SOFT LANDINGS FOR SCHOOLS

Case Studies

Feedback from use of the Soft Landings Framework in new schools

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BSRIA BG 9/2010

SOFT LANDINGS

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SOFT LANDINGS FOR SCHOOLS **CASE STUDIES**

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There is a major policy imperative to make buildings perform radically better and much more sustainably. It will be impossible to meet these expectations reliably unless the service given by the construction industry also changes, with more focus on actual performance in use. Soft Landings is a process that can help this to happen: when formulating the brief, during design and construction, and especially before and after handover. Soft Landings can be used with any procurement system, and for all types of building work, including new construction, refurbishment and alteration.

The case studies outlined in this report tested the applicability of the *Soft Landings Framework* on school projects in progress, and on schools that had recently been completed and occupied. The results are encouraging. The organisations involved were already undertaking some Soft Landings activities but found good reasons for doing more. The approach of the *Framework* also helped project teams take a more unified approach and to bring together previously disparate elements. Valuable insights have been gained, and all team members have decided to make more use of Soft Landings on future projects.

This booklet is a condensed version of a longer report with more case study material. The report is freely available from the Usable Buildings Trust website www.usablebuildings.co.uk.

Bill Bordass
Usable Buildings Trust, October 2010

Firms participating in the Soft Landing for Schools project were invited to propose case studies that concentrated on one or more of the five stages in the *Soft Landings Framework*. While some of the activities were not specifically badged as Soft Landings, they were in the spirit of the process and therefore contribute valuable experience or useful techniques to others who are considering adopting Soft Landings in full.

This booklet categorises the case studies into the five stages of the *Soft Landings Framework:*

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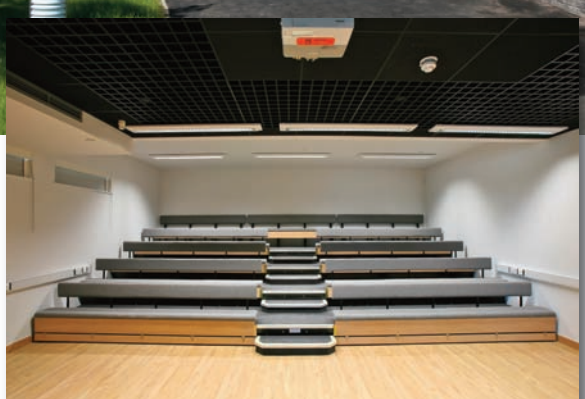
Joseph Leckie School, Walsall



Joseph Leckie Technology Community College. The two-storey teaching block is the first phase of a campus redevelopment. Phase 1 comprised classrooms, meeting rooms, staff accommodation, a drama studio and an atrium. It was handed over in June 2009 with zero defects and 10 weeks ahead of programme.

Inset: Retractable seating in the drama studio.

Stage 1: **Inception and briefing**

What was the project?

The project is a phased redevelopment of the Joseph Leckie Community Technology College, a secondary and sixth form school in Walsall for 1175 students. The redevelopment was procured using the partnering framework, SCAPE (Scape System Build is a local authority-controlled company.) Under SCAPE, the whole project team is appointed at an early stage and contributes to briefing and design.

How was Soft Landings applied?

The *Soft landings Framework* recommends that feedback from existing buildings be used to inform the design of new buildings of a similar type. SCAPE consortium member Willmott Dixon used this project to test the value of a lessons-learned workshop as a way of informing the design and construction of the later phases. The workshop was held with the project team, design team, Walsall Children's Services, the headteacher, support staff and the facilities management contractor (Serco). The project was reviewed against the activities in the five Soft Landings stages, as described in the *Soft Landings Framework.*

What were the key outcomes?

Opportunities were identified to shape future Soft Landings exercises. For Soft Landings Stage 1: Inception and briefing, the SCAPE team found that the lessons-learned workshop can identify and avoid past shortcomings. For Stage 2: Design and construction, although the designs had been reviewed by a board outside the project, in future they would also be reviewed by others, such as the facilities management staff. For Stage 3: Pre-handover, the SCAPE team found scope for tighter pre-handover procedures, including logbooks and user guides. Buddying between members of the building team and operating staff was thought useful. The aftercare stages (4 and 5) were not complete so were not reviewed in detail.

Key outcome: A lessons-learned workshop can bring identifiable benefits to Soft Landings projects.

KEY PROJECT DETAILS

Client **Walsall MBC Property Services** School **Joseph Leckie Community Technology College** Location **Walsall** Architect **Aedas Architects** Consulting engineer **SiConsulting** Builder **Willmott Dixon** Facilities management contractor **Serco** Gross floor area (phase 1) **2400 m²** Student numbers **1175** Project value **£4.7 million**

Southwark Schools PFI programme, London

Bessemer Grange Children's Centre. This £2.4 million (non PFI) project is a new extension to Bessemer Grange Primary School. It provides facilities for a Foundation Centre (a nursery and reception) and a children's centre. The structure of the extension is of cross-laminated timber - a structure with low embodied energy. The building is naturally ventilated through opening windows, roof lights and passive ventilation grilles.

While this project is not part of the Southwark PFI schools programme, it is notable for having had a six-week Soft Landings residency by a member of Architype and the design team, who assisted the end users in settling into the building and teaching them how to operate it.

What are the projects?

The Private Finance Initiative (PFI) schools initiative for Southwark is a major schools rebuilding programme, part of Building Schools for the Future (BSF). Multi-disciplinary practice Buro Happold is working on a batch of schools within the programme. The designer reviewed the application of Soft Landings with the contractor, Balfour Beatty, with particular reference to the mandatory carbon dioxide target for PFI schools of 27 kCO_2/m^2 per annum.

How is Soft Landings being applied?

Buro Happold has attemped to establish energy and carbon dioxide targets at an early stage and identify how the 27 kCO_2/m^2 per annum target could be met. Other activities included managing expectations through design, construction, commissioning, and system fine-tuning.

What were the key outcomes?

In PFI projects particularly, Buro Happold found that Soft Landings principles help to encourage a continuity of thought about building performance throughout a building's life. It was also found better to introduce Soft Landings as a source of ideas and procedures that can be used to help tackle the challenges of the PFI process more effectively, rather than as a radically new way of doing things. Handled carefully, Soft Landings can be a method that can help create the continuity that might otherwise easily be lacking in a fragmented process.

Key outcomes:

- **Proper definition of energy and carbon performance to meet 27 kCO_2/m^2 per annum**
- **More effective procedures were introduced, for example the early involvement of information and communications technology and catering expertise.**

PROJECT EXAMPLE: Bessemer Grange Children's Centre

Client **London Borough of Southwark** Location **Southwark, South London** Architect **Architype** Services consulting engineer **CBG Consultants** Builder **Bryen & Langley Construction Group** Quantity surveyor **Playle and Partners** Structural engineer **Techniker** Gross floor area **685 m^2**

Hackney City Academy, London

Above: Hackney Academy has over 130 classrooms and circulation spaces, most of which are naturally ventilated. Some areas are mechanically ventilated with heat recovery.

Below: Over 1200 motorised actuators have been used for the natural ventilation vents, hatches and roof domes. Classrooms vents are under the local control of the teachers, who are informed by electronic CO_2 level indicators in each room. The ventilators are heavily sound- attentuated to cope with noise from city traffic.

Hackney Academy. Extract air from the classrooms is drawn into circulation areas via colour-coded grilles and extracted at high level via motorised glazed fanlights beneath the inflated ETFE roof.

What is the project?

Hackney City Academy in London was handed over in Summer 2009 and opened in September that year. While it is designed for 900 pupils and 240 sixth-form places, initial occupation began with 180 places for year seven. Despite being located on a busy road intersection the Academy is predominantly naturally ventilated with over 1200 motorised vents and hatches, those in the classrooms under the control of teaching staff.

How was Soft Landings applied?

The Academy's environmental consulting engineers, Max Fordham, recognised that Soft Landings would benefit the handover process, and so concentrated on seeing what they could do in a modest way to influence the pre-handover and aftercare stages. This lead to a series of pre-handover meetings to cover not only the physical building but also the logistics of how the school would be used. The meetings helped to smooth the occupancy of the building and in particular who would be trained and when. The *Framework* checklists also helped the consultants identify the items to look at before handover, the arrangements for taking over the building, and ways of moving in the furniture and equipment.

What were the key outcomes?

As the school is completely new, the move-in discussions proved particularly important. Although the facilities management contractor had been appointed in good time, the involvement of facilities managers before handover had not been thought-through early or thoroughly enough, and so the right facilities people were not always available for comment and training in the run-up to handover.

Key outcome: Facilities specialists need be brought into the Soft Landings process in a structured manner and assigned specific roles and responsibilities.

KEY PROJECT DETAILS

School **Hackney City Academy** Location **London** Architect **Studio E Architects** Consulting engineer **Max Fordham LLP** Builder **Willmott Dixon** M&E Contractor **MJN Colston** Controls contractor **SE Controls** Gross floor area (phase 1) **11 217 m²** Student numbers **1140** Energy performance rating (design) **A**

Estover Secondary Community College, Plymouth

Estover Secondary Community College. The design by architect Feilden Clegg Bradley Studios (FCBS) aims to be thermally efficient and sustainable. Various passive techniques include construction materials with high thermal mass, and summertime night ventilation.

What is the project?

Estover Community College is a comprehensive school and visual arts college. It is part of a £39 million, 120 000 m^2 campus, funded by Plymouth City Council under the One School Pathfinder initiative. The educational part of the campus covers 15 500 m^2. The design by architect Feilden Clegg Bradley Studios and AECOM uses various passive techniques such as high thermal mass and summertime night ventilation.

How is Soft Landings being applied?

The college is being constructed in seven phases on the site of the existing secondary school. When the design and build project began on site, AECOM were novated to the services subcontractor, Mitie. FCBS worked with Kier, Mitie and AECOM to establish an approach to phasing, handover and aftercare. The Soft Landings review focussed on Stage 3: Pre-handover, and the ensuing aftercare stages (4 and 5). FCBS developed summary checklists for each Soft Landings stage and discussed them with the Kier Western site team, who used the checklists alongside their standard handover processes.

What were the key outcomes?

The handover review found Kier's Soft Landings processes to be good. These were developed from Kier's use of Soft Landings at Writhlington School near Radstock. However, it was realised that ICT needed more thought. Late attempts at integration could cause difficulties with servicing, energy use, comfort conditions, and control of daylight. Although there is no contractual requirement to carry out post-completion fine-tuning, Kier felt that benefits would accrue from the school's facilities staff committing to monitoring the building actively, with the environmental data feeding into the school curriculum.

Key outcome: Involve the providers of furniture, fixtures and equipment (including ICT) in good time, and alongside the main contract.

KEY PROJECT DETAILS

Client **Plymouth City Council** Location **Plymouth, Devon** Architect **Feilden Clegg Bradley Studios** Consulting engineer **AECOM** Builder **Kier Western** Cost consultant **EC Harris** M&E contractor **Mitie** Gross floor area **15 500 m^2** Student numbers **1206**

RSA Academy, Tipton

RSA Academy in Tipton. The Academy is being constructed on the site of Willingsworth High School. Construction began in January 2009 with opening scheduled for Autumn 2010.

What is the project?

The Royal Society of Arts (RSA) Academy in Tipton was formed in 2008. It started out in existing buildings, with a new £16.6 million school building planned for occupation in September 2010. The project architect, John McAslan + Partners, has designed the building entirely around the principles of Opening Minds – a broad framework based on five sets of competencies, including citizenship, learning, managing information, managing situations and relating to people. The building is designed with few corridors and with maximum flexibility. Most of the specialist classrooms are located in the building's spine, while three wings house the general classrooms. The general classrooms can be opened up so that teachers can work with different numbers of students.

How was Soft Landings applied?

The cost consultant Davis Langdon Consulting (DLC) reviewed the potential for Soft Landings in relation to the procurement of the Academy, and to see if handovers could be made smoother by establishing a Soft Landings approach early in the process. In line with Soft Landing requirements, DLC began by reviewing past projects and the standard procedures of the design team and the contractors. A review meeting was held with the employer's agent, Gardiner and Theobald, and the builder, Willmott Dixon, to compare and contrast the worksteps of the *Soft Landings Framework* with the procedures in operation at the Academy.

What were the key outcomes?

Various issues arose during the review process, such as whether the project manager was the best person for championing and programming Soft Landings activities, or whether it should be the client or the design team project manager.

Soft Landings Stage 1: Inception and briefing

While the participants thought that there would be no extra cost for Soft Landings Stage 1: Inception and briefing , there would be extra costs for the designers in Stages 4 and 5, and for the contractors in Stage 5. In programming the work, it was felt that some of the activities identified in the *Soft Landings Framework* would benefit from the input of other participants, such as subcontractors and specialists. These players might also initiate specific Soft Landings activities. While a system of reality-checking and sign-off

RSA Academy, Tipton

Above: Aspects of the new RSA academy being explained to students at the existing school. The teaching facilities were designed around the principles of Opening Minds - a broad framework based on five sets of competencies, including citizenship, learning, managing information, managing situations and relating to people.

gateways was not operated, the project team felt that such activities would fall into place naturally, and would help in ensuring greater client satisfaction.

Soft Landings Stage 3: Preparation for handover

If the planning for Soft Landings Stage 3**:** Preparation for handover were to occur in good time, it was felt that this would allow all parties to understand the project better and would improve the commissioning and handover activities in the following ways:

- Production of better and more relevant handover material, including O&M manuals. This was regarded as a good way of limiting the time the design and building team would need to spend on aftercare
- Review and verification of this material might best be undertaken by the *CDM* coordinator
- The proposed review of building readiness and commissioning records might be best initiated by the occupier and the facilities team. To undertake this activity rigorously might delay handover, but it would allow important issues to be addressed more realistically
- The project team felt that there was scope to improve the building readiness programme, with more careful planning and checks of the commissioning records, discussion and demonstration of the BMS and its user interfaces, and training for operators.

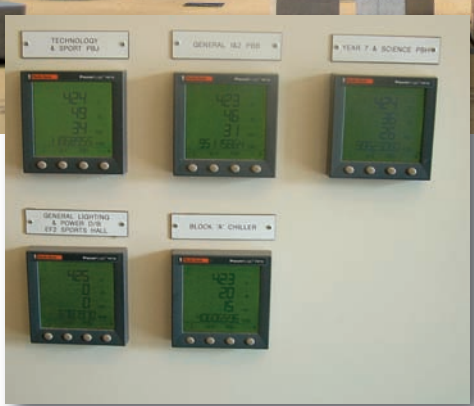
Soft Landings Stage 4: Initial aftercare

For Stage 4: Initial aftercare, the project team felt that better operational readiness, better recorded information, and planned briefing sessions for occupiers and operators by the design and building team would go a long way towards overcoming any problems. These measures would also help to reduce the number of queries the design team would need to respond to during the aftercare period.

KEY PROJECT DETAILS

Client **RSA Academy** Local Education Authority **Sandwell** Location **Tipton, West Midlands** Architect **John McAslan + Partners** M&E and structural consulting engineer **Arup** Builder **Willmott Dixon** Cost consultant **Davis Langdon Consulting** Gross floor area **10 000 m²** Student numbers **1100** Project value **£23.5 million**

Merchants Academy, Bristol



Merchants Academy, Bristol. Energy sub-meters (*left*) are critical items for monitoring and measuring site energy use. If some are not working, and/or poorly calibrated, and their readings not reconciled with those of the main gas and electricity meters, then energy use and emissions cannot be assigned to specific buildings or end-uses.

What was the project?

Merchants Academy is a £30 million school in Withywood, South Bristol, which opened in September 2008. The school comprises five, two-storey buildings with linking corridors around a central open courtyard, and fronted by a main administration, catering and teaching block. Sustainability and energy efficiency were integrated into the design, which helped it achieve a BREEAM rating of Very Good.

How was Soft Landings applied?

The initial aftercare activities of Soft Landings were applied after the building had been occupied for over four months. The planned actions involved energy use reviews as well as workshops with school staff. The workshops helped the architect understand how the building was being used, and where energy was being consumed and how. The team were engaged on paid extra fees to fine-tune systems and help the occupants understand how to use the school's controls. The project was funded by the Merchants Academy Trust, with BSRIA appointed to project manage the exercise. A concurrent educational project run by the Centre for Sustainable Energy aimed to use the school's energy data to inform pupils and create wider understanding of how individual actions can influence the energy efficiency of the school building.

What were the key outcomes?

Some successes were had even with the late adoption of Soft landings Stage 4: Initial aftercare. Workshops with teaching staff identified some glare problems. Extra blinds were provided and troublesome ones modified. However, key construction project members had already been assigned to new building projects and had difficulty remaining engaged. The energy sub-meters had not been calibrated and one meter had failed, preventing detailed energy analysis. Even given the successes, the governing body – which was not part of the early planning – redirected the budget and closed the project.

Key lesson: Start Soft Landings much earlier, and involve the Governors from the outset.

KEY PROJECT DETAILS

Client **Merchants Academy** Location **Bristol** Architect **Penoyre & Prasad** Consulting engineer **Buro Happold** Builder **Cowlin Construction** Project manager **Capita Symonds** M&E Contractor **Mitie** Student numbers **1150 (maximum)** Energy targets **None set** Display energy rating (2009-10) **Not issued at time of publication**

Northampton Academy, Northampton

Northampton Academy. The new academy replaced Lings Upper School on the current Lings site in Northamptonshire. The school provides education for 1400 students in the 11-18 year old age group, and specialises in sports, business and enterprise.

What is the project?

Northampton Academy is a new secondary school for 1420 students, occupied in December 2005. The academy sponsor is the United Learning Trust, which operates a series of academies across England. Business and enterprise are its specialisms. The Academy building comprises four separate buildings clustered around a central courtyard. The concrete frame and soffits are exposed, providing thermal mass for cooling. Natural ventilation is from motorised windows and vents operated by a BMS. Natural daylight is achieved by circular rooflights and large clerestory rooflights above each faculty circulation area.

How was Soft Landings applied?

As part of its standard service, Feilden Clegg Bradley Studios (FCBS) undertakes routine post-occupancy evaluation (POE) on all its school projects, with an emphasis on the architectural aspects. With the assistance of Ann Bodkin Sustainability + Architecture, FCBS applied an aftercare method based on the 10 assessment criteria of the CABE Schools Design Review. The team worked with the school's Council to develop a questionnaire and also held structured discussions with the pupils about the ways the building supports their education.

The student surveys provided useful feedback on detailed issues, such as whether the students could see whiteboards clearly and how well the environmental control strategies were working. While students found it very easy to find their way around the school, the design intent was sometimes frustrated, for example where routes had been closed off as part of the school's security strategy. The design team has found the feedback from students invaluable in considering and developing current school projects with clients, educationalists and users.

The Soft Landings study also looked at operational energy consumption and carbon dioxide emissions. The overall energy use of the school compared favourably with the lowest energy consumer of five academies evaluated by Buro Happold in December 2006. However, electricity use has increased year-on-year since the Academy opened. There is a high constant electrical base load, at about 45 per cent of peak load. In comparison to general teaching space, the electricity used per unit area in other spaces is about one and a half times as much in specialist teaching spaces such as music and science,

Northampton Academy, Northampton

Northampton Academy. The building plan is configured to maximise areas of natural ventilation and daylight in order to reduce capital and in-use costs. The design concept for the Academy is to have a major central courtyard, with faculty teaching areas, technical and music classrooms, sports hall and kitchen, facing into it.

Below: The structural frame is an all-concrete system providing a flat slab soffit, permitting simple routing of services.

twice as much in the library, drama and hall block, and three times as much in the specialist IT space. As a result of the high energy use, the Academy's sponsor was concerned enough to negotiate an advantageous contract arrangement as a bulk consumer, which immediately halved the energy bill. An unfortunate consequence of this dramatic cost saving through commercial measures was that the architect found it more difficult to convince the Academy and the Trust that they should also investigate the potential to fine-tune performance and reduce consumption by a combination of technical, motivational and management measures.

What are the key lessons learned?

The aftercare team benefitted from the insights of post-occupation evaluation, in particular how the designers' intentions compared with the way the building is subsequently used and managed inpractice. Differences stemmed either from a misinterpretation of the users' requirements or a difference between what the brief said and what the users actually wanted.

The key outcomes were:

- **For the governors: to resource an energy reduction strategy including a study of base loads, a policy for ICT, and a review of the BMS, including a better night cooling strategy**
- **For students and staff: to implement a switch-off policy and to learn how to control comfort systems better**
- **For designers: to develop best practice designs of toilets with open handwash areas; to estimate energy performance of unregulated loads not covered by the *Building Regulations* and to explain these to clients. Also, to take more account of ICT loads and possible growth.**

KEY PROJECT DETAILS

Client **United Learning Trust Limited** Location **Northampton** Architect **Feilden Clegg Bradley Studios** Structural and services engineer **Buro Happold** Main contractor **Miller Construction** Cost consultant **Davis Langdon Consulting** M&E contractor **MCG** Gross floor area **11 600 m²** Student numbers **1420** Completion **2005**

What do the school studies teach us?

Stage 1: Inception and briefing

Soft Landings is about changing attitudes as well as procedures, so ideally it should be in the brief, and definitely in the responses of all team members

Once the idea of Soft Landings has been accepted, activities can be resourced and planned properly, and potentially dealt with as part of routine project management. A Soft Landings champion or champions can help to make sure that issues receive enough attention

There is a need for high-level support and understanding, notably from school governors and between parties (such as facilities management and ICT), that do not have direct contractual relationships with the design and building team

Stage 2: Design and construction

Many opportunities for improving schools procurement were identified, such as better engagement with school users and their service providers, especially facilities management, ICT, catering, and fixtures and fittings

Soft Landings provides a unified approach that can bring together formerly separated activities. A narrative about user experience can develop during briefing and design and be used to inform what is finally specified and selected

Taking more account of performance-in-use during design and construction can make energy estimates more realistic than theoretical estimates, and more consistent with metering strategies

Stage 3: Preparation for handover

Better integration between issues relating to the building, the organisation and its equipment, can be of great help to the occupier. This broader approach is particularly valuable where a new school occupies a new building, and has to deal with everything from scratch

Awareness-raising, documentation and training can help both the technical and non-technical staff to understand more about the building they are occupying and to feel more a part of it

There will be fewer problems and call-backs if inspections, sign-offs and documentation are improved. This can lead to better operational readiness when the building is handed over

Stage 4: Initial aftercare

Project team members saw the advantages of an extended handover process in which information could be passed on to occupiers and management in stages, and feedback obtained

There is a need for flexibility in programming. For example, if a building is handed over with the controls not fully operational, the priority must be to get them working as specified. Until they are functional, some fine-tuning and user education activities may well need to be postponed

It is important to find a suitable home in the school where the aftercare team can experience the building and be readily accessible to the occupants. Contractors and designers may be happy to use the site hut, but this remoteness may reduce their visibility and connection with occupants

Stage 5: Extended aftercare

A professional aftercare service can unlock the latent potential of a design, inform occupants and management, incorporate troubleshooting and fine-tuning, and allow performance to be compared with design intent and with other buildings and relevant benchmarks

Soft Landings will also provide feedback for clients, the design and building team, and the construction industry, it can also reduce running costs and environmental penalties, and improve system performance and occupant satisfaction.

The potential for improvement is huge. In one school, annual electricity consumption was halved – largely by better management and control avoiding unnecessary out-of-hours operation of HVAC, lighting and ICT systems

FURTHER INFORMATION

More information on the schools case studies that informed this booklet is available from *Soft Landings For Schools - Final report on Case Studies,* available as a free download from the Usable Buildings Trust via www.usablebuildings.co.uk

Messages for future Soft Landings projects

Encourage client leadership

Encourage client leadership at the very start of a project. This will get everyone involved in a project to agree to adopt Soft Landings routinely, and in a spirit of cooperation

Provide practical support

Construction professionals need to raise awareness of Soft Landings, and find ways of changing the culture to focus on operational outcomes

Share experiences

Clients and project teams need insights into what works, what doesn't, and what needs to be improved

Find the funds

It costs little or nothing to undertake Soft Landings during briefing, design and construction and in preparation for handover. In contrast, teams often found it difficult to obtain the funds for aftercare. Ways must be found to resource this, or opportunities will be missed

Encourage wider support

Wider uptake could be encouraged by Partnerships For Schools, professional institutions, and organisations championing design quality such as CABE, BCSE, CIC and Architecture+Design Scotland. Local authorities could collaborate in developing standard Soft Landings approaches which they could plug into any schools project

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