PRACTICE NOTE

for use with the

PFE Change Management Supplement

For Use with JCT98 Standard Form of Building Contract,
Private Edition, With Quantities Incorporating Amendments 1-4, 2002[1]

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Introduction

This Practice Note is for use with the PFE[2] Change Management Supplement ('the Supplement')[3] when used with JCT98 Standard Form of Building Contract, Private Edition, With Quantities Incorporating Amendments 1-4, 2002[4] ("JCT98").

The Supplement contains the requirements necessary to bring JCT98 into conformity with contemporary management techniques in accordance with the recommendations of the Society of Construction Law for managing change, and for determining extensions of time and periods of time for which compensation may be due as set out in the SCL Delay and Disruption Protocol[5] ("the SCL Protocol").

Some of the terms used in the Supplement and in this Practice Note may be unfamiliar to those not used to using critical path methodology in the management of construction contracts. Useful guidance on the meaning of such terms and in their application can be obtained from the SCL Protocol and from the book *Delay and Disruption in Construction Contracts.*[6]

The completion of a construction project depends upon the vision and ability of many designers to conceive a three-dimensional form of great technical complexity and to convert that vision, generally, into words or two-dimensional drawings. Then, those two-dimensional drawings and words have to be converted into the three-dimensional form by a team of workmen, sometimes coming together for the first time (and often the last) perhaps under difficult climatic or physical conditions. It should come as no surprise, therefore, that few activities on a construction site occur in the way, or at the time, the planning engineer, design team or project sponsor thought they would occur.

We are not gifted with the Promethean ability to see into the future. In most construction and civil engineering contracts, some things are not foreseen; sometimes they are wrongly perceived or misinterpreted by one party or another. Invariably, the result is that time is taken up and costs are incurred in implementing change. In the event that the party incurring those costs does not believe it carries the risk of the change, it will look for reimbursement from the other and dispute will then often ensue.

In most projects there will be a party financing the project, another in charge of constructing it, an architect, several engineers, a quantity surveyor and a range of sub-contractors, some domestic, some nominated and various statutory authorities and utilities. In large projects there may be 40 or 50 sub-contractors or more, some with design responsibilities. The whole process will evolve over a period of several years and in some cases there will be a change in the parties during the process. Thus, there is much to be considered, not only in identifying what risk has been adopted by each party, but also in establishing whether the effects of change and the consequences thereof on time and recoverable loss are within that risk.

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[6] Pickavance, Keith, *Delay and Disruption in Construction Contracts* 2nd Ed (2000), LLP Professional Publications Ltd ISBN: 1-85978-508-5

It is simply not good enough to expect the challenge of dealing with change to be met by allocating the cost and time associated with that change to the other party. That is not risk management – it is merely risk transference[7]. The management of change requires first a change in mindset. A change that is, not just in the mindset of contractors but also in the mindset of employers and the architects, engineers and project managers that they employ. It cannot be achieved without a change of attitude across the board. This is the theme of the SCL Protocol.

On its face, the SCL Protocol is a guidance note for a transparent procedure for dealing with the award of additional time and/or money to the party not at risk for the effects of change. But it is much more than that. It is also a guidance note for the management of the effects of change. At once, through the recognition that the programme and the information underlying it are management tools for which the employer pays, the likely effects of change can be calculated using those tools and, once the likely effects are recognised, the risk of delay caused by change can be minimised, or overcome entirely by revisiting and reprogramming to overcome the effects of that change.

The benefit to the employer that the use of the Supplement to achieve conformity with the SCL Protocol will bring is the power to manage his own risks of change during the construction period rather than having to depend upon the contractor either to manage the employer's risks for him under the aegis of a contractual provision requiring the contractor to *"prevent delay in the progress of the works howsoever caused"*[8] or *"prevent the completion of the Works from being delayed"*[9] or some such similar expression. Alternatively, the employer's risks are not managed at all during the contract period with the resultant inevitable overrun, compensation claims and the disputes that often follow.

The benefit of the use of the Supplement to the contractor is that in following the recommendations of the Protocol he will be better able to manage the Works, better able to manage his own risks and, where his processes are interfered with by the employer, he will be better able to secure the speedy resolution to questions of extensions of time and compensation so improving his ability to manage the future Works and improve his cash flow.

There are two essential elements to the implementation of the Supplement:

1) the contractor has to be told what management information he has to provide and he has to be paid for providing it; and
2) if the contractor fails to provide the information services necessary so as to prevent or inhibit the employer from managing his risks, the contractor must compensate the employer.

[7] See Hayes, W., Ross, R. W., Perry, J. G., Thompson, P. A. and Willmer, G (1983) *Risk Management in Engineering Construction,* SERC Research Report, Thomas Telford , London.
[8] JCT98 clause 25.3.4.1
[9] Ibid.

Management Information Structure

The key to making any construction contract Protocol-compliant is, on the one hand, to make the management information that is usually held by the contractor until a claim is made, available constantly to the employer and his advisers throughout the contract. On the other hand, it is to make the programme that is current at the time an event happens the tool by which the effect of any event is calculated for the purposes of extensions of time and prolongation. The relationship of the information is illustrated in the notes on the Definition of Programme, Draft Programme and Master Programme which follow.

In order for the Supplement to give effect to the recommendations of the SCL Protocol, some significantly different arrangements must be made for construction programming, extension of time provisions from those available in JCT98 along with the introduction of some new concepts in regard to information and electronic exchange and acceleration. Accordingly, these amendments anticipate that some clauses in JCT98 will be deleted in their entirety and be replaced by those in the Supplement, the provisions of the Supplement will amend some obligations and others impose new obligations in addition to those in the standard form.

In drafting these amendments, the principles adopted are:

1. Words which have particular meaning should be defined.
2. A word used in one context where it has a special meaning should not be used in another context where that particular meaning would be inappropriate.
3. Expressions of obligations should be short, clear and concise.
4. The risks that are to remain with the Employer should be clearly expressed.
5. The Employer should be provided with the information he needs in order to manage his risks.
6. The Contractor should be entitled to an extension of time for any Employer's Time-Risk Event[10] which, at the time it occurs, impacts upon the likely Date for Completion as identified by the Contractor's intentions for the future conduct of the Works embodied in the Master Programme as affected, if at all, by progress actually achieved.
7. The Contractor should only be entitled to time-related compensation for loss and/or expense that is actually incurred as a result of an Employer's Cost Risk Event[11].

[10] Under JCT98 these are described in clause 25 as "Relevant Events".
[11] Under JCT98 these are described in clause 26 as "matters".

Structure

The Practice Notes that follow, comprise advice on the implementation of the following amendments:

1) Changed Definitions (Clause 1.3)
2) New Definitions (Clause 1.3)
3) A new rôle for the Risk Manager
4) Change Management
5) Additions to the Appendix
6) Additional Provisional Sum
7) Additional Schedules (identified as Schedules 1, 2, 3 and 4)
8) Amendments and additions to the Agreement and Conditions of Contract

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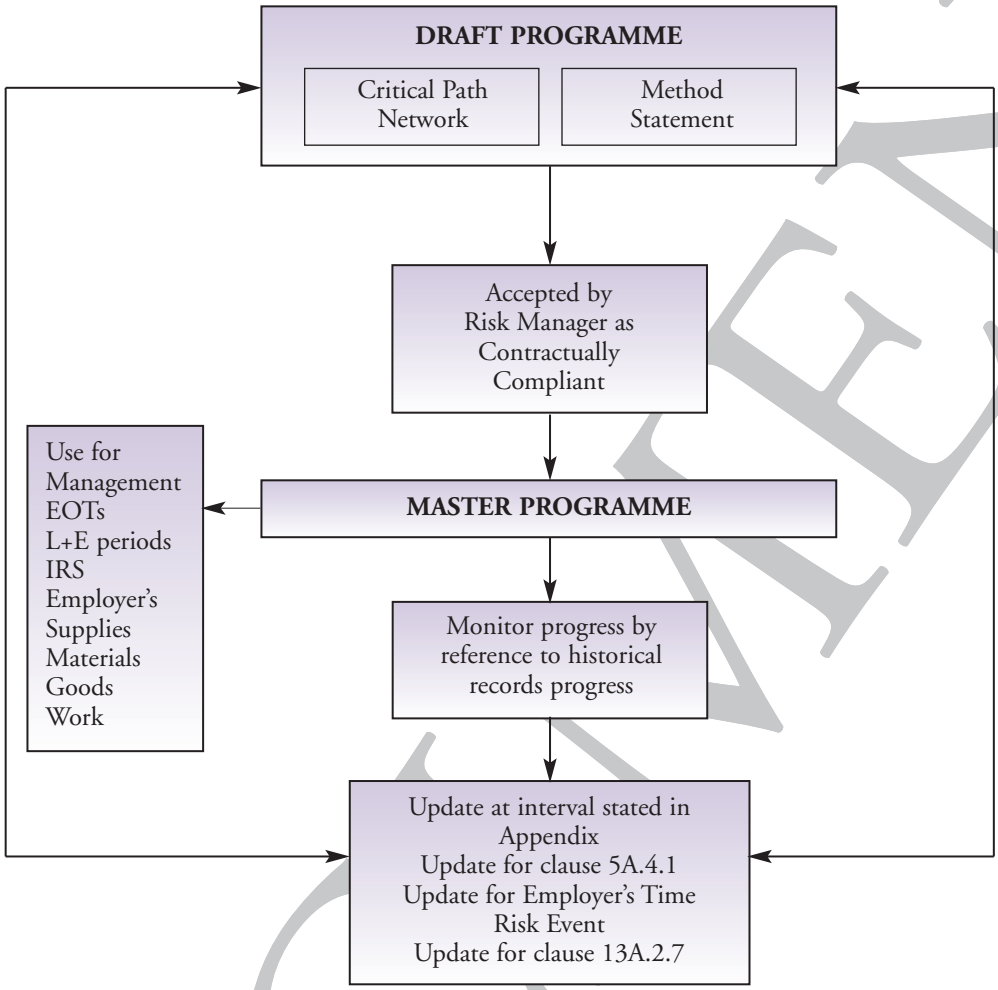
Changed Definitions

Completion Date and Date for Completion
JCT98 defines the Completion Date as *"the Date for Completion as stated in the Appendix or any date fixed under clause 25 or in a confirmed acceptance of a clause 13A Quotation"* and the Date for Completion as *"the date fixed and stated in the Appendix"*. The definitions in JCT98 are now changed so that the Completion Date is the date set down in the Appendix as the date by which the Works are to be completed, or a variation of that date fixed by means of an extension of time under clause 25 or by collateral agreement under clause 13A. On the other hand, the Date for Completion is the date indicated on any programme by which the Contractor plans the future conduct of the work. In other words, the Date for Completion is what the Programme indicates will be the date on which the Works are likely to be finished, irrespective of what is the date on which the Contractor is obliged to complete.

New Definitions

Draft Programme, Programme and Master Programme
There is currently no provision in JCT98 for a programme that can fulfil the recommendations of the SCL Protocol. The SCL Protocol recommends that the Contractor be required to programme



the Works in accordance with a critical path network, supported by a method statement, which will facilitate the effective management of the progress of the work, and for the effect on completion of progress and change to be gauged by reference to its effect on the Programme.

The Programme is defined as a critical path network, together with a method statement, the two of which are to be read together. The requirements for the critical path network are set down in Schedule 2 and those for the method statement are set down in Schedule 3. Initially, they are together referred to as the Draft Programme. Once accepted they together become the Master Programme. The Supplement requires that the review of the Contractor's submittal be conducted by the Risk Manager, who must advise the Architect of its compliance or non-compliance as the case may be. The relationship of the various constituent parts is illustrated *above*.

The Master Programme is the baseline from which the effect of change is calculated from time to time for the purposes of establishing:

1) whether the Contractor is entitled to an extension of time; or
2) the time periods during which the Contractor has experienced delay to progress; or
3) disruption for which the Employer is at risk as to cost.

Employer's Time-Risk Event
An Employer's Time Risk Event is an event for which the Employer takes the risk of a change in the time required to complete the Works. In other words, if the event causes delay to progress, which is likely to cause delay to completion, it is an event for which the Contractor is entitled to an extension of time. In clause 25, JCT98 refers to these events as "Relevant Events".

Employer's Cost-Risk Event
An Employer's Cost Risk Event is an event initiated by the Employer or those deemed to be under his control and for which the Employer takes the risk of the incurrence of loss or expense by the Contractor. In clause 26, JCT98 refers to these events as "matters".

Key Dates and Milestones
A Key Date is the date by which the start or finish of any defined process, delivery, activity, work package, section, or part of the Works defined in Schedule 2 is to be monitored. A Milestone is the indication on the Master Programme of a Key Date linked to the activity or activities, preceding and/or succeeding it. Whilst it is common to think of monitoring the effect of change upon the Completion Date or one or more Sectional Completion Dates, it is often desirable to monitor independently of the Completion of the Works or a defined Section of the Works, the start or completion of other activities or chains of activities. These may now be identified on the programme by means of a Milestone[12] representative of a Key Date. A Key Date, for example, could be represented by a Milestone called: "power-on" or "watertight" or describing the start or finish or a point in the duration of the work of one or more particular specialist contractors or direct works contractors.

Those Key Dates required by the Employer to be monitored are to be specified in Schedule 2. However, if the Contractor wishes others, there is no reason why he should not introduce them into his Programme. In theory, there is no limit to what can be monitored.

The provisions for monitoring a Key Date does not translate it into a Sectional Completion Date or the Completion Date for which liquidated damages may be deducted and for which extensions of time may be awarded. Whereas both a Sectional Completion Date and the Completion Date are Key Dates, a Key Date is not necessarily a Completion Date; it is simply a date of something that the Employer or the Contractor particularly wishes to monitor.

Publish and Publication
Generally the standard forms of building contract require that programmes, if provided at all, be issued in hard copy only. The SCL Protocol recognises that that is not satisfactory and that management information must be provided electronically in a form in which it can be interrogated, and from which calculations can be made. The process of issuing electronic copies of the Programmes has now been defined as to "Publish" and those to whom the documents are to be published are to be set out in Schedule 1 to the Supplement. It is intended that those who require hard copies can then print their own, in the format in which they require to see them rather than having the format predetermined by others.

[12] A programming term for a visible mark that has no duration but which can logically be linked to activities having durations.

In the same way that JCT98 contained restrictions on the use of and provision for the Architect's drawings and so on to be returned following the completion of the Works, the Supplement contains similar restrictions on the use of the Contractor's potentially commercially sensitive information, for that to be returned to him when it is no longer required for it to be deleted from computer systems on which it may have been installed.

New Rôle

The rôle of the Risk Manager is that of adviser. The Risk Manager has no power to commit either the Employer or the Contractor, or any of the Employer's advisers to any course of action. Prior to contract during the course of the preparation of the production information it is the Risk Manager's job to identify, in conjunction with the Employer and his advisers, those significant features of the project design in relation to the intended method of procurement which are likely to be important in the management of time during the course of the construction process. Once identified it is then the Risk Manager's job to ensure that those are properly specified in Schedules 2 and 3 as matters to be included in the Master Programme to be monitored during the course of construction by means of the return of the information specified in Schedule 4.

The Risk Manager will also advise on the techniques to be used to prepare the programme, the software to be used and the general shape and feel of the management information that will be required from the Contractor. The sort of information that is generally likely to be required is included in Schedules 2 and 3. Whether the information in Schedules 2 and 3 is in fact applicable, or whether anything should be added to that stated, will be dependent upon the type of project and the method of procurement anticipated.

The rôle of the Risk Manager is not one normally played by any member of the design or construction teams under the standard forms of building contract. The management of the construction process so as to deal with the risks of change, consequent disruption and delay to progress and to manage them so as to minimise or avoid entirely their effects on the Completion Date requires the ability to use techniques that may not always be found amongst the consultancies normally employed. That is not to say that the architect, contract administrator, project manager, quantity surveyor, engineer or clerk of works in any particular case will not have the skills to conduct the tasks anticipated by the Supplement. Much will depend upon each individual case. However, complex projects, such as the type that is anticipated by JCT98, are likely to be particularly taxing for inexperienced professionals. On the other hand, whether it is considered to be necessary to appoint a Risk Manager to carry out these tasks, or to allocate the tasks to a member of the design team experienced in the techniques required, is a matter of commercial policy for the Employer to determine.

Once tenders have been received and the Employer is in a position to form a contract with the successful Contractor, the Architect must give instructions for the Programme to be prepared within 28 days, for acceptance. Sometimes, it may be appropriate for such instructions to be given on a collateral basis before contract so that before the contract is entered into, consideration can be given to the preparation of the Programme for the Works which the Contractor intends to follow. Once the Programme has been prepared and is submitted for acceptance it is the Risk Manager's task to examine the Contractor's submittal and to advise the Architect whether it complies with the contract. If the Risk Manager wishes to reject it, he must do so within a limited period of time, otherwise the submittal is deemed to be accepted. The periods of time likely to be appropriate for submittal and acceptance of the Programme for a major project are set down in the Supplement but these may be changed to suit particular projects or circumstances.

Because the Employer is to be compensated in liquidated damages for the Contractor's failure to provide a compliant Programme, any dispute as to whether it complies with Schedules 2 and 3 should be promptly dealt with under the dispute resolution mechanisms available under the contract.

Once the Works have commenced on site, the Contractor is required to produce progress information in conformity with Schedule 4. It is then the Risk Manager's task to examine the progress information submitted and to advise on whether it complies with the contract requirements for the proper monitoring of the progress of the Works by means of updating the Master Programme.

At the periods defined by the contract, the Master Programme is to be updated and resubmitted for acceptance. It is the Risk Manager's task to examine the resubmittal against the progress records submitted to ensure that the updated Programme reasonably represents the proportion of work that has been completed, or partially completed, and can properly be used as the Master Programme for the future conduct of the Works.

If the Contractor fails to keep pace with the Master Programme so that delay to Completion for which the Employer is not liable is perceived as being likely to occur, it is the Risk Manager's task to interrogate the Master Programme to see what and, if so, how the work could be resequenced, reprogrammed, resources modified or the Works otherwise reorganised to bring the project to a timely completion. In effect, the Risk Manager's task under these circumstances is to provide a structure and discipline to the performance of the Contractor's overriding obligation to complete the Works by the Completion Date. Ultimately, however, it is the Contractor's obligation to see that the Master Programme is updated, an obligation which does not overshadow the primary obligations of the Contractor to complete the Works by the Completion Date. The importance of this process is the proactive management and prediction of the Date for Completion.

If it is predicted that the effect of an Employer's Time Risk Event is to cause the Date for Completion to be after the Completion Date, it is the Risk Manager's task to interrogate the updated and impacted Programme to establish that the activities comprised in the Event, their durations and their interface with the Programme have been correctly interpreted and that the

impact that has been calculated to be likely to adversely affect the Completion Date has been properly calculated. Once that has been established, the Risk Manager then informs the Architect as to what the effect of the Event is on the Date for Completion (when it is predicted to occur after the Completion Date) so that the Architect can properly certify an extension of time.

With the provisions of the Supplement in place the Employer is also able to control the risk, not only of a delay to completion or sectional completion, but also of delay to a Key Date. Simply put, the project does not have to run late simply because the Contractor has been awarded an extension of time. The provisions for delay management in the Supplement require the Risk Manager and the Contractor to work together to investigate whether and, if so, how the future programme of work can be resequenced or reprogrammed or the resources modified or the Works be otherwise re-organised so as in whole or in part to overcome or avoid the delay that was likely to occur as a result of the change. In effect, the task of the Risk Manager under these circumstances is to provide the Employer and his advisers with the information they need in order for the Architect to be able to give appropriate instructions to the Contractor in order to overcome or reduce the effects of those Events for which the Employer takes the risk of time and/or cost.

Once the Works have been completed, then it is the Risk Manager's task to check the Contractor's final calculations of delay to progress, disruption, prolongation and concurrency and to advise the Architect and/or Quantity Surveyor of those time periods for which the Contractor may properly be reimbursed loss or expense, if it has been incurred.

Change Management

Programme Preparation

The Supplement requires the Contractor to prepare a Programme, using the critical path method, showing the manner and sequence in which it plans to carry out the Works, on computerised planning software that will react dynamically to change, and submit this to the Risk Manager, in electronic format, for acceptance.

The Supplement recognises that the Programme is to be prepared in stages and regularly reviewed and updated, and because it is impossible, at the outset, to get all the information necessary to plan the whole of the Works to an adequate level, the Programme is to be created in varying degrees of detail and constructed so that it will react dynamically to change. Unless both parties can identify where they are in the light of where they ought to be, no sensible management decisions can be made as to whether any activity is in delay or what needs to be done to get the project back on track when activities are affected by change. Thus, it is not generally acceptable for the network to

have total float set to zero,[13] open ends,[14] negative lags,[15] or to have mandatory manually applied constraints[16] which will inhibit the network from adequately reflecting the effect of progress (or lack of it) on the Completion Date.[17]

The Programme must be prepared as a critical path network on industry-standard software that is logically stable. Much development work has been done in the advancement of project planning software following the development of the Pentium processor. But, even now, the best project management software is by no means perfect. All have their foibles and deal with particular situations in different ways and much development work is still to be done. However, we have come a long way from bar charts. Bar charts are no longer an acceptable way of preparing Programmes, Programmes must be prepared as a properly worked out network, preferably resource-loaded and supported by a method statement.

The activities on the critical path network must be identified as precisely as possible in the light of the information available at the time it is prepared. Each activity and its relationship with each other activity is to be set out in a method statement that explains the sequence of activities on the critical path network, and both the network and the method statement are to be passed to the Risk Manager for acceptance.

In so far as the requirements of the Supplement are relevant to the Sub-Contract, Contractors should arrange for the information and participation that they will require from Sub-Contractors and the possibility of acceleration to be dealt in their Subcontract agreements. Contractors should be aware of the desirability of their relationship with the Risk Manager being factored through to the Sub-Contract.

Programme Acceptance

The Supplement requires that the Draft Programme be accepted before it becomes the Master Programme and that any subsequent update of it be similarly accepted as being in conformity with the Contract.

Architects and engineers will sometimes shy away from accepting a Contractor's Master Programme lest they somehow attract some responsibility for it. On the other hand, they will often rely upon it to demonstrate when they need to provide information. When things go wrong and there are insufficient records to show what actually happened the Contractor will generally turn to the planned Master Programme, prepared before the work started, often on inadequate information, and claim that that is exactly what he would have done had things not gone wrong.

[13] Total float is the period of time between the Date for Completion and the Completion Date where the Date for Completion is the earlier of the two. Some software products permit the user to define Total Float as zero irrespective of whether the programme indicates that there is total float.The use of this facility makes all activities appear critical irrespective of the time needed to complete.

[14] Open ends or "dangles" as they are sometimes referred to are activities without successors. The logical effect of the absence of a logical successor is that the activity may continue until the Completion Date without preventing any other activity from being started or finished. If that is the true logic, then it is better to link the completion of the activity to the completion milestone.

[15] Negative lag is the period of time between the completion of a predecessor activity and the start of a successor where the successor is scheduled to start before the predecessor has ended. It is a logical sequence that cannot in fact be performed and distorts the criticality of the predecessor activity.

[16] Some software products permit the user to apply mandatory constraints or "finish no later than" constraints to particular activities. These can have the effect of rendering the activities to which the constraints are applied, and their predecessors, critical whether or not they are on the logical critical path to completion.

[17] The important point is whether the use of any of these techniques has the effect of producing false criticality and/or of inhibiting the critical path network from reacting dynamically to change. For example, negative lag between an activity and the milestone representing the key date upon which drawings necessary to carry out that activity must be issued may be the most desirable method of demonstrating the logical relationship between them.

On the other hand, when he is required to identify where he has not complied with the Master Programme and do something about it, often the Contractor will say there is insufficient information to write a meaningful Master Programme, there are insufficient, or insufficiently skilled project planners available, or he should not be required to rely on his Master Programme for his entitlement. Neither position is satisfactory.

The recommendation of the SCL Protocol is that the accepted Master Programme is not "cast in stone", it is a dynamic management tool that will model the timescale of the contract scope of work and produce a prediction of the sequence of activities to completion based upon the best information then available. Information will improve as the project goes forward, and as better information becomes available, so the programme is to be revisited and updated. Each acceptance is therefore not so much a shift in liability as an acknowledgment by the Risk Manager that at the time it is accepted, the Programme is as good a guide as it can be to the Contractor's intent for the future conduct of the Works, and it can safely be used as a baseline from which to measure the likely effect of change.

The Supplement expressly states that acceptance does not require that the Works shall be constructed in accordance with the accepted Programme and that such acceptance does not relieve the Contractor from any of his obligations under the Contract and the Contractor is not entitled to rely upon acceptance as indicating that the Programme is feasible.

Programme Update

The Master Programme is to be updated, reviewed and revised from time to time. A minimum update period is to be stated in the Appendix. Updates should be carried out at regular intervals, probably no less frequently than monthly and, on some projects, at weekly intervals. What period of time is appropriate is a matter of judgment and depends upon the complexity of the work and the number of zones of operation that are likely to be carried out at the same time. Updating the Programme can be a time-consuming operation which, if it is to be effective, requires good information. But it is the key to change management. Without good quality information about what has happened in relation to what was planned to happen, nothing can safely be decided about what to do about it in the future.

The Programme update process always has three steps to it and may have four, or five, depending on the circumstances prevalent at the time. No matter how well it has been thought out, the accepted Programme will very rarely have been followed to the letter for more than a brief period. Actual progress will have departed from planned progress for many reasons and it would be wrong to see such a departure as 'fault'. At its most serious it can be no more than a symptom of absence of reasonable foresight, but it is simply because accurate foresight of how others are likely to conduct themselves is so rare that some differences between planned and actual will always occur.

It is only departure from the Master Programme of those activities that are on the critical path, i.e. those activities that are part of the longest sequence from commencement to completion, which will affect the Date for Completion. That is why the sequence (or path) is called 'critical'. It is thus those activities on that path which must either start and finish on time, or be resequenced so that

they are no longer critical. In the same way, for each Key Date there may be a separate critical path quite distinct from the critical path to Completion, each activity on which must be started and/or finished on time if the Key Date is to be met. Because planned activities rarely start and finish on the dates they were planned to start and finish, the critical path (and hence the activities critical to completion) will change. That is why the Programme must be updated and reappraised if change is to be managed.

First Step

The first step in the updating process is to identify what has actually happened since the Programme was last compiled. Those activities that have started must be changed from planned activities to activities with actual start dates. Where activities that had been overlooked have started, they must be incorporated into the Programme with appropriate logic. Where planned activities have started in an order or sequence different from that planned, they must be corrected to illustrate the sequence actually followed. Those activities in progress must have their degree of completion estimated. Those activities that have finished must have their planned finish date changed to an actual finish date. Where contingency periods have not been absorbed entirely, they must be reallocated in whole or in part, or discarded.

Second Step

The second step in the updating process is a review of the information upon which the planned Programme was produced. The purpose of this is to see if there was any error in the Master Programme or whether, because of information now available that was not available earlier, there should be additions or changes to the planned sequence. For example, amongst other things, the Master Programme should be reviewed to see whether there is now any better information than before about how sub-contractors, statutory undertakings or utilities are likely to perform. When that review has been completed, the critical path (and hence the likely Date for Completion in the light of that update) must be recalculated. At that point, the Risk Manager, the Contractor, the Employer and any other persons identified in Schedule 1 will know where the Contractor is in relation to where he planned to be.

Third Step

The third step in the updating process is that in which the first phase of the change management can be applied (at this point there has not yet been any consideration of the occurrence of an Employer's Risk Event). This is where the Contractor must consider what to do concerning the progress actually achieved in regard to the Master Programme. If the Master Programme illustrates that the Works are ahead of schedule the Contractor should ask himself whether all successive activities have been allotted sufficient time. If so, will the design team have to produce information more quickly to keep up? And can they do that? If so, at what cost? Alternatively, should additional time be allowed for the provision of information? If the recalculated Date for Completion illustrates that progress is behind schedule, have any activities and their sequences been overestimated? Can they be executed any quicker with the same resources? Can the resources sensibly be increased to achieve faster progress than was planned? Or, can areas of work be taken off the critical path by resequencing? And so on.

The object of this reassessment must be to reorganise the Programme where it can be changed, to identify what needs to be done to achieve completion on time and to set the train in motion by re-programming the work. This is a step that is called for by most standard forms of contract. Sometimes it is called mitigation. Sometimes it is referred to as "the contractor's overriding duty to overcome or avoid delay". Nowhere, in any standard form of contract, is there any guidance or structure for doing it. However, the Supplement calls for this to be done regularly during the update process and requires that whatever decisions are taken, they must be recorded in an updated critical path network and method statement and be accepted by the Risk Manager. In other words, the Supplement requires structure and discipline to be given to the mitigation process.

Potential Fourth Step

The fourth step in the updating process only arises in connection with the occurrence of an Employer's Time Risk Event. In the fourth step, the Contractor must identify what has happened to change the works in a way that is at the Employer's risk as to time and/or cost. The Contractor must identify in a sub-network the new activities and/or durations comprised in the Event, what sequence they must follow, and the interface between that sub-network and the updated Programme. Having done that, the Contractor must again recalculate the Date for Completion. It is the recalculation that determines what is the effect (if any) of the event on progress, what is likely to be the effect on future progress and what is likely to be the effect on the Date for Completion and/or the Completion Date. If the calculated impact of the event demonstrates a likely adverse effect on the Date for Completion after the Completion Date, the Contractor will be entitled to an extension of time. If these new activities are in float, they will not affect the Completion Date and, insofar as the contract specifies that the Contractor is only entitled to an extension of time for those events that are likely to affect the Date for Completion after the Completion Date, no extension of time will be due. This approach is consistent with the judgments on the way extensions of time have been viewed by the courts in *Balfour Beatty Building Ltd* v. *Chestermount Properties Ltd* [18], *John Barker Construction Ltd* v. *London Portman Hotel Ltd* [19], *Ascon Contracting Ltd* v. *Alfred McAlpine Construction Isle of Man Ltd* [20], *The Royal Brompton Hospital National Health Trust* v. *Alexander Hammond and Others* [21], *Motherwell Bridge Construction Ltd* v. *Micafil Vacuumtechnick and Oths* [22], with the default starting position of the parties in *Henry Boot Construction (UK) Ltd* v. *Malmaison Hotel (Manchester) Ltd* [23], and it is also the recommendation of the SCL Protocol.

If the recalculation of the critical path (and hence the Completion Date) shows that any part of the added sub-network is on the critical path at any point then the planned Date for Completion is likely to be adversely affected and an extension of time will be due to the extent of that calculated effect. The Contractor is then entitled to be awarded its extension of time to the extent that the analysis demonstrates that it is likely to be caused delay by that event. The additional time required to accommodate that event is added on to the contract period consistent with the

[18] (1993) 62 BLR 1.
[19] (1997) 83 BLR 31.
[20] (1999) 66 Con. L.R. 119.
[21] (2001) 76 Con. L.R. 148.
[22] (2002) C.I.L.L. 1913
[23] (1999) C.I.L.L. 1572.

recommendations of Colman J. in *Chestermount* [24]. By making sure that any prior slippages caused by matters that are at the Contractor's risk are first dealt with, the possibility of rendering all delays to progress caused by the Contractor irrelevant to the Contractor's entitlement (as was anticipated by the dispute in *Malmaison* [25]) are avoided. In the circumstances in which two concurrent events, that is, one at the risk of the Employer and the other at the risk of the Contractor, both occur to drive the Date for Completion at the same time, then the effect of the process required by the Supplement is to reflect the position adopted by the SCL Protocol, which is the same as that adopted by agreement between the parties in *Malmaison*:

> *"If there are two concurrent causes of delay, one of which is a Relevant Event, and the other is not, then the Contractor is entitled to an extension of time for the period of delay caused by the Relevant Event notwithstanding the concurrent effect of the other event."*

When that sub-network has been introduced into the programme, the actual cost of any disruption or delay to progress can then be monitored against the progress of the sub-network to make sure that the Contractor is immediately and adequately compensated for the knock-on costs of the change.

Potential Fifth Step

The Employer or the Risk Manager will generally instigate the fifth and final step in the updating process but this really cannot be achieved without the Contractor's co-operation because, if this step is to be achieved at all, its success will depend upon the Contractor's active involvement. This step is the management of what the SCL Protocol refers to as "Employer Delay". It is the review of the Contractor's Master Programme and consideration of what must be done to overcome the likely effect of change. This step is closely allied in its process to the third step, although the consequences are radically different. It is sometimes thought that the Contractor's obligation to mitigate or to avoid or overcome delay also extends to an obligation to mitigate, avoid or overcome the effects of change that is at the Employer's risk. This approach is doubtful, and arguably incorrect. All the standard forms provide for the Contractor to be given more time and to be compensated for the effects of changes that are at the Employer's risk and, as His Honour Judge Hicks QC observed in Ascon:

> *"It is difficult to see how there can be any room for the doctrine of mitigation in relation to damage suffered by reason of the Employer's culpable delay in the face of express contractual machinery for dealing with the situation by extension of time and reimbursement of loss and expense."* [26]

The position that it is not the Contractor's obligation to overcome or avoid the natural and probable effects of an Employer's Risk Event is also consistent with the effect of the judgment in *Micafil* [27]. In that case, a FIDIC contract provided for the Contractor to be entitled to an extension of time for the likely or actual delay to completion, but the Contractor had accelerated and resequenced his work to overcome in part the effects of an Employer's delay. The Court held that

[24] *Balfour Beatty Building Ltd* v. *Chestermount Properties Ltd* (1993) 62 BLR 1
[25] *Henry Boot Construction (UK) Limited* v. *Malmaison Hotel (Manchester) Ltd,* (1999) C.I.L.L. 1572.
[26] *Ascon Contracting Ltd* v. *Alfred McAlpine Construction Isle of Man Ltd* (2000) 16 Const. L.J. 316 at p.332
[27] *Motherwell Bridge Construction Ltd* v. *Micafil Vacuumtechnick and Oths* (2002) C.I.L.L. 1913

the Contractor was entitled to an extension of time to the date it would have been likely to have completed the work but for the acceleration and not to the date it actually did complete. Thus, the Employer was not entitled to the benefit of the Contractor's efforts to overcome a delay for which it was entitled to an extension of time and/or compensation.

In the third step, the Programme was to be reviewed to overcome the Contractor's likely culpable delay to completion, and hence, any changes made to the Master Programme were made at the Contractor's expense. However, this cannot be so for the fifth step. In the fifth step of the update, the review of the Contractor's activities, durations, sequence and resources is made to overcome the effect of a change that is at the Employer's risk. Obviously, the Contractor cannot be expected to carry the cost of this, and it should not do so. That does not mean that there will necessarily be a significant cost attached to it but, whatever it is, the Employer should bear it, as it will arise out of the Employer's liability for change in the Master Programme.

The sort of change that may be instructed could be resequencing activities that were sequential to be carried out in parallel, increasing resources where practicable, or the omission of time allowed for work associated with provisional or prime cost sums, or the omission of parts of the measured works. By the power given to him in clause 5A.3.4 the Contractor should have determined from time to time what time contingencies he needed, under ordinary circumstances, in order to accommodate his own risks. An instruction to accelerate may reduce as well as increase those risks and so affect those time contingencies. These are matters which have to be gauged on their merits at the time. Ultimately, any instruction given must be reasonable in the circumstances and should only be given following consultation between the Risk Manager and the Contractor. When all this has been done, the critical path must again be recalculated and any variations to the method statement and network set down and approved by the Risk Manager.

The fifth stage of the update process is a collaborative process to manage change. It requires active participation of the Risk Manager, the design team and the Employer and Contractor, working together to manage change in the construction process. It is truly partnering.

Additions to Appendix

There are three additional elements to the Appendix. There is a period for update of the Master Programme, a period for the supply of Progress Records, and a sum for liquidated and ascertained damages for non-compliance with the provisions for the supply of management information.

The period of update of the Master Programme

The purpose of updating the Master Programme is to enable the Risk Manager to understand how the Works are progressing from time to time in relation to how they were planned to be progressing. In the event that progress is found not to be keeping pace with the Master Programme

then the critical path may change. If the critical path changes then, if the works are to be completed on time, more emphasis will have to be given to the progress of activities other than those which were first thought to be critical. The appropriate period that should be specified to lapse between updates will largely depend on the nature and complexity of the work being contemplated and the contract period. The more complex the work then the shorter the update period. A period of time in excess of four weeks is unlikely to be appropriate except in the case of the simplest but time-consuming work, and a period of less than one week may not be cost-efficient except in the most complicated and fast moving work.

The period for the supply of historical records

The records that are required to be supplied are those set down in Schedule 4. The purpose of requiring the Contractor to prepare and to deliver them to the persons listed in Schedule 1 is to keep informed those who should properly be informed about progress and to facilitate contemporaneous checking of the as-built record against the Master Programme. It is thus important that whatever is specified for the period of supply of historical records is reasonable in regard to the nature and content of the work to be monitored and the period of Master Programme updates anticipated.

Liquidated and ascertained damages

The losses that can be expected to flow from a failure to provide the management information necessary to enable the Employer to follow the progress of the work and to manage his risks are those costs that will be expended in the event of a dispute about a claim for reimbursement of loss and/or expense or for an extension of time which, because of the absence of contemporaneous information, then has to be calculated retrospectively. Depending upon the nature and complexity of the work, the costs of rebuilding retrospectively an updated network programme can be expected to vary between £200 and £5,000 per week of the construction period.

Additional Provisional Sum

Traditionally, contractors have been required to include in their tender their anticipated costs of complying with the requirements set down in the tender documents for the preparation of programmes, historical records and other managerial information. In many construction contracts this has proved to be an unsatisfactory arrangement. It is a fact that the less work a contractor plans to do, the less will be his costs and the lower the costs, the more attractive the tender. The result is that contracts have tended to be awarded to those contractors who do not plan to spend much time or money managing the Works. The result has generally been manifest in confusion, delay and claims. The purpose of the provisional sum is to take out of the tendering equation the costs

of planning and recording the construction process and to make the cost of those elements a common factor amongst all tendering contractors.

Because the software and hardware will have a value to the Contractor beyond any particular contract, it is recommended that purchase, installation and any training in the use of the specified software and any necessary computers be a cost to be included in the Contractor's priced tender. Similar reasoning will apply to the cost of the software and hardware used by the other persons identified in Schedule 1 in relation to their terms of appointment.

The provisional sum in the contract bills must provide for the costs of the preparation of:

1. the first critical path network for the construction of the works;
2. the first method statement describing the network;
3. the number of reviews of the programme necessary to provide a number of updates required by clause 5A.4.2 and 5A.4.3 within the contract period; and
4. the number of historical records required by Schedule 4 necessary to fulfil the requirements of clause 5A.5 within the contract period.

The provisional sum is not required to include the costs of:

1. the correction of any part of any submittal that fails to comply with Schedules 2, 3 and 4; and
2. the resequencing or replanning, or the taking of any other steps to manage the delay to progress or the predicted effects thereof, whether such delay is caused by the Contractor or by the Employer.

The Schedules

Schedule 1

This is the list of the people who are required to be kept informed by the Contractor of his intentions for the future conduct of the Works and of the Contractor's progress achieved.

Typically, the persons that might be identified are listed at Schedule 1 and include, amongst others:

- the Employer
- the Architect
- the Risk Manager, and
- the Quantity Surveyor.

Any other person with an interactive, or supervisory, or advisory rôle who can reasonably be

expected to need to know about how the Works are planned to be carried out or are indeed being carried out should also be included in Schedule 1, for example a project manager.

Schedule 2
This describes the contract requirements for the preparation of the critical path network. It is important that this be thought out in detail during the design stage of the project because it is during that stage that the significant construction features of the project and the interaction required between the Contractor and other bodies, suppliers, sub-contractors, the Employer and/or the Employer's direct contractors will be identified.

Some parts of Schedule 2 will be standard information that will apply to all projects irrespective of their scale or type. However, the importance of rendering Schedule 2 project-specific cannot be overemphasised. A Published critical path network that complies with Schedule 2 cannot legitimately be rejected and any dispute over its acceptability is referable to the dispute resolution mechanisms available under the contract. A failure of the Contractor to comply with Schedule 2 is a breach of contract for which the Employer is entitled to compensation as liquidated damages. Further, any change in the requirements of Schedule 2 is a variation of the contract

Schedule 3
This describes the contract requirements for the preparation of the method statement. The method statement is the description of the Schedule 2 critical path network identifying the nature and content of the activities on the network, the resources necessary and productivity required to achieve the activity periods on the network.

Necessarily, the method statement must describe the work content of each activity identified on the network, the reason for its logical predecessor and successor and, where lagged relationships are indicated, the degree of accomplishment required of the predecessor before the successor can start or finish. As it is with the requirements of the critical path network, so it is equally important that the requirements for the method statement are thought out in detail during the planning stage of the project because it is during that stage that the activities to be planned and their content will be identified.

Some parts of Schedule 3 will be standard information that will apply to all projects irrespective of their scale or type. However, as with Schedule 2 information, the importance of rendering Schedule 3 information project-specific cannot be overemphasised. As with the Schedule 2 information, a Published method statement that complies with Schedule 3 cannot legitimately be rejected and any dispute over its acceptability is referable to the dispute resolution mechanisms available under the contract. A failure of the Contractor to comply with Schedule 3 is a breach of contract for which the Employer is entitled to compensation as liquidated damages. Further, any change in the requirements of Schedule 3 is a variation of the contract.

Schedule 4
This is the table of the progress information required from the Contractor. It sets out the method of preparation and submittal. It should be in sympathy with the critical path network and method statement set out in Schedules 2 and 3 and be sufficient to enable the Risk Manager to know

whether the Contractor is at any time managing the Works adequately so as to produce the productivity anticipated by the Master Programme.

As with Schedules 2 and 3, some parts of Schedule 4 will be standard information that will apply to all projects irrespective of their scale or type. As with Schedule 2 and 3 information, the importance of rendering Schedule 4 project-specific cannot be overemphasised. As it is with the Schedule 2 and 3 information, progress information that complies with Schedule 4 cannot legitimately be rejected and any dispute over its acceptability is referable to the dispute resolution mechanisms available under the contract. A failure of the Contractor to comply with Schedule 4 is a breach of contract for which the Employer is entitled to compensation as liquidated damages. Further, any change in the requirements of Schedule 4 is a variation of the contract.

Amendments and Additions to the Agreement and Conditions of Contract

Articles of Agreement

Article 8 now defines who is to be the Risk Manager. The Risk Manager must be the Architect, or a person named. On the occurrence of the death of the Risk Manager or his ceasing to be the Risk Manager for the purposes of this Contract the Employer must replace him within 14 days of the cessation.

Conditions of Contract

Clause 1.3 Definitions
This now contains revised definitions of "Completion Date" and "Date for Completion" together with the redefinition of "Relevant Events" listed under clause 25 as "Employer's Time Risk Events" and "matters" listed under clause 26 as "Employer's Cost Risk Events". The clause also contains new definitions for "Activity", "Draft Programme", "Master Programme", "Key Date", "Progress Records", "Milestone", "Publish" and "Risk Manager".

Clause 1.5 Contractor's Responsibility
This is amended to make it clear that the Contractor's obligations remain the same whether or not the Risk Manager accepts the Master Programme.

Clause 5.3.1.2 Copies of Documents
This is deleted to remove the optional obligation to provide copies of an undefined Master Programme

Clause 5.4.1 Information Release Schedule
This is amended to make the time such information is actually needed referable to the Master Programme in use from time to time.

Clause 5.6 Return of drawings etc.
This is deleted and replaced with an expanded clause giving reciprocal rights to the Contractor in regard to his resource, method and planning information

Clause 5.7 Limits to the use of documents
This is deleted and replaced with an expanded clause giving reciprocal rights to the Contractor in regard to his resource, method and planning information.

Clause 5A "Management Information"
A new clause 5A now provides for the preparation, publication and submission and acceptance of management information. The requirements for the preparation of the information are contained in Schedules 2, 3 and 4. Provided that the draft Programme Published by the Contractor complies with the Contract, the Risk Manager must accept it or if not rejected within a defined period of time, it is deemed to be accepted. The Master Programme is to be used for:

.1 planning the intended periods of activity and sequence of those matters identified in Schedule 2;

.2 identifying the dates and logic by which the information described in the Information Release Schedule or any other request for information required is to be supplied in relation to the activity or activities to which any such requirement relates;

.3 identifying the intended dates and logic by which plant, materials or goods are to be supplied or work to be carried out by the Employer or those engaged or employed by him in relation to the activity or activities to which any relates

.4 identifying any time contingency required by the Contractor, any Nominated Sub-Contractor and/or Nominated Supplier in relation to all activities and any one or more Key Date or Dates;

.5 identifying free float and total float that is available to be used by the Contractor and/or the Employer for managing the expenditure of the Contractor's time contingencies referred to in clause 5A.3.4 or the effect of Employer's Time Risk Events listed in clause 25.4;

.6 calculating the likely effect of any delay to progress on the Completion Date, if any, caused by an Employer's Time Risk Event as required by clause 25.2;

.7 calculating the effect on progress and/or the Date for Completion, if any, caused by Employer's Cost Risk Events referred to in clause 26.2; and

.8 recording the degree of progress actually achieved from time to time.

The quality of the update process, and hence the quality of decisions based upon it, will depend to a large extent upon the quality of historical records.

At intervals no greater than that stated in the Appendix, the Contractor is to deliver to the Risk Manager in the manner specified, a record of the resources listed in Schedule 4 for each day of the stipulated period together with any other information that may be specified in Schedule 4.

The key to good record keeping is an awareness of for what the records are to be used and a storage system that renders the information easily retrievable. Records that do not keep the right information or systems of record management that render information irretrievable except over a long period and at a high cost, or are inaccurate, or are simply not available to the party charged with the risk, are useless. In principle, under this clause, the Employer and the Contractor agree that there shall be regular records kept by the Contractor identifying the activities, labour, plant, sub-contractor work on site, delivery of material to the site, list of any instructions given, weather conditions encountered, and any delays encountered. These records are to be submitted regularly to those persons identified in Schedule 1 in accordance with Schedule 4 at the periods identified in the Appendix.

Clause 5B Liquidated Damages for Failure to Provide Management Information
This clause provides new powers to recover any losses as liquidated damages if, as a result of the Contractor failing to supply the Employer with the information he needs, he is inhibited from managing his risks. The protocol for the deduction of liquidated damages is broadly similar to that for the deduction of liquidated damages for delay.

Clause 13.1 Variations
This is now expanded to provide that, as a variation, the Architect may instruct the Contractor to alter or modify the duration, sequence or timing of any activity or activities on the Master Programme, or any period of time whether by reference to a lead, lag or otherwise, or the resources to be used in connection with any activity or activities, or the requirements of Schedules 1, 2, 3 or 4 save insofar as they are occasioned by any omission or default of the Contractor.

Clause 13A Variation Instruction – Contractor's quotation in compliance with the instruction
This is now amended to remove the option of identifying the effect of a variation on time when it is the subject of a collateral agreement. It is now necessary to identify the effect on time as well as on cost of a variation in relation to collateral agreements.

Clause 18 Partial Possession
A new clause 18.1.5 is added requiring the Contractor to add to the Master Programme the Key Date for the relevant part or parts of the Works, indicating the date on which the Employer took possession, and logically link the milestone to its predecessor activities in the Master Programme.

Clause 25 Extension of time
Clauses 25.1 – 25.3.6 inclusive are deleted and replaced with new requirements. Clause 25.1 is now entitled "Delay to Progress, Delay to Completion and Extension of Contract Period". A delay to progress is any departure from the Master Programme. If that should occur, the Contractor is required to give to the Architect a notice in writing stating the cause of the delay to progress and to state whether, in the Contractor's opinion, the cause is one for which the Contractor has provided a time contingency, is an Employer's Time Risk Event, or is an Employer's Cost Risk Event.

Before the Completion Date, the Contractor is required to calculate the effect of an Employer's Time and/or Cost Risk Event by the Time Slice Method[28] as recommended by the SCL Protocol.

[28] The methodology is specified in the Supplement. For further guidance see *SCL Delay and Disruption Protocol* (2002) Society of Construction Law, or Pickavance, Keith *Delay and Disruption in Construction Contracts* (2nd Ed 2000) LLP Professional Publications Limited.

If, on receipt of the information provided by the Contractor, the Risk Manager is reasonably of the opinion that the Event has occurred, the sub-network used in the Contractor's calculation is an accurate record of the Event, and the impact of the Event is likely to cause the Date for Completion to be delayed beyond the Completion Date then he must advise the Architect and the Architect must fix a new Completion Date commensurate with the likely effect of the Event on the Date for Completion beyond the Completion Date.

It should be noted that the method of calculation of a period of an extension of time due in regard to an Employer's Time Risk Event occurring after the Completion Date has passed (i.e. when the Contractor is in culpable delay and liable to liquidated damages) is not the same as that used before the Completion Date. The principle adopted by the SCL Protocol is that the Employer should not be entitled to the benefit of liquidated damages during a period in which the Contractor is adversely affected by an event for which the Employer takes the risk under the contract. Thus, after the Completion Date has passed, and irrespective of whether such effect is to cause delay to an activity that is on the critical path, the occurrence of an Employer's Time Risk Event relieves the Contractor from liquidated damages for the period during which its effect is felt on site.

The effect of an event must be reviewed and the Date for Completion recalculated if the Architect issues an instruction for the omission of work, or the omission or diminution of an obligation, or one resulting in a reduction of work to be carried out.

Delay Management
This is a new section of clause 25, which provides the powers necessary to give effect to stages 3 and 5 of the update process. There are three parts to it:

1. 25A The power to instruct acceleration when in culpable delay
2. 25B The power to instruct acceleration when in excusable delay
3. 25C Damages for failure to comply with an instruction under clauses 25A or 25B

In both clauses 25A and 25B, there is a consultative process requiring the co-operation of the Contractor. In the former the Contractor bears the costs, the latter is a variation for which the Employer is to bear the costs.

If the Contractor fails to comply with instructions to accelerate that have been properly given then under clause 25C he will be liable in damages to the Employer for the loss that is actually suffered as a result any delay to the Completion Date, over and above the liquidated damages specified in the Contract.

Clause 26
Generally in this clause the expression "Matters" is replaced by "Employer's Cost-Risk Events".

Clause 26.3
This clause is deleted and replaced by requirements for the purposes of identifying any time periods in which delay to progress or prolongation has been suffered as a result of an Employer's Cost Risk Event. The Risk Manager is required to inform the Architect whether as a result of the Employer's

Cost Risk Event any change has been caused to the start or finish of any activity or the productivity of any resource.

For the same reason, in relation to Nominated Sub-Contractors, clause 26.4.2 is deleted and replaced.

Clause 26.7 Calculation of periods of time for purposes of compensation for prolongation after the completion of the Contract

For the purposes of calculating the period of prolongation caused by an Employer's Cost Risk Event and the period during which that cause arose, the Contractor is required to convert his final updated programme into a dynamic simulated as-built programme that can be used for an analysis based upon the method known as 'as-built but-for' or the 'collapsed as-built' method and to publish the results of his calculations. On receipt of that, it is the Risk Manager's job to check the calculations and to confirm to the Architect and Quantity Surveyor in writing the periods of time caused by an Employer's Cost Risk Event for which the Contractor is entitled to compensation for any loss and/or expense that has been incurred as a result of prolongation of the Works and for the Architect then to ascertain, or to instruct the Quantity Surveyor to ascertain, the loss and/or expense that has actually been incurred thereby, if any.

If the Contractor should fail to deliver to the Risk Manager the calculation required and/or to Publish the Master Programme as required, the Architect may serve upon the Contractor the default notices entitling the Employer to employ and pay others to make and deliver the calculation and Publish the Programme and to deduct any cost or expense so incurred from any monies due or to become due to the Contractor, or to recover it from the Contractor as a debt.

Clause 35.14.2

This clause is amended to refer to similar provisions for Nominated Sub-Contractors to provide management information to the Contractor to those that require the main Contractor to provide management information to the Employer.

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