

# CODE OF PRACTICE

## Specification and Use of Liquid Applied Car Park Deck Systems

PRODUCED BY **THE LIQUID ROOFING AND WATERPROOFING ASSOCIATION**

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## FOREWORD

**When Peter Cowlard first approached me to comment on the draft Code of Practice being developed by the Car Decking Group of the Liquid Roofing and Waterproofing Association I was intrigued. I found myself asking all the usual questions: What is this all about? Why is it important? What's in it for me? Why should I?**

As an engineer, I think logically, and admire the 'art of parking' created by my colleagues and it always intrigues me why some car parks are obviously well-managed and maintained and yet others are clearly neglected; as a consumer I want to be able to park my car as quickly and as effectively as I can and get on with the business in hand, be it work or play; this is especially true if I have children with me.

My experience has taught me that parking is a means to an end, it is the first and last impression of my 'destination'; it needs to be good if I'm to contemplate returning there again and again. This is especially true in the retail and commercial world where [hopefully] my custom is valued. It is equally true when I visit an unfamiliar town or city, park at a rail station, or simply spend a day at leisure someplace.

For many years now there has been concern about the structural safety of the UK's car parks and I have long been an advocate of Life Care Planning for Parking Structures. A properly developed Life Care Plan enables any work to be undertaken safely and in a planned way with minimum disruption and without loss of customer confidence; it will enable

the whole life performance of a car park to be properly managed, with least disruption and to achieve maximum financial return. That can't be bad, can it? Add to that minimising the operator's exposure to a claim for negligence and consequential losses and it starts to look very appealing.

This Code sets out to help people who design, specify or have some degree of influence over the maintenance of car parks to seek out the best when it comes to maintenance of the roofs, floors and other surfaces, particularly in the prevention and management of the ingress of water. As an engineer, there is nothing worse than seeing water in structures where you do not expect to see it; as a consumer, leaking and dripping roofs which stand to make me and my car very wet or worse is unacceptable.

That someone cares enough to want to do something about this is good. The fact that a group of companies that specialise in providing goods, services and materials to enable proper and effective waterproofing and maintenance of parking structures have got together to share best practice and knowledge and raise expectations of what can be done and how best to do it is commendable.

The Code is also a useful reference for those considering the Park Mark® Safer Parking Scheme.



Kelvin Reynolds



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# 1. GENERAL

## 1.1 SCOPE

The Code covers the selection and application of Liquid Applied Car Park Deck Systems (LACPDS), Health and Safety aspects, procedures for specification of materials and methods, survey and inspection, observation of relevant regulations/legislation, utilisation of competent contractors including Quality Control and training, and maintenance.

## 1.2 INTRODUCTION

This Code of Practice has been prepared to provide specifiers, clients, suppliers, contractors, and other interested parties with a comprehensive guide for the waterproofing, surfacing and coating of trafficked car park decks using LACPDS.

This Code of Practice is issued by the Liquid Roofing and Waterproofing Association (LRWA). It is based upon best practice and provides guidance on the specification and use of liquid applied waterproofing, surfacing and coating systems.

The Code is based on the collective experience of LRWA members, and that of manufacturers, suppliers, contractors and specifiers within the car park waterproofing, surfacing and structural protection industry. It is published with the intention of improving and maintaining performance standards of LACPDS materials and their application.

Whilst details may vary depending upon specific circumstances, the approach and methods used should be substantially the same as those set out in this document. In properly maintained structures, the methods set out here are designed to achieve satisfactory performance.

The information provided in this Code should always be used in conjunction with that given by the manufacturer of the liquid systems in use. The manufacturer's detailed literature and instructions for applying the specific Liquid Applied Car Park Deck System should be carefully followed in all cases.

The Code is not designed to constitute or provide a work specification.

## 1.3 DEFINITIONS

For the purposes of this Code of Practice, the following definitions apply:

### i) CAR PARK:

In the context of this code, car park refers to the following car park structures:

- Multi-storey car parks
- Underground car parks
- Roof top car parks over occupied space

Open air, surface car parks are generally not subject to treatment with LACPDS and are therefore not included.

Car Parks may be constructed using a variety of techniques:

### Frames

- Pre-cast reinforced concrete
- Insitu reinforced concrete
- Steel

### Decks

There are numerous forms of deck construction including;

- Insitu reinforced concrete
- Pre-cast units with or without structural concrete topping
- Variations of the above construction types.

There are a number of variations on these, including car parks with permanent formwork, lift slabs, post tensioned and insulated decks, etc.

An understanding of the structure itself is required in order to determine particular areas of risk and general characteristics in terms of movement, deflection etc.

Projects where LACPDS are used may include both new build and refurbishment. As new build structures may not have been dynamically or statically loaded, may not be fully settled or have not been through thermal cycling, the risk may often be higher than with refurbishment structures, where the

results of these processes may already be evident.

The materials upon which the LACPDS may then be applied, may be any one of the following:-

- Structural insitu concrete deck
- Concrete screed to falls
- Structural concrete topping
- Pre-cast concrete (Double T without structural topping)

These constructions may previously have been covered by one of more of the following materials:

- Built-up asphalt
- Tarmac
- Stone mastic asphalt
- Hot rolled asphalt
- Bituminous coatings
- LACPDS

## ii) INSULATED CAR PARK DECKS:

**Warm Roof Car Park Deck:** In the construction of warm roof car park decks, the principal thermal insulation material lies beneath the LACPDS. The deck and cavity are thus maintained at warm temperatures during the winter.

The typical build-up from the bottom upwards comprises:

- Structural concrete deck
- Vapour barrier
- Non-compressive insulation
- Structural concrete topping
- LACPDS

**Cold Roof Car Park Deck:** In this type of construction the principal thermal insulation material is placed below the structural roof deck, normally at ceiling level. Heat loss through the ceiling is thus restricted keeping the cavity, roof deck and covering at low temperature during winter conditions. The concept is usually concerned with structures which include an independent ceiling enclosing an air space between the deck and ceiling.

The typical build-up from the bottom upwards comprises:

- Insulation
- Structural concrete deck
- Structural concrete topping or screed
- LACPDS

**Inverted Roof Car Park Deck :** In this type of construction the principal thermal insulation material is applied on top of the weatherproof covering so that the complete roof construction including roof covering is kept at warm temperatures during the winter months and at moderate temperatures during the summer months, the system is also referred to as a 'protected membrane', or 'upside down' roof. The LACPDS are used as the waterproofing layer below the insulation layer. These constructions may use a variety of coverings over the insulations including pavers on supports and structural concrete.

The typical build-up from the bottom upwards comprises:

- Structural concrete deck
- LACPDS
- Slip/drainage layers
- Non-compressive insulation
- Covering

## iii) OUTLETS:

Car park structures are constructed to falls to allow the drainage of rainwater to outlets.

Outlets may be of various designs including non-trafficked outlets, drainage channels and heavy duty trafficable outlets.

Outlets should be incorporated into the LACPDS treatments to ensure continuity of waterproofing.

## iv) UPSTANDS AND FLASHINGS:

Upstands to car parks generally comprise insitu or pre-cast concrete, brickwork or steel and should be incorporated into the LACPDS treatments to ensure continuity of waterproofing.

Consideration should also be given to abrasion in these areas; here additional steel trims may be considered appropriate.

Flashings typically comprise lead dressed into a chase, stainless steel or aluminium mechanically fixed.

## v) DETAILS:

Car park decks generally feature a range of other details including insitu penetrations, surface mounted penetrations and joints.

All details should be incorporated into the LACPDS treatments to ensure continuity of waterproofing.

#### vi) SLIP RESISTANCE:

LACPDS should be designed to provide adequate levels of anti-skid for both pedestrians and cars in both wet and dry conditions.

Guidelines are contained within "The Measurement of Floor Slip Resistance: Guidelines Recommended by The UK Slip Resistance Group: Issue 3 – June 2005 and the GLC Architects Dept. Bulletin No 43: March 1971: Slip Resistance of floors, stairs and paving.

Values of 36+ PTV (wet), as measured with the TRRL Pendulum, are considered appropriate and are designated a low potential for pedestrian slip. It may not be sufficient to use this value alone specifically in relation to the slope of the floor, here an increase may be required. Reference should be made to Section 6 of the UKSRG guidelines for further advice.

The manufacturer of the LACPDS should be consulted about the suitability of any proposed system and in specific areas i.e. car wash areas, special floor finishes may need to be considered.

#### vii) PONDING:

Although car parks are constructed with falls to allow water to drain away, minor constructional variations in the plane of the surface will allow the collection of water which has no way of draining.

This may be a risk to Health and Safety and could be addressed as part of the LACPDS treatment. The most effective method of treatment may be to install additional drainage in the affected area.

#### viii) PRE-INSPECTION:

Prior to the specification of a LACPDS it is necessary to inspect the existing structure for remedial work. Pre-inspection guides the specifier toward the most suitable system, noting the needs of the project, existing issues and priorities of all parties.

A structural survey may be appropriate to consider the effects and magnitude of any further structural movement, specifically associated with existing cracks.

It may also be appropriate to recommend further material testing prior to the specification being produced, in order to define chloride contamination, reinforcement condition and the inclusion of any deleterious materials in the concrete.

#### ix) POST INSPECTION:

All work requires an inspection following the completion of work using a LACPDS. Post-application inspection can cover such items as :

- Application rate - film thickness
- Reinforcement or special treatments
- Upstands, flashings and details
- Adherence to the design specification
- Other related matters
- Surface slip resistance testing

#### x) ELEMENTS OF LACPDS:

Common elements:

##### Substrate:

Any surface to which the LACPDS will be applied

##### Primer:

Usually a low viscosity liquid applied product, this is applied to improve the adhesion of a LACPDS system to the substrate.

##### Waterproofing Coating:

A liquid applied product, which once coated onto the primed substrate and cured will provide protection against water ingress.

##### Wearing Layer:

A liquid applied product used in combination with aggregates/fillers to provide wear resistance to traffic and to provide a slip resistant surface for both vehicles and pedestrians.

##### Seal Coat:

A liquid applied sealer to provide colour to the system, wear resistance properties, colour demarcation and in some cases UV protection.

Depending upon the purpose of the system, certain elements may be omitted or combined.

##### Reinforcement:

On occasions it may be necessary to strengthen the LACPDS by the inclusion of a suitable reinforcement between successive coats, or by the application of additional layers. Reinforcement may especially be necessary at points of stress concentration such as upstands, cracks and day joints.



## 2. GENERIC TYPES OF LACPDS

Liquid Applied Car Park Deck Systems can be categorised both in terms of chemical composition and performance criteria. Products of a certain generic type may satisfy one or more of the generic performance criteria.

Different generic types will behave differently during installation, operational use and in maintenance. It is therefore necessary to consider how systems of different polymer composition will perform relative to the client's requirements.

The following comprises a list of generic types of LACPDS in terms of chemical composition:

- Polyurethanes
- Acrylics
- Epoxies
- Bituminous emulsions and solutions
- Polyureas
- Polyaspartics

Systems applied to car park decks may contain more than one of these generic types in their multi-layer composition or may be produced from a blend of different polymers that combine positive features of more than one generic group.

It is essential when specifying a LACPDS that the performance criteria of the required system is determined. Most systems fall into the following categories:

- Un-reinforced elastomeric systems
- Reinforced elastomeric systems
- Non-elastomeric systems

In addition to the above mentioned criteria, the third consideration to be taken into account is whether the LACPDS is to be external or internal, hence determining whether the product to be used is UV stable or whether UV stability is not a requirement. The final classification can therefore be:

- UV stable
- Non UV stable

Other criteria that should be considered include:

- Aggregate finish to enhance skid-resistance
- Colour to differentiate areas
- Resistance to standing water
- Compatibility with substrate materials
- Thickness of system and resistance to wear
- Suitability for application to gradients – ramps
- Ease of repair
- Ability to overcoat
- Cure times/over-coating times/drive-on times
- Weather sensitivity
- Plant requirements / access available
- Health & Safety – risks to the public



## 3. HEALTH & SAFETY

### 3.1 SAFETY DATA SHEETS

Standard Manufacturers 'CHIP' Safety Data Sheets are essential reading prior to handling any materials. They contain information under 16 headings which are shown as following.

#### Primary Headings For Safety Data Sheets Ex Manufacturers

1. Product and company identification
2. Composition/Information on ingredients
3. Hazard identification
4. First aid measures
5. Fire fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure control/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

### 3.2 The following non-exclusive list shall be considered in relation to safety:

- CONDAM (or C.D.M.) Regulations - relationship at time of quote
- Contact with client's CDM Co-ordinator
- Safety during initial site visit by estimator
- Access for inspection purposes. Question the existence of:
  - Any 'in-house' rules regarding access within the live car park

Registering on site with the operating staff

Issues associated with live traffic

Birds (especially gulls)

Unstable parapets

- Decisions relating to specification e.g. will it be possible to transport equipment, raw materials etc., within the structure.
- Health and Safety cost implication - adequate funding should be provided.
- Risk assessment and work methods to be agreed with CDM Co-ordinator.
- Special client requirements for work area, i.e. site Health and Safety requirements, hard hats and other standard PPE, working hours, etc.
- Specification, COSHH, working environment, training, site supervision, method of work, waste regulations, disposal of containers.
- Final quality check.
- Scaffold erection and removal, if required for external works.
- Removal of residual rubbish.
- Other safety legislation such as Confined Space Regulations, Noise at Work Regulations, Working at Height Regulations

### 3.3 HEALTH & SAFETY IN CAR DECKING WORKS

Essential reading is contained in HSE Publication HSG/150 (1996) and HSG/151 (1997/2002).

These documents contain advice/information regarding safety on the site and operating safely, where an interface with the public exists.

Further areas to be considered are:

- *Role of the client*
- *Role of the operating staff*
- *Role of the designer*
- *Planning for safety*
- *Working safely*

- *General issues: -*
  - *Safe place of work*
  - *Materials handling*
  - *Falling materials and dust*
  - *Weather conditions*
  - *Electricity at work*
  - *Traffic control*
  - *Pedestrian control*
  - *Edge protection*
- *Types of work -*
  - *Refurbishment*
  - *Maintenance and cleaning*
  - *Inspection of car parks*
  - *New applications*
- *Types of deck -*
  - *Flat decks (internal)*
  - *Sloping decks (internal)*
  - *Exposed top decks (flat and sloping)*
  - *Entrance/exit ramping.*
- *Protecting the public*
- *Controlling health risks*
- *Training for operatives and supervisory staff*
- *The law*

### 3.4 CON DAM REGULATIONS

The Construction (Design and Management) Regulations 1994 has the main purpose of

establishing a Safety Management Network at all stages of a construction project. Obligations are imposed on everyone but principally on the CDM Co-ordinator and a Principal Contractor. There must be a Safety plan at all stages of the construction process to combat risks at source and this will involve a method statement based on Health and Safety Plans. LRWA manufacturers/installers of LWS must be compliant with these aims.

There exists a liability on all parties (Client and Contractor) to ensure a safe method of work at design and installation stages.

### 3.5 COSHH REGULATIONS

The Control of Substances Hazardous to Health (COSHH) Regulations, first introduced in 1988 and last amended in 2002, are designed to protect workers against the risk of exposure to substances considered hazardous to health. The use of such substances arises out of, or in connection with, work undertaken under the control of the employer. The hazards that may be associated with the chemicals used in LWS will be shown in the Manufacturers Safety Data Sheets (MSDS) issued by the material supplier. Under the regulations, contractors must prepare and submit COSHH assessment sheets to the client/contract administrator for all materials falling under the regulations.



## 4. SUBSTRATES

### 4.1 GENERAL

The primary objectives of LACPDS are to provide the following functions to the substrate on which it is applied:

- Waterproofing
- Structural protection
- Wear resistance
- Slip/skid resistance
- Aesthetic demarcation

The successful application and performance of a suitable LACPDS is highly dependent upon the suitability and preparation of the substrate. Surface coating treatments should only be carried out on substrates that are structurally sound. Care should be taken by the engineer to ensure that the application of a new decorative coating is not masking a deterioration problem within the substrate that could go undetected.

Vehicles, braking and accelerating on a surface that is required to provide skid resistance, frequently now equipped with power steering, exert high shear forces on the LACPDS. The requirement for good adhesion and sufficient cohesive strength within the surface of the substrate is critical.

Any one or a combination of the following can reduce the adhesion of a coating system:

- Concrete permeability
- Release agents or curing agents
- Water repellents
- Contamination
- Surface laitance
- Weak surface layer – poor curing
- Incompatible repair materials
- Moisture
- Existing coatings

The correct installation of a system requires that the manufacturer's recommendations be followed.

Whilst varying from system to system, these recommendations will refer to all stages of installation, including substrate suitability, preparation, moisture content and testing.

Not all systems will be suitable for use on all substrates. Specifiers of LACPDS must ensure that the substrate is suitable for the chosen system.

### 4.2 TYPICAL SUBSTRATES

- Insitu reinforced concrete
- Pre-cast reinforced concrete
- Cementitious screeds
- Asphalts
- Steel
- Existing coatings/surface treatments

LACPDS will provide fully bonded seamless coatings with varying properties as required. Pre-cast reinforced concrete substrates will therefore be required to be made continuous by either the placement of insitu stitching or by an insitu reinforced concrete topping.

### 4.3 CONCRETE FINISHES

On new construction the surface finish should be specified as recommended by the manufacture of LACPDS in order to minimise additional surface preparation. Unformed concrete surface finishes can be placed, finished and cured in a variety of ways that can have a significant effect upon surface strength, regularity and texture. The concrete specification can define the method used to finish the concrete, the surface characteristics to be achieved e.g. smooth, flat etc. or a combination of these.

LACPDS typically reflect the surface finish onto which they are applied and therefore consideration to the effect that the surface finish will have upon the appearance should be given prior to commencing the construction process. As well as affecting aesthetics, an irregular surface finish can reduce the contact area, which can accelerate wear.

Experience on site has shown that achieving the specified surface finish is variable and test panels to agree finishes will assist. Greater controls in concrete finishing can significantly reduce the amount of secondary preparation required to achieve an acceptable surface onto which a coating should be applied.

#### **4.4 ASPHALT SUBSTRATES**

Asphalt substrates will generally be found on existing car parks where for a variety of reasons the client requires a new LACPDS. Overlaying the existing asphalt surface can reduce disruption, save costs and minimise loss of revenue.

There are three main types of hot asphalt, namely Hot Rolled Asphalt (HRA) and asphalt concrete (e.g. Stone Mastic Asphalt (SMA)), both used for road and pavement surfacing, and mastic asphalt, which is used for waterproofing, and wearing courses on trafficked decks. Occasionally mastic asphalt has been used in heavy duty surfacing applications as a thinner and lighter alternative to HRA and SMA.

Mastic asphalt has been most widely used in the past on car park decks, usually applied over a separating layer that is intended to isolate the asphalt from any cracking or movement of the substrate whilst still providing sufficient surface friction against contraction in cold weather. The vapour permeability of mastic asphalt is negligible so the isolating layer also provides a route for any moisture to be released and so avoid blistering the asphalt.

When considering if the mastic asphalt is suitable to receive an overlay, consideration should be given to the possibility that some water or moisture may be trapped between the asphalt and the structural deck beneath. Typically if this is the case, the asphalt will already show significant signs of blistering.

The risks associated with overlaying asphalt materials with entrapped moisture will be considerably greater with those materials that have a higher void content (e.g. HRA or SMA) compared to build ups comprising mastic asphalt and paving mastic asphalt.

The main factors that should be considered when

determining the suitability of asphalt for overlay include:

- Existing level of blistering and cracking
- Hardness of the asphalt - deformation from vehicle tyres etc.
- Extent of oil contamination - this is normally only an issue for internal decks
- Compatibility of the proposed LACPDS with asphalt
- Experience of the LACPDS manufacturer in asphalt overlay

LACPDS can provide a cost effective solution for overlaying an existing weathered asphalt surface. However, given that the nature of the defects can be any one or more from the list previously detailed and that the quality of the asphalt installation can vary enormously, the decision to overlay can only be made following a detailed site inspection and by agreement of all Parties.

# 5. SPECIFICATION, PREPARATION & APPLICATION

## 5.1 GENERAL

In order to draw up a specification the following criteria should be taken into account.

## 5.2 PRELIMINARY INSPECTION

Choice and recommendation of a LACPDS should only be made on completion of a full inspection of the construction in accordance with Health & Safety criteria (see Section 3). A survey should involve both internal and external inspection of the construction in order to ensure the correct diagnosis is made.

A standard inspection/survey template to assist in the production of an appropriate specification for the LACPDS can be found in Appendix i.

The Institution of Civil Engineers (ICE) recommend a whole life care plan be produced for all MSCPs (report ref: The Inspection and Maintenance of Multi-Storey Car Parks). A full survey inspection should take into account the condition of the supports, the structural decks, the parapets and safety barriers, the existing waterproofing, any expansion joints and the drainage system.

If any deck cannot be inspected from below, core samples should be taken from the external surface through to the deck to assess the condition.

The supporting structure and the decks/soffits should be visually inspected and the type of construction identified as this will provide an indication regarding typical defects to look for and the risks they create.

## 5.3 CONSTRUCTION TYPES

### 5.3.1 TYPES OF STRUCTURE

#### BASEMENT CAR PARK

- Suspended reinforced concrete slab

- Mass concrete
- Ground bearing

#### MSCP

- Suspended reinforced concrete deck (intermediate deck/s)
- Suspended reinforced concrete deck (exposed/roof)
- Ground bearing mass concrete
- Ground bearing reinforced (raft on piles)

#### ROOF TOP PARKING

Suspended reinforced concrete deck (insulated)

Suspended reinforced concrete deck (over occupied)

### 5.3.2 TYPES OF CONSTRUCTION

Generally parking decks are constructed using either insitu or part insitu/part pre-cast concrete decks and with either insitu or pre-cast concrete or steel supporting beams and columns.

Parking decks will usually be constructed using one of the following methods:

- Flat slab
- Waffle slab
- Trough slab
- Lift slab
- Post-tensioned slab
- Pre-stressed slab
- Pot and beam
- Permanent steel shutter
- Pre-cast inverted 'T' beams
- Pre-cast inverted 'T' beams with insitu topping

- Pre-cast deck with insitu stitching
- Pre-cast 'I' beams, concrete planks and insitu topping

### 5.3.3 ROOF TOP PARKING

Where the parking deck is directly above habitable space the deck also serves as a roof and therefore will generally be required to be thermally insulated in accordance with the Building Regulations Part L.

Placement of the thermal insulation on the underside of the deck/roof will produce a 'cold roof' that should be ventilated to avoid condensation, in accordance with the requirements of the Building Regulations.

Mechanically ventilated plenums within the ceiling void are sometimes used for this purpose since adequate cross ventilation is rarely practical.

Alternatively there are specialist heavy duty suspended paving systems available on the market that are designed for this purpose and will accommodate the provision of the thermal insulation and waterproofing, in an inverted warm roof construction.

## 5.4 SPECIFICATION

Part 2 of BS EN 1504-02 "Products and systems for the protection and repair of concrete structures" deals with "Surface protection systems for concrete".

This section of BS EN 1504 is designed to cover all aspects of surface protection systems for concrete, including ingress protection, moisture control and coatings, and must therefore cover sealers, paints, varnishes, coatings etc.

Part 2 of the standard is not specifically designed for the assessment of trafficked surface protection systems for car parks.

As Part 2 does not take into account the unique requirements of car park structures and LACPDS, LRWA recommends that it should not be used to determine the criteria for assessment and specification of LACPDS.

### 5.4.1 PREPARATION

The following list comprises basic guidelines only. Each manufacturer of LACPDS will provide their own specific instructions and requirements which will take priority over this generic specification.

It is essential for the long term performance of the chosen LACPDS that thorough preparation of the substrate is undertaken as the performance of the system will in most cases be reliant on it remaining fully bonded to the substrate.

### SUBSTRATE PREPARATION

It is extremely important that the LACPDS is applied to a clean, uncontaminated and dimensionally stable substrate. Substrate preparation may be achieved using a number of techniques, the most common of which are outlined below:

- **Enclosed (captive) shot blasting** is effective on most substrates and has the advantage of introducing no water into the substrate/structure. Enclosed shot blasting techniques also create a surface texture, which may assist in bonding of the LACPDS. The process does not generally alter the surface profile of the substrate but surface irregularities and imperfections may need to be removed by other techniques.
- **Heavy preparation equipment** such as bobcat mounted equipment and ride-on scarifiers may be used where existing coatings require removal or the profile of the substrate needs to be levelled. In such cases, consideration should be given to the weight of the machinery and the resulting loading on the structure during use.
- **Hand operated grinders and scarifiers** may be used for surface preparation locally on larger installations, or for smaller installations and repairs.
- **Hand tools** such as grinders and portable open blasting machines may be used for isolated preparation works and for preparation to vertical surfaces and edges, which are not accessible to other equipment.
- **Other tools** may be used in the preparation process such as mechanical sweepers, hand brooms, air lances, vacuums and the like to remove surface particles immediately prior to application of the LACPDS. These may also be utilised between layers of multi-layered systems.

- When cleaning it is important to ensure that no debris can cause blockages in the rain down pipes and other drainage. Drainage gullies are commonly found on parking decks and they should be plugged prior to preparation works commencing, to prevent such blockages. Before unplugging the gullies any linked drainage channels and the like should be cleared of debris.

Generally the substrate should be clean, dry, and free from dust, laitence, grease, oil and any other contaminants and meet the LACPDS manufacturers requirements in terms of hardness, moisture content and adhesion prior to application of the LACPDS.

## REPAIR

The repair of the parking deck prior to overlay with the LACPDS depends largely on the substrate to be coated. Such repair methods may involve concrete repairs, surface screeding, resin injection, crack overbanding, joint sealing and other remedial actions. The repairs which are required often become much more apparent following the substrate preparation process and a thorough inspection should be carried out following that operation.

Typical repair processes are as follows:

- Concrete, concrete repair materials, screeds and mortars should be inspected for soundness. Any cracking should be noted and dealt with in accordance with the manufacturer's instructions. Concrete repairs should be carried out in accordance with best practice and with proprietary materials suitable for overcoating with the chosen LACPDS. Care should be taken to ensure that the repair materials are suitably hydrated and have achieved suitable compressive strength prior to overlay with the LACPDS.
- Asphalt coated decks suffer from typical defects such as splitting, cracking, blistering, indentation and failure of details. Determination of suitability for overlay and subsequent repairs to such defects shall be carried out in strict accordance with the LACPDS manufacturers instructions and guidance. Common repair methods include the cleaning out and filling of splits and cracks, the removal of blisters and filling, the levelling of indentations and the repair or removal of failed details.
- Existing lightweight coatings should be inspected and tests carried out to determine existing

adhesion levels and the adhesion of the proposed LACPDS to the membrane. Where there is any doubt the existing coatings should be removed.

It is extremely important to ensure that the repaired areas are thoroughly cleaned and cured sufficiently for the LACPDS to be applied.

## GENERAL

- Water outlets, gullies and rainwater goods must be inspected to ensure they are not blocked, are sound and free draining. Additionally, water should not be impeded by the build-up of previously applied systems. Drainage channels must be cleaned and inspected. Rain water gullies should where possible be prepared into the throat of the drainage pipe in order that the LACPDS may be continued well into the gully detail to ensure a watertight seal in this vulnerable area.
- Metal flashings should be lifted or removed to allow the LACPDS to be installed on upstands. Flashings should then be replaced if required or alternatively the manufacturer shall be approached to recommend a suitable detail which may avoid the necessity for replacement of flashings.
- Where an existing chase is present in the upstand, any existing filler should be removed to allow the membrane to be dressed in. The chase should then be re-pointed with a suitable mastic/filler in accordance with the LACPDS manufacturer's instructions.
- It is common to carry out repairs and preparation work on a phased basis in live car parks and it is therefore extremely important to consider traffic management and the safety of the general public. This involves not only ingress by the public into the work area, but the effect of the works to live areas of car park and surrounding buildings such as the production of dust and the use of construction chemicals controlled under COSHH. Such consideration shall be fully covered in Health and Safety method statements and the like.

### 5.4.3 INSTALLATION/APPLICATION

- The choice of LACPDS should be made with reference to section 2 of the code i.e. generic types.
- Methods of application of LACPDS are varied and include brush, roller, spray and squeegee, depending on the materials used, and particular



application: in all cases it should be in strict accordance with the manufacturer's instructions.

- Most systems are comprised of a series of layers including resins, fillers and aggregates. The number of layers and the layer thicknesses vary widely and reference should be made to the LACPDS manufacturer's technical information.
- With multi-layer systems, reference should be made to the Manufacturer's minimum/maximum overcoating times, as this can affect inter-layer adhesion of the system.
- The contractor shall keep full quality assurance records showing the materials used on a daily basis, recording location, materials used, batch numbers, temperature, humidity and coverage rates among other items recommended by the manufacturer and designated by the quality assurance procedures of the manufacturer, contractor, and any outside authority.
- The LACPDS manufacturer's guidelines in terms of temperature, both ambient and substrate, and surface dryness must be followed at all times.
- The client shall be made aware of cure periods in which the completed LACPDS must remain untrafficked. This may vary between foot and vehicle traffic and is dependent on the system to be used. The contractor shall ensure that the access to this area is prohibited with suitable traffic and pedestrian management during the cure period.
- Prior to opening up the area, a joint inspection shall be carried out with the contractor and the client's representative and the deck signed off ready for trafficking.
- Deck markings are commonly applied during the cure period. They may form an integral part of this system or alternatively be simply a proprietary road marking product compatible with the deck coating.

#### **5.4.4 MANUFACTURERS/SUPPLIER REQUIREMENTS**

- They should be Members of LRWA.
- They should subscribe to the contents of this CoP.
- They should operate an Authorised Contractor policy and ensure that their LACPDS is only installed by one.
- They should operate an Authorised Contractor

training and auditing scheme.

- They should be able to demonstrate a significant track record in the supply of LACPDS (e.g. >10 years experience and more than 20 reference sites).
- They should operate a Quality Management System accredited to BS 9001.
- They should operate an Environmental Policy accredited to BS 14001.

#### **5.4.5 CONTRACTORS**

When choosing Contractors to lay LACPDS a number of factors should be considered and the following list gives some guidance:

- They should be Members of LRWA.
- They should subscribe to the contents of this CoP.
- They should be Authorised Contractors of the selected material Suppliers.
- Operatives should be trained in the use of LACPDS (see section 8).
- They should be able to demonstrate a significant track record in application of LACPDS systems to car decks.
- Application Companies should be accredited to ISO9001 and/or ISO18001.

#### **5.4.6 GENERIC NBS CLAUSE**

A generic NBS clause is given in Appendix ii for the guidance of specifiers.

## 6. QUALITY CONTROL ON SITE

### 6.1 GENERAL

The selection of a suitable specification based on the particular set of circumstances which prevail within the car park, having regard to the car park structural design, is the first stage of a quality programme. Such recognition will provide a specification for a durable system.

Particular attention should be paid to the existing decks and the way in which they have performed, with regard to any existing waterproofing. Assess the mode of any failure, in relation to structural issues and in relation to vehicular movement, equipment mounted on the decks and specific customer requirements.

The proposed specification should take account of the application requirements, Health and Safety needs and the practicality of installation on each site.

Quality control should be a consideration at the design stage and a feasible programme established covering all aspects of the proposed works, including constraints issued by the customer.

It is important that scheduled quality control is included at every stage of the application, including the preparation phase, as post-installation inspection is often difficult, or indeed impossible.

Unlike other forms of membrane, which are produced under factory conditions, liquid applied car deck membranes are formulated for application on site. Installation should therefore be thought of as a succession of stages, each of which requires a quality control procedure.

**Particular note should be made of the weather prevailing during application and the effects of any interruptions to the application process caused by inclement weather.**

The process should therefore include the following items:

- Initial site survey and development of a specification
- Provision of suitably trained labour and supervision
- Preparation of the substrata
- Acknowledgement of surface profile and how it is to be dealt with
- Carrying out of detail work, around deck outlets, upstands, etc. and work in relation to construction and expansion joints
- Primer and successive coats, including the formation of the wearing layer
- Reinforcement within the system (where necessary)
- Coating thickness control measures, for all 'layers'
- Customer deck signage
- Evaluation of site applied check samples
- Evaluation and control for the degree of slip resistance, to known criteria
- Contractor/manufacturer, joint inspection, for warranty purposes
- Manufacturer/contractor site monitoring provisions during all stages of application, including any necessary installation testing deemed appropriate to stages of the installation

### 6.2 COMPLETION

Completion should be considered as the final stage of this organised work programme and not identified as a remote item at the end of the project. It should be thought of as the final check in a series of quality control and procedural processes. These would cover the following items:

- Adherence to the manufacturer or specifier's data sheet or, project specific specification.
- Logging of all material batch data obtained from packaging, e.g. numbers, dates, etc.
- Execution of detail work, e.g. crack over-banding, around drainage outlets, at upstands, at termination edges

- Because once the substrates are covered, it is not easy to check such items as preparation and material usage, there is a need to review at all stages
- Film thickness may require checking – probably best established by material usage at all stages of application. Account should be taken of surface profile
- Reinforcement – usage and overlap, checked at the appropriate stage
- Film conditions during laying – i.e. freedom from pinholes, cure, general appearance. All may be

corrected at the appropriate time in the system laying

- Final slip resistance and wearing layer i.e. even distribution, aggregate bound in, even coating of encapsulating layer
- Applicators should display a site-based QA system for application and adherence to it should be monitored daily/weekly
- Manufacturer's/contractor's warranties should be considered for the works. These need to be assessed in terms of time period, content and must be specified at the time of tender.



## 7. MAINTENANCE AND IN-SERVICE CARE

The application of LACPDS to car park structures may be for a number of reasons, including waterproofing, surfacing, structural protection, aesthetic enhancement and safety.

Guidance on maintenance of car park structures generally can be found in "*Recommendations for the inspection, maintenance and management of car park structures*" published by the Institution of Civil Engineers (Ref: to READING REFERENCES).

Guarantees/warranties for LACPDS may also last for many years, and it is therefore necessary to establish the appropriate maintenance schedule and guidelines which should be adopted to ensure trouble-free performance during its service life.

Consideration should be given to the need for an annual maintenance inspection to highlight any defects or damage, which can then be isolated for attention.

### 7.1 GENERAL MAINTENANCE

- Regularly remove any loose debris from the deck surface, and all items which could potentially cause damage to the installed LACPDS.
- Regularly check and clean outlets, drainage points, gutters, downspouts etc. and ensure that all rainwater goods are working effectively.

### 7.2 GENERAL INSPECTION

- Check all details visually to ensure a sound bond to substrate.
- Check the installed LACPDS for any signs of mechanical or chemical damage.
- Check the soffit where visible for evidence of water ingress, wet patches, water staining etc.
- Check other building components e.g. barriers, balustrades, parapet walls, joints etc. for soundness.

### 7.3 REPAIRS

- Areas of mechanical damage or defect should be reported to the LACPDS manufacturer or the original installer (as per the original contract documents) as soon as possible after they become evident.
- If remedial work is required then this should be executed in accordance with the manufacturer's specification as soon as possible after the defect becomes evident.

### 7.4 ADDITIONS AND REMOVALS

- Prior to additions or removals which may affect the integrity of the installed LACPDS, contact the LACPDS manufacturer or approved contractor for approved methods.

### 7.5 GENERAL PROTECTION

- Where LACPDS treated areas are likely to suffer damage or contamination from other trades during subsequent or other works, suitable precautions should be taken to protect the installed LACPDS.

### 7.6 CLEANING

- Should the installed LACPDS require cleaning for aesthetic or maintenance reasons, consult the LACPDS manufacturer or Approved Contractor, for details of approved methods and cleaning chemicals.

### 7.7 DE-ICING

- Most LACPDS are resistant to common de-icing materials; however, it is recommended that the LACPDS manufacturer is contacted for confirmation of approved materials and techniques.

### 7.8 CAR WASH AREAS

- Only detergents, cleaning materials and methods approved by the LACPDS manufacturer should be used for car washing.



## 8. TRAINING

### 8.1 GENERAL:

The growing requirement for the protection of car park structures has led to the development of a number of new car deck waterproofing products. Consequently this has meant that there is now a considerable variety of materials and applicators operating within the car park deck waterproofing market. In order to ensure that the materials being applied to car park decks are allowed to function in the best possible way, it is *essential* that all persons concerned with the operation, from the estimator to the operative applying the material, have received the appropriate *training* in the activities involved.

For all persons involved in the application of liquid coatings on car park decks, thorough training is a pre-requisite, not only in the application of the coatings, but also in the identification of potential problems with the materials that are to be used, how laying conditions may affect the end product, or how the substrate should be prepared prior to applying materials. Operatives must at all times work in a safe manner such that no person, including members of the general public, are put at risk during any of the works.

Liquid coatings must be applied in accordance with the manufacturer's specification and application guides, by trained operatives. It is essential that operatives can demonstrate they have been trained in the use and application of the relevant materials being applied. Operatives should have photographic identity cards clearly detailing the level of training undertaken, materials covered and period of validity. As a minimum, operatives should hold the relevant Construction Skills Certification Scheme card for Liquid Waterproofing. This covers not only the operative, but also site management and supervision. ***All personnel involved on site, should carry identity cards clearly showing the level of training received.***

The responsibility for training the workforce to a satisfactory standard falls upon the employing company. Safety training for the operatives can either be conducted in-company or by an outside organisation, e.g. Construction Industry Training Board, utilising recognised standards appropriate to the particular trade/processes being undertaken.

### Various schemes operated include:

- Supplier training schemes for approved contractors, including QA and Site Records for traceability
- Quality assurance schemes supervised by 'The Institute of Clerks of Works'
- Pre-start site meetings with suppliers (Incorporating appropriate site specific material tool-box talks)
- Manufacturers on site auditing
- National Vocational Qualifications (NVQs)
- Construction Skills Certification Scheme (CSCS)

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Makers Construction Ltd **Peter Cowlard**

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Triflex (UK) Ltd

**Paul Barker**

## 9. READING REFERENCES

### ELRA

Guidance Note : As Issued by LRWA (NB To be added)

### European Standards

- European Technical Approval - General
- EN 1504 – Part 10
- OS Standard

### British Standards Institution

BS476 Part 3 : 1975:	External fire exposure roof test
BS5250: 1995:	Code of practice for control of condensation in buildings
BS6367: 1983:	Code of practice for drainage of roofs and paved areas
BS6399 Part 3: 1988:	Code of practice for imposed roof loads
BS8000 Part 4: 1989:	Code of practice for waterproofing
BS8093: 1991:	Code of practice for the use of safety nets, containment nets and sheets on construction works
BS8300: 2001:	Code of practice for the design of buildings and their approaches to meet the needs of disabled people
BS8102: 1990:	Code of practice for protection of structures against water from the ground
BS EN 1992:	Eurocode 2, Design of Concrete Structures

BS 8204-1: 2002      Concrete bases and cement sand levelling screeds to receive floorings. Code of practice

### Industry Publications

*The Inspection and Maintenance of Multi-Storey Car Parks* – Institution of Civil Engineers.

*Enhancing the Whole Life Structural Performance of Multi-Storey Car Parks* – ODPM/Mott MacDonald. September 2002

*Design Recommendations for Multi-Storey and Underground Car Parks (2002) (3rd edition)* – Institution of Structural Engineers

### Standing Committee on Structural Safety (SCOSS)

*Bulletin No 2: Structural Appraisal of MSCP – have yours been done yet?*

### Other references

Health & Safety at Work Act 1974

The Assessment of Floor Slip Resistance – The UK Slip Resistance Group Guidelines – Issue 3, 2005

COSHH Regulations 1988

Building Regulations

HSE 33

CHIP

COSHH

CONDAM

## 10. GLOSSARY OF TERMS

### A

#### Anti-skid

The properties of a surface finish that offer resistance to skidding

### C

#### Cementitious

Material or substance producing bonding properties or cement-like materials

#### Chase

A rebate into which traditional bitumen felt or asphalt waterproofing is terminated

#### CHIP

Chemicals (Hazard Information and Packaging for Supply) Regulations 2002

#### Coefficient of Thermal Expansion

Change in unit length per degree change of temperature

#### Cold Roof

A roof construction that has no thermal insulation above the deck

#### Compressive Strength

A material's resistance to compressive forces

#### Concrete Repair

A repair procedure for reinforced concrete

#### CONDAM

Construction Design And Management Regulations

#### COSHH

Control of Substances Hazardous to Health

#### Crack Bridging

The ability of a material/coating system to accommodate cracks within the substrate

#### Crack Over-Banding

The process of applying a reinforced strip of coating/reinforcing locally over a crack

#### Curing Agents/Compounds

Liquid compounds applied to newly laid concrete to prevent evaporation of the water and aid hydration

### D

#### Deck/Line Markings

Coloured coating materials applied to the surface of the deck membrane

#### Dew Point

The temperature at which saturation point will occur, when condensate occurs

#### Differential Thermal Movement

Materials having different coefficients of thermal expansion will expand/contract (move) at different rates from one another

#### Drainage System

A system of connecting pipework, gullies, gutters or channels designed to transport water/liquid to a drain or collection point

#### Driving Aisle

The area of a car park which vehicles use to move within the facility

### E

#### Efflorescence

A crystalline deposit of salts which leach from the concrete as soluble calcium hydroxides and within a short period of time will combine with the atmospheric carbon dioxide to form insoluble calcium carbonates, usually white in colour, appearing on the surfaces of masonry, stucco or concrete

#### Enclosed Shot Blasting / Vacuum Blasting

A process of firing steel balls at pressure onto a surface for the purposes of cleaning it. The machine used contains the medium and has a vacuum recovery system that collects the abrasive and any material that has been removed from the surface being prepared

#### Expansion/Movement Joint

A joint between two structures or sections of a structure where movement is designed to occur



## F

### **Fillet**

A triangular section of timber, cork, polyurethane or similar supporting material placed into the corner usually in order to change a 90° internal angle to 2 x 45° angles

### **Flashings**

A covering traditionally of lead, pressed metal or stainless steel, used to protect a section of work or a joint/termination from either damage or water ingress. Usually used at the top of a skirting/upstand

## H

### **HRA**

Hot Rolled Asphalt – traditional bitumen, filler and aggregate mix machine-laid for road construction

## I

### **ICE**

Institution of Civil Engineers

### **Intercoat Adhesion**

The adhesion achieved between two components of a multi-layered coating system or within the laps of day joints

## J

### **Joint Sealing**

Methods used to provide a waterproof seal within a joint. Usually achieved with a proprietary sealant material or preformed bonded rubber insert

## L

### **LACPDS**

Liquid Applied Car Park Deck Systems

### **Laitance**

A residue of weak and non-durable material consisting of cement, aggregate, fines, or impurities brought to the surface of overwet concrete by the bleeding water

### **LRWA**

Liquid Roofing and Waterproofing Association

## M

### **Mastic Asphalt**

A mixture of bitumen and limestone filler traditionally used for waterproofing

### **Mortar**

A mixture of cement, sand and water. When used in masonry construction, the mixture may contain masonry cement, or standard portland cement with lime or other ad-mixtures which may produce greater degrees of plasticity and/or durability

### **Multi-Storey Car Park**

A car park having more than one suspended parking deck

## P

### **Parapet**

An upstand or wall around the roof perimeter

### **Parking Bin**

A space within a car park designated for vehicle parking, nominally 2.4 x 4.8 M

### **Paving Grade Asphalt**

Mastic asphalt with harder bitumen and additional aggregate for use as a trafficked wearcourse

### **Plenum**

A mechanically ventilated void usually between the soffit of the roof deck or floor and a suspended ceiling, generally maintained at a positive air pressure

### **PPE**

Personal Protection Equipment

### **Precast**

A concrete member that is cast and cured in an area other than its final position or place, usually off-site

### **PSV**

Polished Stone Value – defines the resistance of a material to polishing

## R

### **Reinforced Concrete**

Concrete in which reinforcement has been embedded such that the two materials act together in resisting forces and sustain the tensile stresses

**Reinforced Membrane**

A membrane encapsulating a reinforcing fabric designed to increase tensile tear resistance

**Release Agents**

Oil or wax based materials applied to concrete formwork to facilitate removal

**Resin Injection**

A process whereby a resin is pressure injected into cracks, normally within concrete, in order to fill the cracks/voids

**RH**

Relative Humidity – The ratio of the quantity of water vapour in the air to the maximum amount the air would hold at the same temperature, expressed as a percentage

**Rooftop Car Park**

Where the parking deck is also the roof of the building

**S****Safety Barrier**

A purpose-built protection system such as a fence/barrier system designed to resist vehicle impact

**Scarifiers**

Mechanical plant used for the preparation of concrete surfaces

**Screed**

A separate cementitious layer applied after placing of the original reinforced concrete to achieve falls or levels

**Slip Resistance**

The properties of a surface finish that offer resistance to slippage

**SMA**

Stone Mastic Asphalt – an asphalt concrete, bitumen-coated aggregate widely used in road construction

**Solar Reflectivity**

The amount that a surface reflects solar heat

**SRV**

Skid Resistance Value – method of measurement used to define resistance to skidding

**Structural Deck**

The floor component that forms part of the load bearing structure

**Surface Flatness/Texture**

A measure of the surface plane or variations over a short distance

**T****Tensile Adhesion**

The adhesion between two or more materials (usually of a coating) measured by subjecting the materials to a tensile force, pulling perpendicular to the substrate

**Traffic Management**

A system of safely controlling traffic usually communicated through signage, traffic lights and road markings

**W****Warm Roof**

A roof where thermal insulation has been placed above the deck

**Wet Film Gauge**

A gauge such as a comb or pin that is dipped into a liquid coating or paint before it has dried or cured, to determine its depth whilst still wet

**White Finger**

A nervous injury resulting from repetitive use of vibration/percussion machinery

**U****Underground Car park**

A car park where the parking levels are positioned below ground level

**Upstands**

The vertical element around the perimeter of a roof

**V****Vapour Barrier/Vapour Control Layer**

A layer that is designed to prevent or restrict the passage of moisture-laden air

**Vapour Permeability**

The degree with which a material will allow water vapour to pass through



# APPENDIX i

## MULTI-STOREY CAR PARK ASSESSMENT FORM

Name of Car Park: \_\_\_\_\_ Town: \_\_\_\_\_

Surveyor: \_\_\_\_\_ Survey Date: \_\_\_\_\_

Client: \_\_\_\_\_ Contact: \_\_\_\_\_

Tel No: \_\_\_\_\_ Weather: \_\_\_\_\_

Design Structure: \_\_\_\_\_

### GENERAL STRUCTURE

New Build?		Refurbishment?		How Old?		No. of Levels?	
Steel Frame?		Concrete Frame?		Precast/insitu?		Shopper MSCP?	
Commuter MSCP?		Asphalt Deck?		Type of Asphalt?		Above Occupied Premises?	

### WEATHER DECK – CONSTRUCTION

Concrete Planks?		Waffle/ trough?		Cast insitu (lift)?		Pre-cast Panels?		Other?	
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How is the deck constructed (i.e. Waffle overlaid with 50mm Concrete Screed)?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Deck 1: \_\_\_\_\_ m length \_\_\_\_\_ m width Area \_\_\_\_\_ m<sup>2</sup>

Deck 2: \_\_\_\_\_ m length \_\_\_\_\_ m width Area \_\_\_\_\_ m<sup>2</sup>

Deck 3: \_\_\_\_\_ m length \_\_\_\_\_ m width Area \_\_\_\_\_ m<sup>2</sup>

Deck 4: \_\_\_\_\_ m length \_\_\_\_\_ m width Area \_\_\_\_\_ m<sup>2</sup>

Deck 5: \_\_\_\_\_ m length \_\_\_\_\_ m width Area \_\_\_\_\_ m<sup>2</sup>

## WEATHER DECK – CONDITION

Is the surface waterproofed?  **YES**  **NO**

If you answered YES then:

Type of System:		Manufacturer:	
Condition:			

General Comments (i.e. state of mastic if covered/state of other system):

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Is the concrete surface visible? **YES/NO** If YES describe the finish?

Heavy Tamp?  Light Tamp?  Power Float?  Brushed?  Other: \_\_\_\_\_

% of concrete area that is spalling or loose?  % of area potholed?

Is reinforcing exposed? **YES/NO** If YES, what is % of area?  %

**Spillages:** Oil Light:  Heavy:  **Tyres:** Light:  Heavy:

## SURFACE CRACKING (not day work or mechanical joints)

Plastic Cracking:	YES/NO	Stress Cracks:	YES/NO
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<b>Trend of Cracks:</b>	Random:		Along Deck:		Across Deck:		Radiating out from columns:	
	Over beams:		Around panels:		Along centre of troughs:		Other:	

## DAY WORK & MECHANICAL JOINTS

Day work joints:

Condition:	Number:	
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Expansion Joints:

Condition & type (e.g. mechanical/elastomer in rail/polysulphide/joint type)	Number:		Length:		Width:	
	Number:		Length:		Width:	
	Number:		Length:		Width:	
	Number:		Length:		Width:	
	Number:		Length:		Width:	

## DECK DRAINAGE

Gulleys:	Grids:		No Grids:		Width:		Position:	
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Drains (RWOs). Please describe (i.e. round with grates):

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Does deck fall towards outlay points? **YES / NO**

## BALUSTRADES/LAMP STANDARDS etc.

<b>Balustrade Wall:</b>	Concrete:		Brick:		Other:	
Contains vertical joints:	What spacing?		How treated?		Any cracking?	

If other, please specify:

--

## WEATHER DECK – UNDERSIDE/SOFFIT

Is the soffit exposed? **YES / NO**

<b>Is there evidence of:</b>	Leaks:		Lime Stains:		Rust Stains:		Spalling Concrete:		Stalactities:		Cracks:	
------------------------------	--------	--	--------------	--	--------------	--	--------------------	--	---------------	--	---------	--

<b>Joint to Deck:</b>	Moving Joint (needs sealant):		Cast to Deck:		Bolted:		Other:	
<b>Safety Barriers:</b>	Fixed to Deck:		Fixed to Wall:		Kerb:		Other:	

Bolted through existing waterproofing? **YES / NO**

Comments:

## RAMPS

If the ramp's surface is exposed:

Heavy Tamp:		Light Tamp:		Brushed:		Other:	
Cracks at midspan?		Cracks at 1/3 positions?		Cracks at 2/3 position?			

Condition of head joint and foot joint:

Ramp 1	
Ramp 2	
Ramp 3	
Ramp 4	

## INFORMATION FROM THE CLIENT

Is the whole deck available? **YES/NO**

Any electrical equipment on deck? **YES/NO**

Any special precautions (i.e. sheeting off an area etc.)?

Proposed Schedule: \_\_\_\_\_ (Month)      Budget Available \_\_\_\_\_ (£)

Has a guarantee been asked for? **YES/NO**

BBA Certificate Required? **YES/NO**

Company:		Insurance Backed (additional cost)		BBA	
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Is white lining to be included? **YES/NO**    If YES, what type - paint/thermoplastic \_\_\_\_\_

### ANY OTHER ADDITIONAL INFORMATION (Not Covered)

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(ATTACHED SKETCH SHOWS RAMPS, STAIRWELLS, JOINTS, RWOS & LAYOUT)

### PROJECT CRITICAL DRIVERS

Speed of return to service overall?	
Is car park working 12 or 24 hours?	
Night working required?	
Phased working or complete shutdown?	
Cost of car park space per day?	

### OTHER REQUIREMENTS:

Anti-carb coatings to soffits?	
Coloured A/C coatings to columns and walks?	
Joint replacement?	



Stair case treatment?	
Edge protection?	

<b>Stair Tower Buildings – Relationship to Deck</b>	Built off (no movement likely)	
	Built through (differential movement likely)	
	Separate building (differential movement likely)	

## APPENDIX ii

### NBS SPECIFICATION CLAUSE

#### J30 CAR DECK WATERPROOFING AND WEARING SURFACE

To be read with Preliminaries/General Conditions.

##### Liquid/Spray Applied Waterproof/Wearing Surface for Exposed and Covered Car Decks

110 COMPLIANCE WITH THE CODE OF PRACTICE FOR LIQUID APPLIED CAR DECK WATERPROOFING SYSTEMS ISSUED BY THE LIQUID ROOFING AND WATERPROOFING ASSOCIATION (LRWA) :

- The tenderer shall confirm to the contract administrator whether or not they are a member of LRWA and also confirm whether the supplier of the deck waterproofing system is a member of LRWA.
- The deck waterproofing system applicator and supplier shall confirm to the contract administrator

that they are aware of the LRWA Code of Practice and that the survey, preparation, supply, installation and aftercare shall follow guidelines therein and in any published addendums/guidance notes to that document current at the time of tendering for the works.

- The tenderer shall, on request, and throughout the course of the works produce evidence to the contract administrator that the works are being undertaken in accordance with the LRWA Code of Practice and in any published addendums/guidance notes to that document current at the time of tendering for the works.



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