Safety Regulation Group

Civil Aviation Authority

CAP 781

Runway Rehabilitation

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Section 1

1 Introduction

The surface of a runway (known previously as wearing course) has a finite life expectancy. Due to deterioration of the surface, an Aerodrome Licence Holder (ALH) may need to renew this surface course periodically.

In the rare event that a totally new runway is to be constructed, the work is usually isolated from other aerodrome activity, which enables it to proceed without interruption. In the final stages of construction, when it becomes necessary to integrate the new runway into the existing aerodrome infrastructure, a specific management plan will be required. In all other cases, ALHs face the decision of whether to close an existing runway for the entire period of the rehabilitation work or to coordinate construction work with flying operations.

As runways can have up to a 30 year life span depending on traffic levels, it is quite possible that, at a number of aerodromes, those in charge of the project will never have attempted to rehabilitate a runway nor will ever be involved with such a project again. Only at the biggest, most heavily trafficked airports is it likely that resurfacing part or all of a runway occurs more frequently and hence a body of knowledge and experience can be assembled.

Over the last few years the changes in the UK air transport industry have seen a number of factors affect aerodromes. Due to the national increase in passengers travelling, smaller regional aerodromes have experienced a consequent increase in runway use accelerating the need for major maintenance. Another important impact has been the loss of aviation operational experience from the industry and an increasing number of senior managers entering from other spheres, instead of rising through the operational ranks.

These, together with recent experiences at a number of aerodromes, have led the CAA to identify an increased level of risk in the case of runway rehabilitation projects, especially those being undertaken by ALHs with little or no experience of such a project where public transport jet or turboprop movements are to continue during the work. The CAA believes that the provision of guidance material regarding the management of a rehabilitation programme will be beneficial to industry in helping to reduce these risks.

This guidance addresses issues in the latter case and is intended to help ALHs ensure that any such project is well planned, takes into account all potential hazards and remains safe for passengers, aircrew and contractors.

By publishing this guidance, the CAA has not sought to offer a "How to do it" guide, since the variety and complexity of solutions are manifold. The intention is to provide a series of prompts with cross-references to other material as necessary, which should assist in identifying key project milestones and the assurances required to be in place at each one.

Although renewal of the runway surface is used to illustrate the procedures to be adopted, they are also applicable to other significant projects such as reprofiling, upgrading AGL or repainting surface markings.

Further information is contained in CAP168, in particular Appendices 2 and 3.

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Section 2

2.1 Planning the project

The decision to resurface a runway, either in part or over the complete length is one not taken lightly. Clearly, the more ALHs focus on planning and allowing adequate time for the project at all stages, the better prepared they will be for unforeseen events. ALHs should obtain sufficient data to inform the decision-making process, from a number of sources, well in advance.

These can include:

- Runway Surface Friction Assessments;
- Visual inspection records;
- Specialist pavement condition surveys;
- Traffic forecasts;
- Long Range Weather Forecasts;
- Capital budget plans;
- Other projects requiring runway access;
- Other aerodromes' planned maintenance;
- Environmental considerations; and
- Consultation with stakeholders.

2.2 Engagement with Stakeholders

Early engagement of all stakeholders is vital in any runway rehabilitation project. Once an indication of either complete runway closure or phased reduced-length-working has been reached, all aircraft operators will need to assess the effects on aircraft performance and possibly make payload adjustments. If, for example, holiday charter airlines operate from the aerodrome, 12 months notice may be required due to the nature of seat sales. Part of the dialogue will be ensuring the roles and responsibilities for operations and tasks associated with the project are clearly understood and complied with by everyone concerned.

Typically, the following will require an early indication of planned runway works:

- CAA;
- Airlines including aircrew;
- Air Traffic Service Providers;
- Local Runway Safety Teams;
- Handling agents;
- Emergency services including LA contingency planners;
- General Aviation Community;
- Aeronautical Information Service (AIS);
- Other aerodromes;
- Consultative committees/local residents.

2.3 Hazard Identification

Once an aerodrome identifies the need to rehabilitate a runway by resurfacing, an important early task is the assessment of all the hazards that could affect the project.

Key areas in which to look for hazards include, but are not limited to:

1 Weather (both daily and seasonal);

2 Aircraft performance;

3 Reduced length runway operations;

4 Ungrooved runway surface;

5 Bird hazard control;

6 Rescue and Firefighting Services (RFFS);

7 Runway Incursion;

8 Control of Contractors;

9 ATC Procedures.

These are further discussed below, but a wide-ranging hazard identification process should be employed to help ensure all scenarios are examined. Bringing together different stakeholder representatives as a group to list these can prove fruitful.

2.3.1 Weather

The timing of the project can be critical and, bearing in mind prevailing weather conditions, a balance has to be made between winter with less traffic but potentially lower temperatures and summer with better weather but with the potential for greater disruption.

Items that should be considered include:

- Alerting for weather - how quickly the weather may change at different times of the year;
- Likelihood and duration of Low Visibility Procedures;
- Adverse weather including high winds, rain, snow & ice; consideration should be given to the potential impact on an immature/part reconstructed runway surface.

2.3.2 Aircraft performance

Aircraft performance may become critical if runway length is reduced or performance of the runway surface is affected by rehabilitation during operations. It is particularly important that those aircraft types that have performance certification based upon certain types of runway surfaces, such as grooved asphalt, are taken into account in respect of those periods during the project when such surface enhancements are not available over the full length.

Items that should be considered include:

- Effects of obstacles on Obstacle Limitation Surfaces (OLS) during WIP;
- PANSOPS (ICAO Doc 4444) surfaces;
- Management of aircraft operating criteria (EU-Ops) to justify reduced design criteria;
- Runway occupancy time;
- Reduced lighting/marking;
- Temporary Total Ungrooved Runway Length (TTURL).

2.3.3 Reduced length runways

If, as part of the project, work is divided up into phases where different parts of the runway remain operational with a reduced length available, restrictions may affect operators.

Items that should be considered include:

- Handover of possession - temporary closure and reconfiguration;
- Safety areas – at either end to protect from the risks of undershoot or overrun – with reduced distances the need for extensive safety areas may be increased;
- Temporary runway lighting;
- Planing-out and ramping of the surface;
- Contractor access routes;
- Human factors issues, such as misunderstanding and miscommunication[1];
- Circumstances that might cause the project to be suspended;
- Hand back at the end of each possession and inspection procedures;
- Communications of phases to stakeholders (see appendix 3).

If any part of the runway has been resurfaced but not yet grooved the runway could have to be promulgated as slippery when wet. Correct interpretation of CFME readings should indicate this; see CAP 683 Edition 3.

For a runway that normally can support CAT III operations ALHs should liaise with airlines regarding their minima for a runway temporarily without full CAT III AGL (normally Touch Down Zone and centreline lights would be removed during resurfacing projects). The impact of reduced AGL should be continuously assessed at each stage of the project with ongoing photometric checks to confirm compliance with licensing and operating requirements.

2.3.4 Bird Hazard Control

During major construction work the normal pattern of bird movements may be altered, construction work may create new bird attractants or there may be areas into which the bird hazard control team cannot gain access. An assessment of the potential changes should be made during the planning process and procedures revised as required. Increased Bird Control Unit activity during the project may require extra resources.

2.3.5 RFFS and Emergency Planning

Inevitably runway closures, which involve areas being closed to operational traffic, may restrict access to other parts of the aerodrome, such as the closure of particular taxiway routes or runway crossing points. If aircraft operations are to continue during resurfacing, for each phase of the project, access routes will need to be devised and agreed with the aerodrome RFFS, with suitable training for their crews and Air Traffic Services.

As part of the stakeholder consultation the Local Authority should be kept informed of changes that may affect their emergency response.

1. See AAIB Report N0. 3/06 G-XLAG and NOTAL 2007/02 for further information

2.3.6 Runway Incursion

Under conditions of total runway closure, incursion risks could be regarded as nil but at some aerodromes helicopter flying, the movement of aircraft for maintenance purposes or the use of subsidiary runways including grass strips may occur.

Should there be another parallel operational or standby runway, then mitigation needs to be in place to ensure the closed runway isn't mistaken for the operational runway and any parallel taxiway isn't mistaken for the alternative operational or standby runway.

Where part of the runway is given over to the contractor the risk of incursion is greatly increased. In all cases a robust plan to prevent any incursion must be in place with adequate safeguards to ensure continuous mitigation. This can include variations to the "normal" routes to and from the runway, which should be clearly marked and promulgated in advance.

2.3.7 Control of contractors

As above, the risks of incidents happening due to plant, equipment and operatives' presence on the aerodrome cannot be underestimated. Consideration should be given to areas of aerodrome land given over to the Principal Contractor for a site compound, assembly areas for work parties in advance of runway handover and storage of arisings from each shifts' work with respect to the impact on obstacle limitation surfaces etc. Specific access routes from offices and compounds should be provided and promulgated.

Where possible, ALHs should use organisations with a proven track record and experience of working airside. The ALH's staff should exercise extra vigilance until confidence with the contractors reaches an acceptable level. Particularly, the on-site creation of hazards such as waste, standing water and bird attractants should be monitored.

2.3.8 ATC Procedures

Runway closures/reduced distance operations can have a significant effect on ATC procedures, both in the air and on the ground. Often, the alternative operational full-length runway or existing reduced distance runway has limited navaids or infrastructure, which require increased spacing on approach. As a consequence, ATC workload increases and capacity decreases. At busy airports this can happen at night when ATC manning levels are normally reduced.

Further guidance is available in the form of ATSINs and NOTALs.

2.4 Risk Assessment

There are many publications offering advice on the completion of risk assessments including CAP 729 Guidance on Aerodrome Development Procedures and CAP 760 Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases.

The CAA will expect to see and approve comprehensive safety assurance documentation addressing the risks to aircraft, which shows all identified hazards have been assessed and reduced to tolerable levels or otherwise mitigated[1] before work starts.

1. NOTAL 2/2008 On Aerodrome Development

2.5 Regulatory Compliance

The CAA will also expect to receive a statement of compliance. This could take the form of a matrix (see appendix 1), which will assist the CAA in identifying areas of concern at an early stage. This should also help focus attention on the opportunity to eradicate or minimise existing licence variations.

It is the ALH's responsibility to ensure that, before construction starts, the CAA has given approval to start the project (as is required by Aerodrome Licence condition No 3.)

Projects such as this often test the aerodromes' safety management system (SMS). The ALH, through the SMS, should ensure that the project is safely managed. This will involve initial and continued coordination with all stakeholders, both those directly involved with the project and those impacted. The accountable manager should sign off all the documentation prior to submission to CAA.

During the life of the project, oversight of the continuing status of compliance should be afforded the highest priority and action taken where non-compliances are detected.

2.6 Selection of contractors

Contractor selection and tendering on major capital projects is covered by European Directives to ensure fair competition. The Official Journal of the EU is usually used to advertise any tender invitations and early engagement with prospective bidders to discuss partnering can bring cost benefits. The importance of concise Employers' Requirements cannot be over emphasised or the need to assess bids on a whole life cost basis.

Larger aerodromes may have framework or term contracts in place with pre-qualified organisations, but generally, for one-off rehabilitation projects, no previous contractual relationship will exist. The success or failure of the project can rest upon selection of the appropriate designers, contractor and sub-contractors for the project.

Effective project management of operational aspects by the ALH and by the project-managing contractors of the work itself, are essential to a successful development. Collaborative Decision Making (CDM) can assist in meeting this objective, see http://www.euro-cdm.org/ for more information.

To help inform the decision the following non-financial points should be covered:

- Demonstrated competence on previous projects;
- Health and Safety training;
- Competence of employees;
- Traditional design or Design and Build experience;
- Sub-contractor selection and project management of sub-contractors.

2.7 Selection of surfacing materials

Since the 1980s, Porous Friction Course (PFC) has been replaced by grooved Marshall Asphalt at many of the larger aerodromes in the UK. Additionally, the introduction of new materials into the UK has seen a shift towards a wider choice for runway surface rehabilitation programmes.

These include:

- Asphalt
  - Marshall Hot Rolled asphalt (HRA)
  - Beton Bitumineux Aeronautique (BBA)
  - Stone Mastic Asphalt (SMA)
  - Porous Friction Course (PFC)
- Pavement Quality Concrete (PQC).

Selection of the appropriate materials should take into account a range of factors including:

- Availability of local materials;
- Texture (Micro/macro);
- Grooving (Depth and width);
- Local Authority policies;
- Environmental impact (carbon footprint).

There is a wide range of references containing detailed technical information on the various construction methodologies and some of these are listed in Appendix 2.

Additionally, the CAA has recently issued additional guidance that ALHs may find useful in the form of NOTALS. See www.caa.co.uk/NOTALS.

Relevant ICAO documentation includes:

- Annex 14 Volume 1 Paragraph 2.6;
- ICAO Aerodrome Design Manual Parts 1 and 3 (Doc 9157);
- ICAO Airport Services Manual Part 2 (Doc 9137).

Section 3

3.1 Project Management

Although day-to-day management of the project will be vested in the Principal Contractor, as per the Construction Design and Management Regulations 2007, it is imperative the ALH retains oversight to ensure that the SMS process is being followed.

The following topics should be kept under continuous assessment:

- Daily oversight and review, both of construction and operations;
- Auditable records - sign-off each day;
- Regulatory compliance;
- Handover procedures;
- Phasing plans for access during closures for aircrew and drivers;
- Environmental considerations;
- Local noise considerations;
- Meeting production targets;
- RTF/communications onsite and to ATC etc;
- Communications with stakeholders.

Overall responsibility rests with the aerodrome's accountable manager and cannot be devolved to the contractor. A system to ensure open lines of communication throughout and an auditable trail of documentation recording processes, day-to-day meetings, design changes, actions and decisions should be in place. Relevant documents should be made available for audit by agencies affected by the work.

An Issues Log is effective for transmitting important outstanding decisions up the line. The need for a communications plan so that the correct lines of reporting and cascading are established should be self-evident.

Where contractors are given night time possession of the entire runway, or phased access to part of the runway permitted, pre- and post-shift handover briefings between the appropriate staff should take place every time. The contents of this brief should be recorded and made subsequently available for audit.

It is important to continue liaison with stakeholders during work periods on both tactical and strategic issues. Promulgation of information will help answer queries in advance and reduce the possibility of misunderstandings.

A number of key issues can affect how the project runs and these include:

- Reduced provision of AGL/Navaids;
- New obstacles in the OLS;
- Weather;
- Public Holidays.

3.1.1 Reduced provision of AGL/Navaids

CAP 168 sets out the minimum extent of markings, lighting and navaids required to support certain categories of operation. EU Ops (previously JAR Ops 1) sets out operating limitations for aircrew and details minimum services required. Maintaining

adequate guidance to aircrew at all stages should be afforded the highest priority and in particular the benefits of runway centreline lighting, where normally provided, are emphasised. It is therefore important that any changes in the extent of provision of runway services are communicated to users via NOTAM at the time of the change so that operators have accurate information available to them.

If CAT I ILS operations are supported by Human Observed Runway Visual Range (HORVR) measurement, sufficient edge lights visible from the ROP should be maintained throughout the project.

3.1.2 New obstacles in the OLS

As work progresses along a runway, contractors' plant and materials may pose a hazard by penetrating obstacle limitation surfaces.

3.1.3 Weather

Contingency plans for weather that stops work partway through a shift should be in place. Furthermore, due consideration to the effect on a programme of long term weather forecasts should be given and options to account for different scenarios developed.

3.1.4 Public Holidays

Should a rehabilitation project extend over the period of a Public Holiday, any extended shutdown by the contractor should not leave the runway with either excessive areas of ungrooved new surface course or temporarily refilled planed-off areas that could break out under repeated trafficking.

3.1.5 Temporary Total Ungrooved Runway Length (TTURL)

Once renewal of the surface course has started a three-part method of shift working may be employed:

1 Planing-off

2 Laying

3 Grooving (if required)

Decisions that can affect aircraft safety will have been made during planning and it is important that the accountable manager ensures no deviation from plan and those nightly targets are met in full.

Laying new material follows removal of the surface course, which is usually done by planing-off. If Marshall Asphalt is specified this is delivered hot and rolled into place. Because of the time taken to cure, grooving cannot generally start for at least 72 hours thereafter.

A decision about temporary total ungrooved runway length (TTURL) has therefore to be made. An arbitrary figure based on asphalt batch production and laying speed may not meet the operational requirement if the runway is to be returned to service after each night shift. 100m of TTURL on a 3km long runway will have less significance than on one 1100m long so there should be a balance against declared distances available. It should also be borne in mind that more than one area can be ungrooved over the full runway length.

Similarly, if more material is planed-off than can be re-laid during the shift, ramps may have to be formed to carry aircraft across the join between the two different surfaces. This can also result in Binder Course material being left exposed to trafficking. Either closer attention to the two parts of the operation or temporary refilling of any gap should be employed to avoid this where possible.

Section 4

4.1 Return to service

As the project enters the final phase, a number of important checks should be completed prior to returning the runway to full service. Depending on the extent of the works carried out the following may need to be considered:

- Runway Surface Friction Characteristics;
- Clear and Graded area and grass restoration;
- Delethalisation;
- AGL Flight Check;
- Navaids Flight Check;
- Notification of reopening date to stakeholders;
- As built drawings;
- CAA acceptance.

4.1.1 Runway Surface Friction Characteristics

Before any runway that has been the subject of a major rehabilitation project can be returned to service, the friction characteristics of the new surface should be assessed in line with CAP 683. This should include investigations into the wet friction characteristics under natural rain conditions. The use of high-speed runs can indicate the presence or otherwise of good macro-texture surface which aids surface water run off and helps maintain adequate aircraft braking performance when wet.

The paint markings, if reapplied following resurfacing, should use materials that maintain the friction characteristics of the surrounding surface. A number of proprietary paint additives are available.

New laid asphalt materials can exhibit reduced levels of grip whilst the surface releases volatile materials.

4.1.2 Clear and Graded area and grass restoration

If, as part of the project, excavation work in the Clear and Graded Area (CGA) of the runway strip has disturbed the ground, a careful check to ensure that it has been restored to comply with CAP 168 Chapter 3 should be made. At the same time, a check to ensure that any new construction below ground level in the CGA that features buried vertical faces has been ramped to the correct level of delethaliastion should be made. CAP 168 Chapter 3 refers.

Disturbed ground can prove an attraction to a variety of bird species that forage for food. Restricting the amount of grass contractors can have access to will minimise the problem but timely action to restore the grass should be planned. In any case, active bird dispersal by the Bird Control Unit, enhanced if necessary, should be maintained throughout the project.

Treatment of disturbed earth with the appropriate pesticide can reduce the amount of food available, though soil analysis may be required to identify which invertebrates are present.

4.1.3 **AGL Flight Check**

CAP 168 Chapter 6 requires that commissioning flight checks of new AGL installations, including (A) PAPI, shall be conducted prior to their operational use. The CAA may choose to participate in or conduct such checks.

4.1.4 **Flight Checking of Navaids**

In addition to the AGL flight check, as part of the return to service, it may be necessary to engage a specialist flight-checking organisation for Navaids such as ILS or DME.

If any NAVAID has been repositioned, the Directorate of Airspace Policy http://www.caa.co.uk/DAP will need to be informed in case of an impact on Standard Instrument Departure (SID) or Standard Arrival Route (STAR) distances.

4.1.5 **Notification of reopening**

Once the project is complete and any performance restrictions lifted, normal operations can resume. It is important to give adequate notice to stakeholders of this date so that planned flights can take advantage of the improvement immediately.

4.1.6 **"As built" drawings**

Whether traditional design or design and build is employed, appropriate "as built" drawings showing all relevant layers of information must be submitted by the contractor. Of particular importance is a record of all underground works and their location.

4.2 Learning Points

No major project involving multiple organisations working together can be expected to run without problems. Therefore, after the runway has been returned to service but before the contractors have been released, a final joint review of the project should be conducted. The process of reviewing the project with contractors should be done with the objective of capturing all relevant learning points for each organisation's mutual benefit.

This should examine:

4.2.1 What could be improved?

- Decisions;
- Processes;
- Procedures;
- Actions;
- MORs;
- Suspensions;
- Regulatory action;
- Human Factors.

4.2.2 What went right?

- Decisions;
- Processes;
- Procedures;
- Actions.

4.3 Conclusion

By using the guidance offered in this paper, applying the appropriate resources effectively (especially in the planning stages), communicating with everyone concerned and maintaining vigilance throughout, ALHs will afford themselves the best possibility of a successful project.

It cannot be stressed too much that projects of this nature require continuous monitoring due to the dynamics of the situation. ALHs must also bear in mind that any lessons learnt should be applied to ongoing aerodrome procedures.

The CAA will expect ALHs contemplating runway rehabilitation projects to have read this guidance and taken note of its contents.

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Appendix 1 Aerodrome Compliance Matrix (Version No. XX)

NAME OF AERODROME: **BROADWAY CENTRAL AIRPORT**

PROPOSED DEVELOPMENT: **PAPI INSTALLATION** **START/COMPLETION DATES:** **……**

Description	CAP Reference	Compliance Statement (include reference documents where appropriate)	Person responsible	Date
Layout and elevation Setting Angles	CAP 168, Chapter 6, Appendix 6B	Layout and elevation settings compliant with licensing criteria as laid down in CAP 168, and compatible with the aerodrome's operating environment.	A N Other	3 April '06
Wheel Clearance and Minimum Eye Height over Threshold (MEHT)	CAP 168, Chapter 6, Appendix 6B	Wheel clearance and MEHT is appropriate to the most demanding aircraft when it is at the lowest possible on-slope signal from the PAPI. This has been agreed in consultation with the CAA.	A N Other	3 April '06
Obstacle Clearance Considerations	CAP 168, Chapter 6, Appendix 6B	The approach angle is set to allow flight crew of an aeroplane receiving the lowest on-slope signal to clear all obstacles in the approach by a safe margin.	A N Other	3 April '06
Compatibility of PAPI with ILS	CAP 168, Chapter 6, Appendix 6B	PAPI is sited so that its on-slope visual indication conforms as closely as possible to the ILS glidepath signal.	A N Other	3 April '06
Installation (Left/Right) Height Spacing Between Units Position from runway edge	CAP 168, Chapter 6, Appendix 6B	 0.6m 9m 15m	A N Other	3 April '06

Description	CAP Reference	Compliance Statement (include reference documents where appropriate)	Person responsible	Date
Construction of Bases Power Supply to lamps interleaved		Concrete, depressed below ground level Yes, per Luminaire		
Initial Checking of Elevation Angles	CAP 168, Chapter 6, Appendix 6B	Theodolite used to check setting angles. No errors detected greater than +-1 minute of arc.	A N Other	10 April '06
Flight Inspection of PAPI: Check 1: Effective Range Check 2: Colour Changes - sharpness Check 3: Colour Changes – 4 reds/whites Check 4: Luminous Intensity Settings Check 5: Compatible with non-visual aids Check 6: Obstacle Check	Chapter 6, Appendix 6D	 Confirmed as Acceptable Confirmed as Acceptable Confirmed as Acceptable Confirmed as Acceptable Confirmed as Acceptable Confirmed as Acceptable	A N Other	18 April '06
Risk Assessment Methodology: Hazard Identification Consequence Evaluation Occurrence Likelihood Risk Tolerability Risk Reduction (Management)	CAP 729, Appendix B	The risk assessment methodology has been completed to the satisfaction of the airport management and all hazards have been identified; actions required to reduce the severity of the hazard and/or likelihood of its occurrence are shown in the Operational Requirement & Safety Statement, provided to the CAA.	A N Other	1 April '06

Signed ..... (Project Manager)

Dated .....

Appendix 2 Reference Material

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XP P 18-540, Aggregates –Definition – Conformity- Specifications

P 18-559, Aggregates –Determination of densities of sands and chippings in paraffin oil.

P 18-565, Aggregates – Determination of Rigden air void content

P 18-576, Aggregates – Measurement of the friability for fine aggregate

NF P 98-149, Asphalt concrete – Terminology

NF P 98-150, Asphalt concrete – Laying of base, binder and surface courses – Components – Mix components – Performance and checks.

NF P 98-216-1, Test relative to pavement – Macrotexture determination- Part 1: Sand patch test

NF P 98-218-1, Test relative to pavement – Evenness test - Part 1: Measurement with 3 m straightedge

NF P 98-218-3, Test relative to pavement – Evenness test- Part 3: Determination of longitudinal evenness indexes calculated from profilometer data

NF P 98-218-4, Test relative to pavement – Evenness test – Part 4: Mechanical profilometer with inertial reference

NF P 98-250-2, Test relative to pavement - Preparation of bituminous mixtures- Part 2: Slab compactor

NF P 98-250-5, Test relative to pavement - Preparation of bituminous mixtures – Part 5: Measurement of the density in the laboratory using a gamma densimeter

NF P 98-251-1, Test relative to pavement – Static test on bituminous mixtures- Part 1: Duriez test on hot mix

NF P 98-252, Test relative to pavement – Determination of bituminous mixtures response under compaction – Compaction test with gyratory shear press (PCG)

NF P 98-253-1, Test relative to pavement – Permanent deformation of bituminous mixtures- Part 1 : Rutting test

NF P 98-260-1, Test relative to pavements – Measurement of rheological properties on bituminous mixtures - Part 1: Determination of the modulus and the lost linearity under direct traction

NF P 98-260-2, Test relative to pavement – Measurement of rheological properties on bituminous mixtures – Part 2: Determination of the dynamic bending modulus

NF P 98-261-1, Test relative to pavement – Determination of the fatigue resistance of bituminous mixtures - Part 1: Two points flexural fatigue test

NF T 65-000, Hydrocarbon binders – Definitions and classifications

NF T 65-001, Hydrocarbon binders – Pure bitumen – Specifications

NF T 66-008, Black product – Determination of softening point on bituminous mixtures – Ring and ball method

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Appendix 3 Major Runway Works 2006 (Handout)

(With permission of BAAplc)

Introduction

During 2006 Stansted Airport Limited will undertake a major programme of work to resurface its runway. This will commence on the night of Monday 20th February 2006 and is scheduled to continue until the end of November 2006.

This work will be undertaken in three phases each of which will cause various operational restrictions. Full details are available in the relevant Director's Notices and published in a UKAIP supplement.

Works Programme

Construction will take place five nights each week Saturday, Sunday, Monday, Tuesday and Wednesday, with no work scheduled to take place on Thursday and Friday nights.

Saturday and Sunday nights there will be a full closure of the runway. On Monday, Tuesday & Wednesday nights the work will affect the runway declared distances, ground lighting and navigational aids.

There will also be block closures of the taxiway system to safeguard the closed section of runway and facilitate contractor access to the worksite.

Phase 1: Commencing on the 20th February 2006, Monday, Tuesday and Wednesday nights (23:59 to 06:00 local). There will be a partial runway closure with a displaced 05 landing threshold and a take off run of 1900m.

Phase 2: Commencing on the 25th February 2006 Saturday and Sunday nights (23:59 to 06:00 local) there will be a full runway closure for the duration of the works period.

Phase 3: Commencing the 3rd July 2006 on Monday, Tuesday and Wednesday nights (23:59 to 06:00 local). There will be a partial runway closure with a displaced 23 landing threshold, and a take off run of 1900m. This phase of work will only commence once Phase 1 is complete.

Operational Restrictions during periods of reduced distance

At the start of each nights work and before returning the runway to full length during phases 1 and 3, the runway will be closed for approximately 15 minutes to enable lighting changes to be undertaken. The lighting configuration during these phases will comply with the criteria laid down in CAP168 for non-precision approaches and take-offs where the Instrumented Runway Visual Range (IRVR) is in excess of 400m.

During reduced distance operations the ILS will not be available, a Surveillance Radar Approach (SRA) procedure will be in place, as outlined in the relevant UKAIP supplement titled 'London Stansted – Major Runway Works'.

Operational Restrictions when the full runway length is available

Unless otherwise informed, outside of the working period all runway distances will be fully available as published in UKAIP at AD 2-EGSS1-5/6.

The runway centreline and Touch Down Zone (TDZ) lighting will not be available between 1st April and 31st October 2006. Therefore runway lighting during this period will not conform to CATII/III requirements, however, a full CATIII ILS will remain operational unless otherwise advised. Operators should check their landing/take-off minima accordingly.

Designed and produced by Mark George 07863 126442

Contact Details

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or Operations Duty Manager **Tel +44 (0)1279 66 2378**

London BAA Stansted

major runway works 2006 information leaflet

(FEBRUARY 2006)

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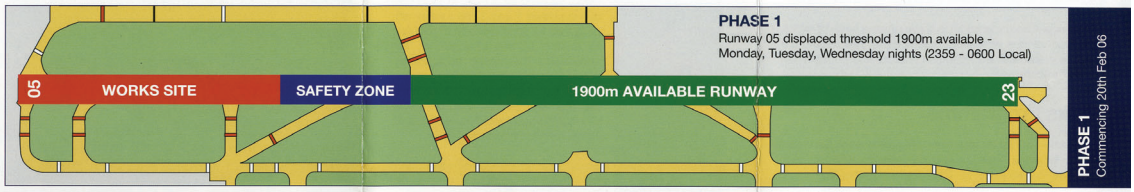

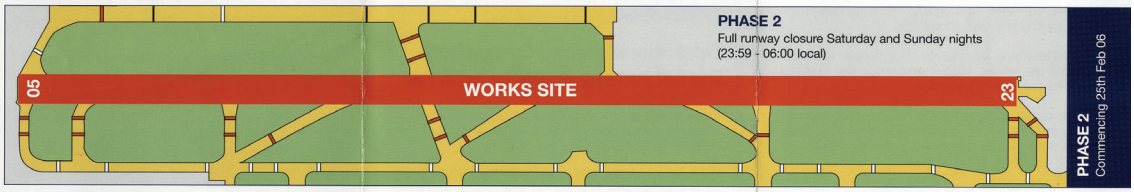

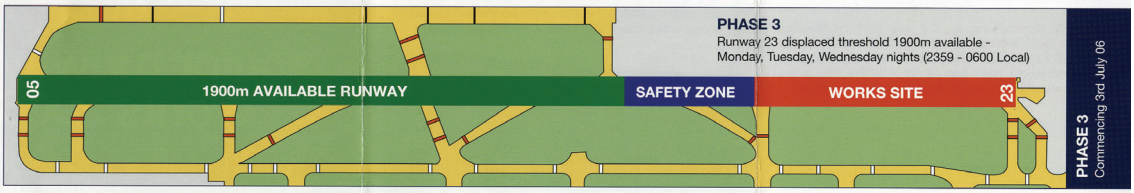

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