas is eliminated.

Services will be required by the bus depot in respect of water supply, sewerage drainage, electricity and telecommunications. Due to the nature of the proposed land use, these utilities are generally expected to be small in scale. It is recognised that service and utility conduits often have the capability to act as preferential migration pathways for landfill gas. However, in this instance it is understood that almost all utilities and services will be connected to the Western side of the Site to existing services on Wan Po Road. That is, with the exception of electrical supply, there will be no utilities or conduits located within the areas between the landfill and the Site. As such, the opportunity for these features to act as preferential migration pathways between the landfill and the Site is considered to be very small.

It is known that an electricity supply will be provided from an existing China Light & Power (CLP) main located to the southeastern side of the Site. In response, the electricity 'Pillar Box' will also be constructed to the southeastern side of the Site. This approach will serve to minimise the distance between the 'Pillar Box' and the CLP main and will therefore also minimise the length of any potential preferential gas migration pathway.

In order to further minimise any potential opportunity for electrical services to present a landfill gas hazard risk, electrical service entries into above-ground enclosed buildings will also be made above ground level. This approach will effectively provide an 'atmospheric break-leg' thereby eliminating the risk of gas entry to the interior of any above-ground enclosed buildings.

The assessment of landfill gas hazard was conducted in accordance with the Landfill Gas Hazard Assessment Guidance Note issued by Environmental Protection Department (June 1997). It can be appreciated that, as a whole, the proposed bus depot can be considered as an 'open' facility with minimal excavation and foundation requirements. This arrangement is necessary due to both the inherent requirements for bus depots, and also the temporary nature of the proposed land use. As a consequence, the opportunity for the accumulation of landfill gas below ground or within structures is low. Therefore, in view of the nature of the design, purpose, and operation of the proposed facility, and in accordance with the qualitative risk assessment matrix, it is considered appropriate to assign a Target Sensitivity classification of 'Low'.

In view of the evidence of recent monitoring data, but in consideration of the very recent nature of the completion of restoration works, it is considered appropriate at this time to conservatively assign a Source risk classification of 'Medium' to Tsung Kwan O Stage II/III Landfill. It is expected that this classification can be reduced to 'Low' prior to the construction of the temporary bus depot as and when monitoring data further confirm the effectiveness of the recently installed gas control measures.

In light of the lack of details on geology, hydrogeology and anthropogenic gas migration routes, and in recognition of the short distance between the site and the landfill, it is reasonable to assume a worst case scenario and to assign a Pathway criteria of 'Very Short / Direct' for the purposes of the preliminary qualitative risk assessment.

The qualitative landfill gas risk assessment has indicated that the risk of gas ingress into the proposed temporary landuse at Area 85 is low. Thus the landfill gas risk to the operation of the proposed temporary use is also low.

Hazard:- The two fuel (Diesel Oil) storage tanks will be installed above ground by a recognised oil company in accordance with the requirements from the Fire Services Department. The capacity of each tank is approximately 22500 litres. A licence for the storage of such fuel will be granted from the Fire Services Department under the Dangerous Goods Ordinance (Chap.295) prior to the operation of the proposed temporary bus depot. As a result, no adverse impact would be anticipated.

ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS

Describe measures to minimise environmental impacts

Construction Phase

Recommended mitigation measures:

- (a) Dust suppression measures as stipulated in the Air Pollution Control (Construction Dust) Regulations will be included in the contract document and will be implemented by the contractor during the construction period.
- (b) Sediment traps will be installed at site discharge points to eliminate high levels of suspended solids from site discharge to within the requirement of the Water Pollution Control Ordinance (Cap.358).
- (c) Suitably inert solid construction wastes generated from the site will be properly directed to public dumping sites. Off-site environmental impacts will be minimized by good waste handling practices such as avoiding overloading of transportation vehicles, securely covering the vehicle loads with tarpaulins and following strict instructions to ensure that construction wastes are dumped only at the designed disposal site.
- (d) The findings of the qualitative landfill gas assessment have indicated that the risks posed to the temporary bus depot within Area 85 by Tseung Kwan O Stage II/III Landfill are low. However, there will still be a need to ensure that adequate precautionary measures are taken during the construction phases of the proposed temporary use. These measures include:-
- All relevant construction workers should undergo training about the risks and indications of landfill gas and should be thoroughly versed in first aid and emergency and evacuation techniques.
 - A no smoking policy should be strictly enforced on the site.
 - The possibility of methane rich air being taken into diesel-engined plant should not be overlooked, although this is not likely to occur.
 - All electrical equipment (including extension leads) should follow the appropriate requirements set out in the Code of Practice within the Electricity (Wiring) Regulations.
 - As a minimum, no work should be undertaken in the absence of fire extinguishers.
 - Monitoring of methane, carbon dioxide and oxygen should be undertaken at all times during any excavation works using suitable equipment. Monitoring equipment should have, as a minimum, the indication ranges set out below.
- | | |
|-----------------|--------------------------------------------------------|
| Methane: | 0 - 100 % LEL(Lower Explosive Limit) and 0 - 100 % v/v |
| Carbon Dioxide: | 0 - 100 % v/v |
| Oxygen: | 0 - 21 % v/v |
- As a minimum, monitoring frequency should be undertaken on an hourly basis during excavation works and should always be undertaken by suitably qualified personnel. All measurements should be recorded and included in the site diary.

Requirements to be achieved by mitigation measures: as described above

Where mitigation measures to be installed: within the Site

When mitigation measures to be implemented: during the construction period

Parties responsible for implementation of mitigation measures: KMB's contractor

Operational Phase

Recommended mitigation measures:

- (a) The proposed wastewater treatment system will comprise of three principal pieces of equipment: the mix tank, sludge holding tank, and filter press. This proposed wastewater treatment system will be designed to comply with the water quality standards for Junk Bay Water Control Zone as stipulated in the Water Pollution Control Ordinance (Cap.358). Under the Water Pollution Control Ordinance, a waste water discharge license will be obtained from Environmental Protection Department (EPD) prior to discharge the treated effluent into public sewers.
- (b) Sludge generated from the filter press of the waste water treatment system, will be collected and dumped to the appropriate dumping site by a registered contractor holding a valid sludge disposal licence under the Waste Disposal Ordinance (Cap.354).
- (c) The refuelling area will be sited as far as away from ASRs as possible and will be covered at the top only for protection of refuelling facilities. Therefore, the refuelling area is still open to all sides to avoid accumulation of odorous emission.
- (d) The following precautionary measures will be undertaken during the operational phase of the proposed temporary bus depot:
 - all personnel and staff working at the temporary bus depot should be educated in the dangers of landfill gas;
 - smoking should be prohibited on the site at all times;
 - the presence of landfill gas should be assumed and suitable precautions should be adopted at all times by maintenance workers;
 - specifically, all maintenance workers inspecting any manhole should follow the Safety Guide to Working in Confined Spaces to ensure compliance with the Factories and Industrial Undertakings (Confined Spaces) Regulations of the Factories and Industrial Undertakings Ordinance;
 - a strictly regulated “work permit procedure” involving training should be implemented;
 - although no underground cavities or rooms are proposed for normal human access, adequate ventilation of above ground buildings should be maintained (where appropriate); and
 - all electrical equipment should follow the appropriate requirements set out in the Code of Practice within the Electricity (Wiring) regulations.
 - To further minimise any potential opportunity for electrical services conduits to facilitate a landfill gas hazard risk, electrical service entries into above-ground enclosed buildings will also be made above ground level. This approach will effectively provide an ‘atmospheric break-leg’ thereby eliminating the risk of gas entry to the interior of any enclosed buildings.
 - The assigned person in charge of the depot should maintain close liaison with Environmental Protection Department (EPD) to remain up to date with the findings of the formal landfill gas monitoring programme (as undertaken as part of the TKO Stage II/III Aftercare works) already underway. In addition to this, a landfill gas surveillance exercise will be undertaken within the Site. This surveillance exercise should be:

- undertaken in any fully enclosed buildings on a quarterly basis;
- undertaken using equipment of a specification described in the previous section; and
- Undertaken for the duration of the site occupancy, or until such time that EPD agree that surveillance is no longer required.

(e) In the unlikely event that the residential development in Area 86 comes into operation before the expiration of the lease tenancy of the proposed temporary bus depot, the bus depot will be relocated before the occupation of the residential development in Area 86.

Requirements to be achieved by mitigation measures: as described above

Where mitigation measures to be installed: within the Site

When mitigation measures to be implemented: during the operation period

Parties responsible for implementation of mitigation measures: KMB

Comment on the possible severity, distribution and duration of environmental effects

As the residential development in Area 86 will not be operational for the duration of operation of the proposed temporary bus depot under the short-term lease tenancy, no adverse effects on this Noise Sensitive Receiver will occur. In a case where the residential development in Area 86 was operational earlier, the proposed temporary bus depot has potential to cause adverse noise impact. Therefore, the proposed temporary bus depot will be required to move before the occupation of the residential development.

Comment on any further implications

The environmental implications of the proposed development is to bring in an environmental improvement to surrounding residential buildings in the vicinity of the existing temporary bus depot at Area 13 Tseung Kwan O, particularly with respect to the noise aspects. Due to the remoteness of this proposed site, the environmental impact on the surrounding environment would be minimal before the operation of the residential development in Area 86.

USE OF PREVIOUSLY APPROVED EIA REPORTS

Restoration of Tseung Kwan O Landfills: Detailed Environmental Impact Assessment (dated 3/11/97)

Restoration of Tseung Kwan O Landfills Final Report (dated October 1994)

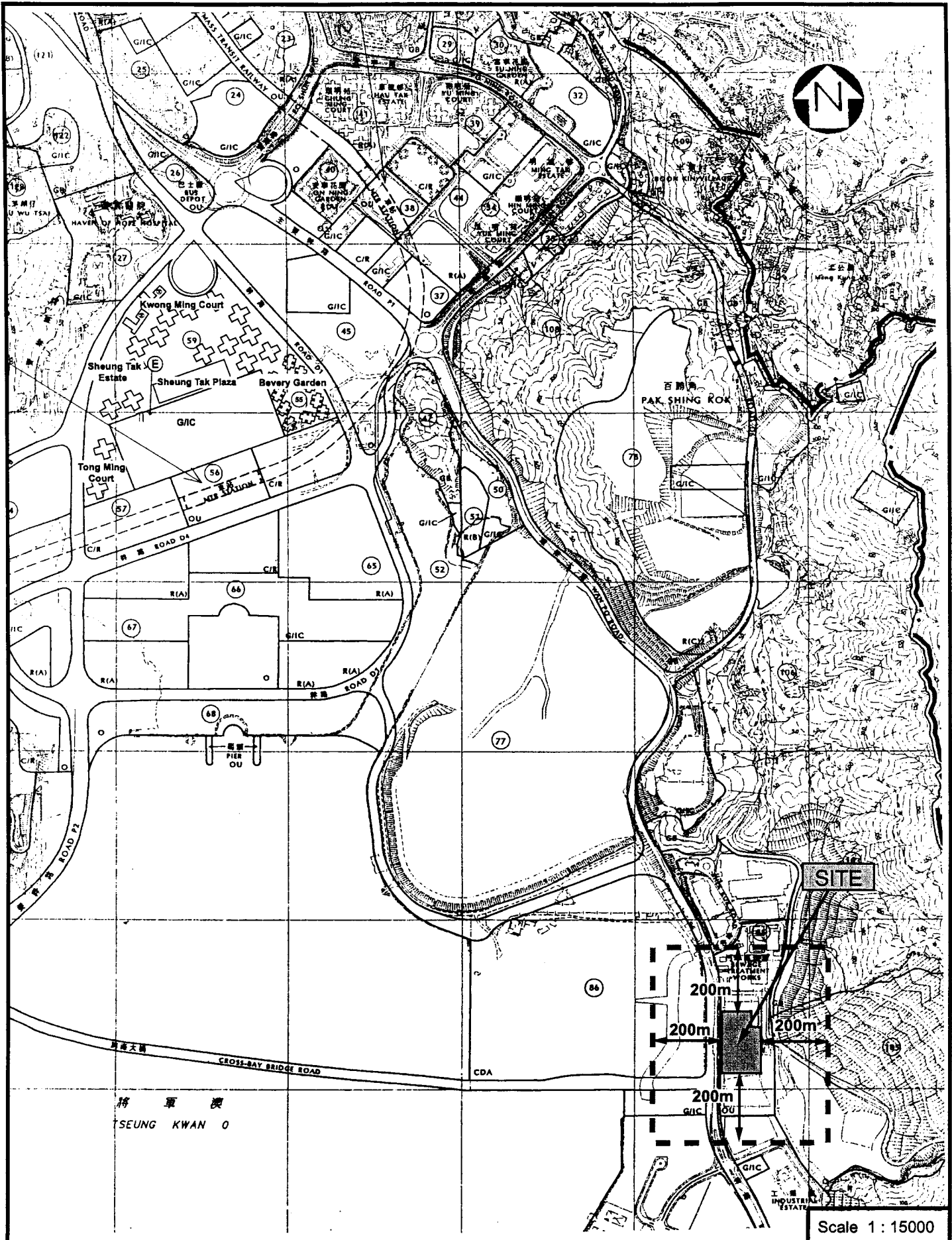


Figure 1 Site Location shown on Tseung Kwan O Outline Zoning Plan No. S/TKO/6

Figure 2

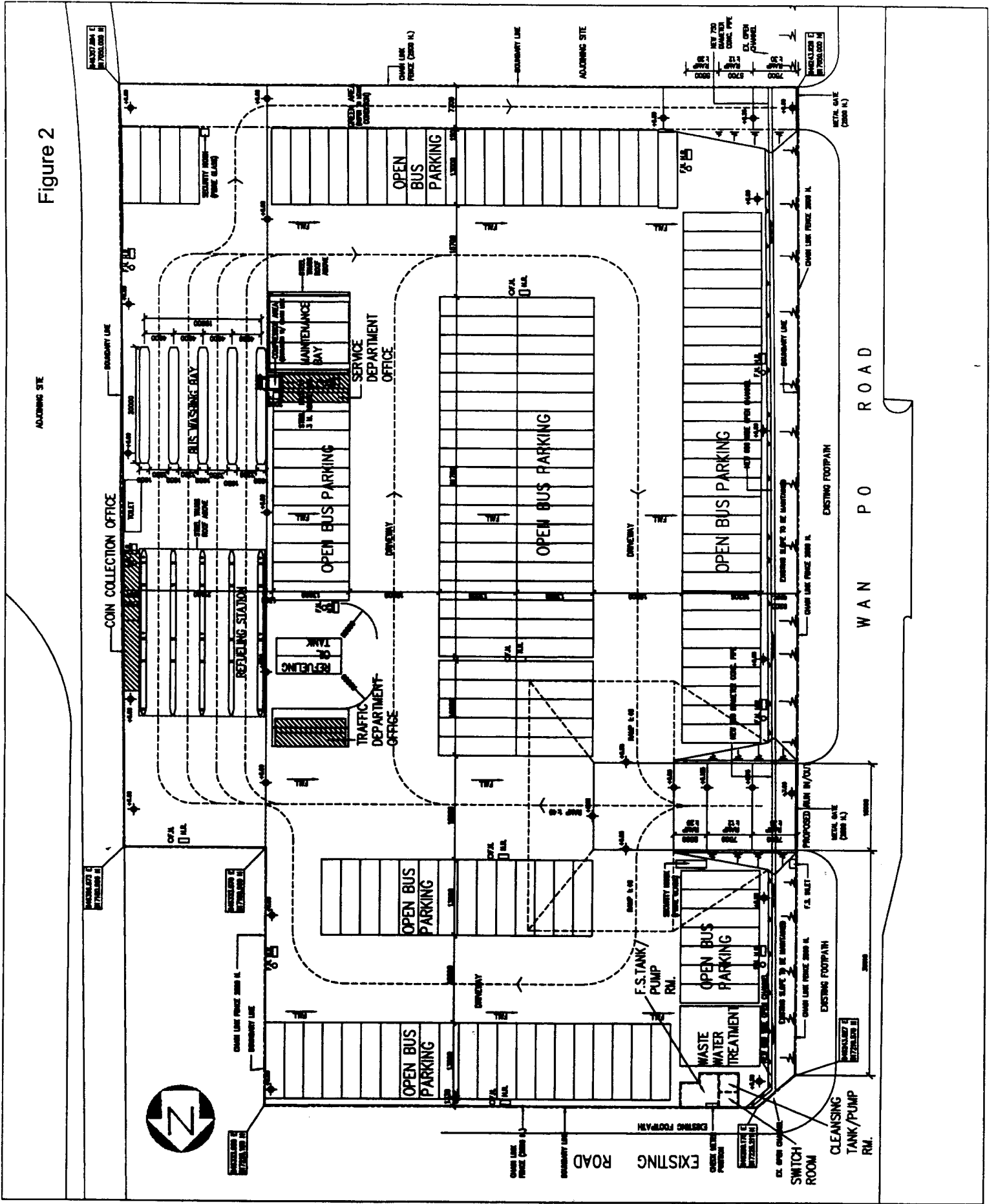
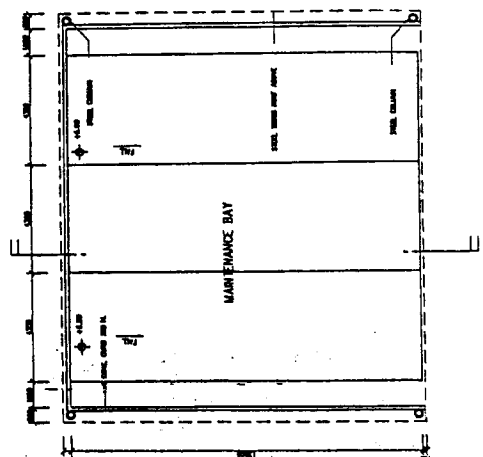
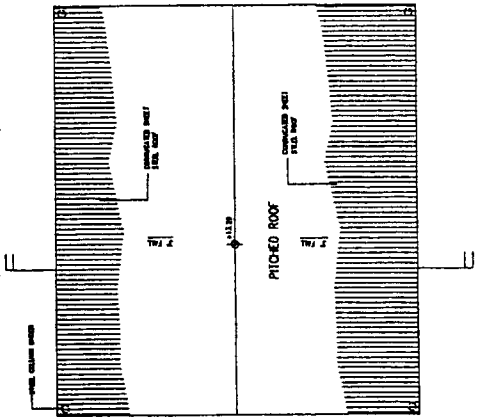
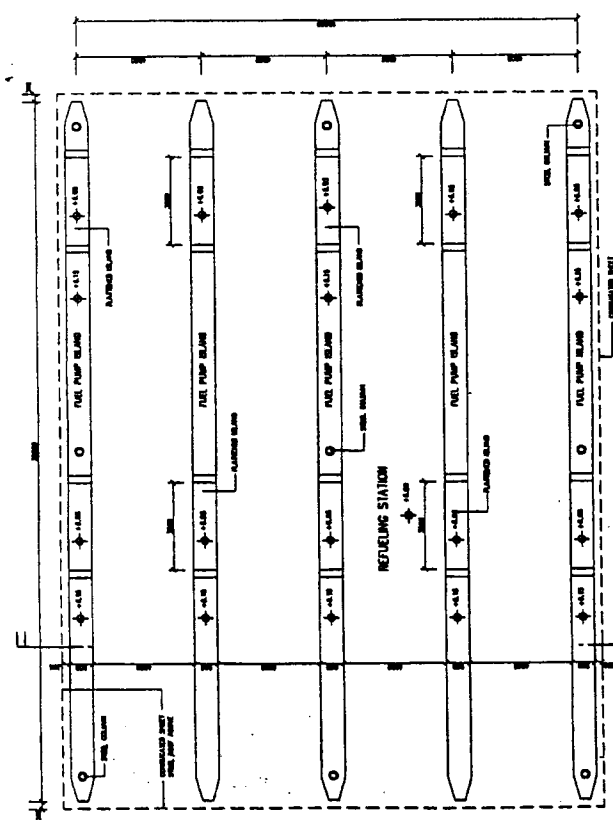
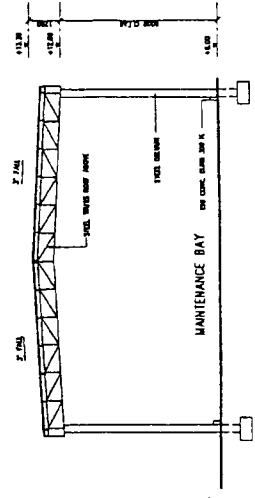
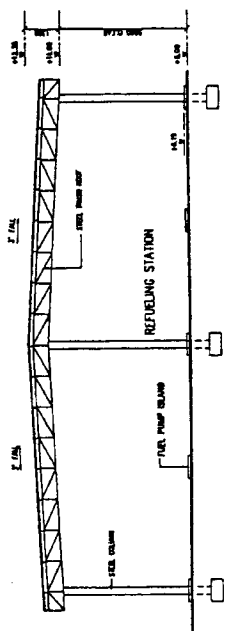
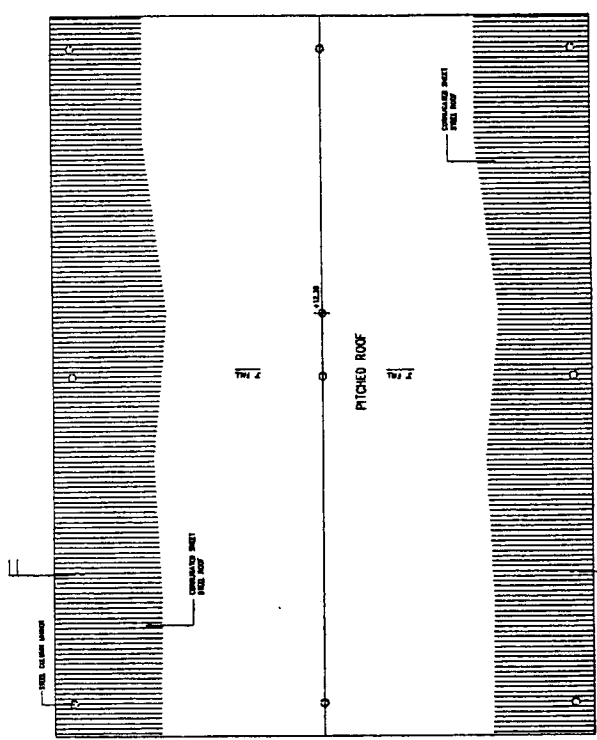


Figure 3



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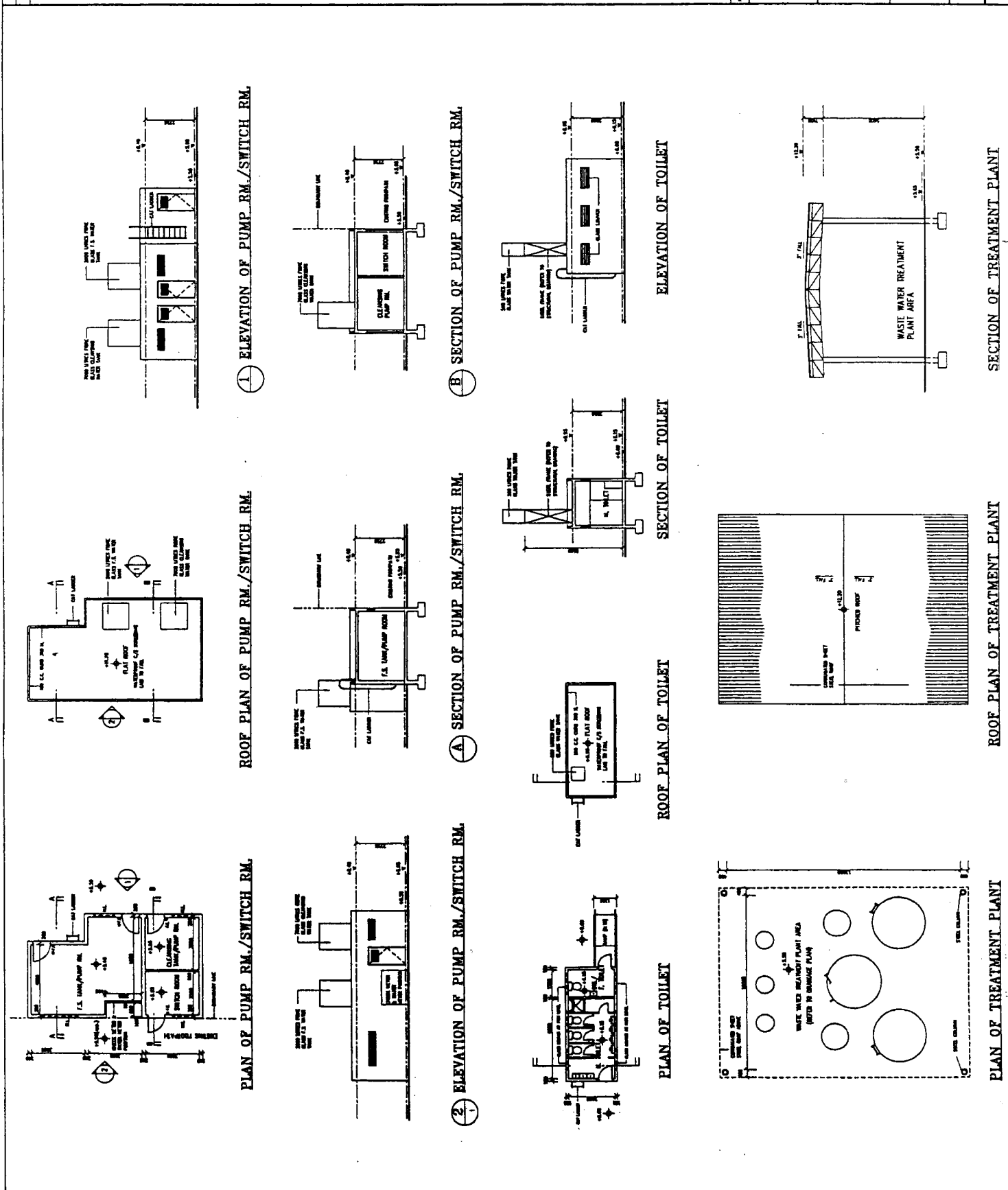
PREPARED BY
Amstar China Ltd
 127, The Arcade, Causeway Bay, Hong Kong

PROJECT
 A member of the oil field group of companies
AMARS

**PROPOSED TEMPORARY BUS DEPOT
 AT AREA 85 TKO
 TSEUNG KWAN O, N.T.**

**REFUELING STATION &
 MAINTENANCE BAY
 (SHEET 2 OF 3)**

SCALE AT 1:100	SCALE AT 1:50	SCALE AT 1:25	SCALE AT 1:10
DATE 8-59	DATE 8-59	DATE 8-59	DATE 8-59
NO. 2943	NO. 2943	NO. 2943	NO. 2943
DRAWING NO.			NO. A-02



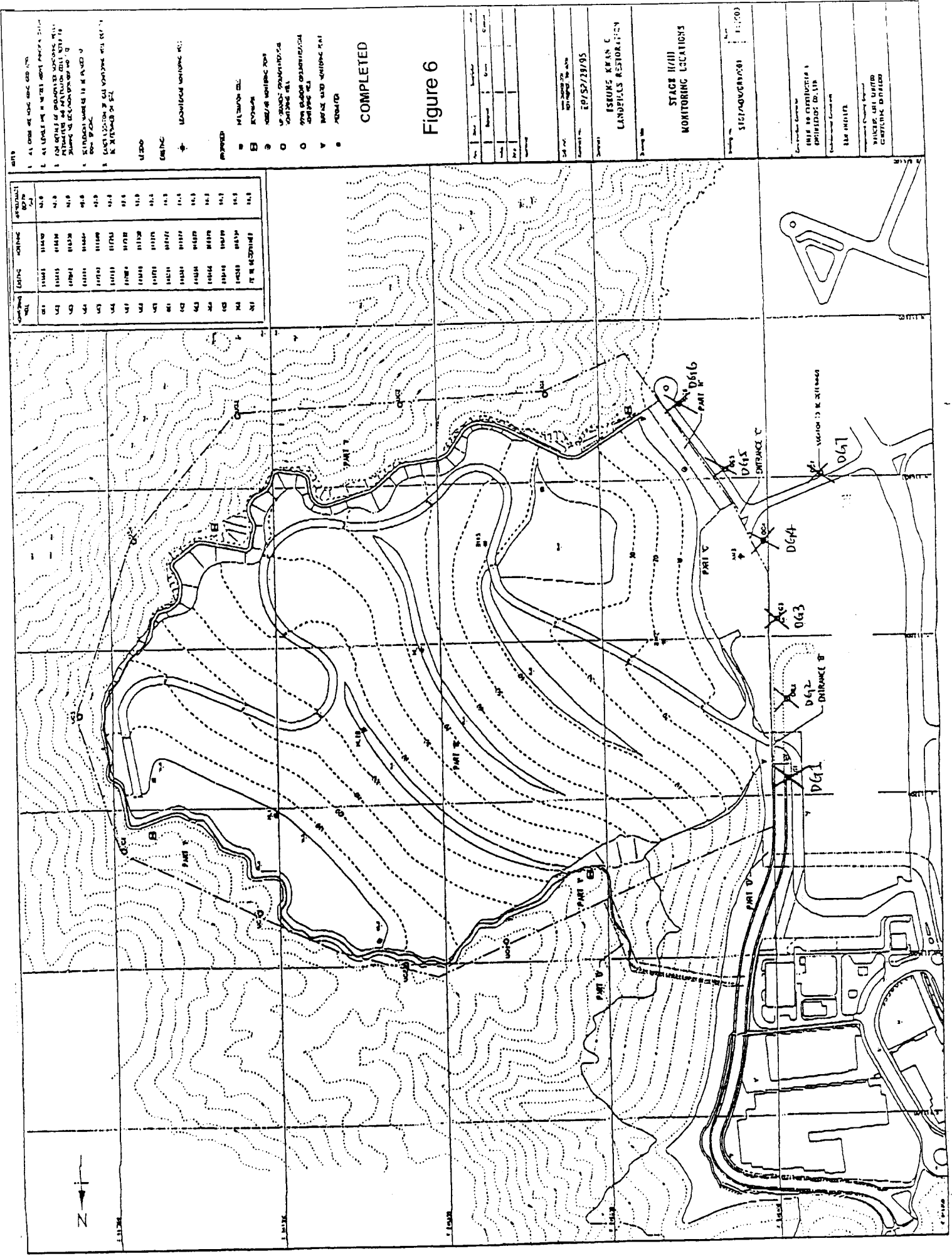


Figure 6

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COMPLETED

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Area 2										
Area 3										
Area 4										
Area 5										
Area 6										
Area 7										
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Date: 10/25/95
 Project: ISEOKJEON KEAM C LANDFILL RESTORATION
 Drawing No: 10/25/95

STAGE II/III
 MONITORING LOCATIONS

Scale: 1" = 100'
 Date: 10/25/95

Prepared by: [Name]
 Checked by: [Name]
 Drawn by: [Name]

Table 1

Landfill Gas Migration

Location	Date of Sample	Time		CO ₂ (%)	Methane (%)	O ₂ (%)	Pressure (mbar)	Temp. (°C)	Remarks	Laboratory result					
		From	To							Methane, %	CO ₂ , %	H ₂ , %	N ₂ , %	O ₂ , %	
2DG1	31-Aug-98	18:00	18:05	7.1	0.0	11.2	4.0	34.1		<0.25	<0.31	<0.06	<0.12	79	21
	23-Sep-98	15:00	15:05	4.8	0.0	14.8	4.0	37.9							
	9-Oct-98	15:03	15:08	4.4	0.0	10.2	0.0	32.8							
	14-Oct-98	14:30	14:35	2.2	0.0	17.2	5.0	41.2							
	30-Oct-98	11:46	11:51	3.5	0.0	15.8	2.0	30.7							
	11-Nov-98	12:10	12:15	3.1	0.0	17.1	3.0	25.0		<0.25	<0.31	1.5	<0.13	74	21
	26-Nov-98	11:50	11:55	4.2	0.0	15.4	2.0	27.4							
	14-Dec-98	14:05	14:10	1.9	0.0	18.5	0.0	21.8							
	12-Jan-99	11:10	11:15	3.8	0.0	15.4	1.0	27.4							
	8-Mar-99	14:00	14:05	0.3	0	19.3	0	19.2							
20-Apr-99	10:40	10:45	0.6	0	19.5	2	25.4								
2DG2	31-Aug-98	17:42	17:47	11.2	0.0	2.3	4.0	34.2		<0.25	<0.31	4.8	<0.12	86	7.3
	23-Sep-98	14:52	14:57	11.8	0.0	1.7	4.0	34.8							
	9-Oct-98	14:52	14:57	12.8	0.0	3.6	1.0	32.6							
	30-Oct-98	11:55	12:00	12.3	0.0	4.5	3.0	27.5							
	11-Nov-98	11:50	11:55	11.7	0.0	5.4	3.0	29.4		<0.25	<0.31	5.4	<0.13	72	12
	26-Nov-98	12:00	12:05	9.6	0.0	7.4	3.0	26.6							
	14-Dec-98	12:40	12:45	12.3	0.0	3.5	0.0	21.4							
	26-Feb-99	14:10	14:15	11.4	0.1	7.1	1	28.5							
	31-Aug-98	17:31	17:36	0.1	9.2	2.4	5.0	32.0		12	<0.31	2.0	<0.12	83	4.7
	23-Sep-98	14:40	14:45	3.1	0.0	10.0	3.0	31.7							
2DG3	9-Oct-98	14:42	14:47	0.5	12.0	5.5	2.0	26.3							
	14-Oct-98	14:20	14:25	7.5	7.0	0.2	4.0	36.1							
	30-Oct-98	11:35	11:40	7.0	5.2	0.5	2.0	28.4							
	11-Nov-98	11:35	11:40	8.5	9.7	0.1	2.0	24.3							
	26-Nov-98	12:15	12:20	7.2	10.6	0.2	4.0	27.2		8.5	<0.31	4.9	<0.13	71	8.3
	14-Dec-98	12:32	12:37	8.2	9.0	0.1	1.0	19.2							
	12-Jan-99	11:03	11:08	6.2	7.9	1.2	2.0	25.2							
	26-Feb-99	13:55	14:00	6.8	1.8	0.1	2	21.9							
	8-Mar-99	14:10	14:15	7	1.1	0.2	0	20.6							
	20-Apr-99	10:26	10:31	3.5	0	7.6	1	25							
2DG4	31-Aug-98	17:08	17:11	5.8	0.0	10.0	2.0	30.7							
	23-Sep-98	14:20	14:25	6.0	0.0	10.0	3.0	40.7							
	9-Oct-98	14:23	14:28	0.0	0.4	18.9	1.0	32.4							
	14-Oct-98	14:55	15:00	5.0	0.0	11.2	6.0	30.3							
	30-Oct-98	12:05	12:10	5.9	0.0	12.7	3.0	33.1							
	12-Jan-99	11:25	11:30	5.2	0.0	13.6	2.0	28.0							
	9-Mar-99	12:12	12:17	4.8	0	14	0	17.6							
	20-Apr-99	10:50	10:55	0.9	0	19.1	2	25.8							

