

Annex
Supporting Paper on Airport Masterplanning

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Synopsis

This paper explains the use of Airport Master Plans (rather than Asset Management Plans) as best practice to serve the particular needs of the airport industry stakeholders, including:

- how international standards of operation and maintenance for the safe continuity of critical services are assured by Civil Aviation Authority licensing and audits
 - why consumer service risks are therefore not related to asset failure but rather the failure to plan for asset developments
 - the multiplicity of airport services provided by other businesses and government agencies
 - the range of airport stakeholders with different interests
 - how master plans, and further consultation during the detailed planning of airport facility development projects, serve stakeholder information requirements
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1. Purpose of Paper

In support of the NZ Airport Association's response to the Commerce Commission Discussion Paper on Information Disclosure, this paper explains the use of master plans as best practice in the airport industry.

2. Author

The author is a UK based independent consultant airport planner and engineer with over 35 years international experience of airport planning, design and development. His familiarity with New Zealand airports is limited to recent roles for AIAL as an expert witness and subsequently providing advice on planning principles and processes. The author's curriculum vitae is attached at Appendix A.

3. Background

The purposes of Part 4 are stated in the Commerce Act 1986. The Commerce Commission has proposed Asset Management Plans (AMP) to facilitate assessment of the following objectives in the purpose statement:

- a) incentives to innovate and invest, including in replacement, upgraded and new assets
- b) incentives to improve efficiency and to provide services at a quality that reflects consumer demands

An AMP may be an appropriate and effective methodology for a utility company, and may represent best practice within the utilities industry. However, the airports industry has evolved its own 'industry specific' asset management discipline. This paper outlines the reasons for and importance of the airport industry use of master plans and how these serve the particular needs of the industry stakeholders.

4. The Airports Industry: Primary Aviation Functions

Airports are specialised interchanges between surface and air modes of transport. Airports are the location of a cluster of services by different providers. The airport owner / operator is the 'landlord' providing infrastructure, some facilities and some services to all other service providers as tenants. The primary 'products' of airport services are the safe and efficient transfer of passengers and freight between surface transport and air transport.

Airports are land extensive fixed capital works with wide impacts on surrounding communities and infrastructure. International airports are also national border crossing points and provide services to international airlines. Clearly all such operations require strict rules and standards for the conduct of safe and efficient operations.

Aviation evolved in the 20th century and is internationally regulated to ensure standards of safety worldwide. ICAO, which is a United Nations agency founded in 1944, is the primary institution for the regulation of safe and consistent operational procedures. The standards are predominantly concerned with flying safety (approach and departure) and the ground operations of aircraft and the licensing of related skills (rather than terminal buildings or the landside support functions).

All aviation nations are contracting states that abide by ICAO standards. National regulations supplement the ICAO international standards with some detailed interpretation of local practices.

New Zealand is a contracting state and follows ICAO standards and recommended practices for airport planning in all respects that specify the dimensions of airside areas and related off-airport zoning to protect flying operations (as contained in New Zealand's Civil Aviation Act 1990). These standards determine the scale and form of land areas that have to be committed to airside use and the constraints that apply to surrounding land.

ICAO also provides guidance on the required minimum content of airport master plans to show how the (ICAO and National) standards are met. These plans extend well beyond the physical

airport boundary to show safeguarded aeronautical surfaces (height restrictions and the marking of obstacles) the protection of navigation aids and other restrictions on surrounding land use to mitigate adverse safety and noise impacts. Master plans also show long-term land safeguarding for future development of the airport and its future impact on surrounding land use. The regulation of such standards and associated operational practices are invariably by a Civil Aviation Authority established by the government as an independent specialised agency.

Primary airport infrastructure and operations are subject to strict international rules and standards and compliance is regulated by the Civil Aviation Authority. In New Zealand the capability and management systems of the airport operator required to maintain ongoing compliance are confirmed by the CAA prior to initial certification of the operator, then comprehensively reviewed every five years through a recertification process. Day to day operational and asset management practices are subject to regular audits and inspections by the CAA, supplemented by comprehensive reporting and investigation systems.

For passenger and freight handling facilities, the International Air Transport Association ("IATA") represents the airline interests in the way airports are planned. In the IATA 'Airport Development Reference Manual' IATA sets out many aspects of best practice from the airline perspective to ensure cost effective capacity and levels of service. These guidelines provide the baseline reference material for airport facilities planning and their review with the airlines. Airline consultation is generally through an Airport Consultative Committee (ACC) established for each airport and particularly active in the review of draft master plans and the design of major airport infrastructure and facilities.

The above is a simplified summary of the 'primary' aviation functions and agencies. However, airports also encompass a wide range of other activities that support aviation functions with diverse stakeholders.

5. Airport Stakeholders

Airport planning involves a broad community of interests:

- Regulators: ministries & their agencies; transport, civil aviation, defence, environment, finance, commerce etc
- Airport owner / operator / developer
- Lenders: shareholders, institutional investors, loan agencies
- Legal authorities; for planning, title, contracts, tax, employment, social and environmental responsibilities etc
- Community: regional economic, social and environmental impacts on landowners, residents, employment, noise, traffic, effluents, etc
- Airport users and tenants: airlines, air traffic control, fire crash & rescue, ground handling agents, freight forwarders, retailers, caterers, hotel, bus & taxi operators, rental car agencies, etc
- Police, aviation security, and border control agencies: police, customs, immigration, health, agriculture, security, intelligence, etc
- External infrastructure: highway, rail, power, water, communications, fuel, etc.

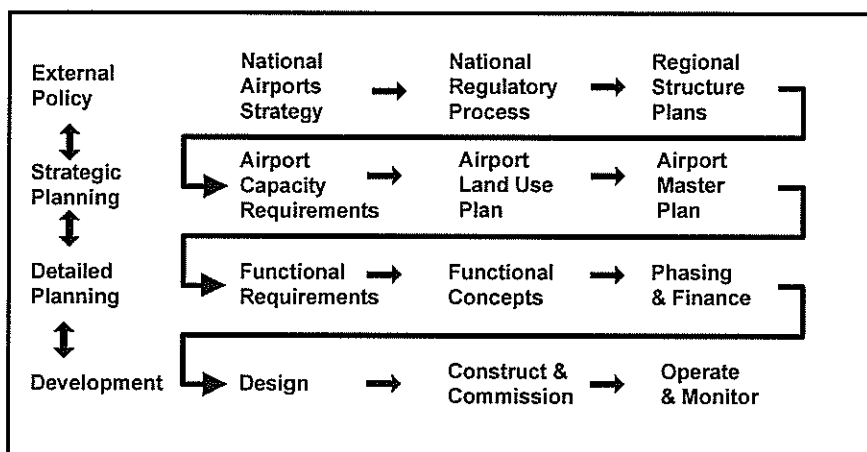
All of these stakeholders contribute to shaping and delivering airport services. The airport owner / operator has different statutory or contractual relationships with each party and different 'information sharing' relationships relating to their particular interests.

These disparate interests are notoriously difficult to co-ordinate and reconcile, and any stakeholder may have the power to impede agreement of plans and the effective implementation of airport development. Airports are therefore subject to planning procedures to resolve these multiple and disparate interests.

6. Airport Planning Hierarchy

Airports are major elements of public infrastructure with significant economic, social and environmental impacts. The approval processes for airport development therefore involve a hierarchy of national, regional and local interests, as well as the direct airport stakeholder interests (eg airport authority, airlines, and border control agencies).

Figure 1: Airport Development Processes: illustrates a model planning hierarchy of linked processes.



A national airport strategy designates each airport's role and long term contribution to the nation's air transport infrastructure. Such government strategy is either explicit in published transport policy or implicit as a mandate to the airport owner / operator through enabling legislation. The national regulatory processes support the implementation of such strategic policy through laws and supervising agencies.

As a major land use with wide impacts, the airport's strategic planning is integral with regional planning. Regional structure planning helps to secure the airport's long-term role by designating land and access corridors and ensuring the compatibility of surrounding land uses.

Airport strategic planning therefore needs to safeguard ultimate development requirements. Internal land use and development phasing depends on the progressive evolution of the airport operational demands over time.

This is an utopian model. In practice the relations between the processes are imperfect due to the parties' differing perspectives. However, as airports respond to air traffic growth and other development pressures, some form of the above model is a pragmatic necessity. In any region the options for meeting air transport demand growth are limited. The outcome is likely to include the continued development of the existing airport to its capacity limits.

The external policy processes establish the governmental mandate for the airport's social and economic role, regulatory control of the airport operator, and the regional consensus for airport development. These are managed by elected representatives in accordance with prevailing laws and procedures of public administration.

The airport strategic planning either complies with external policy or seeks change through consultation with national and regional authorities. In general, planning consents reflect the agreement of these elected bodies that the proposed development properly serves public interests.

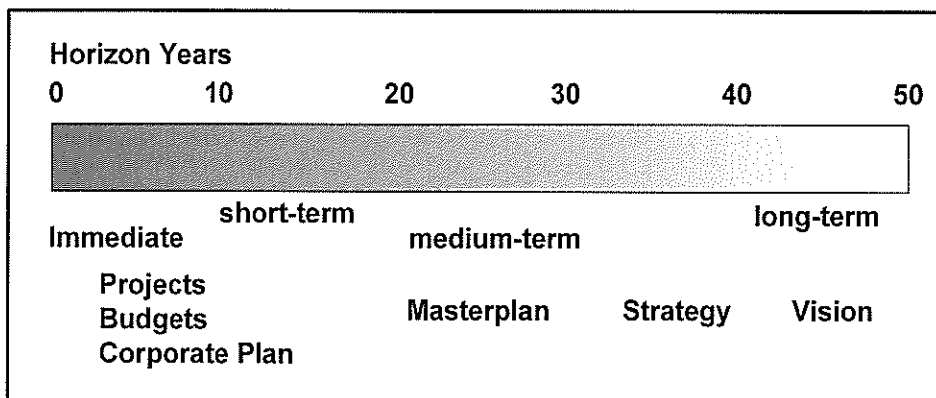
The dialogue between the airport operators and the governmental agencies addresses a range of public interests. In particular, public policy seeks to balance the national / regional social and economic benefits with the fair treatment of those locally impacted by the airport development and operations.

This balance requires that the parties recognise different airport planning horizons for different purposes.

7. Airport Planning Horizons

Airports are long-term public infrastructure investments for past, present and future generations. NZ international airports have a history of over 40 years and will remain a critical regional asset for at least the next 50 years. Planning methods address various timescales for different purposes.

Figure 2: Airport Planning Horizons illustrates the time frames of different aspects of airport planning



Immediate and short-term planning is required for the management of airport operations, maintenance and development projects. These take various forms and are part of business as usual for airports. [Unlike utility companies, in the experience of airports, the greatest risk to asset management for airports – is failure to anticipate or plan, rather than a failure to maintain.]

Master planning establishes the medium-term trends which determine the requirements for major capital investments. Such major infrastructure and facilities development planning, approval and implementation generally takes five to ten years. Therefore such capacity development looks two decades ahead to avoid being overtaken by demand growth. Some elements of the new capacity may be phased in where economic increments are feasible.

Strategic planning goes beyond trend forecasts to envision future long-term land-use requirements to safeguard the ultimate airport capacity.

Long-term propositions by infrastructure planners are often subject to public and even institutional scepticism on the basis that no one can predict so far into the future. However, failure to anticipate that significant changes in requirements will arise creates avoidable constraints and costs within a generation. The airport and regional public authorities are therefore custodians of these substantial public service investments and are obliged to safeguard their future orderly and economic development. The discharge of these responsibilities requires long-term planning for uncertain futures.

Indeed even medium-term plans are subject to wide uncertainties.

These planning horizons are longer than the commercial horizons which are adopted by many businesses (including airlines). However, public infrastructure is necessarily different and airport strategic and master planning has to safeguard the ability to continue to serve the regional air transport needs.

8. Forecasting Airport Requirements

In 50 years civil aviation has transformed from a niche service for senior government officials and elite wealthy citizens to a mass market service used each year by more than half the population of advanced countries. Air freight has changed from a mail service to the carriage of 40% of traded goods by value.

The changes to air travel markets and how they were served made forecasting on the basis of trends very unreliable. Generally, future demand was underestimated and the plans based on those forecasts were overtaken by events. Airport planners realised that "no plan survives contact with reality".

However, as growth in demand overtook built capacity, airports were able to take on-board the developments required to accommodate changes in technology and operations, and the broadening of commercial services. The effective life of some airport facilities can be as short as 10 to 15 years before refurbishment or replacement due to expansion.

In 'Airport Systems Planning, Design & Management' by de Neufville / Odoni, the authors state that:

Dynamic strategic planning ... is traditional master planning adapted to the realities of the airport and aviation industry of the twenty-first century. It recognises future uncertainties and leads to a flexible development strategy that positions airports to minimise risks and take advantage of opportunities.

The forecast is always wrong. Modern planners and managers must face this reality in the era of deregulation and competition. Airlines form alliances, merge, and change their routes and services; passengers and shippers reorient their patterns. These changes make forecasts of levels and types of traffic unreliable. Airport professionals must assume that the future reality will be different from what seems most likely at present.

Due to the dynamic changes inherent in aviation, airport plans cannot be rigidly pre-determined and fixed for the long-term. Airport planning has to chart a long-term course based on reasonable scenarios of future requirements, but remain flexible to accommodate external changes and actual operational characteristics as they arise.

The airport master plan provides stakeholders with a medium and long term view of development strategy.

The forecasting of specific requirements is subject to considerable uncertainties (including 'when' operational demands will exceed capacity). Similarly the capacity of facilities and systems are complex measures relating to acceptable levels of service during busy periods. These are impacted by changing patterns of traffic and changes to the operational use of facilities.

Airport planners test the logic of upper and lower bounds - ie how wrong could we be? This helps the airport management to understand what factors would cause lower or higher values. Some factors will be relatively stable and others found to be volatile or themselves uncertain. Exploring these ranges allows; testing of strategies for best and worst case outcomes, safeguarding of highest likely, and commitment to lowest likely with planned responses to any faster growth.

The decisions on the timing and scale of airport infrastructure and facilities developments therefore require continuous monitoring of market developments and testing of how emerging traffic patterns will impact on existing and planned facilities.

9. Demand Patterns, Utilisation and Service Efficiency

Each air traffic market (city pair) has particular characteristics which affect the aircraft size, frequency, and schedule timing of services. Airport infrastructure and facility capacity requirements are related to the demand in busy / peak hours of aircraft arrivals and departures. The scheduled patterns of traffic vary in any year by season, by day of week and by hour of day.

The mix of markets at each airport determines traffic patterns to be served. For example; a high proportion of tourist traffic will lead to higher summer season traffic levels, and a high proportion of business traffic will result in higher weekday than weekend traffic levels.

However, the critical demands for capacity are in the peak hour or typical busy hours that have to be served regularly. The capacity will be measured to provide a good level of service in busy periods with an adequate level of service in peak hours. These may include tolerance for un-scheduled peaks caused by disruptions.

At airports where traffic is fairly similar across the seasons, days of the week, and throughout the operating day, then utilisation of the capacity will be high (efficient). However, at airports where the traffic patterns are uneven and peaked, the facilities need to cope with the peaks but will be under-utilised for much of the time.

Therefore comparisons between airports utilisation will largely reflect traffic patterns rather than efficiency.

The airport has limited influence over traffic patterns. A congested airport, where peak hour demand exceeds available capacity, may be able to 'manage demand' by use of restrictions or price incentives to shift traffic away from peak periods.

Adding airport capacity tends to be 'lumpy' with relatively low early utilisation. Therefore the timing of development requires a compromise of managed demand and / or lower service standards in peak periods until the growth of demand would justify the new capacity (and costs to the beneficial user airlines and passengers).

A few years of lower service standards in peak hours may be good practice in terms of investment efficiency for the airport, airlines and passengers. Comparisons of level of service between airports, and even for an airport over time, require interpretation which will not be easily understood by the wider public and may be misused by mischievous parties seeking an alarmist story.

10. Airport Investment / Development Agreements

The masterplan strategies and concepts provide the context of the next stages of development, including the airport land use and the relationship with surrounding communities. The masterplan is stable in these respects and therefore serves these purposes.

For incremental aviation investments (such as the airfield, aircraft aprons and terminals) the scale, timing and form of development are matters for airport operator consultations with the airlines. Where development will impact other on-airport stakeholders (for example; fire crash & rescue, border agencies, into plane fuelling, etc) they are also consulted. These parties have different roles and perspectives, but all understand the industry issues involved. Each party to the consultations examines the operational benefits and commercial impacts on their business planning. These facilities planning consultations refine the development requirements and are the basis for changes to the use of infrastructure and facilities, operational procedures and lease agreements.

Similar considerations apply to landside investments, such as surface access capacity development. The regional highway authority and all on-airport agencies significantly impacted (including airlines) would be part of the facilities planning consultations.

The outcomes of these airport investment / development facilities planning agreements can be reported as annual commentaries on the realisation of the masterplan. The facility planning precedes design, tender and constructions activities and therefore information disclosure would precede implementation. The developments are incorporated in the next masterplan update.

11. Conclusions

Due to the large and lumpy nature of airport investment the greatest risk to asset management for airports, and consequently cost for consumers, is not the risk associated with reduced

NZ Airports Response to Commerce Commission on Information Disclosure: Supporting Paper on Airport Master Planning

performance of assets or asset failure, but rather the failure to anticipate or plan for the creation or migration of assets.

This has seen the development of an asset management discipline in the form of airport master plans which are focussed around ensuring:

- that the future regional role for airport services will be served
- demand forecasts and peak hour requirements are understood
- simulated demand and implications for levels of service are understood
- balance is maintained throughout the entire value chain (airspace, airfield, passenger and freight terminals, all ancillary functions, surface access and utilities)
- on-airport stakeholder engagement informs land use and processing requirements
- community stakeholder engagement reconciles off-airport impacts with the regional planning controls, including environmental measures.

The reasons asset management planning specified per master plans are more important for airports than day to day asset management practices is explained by the differences between airports and utility companies (which use Asset Management Plans):

- primary airport infrastructure and operations are subject to strict international rules and standards and compliance is regulated by the Civil Aviation Authority, This includes reviews of risk management and operational practices associated with all safety-related assets
- the primary services, passenger and freight operations, are provided to the end users by the airlines
- airport operators are landlords for multiple services provided by other businesses and government agencies
- airports provide the infrastructure and facilities for shared use by these businesses
- airports are land extensive, including the safeguarding of land for long-term capacity development (required in the public interest)
- airports have major economic, social and environmental impacts on the surrounding land use. These are resolved through master plan consultation with government agencies and local authorities and are reflected in regional plans and agreements governing those issues
- airports have multiple stakeholders with different interests in airport development plans and the delivery of airport services. All of these stakeholders contribute to shaping and delivering airport services. The airport operator has different statutory or contractual relationships with each party. The information sharing requirements of each relationship relate to their particular interests and many involve legitimate commercial sensitivities
- airport service standards and capacity involve complex dynamic measures that are not easily understood and easily misinterpreted. Direct comparisons between airports and over time will often mislead rather than inform. The agreement of development requirements are therefore more appropriately conducted between those with full insight of the dynamics and best practices of the industry
- airport investment / development planning involves extensive consultation with the concerned stakeholders from the strategies and concepts in the masterplan, through the scope and timing of particular projects, and the detailed facilities planning to refine the stakeholders operational requirements.

Other regulators have acknowledged the importance of master planning but do not require detailed asset management plans, for example the UK report of the independent panel on airport regulation, 2009 includes:

“The panel also recommends that [Tier 1 and Tier 2 airports] be subject to a licence condition requiring them to prepare and consult with the local community, passengers and airlines and others on a Master Plan for the airports development.”

The provision of master plans is also required for some Australian airports.

It is not appropriate for master plans to be updated annually. However, in order to assess material changes and progress with respect to asset developments, interested parties could be provided with annual commentaries in order to formulate their views on whether airport investment is being conducted in the long term interest of consumers.

APPENDIX A: CURRICULUM VITAE

PETER D SMITH

Personal details

Nationality	British
Profession	Civil engineer
Specialisation	Airports and project management
Position	Consultant
Year of birth	1946



Key qualifications Over thirty five years professional experience on major civil and architectural capital development projects, with nineteen years spent overseas

Management of the planning, design, construction and commissioning of major international airport projects

Education and professional status BSc (Hons) Civil Engineering, University of Surrey, 1964-1968
Member, UK Institution of Civil Engineers, 1971-2006
Chartered Engineer, UK Council of Engineering Institutions
Diploma in Economics, University of London, 1969-1972
Executive Program, Stanford University Business School, 1986

Language ability English mother tongue

Publications and lectures

Effectively Managing Project Risk in Airport Development

Asian Airports Conference - Hong Kong 1995

An Eye on the Future - Passenger Terminal Zone Planning for the 21st Century

Passenger Terminal world - January 2000

Must we live with Airport Chaos?

UK Institution of Civil Engineers Lecture

University of Surrey - July 2001

A Decisive Year for UK Airports Policy

Passenger Terminal World - June 2002

Managing Airport Planning - Interests, Cultures and Realities

Loughborough University

Postgraduate Courses in Airport Strategic and Master Planning, annual 1998 - 2003

Leadership Roles - A Customer Viewpoint

British Airways Captains Command Leadership Courses, 1998, 1999, 2000

Experience record

2006 - present

Independent Consultant

Short assignments for Halcrow and others

1993-2006 (retired)

Halcrow Group Limited

2003-2006

Air Transport, director major projects

Project Director for fast-track site investigations, design and tender documentation for the new Doha International Airport platform, with 60Mm³ of reclamation fill, 14km of revetments and the relocation to landfill of 6.5Mm³ of an old refuse tip.

1996-2003

Director - air transport

Responsible for the Halcrow Group Air Transport consultancy business worldwide. Airport projects carried out in the UK, Ireland, Taiwan, Korea, Germany, Russia, Uzbekistan, Moldova, Greece and the Caribbean. Led the airports planning component of UK Government policy development studies for the UK SE and Midlands regions.

1995-1996

Malaysia: Asia Pacific, director - airports

Responsible for obtaining and directing airport study and design projects in the region including Malaysia, Philippines, Cambodia and South Korea.

1993-1995

Malaysia: New International Airport, Kuala Lumpur, resident project director

Responsible to the company directors for the performance of the engineering planning of all airport core facilities, the design of the 120Mm³ of airport bulk earthworks, main drainage, access and airfield infrastructure, and the construction supervision of the bulk earthworks and drainage contracts. Project value: US\$3.5 billion.

1990-1993

**Ballast Nedam Group NV, Amsterdam/Riyadh
*Sulayyil Air Base, program manager***

Responsible to the board for the management of project definition, the procurement and supervision of design and site development sub-contracts, and all associated client approvals. Values are confidential. The peak BNG project organisation was over 120 expatriate and 90 third country personnel.

Development of risk and value management practices and integration into company project planning and control procedures.

1988-1990

Independent aviation project management consultant

Aircraft maintenance facilities master plan for Saudi Arabian airlines (Saudia). Adopted as policy and the basis for the first development phase.

International consortium proposal for design and management services on a military airbase project. Award obtained.

International consortium proposal for turnkey development of an aircraft maintenance facility, including alternative design for cost reductions.

1982-1988 and 1977-1981

**Saudi Arabia: Ministry of Defence and Aviation
International Airports Projects Directorate (IAP)**

IAP was responsible to the Minister for the planning, design, construction, commissioning and operation of the Kingdom's three new international airports at Jeddah, Riyadh and Dhahran, with a total capital expenditure of over US\$11 billion.

1982-1988

Director of engineering and construction

The engineering and construction department established functional and technical standards, defined project requirements, and managed their implementation through the use of contracted services. The annual construction expenditure ranged from US\$350 million to over 1,000 million. The department was typically about 100 staff, including 40 senior international professionals, 30 Saudi architects and engineers and 30 support staff.

Operated in a staff position to the IAP director general on aspects of corporate policy and long-term national aviation development issues.

1981-1982

Greece: British Airports International (BAI)

The BAI contract for project management support to the New Athens Authority ended with the project cancellation by a new government. As planning controller, tasks accomplished included:

- master plan review and forecast update
- preliminary design reviews
- financial feasibility study
- revised scope and operational criteria for a majority of the facilities
- consultancy packaging and terms of reference for final design.

1979-1981

**Saudi Arabia: Ministry of Defence and Aviation, IAP
*New Jeddah International Airport, project manager***

Responsible to the department director for all aspects of project technical management during the two years up to airport commissioning, including:

- leadership of multi-disciplinary international client project team
- co-ordination and approval of consultant and construction management activities
- co-ordination with operations, maintenance, properties, finance and legal departments
- liaison and representation with other ministries, government and tenant agencies.

1977-1979

**International Civil Aviation Organisation (ICAO)
(then) Saudi Arabia: Ministry of Defence and Aviation,
IAP
*Engineering advisor to IAP***

Planning, design and construction reviews of the three international airport projects, which were at various stages of development. Initiated major scope changes to accommodate rapid aviation growth and to rationalise operational criteria. Influenced the establishment of an operating organisation.

1974-1977

**UK: British Airports Authority (BAA)
*Consultancy Services, planner***

Assignments included land use planning, operational analysis, requirements definition, schematic layouts, cost estimates, working papers and reports for Birmingham Airport New Terminal Complex, and land use plan for Doha Airport and the terminal design competition terms of reference.

UK: Pavements Branch, BAA Engineering, engineer

Responsibilities included, planning liaison, detailed design and preparation of contract documents for concrete and asphalt aircraft pavements, associated services and site works for a new air cargo area and hydrant fuelling system contracts at London Gatwick Airport, and new passenger apron, taxiways and runway rehabilitation at Aberdeen Airport in Scotland.

1969-1974

UK: Consulting engineer

Civil design, contract documents, site surveys and investigations, feasibility studies, client liaison and site supervision, UK and from 1970 on overseas airport in Grenada, Kenya and East Malaysia.

1966-67 and 1968-69

UK: Contractor

Junior duties on several large civil works including setting-out, QC and measurement, and site investigations.