Swiss Re

Contractors' All Risks insurance

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Introduction

The first Contractors' All Risks (CAR) policy is said to have been issued in 1929 to cover the construction of the Lambeth Bridge across the Thames in London. A special policy was created in Germany in 1934 and started to spread slowly. The real development, however, took place only with economic recovery and the construction boom after the Second World War. Boiler insurance, on the other hand, goes back to the middle of the 19th century. Just prior to the turn of the century, machinery insurance was introduced.

For a long time, CAR business was looked after by property underwriters, and some companies still operate on this basis. In North America, much of this "course of construction" business disappears in property accounts. However, most of the larger companies and also insurance brokers, particularly those which are active on an international scale, decided many years ago to train or hire specialists for this type of business. The professionals in this field today, insurers, reinsurers and brokers alike, all have engineers on their staff, which is not surprising considering the complexity of many of today's construction projects.

Many would argue that CAR is not so different from property insurance. There too, plenty of engineers can be found doing surveys, risk inspections and also assessment work in connection with claims adjustment.

Yet some basic differences remain in spite of many similarities. One of them would certainly be the numbers involved. The spread of risks in CAR is substantially less than in property because there are fewer risks involved. In many portfolios, the premium for CAR is less than 5% of the property premiums. The exposure per risk in relation to the total portfolio is therefore much greater. One or two claims which would be considered by property underwriters to be of small to medium size could totally upset the balance of a CAR portfolio for years. It is therefore paramount – especially with regard to large and heavily exposed risks – to direct all attention to professional assessment and underwriting of a project.

There is also the difference in exposure between a completed project and one under construction. An open trench for a pipeline, site excavation for a building or a road under construction is, for example, much more exposed to rain and inundation than the completed project. In fact, one would expect damage to the completed project only in the case of a catastrophe.

The CAR insurer will also be confronted with the economic factor. Contractors will not only compete on price, but also on construction time. Material and workmanship (quality of labour) as well as construction methods and the start of construction may determine financial success or failure for the contractor. Yet all these factors also affect the exposure of the insurer.

One more factor to be mentioned in CAR is that of innovation or prototype design. New materials and construction methods mentioned as an economic factor could also be classified as an additional exposure under the heading of innovation. It is important to realise that every major civil engineering project is a prototype design embracing tunnels, dams, ports, highways, irrigation projects etc.

These introductory remarks may help to illustrate that CAR is a very specialised line of business. This brochure aims to give a good introduction to the subject for newcomers to insurance or to this line of business. Years of experience would be required to become an absolute expert. If we succeed in planting the seed and in conveying some of the intricacies of providing insurance cover for construction projects, then the purpose of this publication has been fulfilled.

I The parties to a construction project and the works contract

The following information focuses on larger projects. However, procedures for smaller projects follow basically the same pattern.

1 Project stages and the insurer's part

1.1 Definition of needs and objectives

Any kind of civil engineering or building project, ranging from a dam across a river bed to a high-rise building, is born as an idea – to improve public services, to satisfy private needs or to realise business opportunities. Whether put forward by a private party or by a public body, it will inevitably run through various stages, from the drawing board to actual completion and service-entry. In the first instance, the needs to be considered and the objectives to be achieved must be clearly defined.

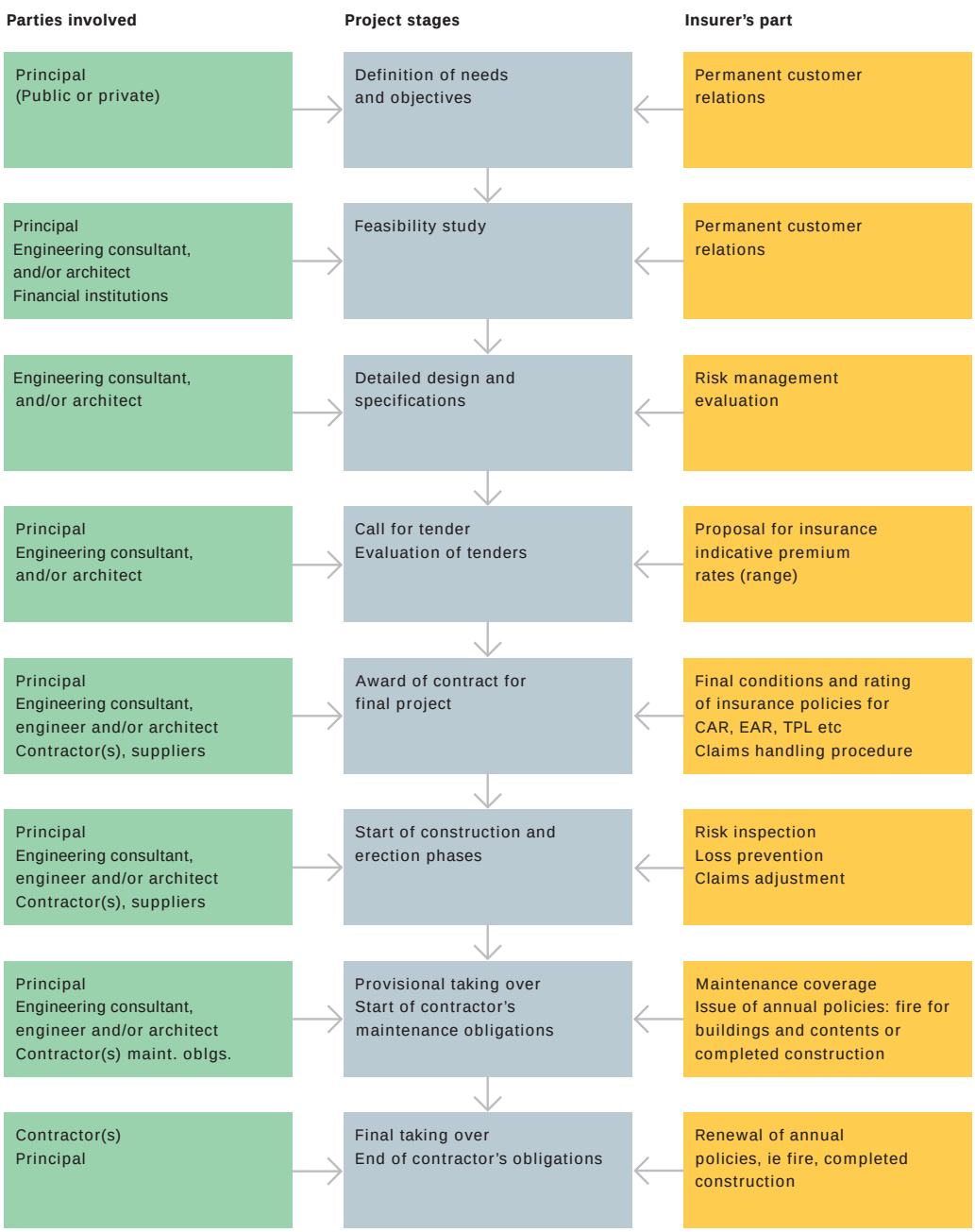
1.2 Feasibility study

A feasibility study is undertaken to answer any physical, economical, environmental and possibly political questions. Presented are solutions to questions such as:

- size of the project, future extensions
- optimal location, environmental, political reactions
- selection of design and materials with alternatives
- approximate project cost, cost – benefit analysis
- economics of the project, prospective operating costs and return on investment
- ways and means of financing the project and subsequent operations.

Obviously, a feasibility study for major civil engineering or building works is not the exclusive domain of the engineering consultant/architect, but he normally assumes the role of the co-ordinator. Financial, political and other professional advisers to the principal would investigate the economics as well as the social and environmental implications. Once the principal has given his stamp of approval to the conclusions of the study, he requests his engineering consultant (in the case of a building: the architect) to draft preliminary specifications for the works, which will then be the object of further research and planning. As soon as the design is sufficiently detailed and specified, tenders or bids could be invited.

Table 1
The insurer's role in large projects



1.3 Risk management input by the insurer

With larger projects, a risk analysis will produce valuable recommendations for the elimination or minimisation of risks. The insurer who can offer the corresponding know-how can provide a useful service for the principal and the consultant engineers at an early stage.

Good relations between the consultant engineer and the insurer have, therefore, advantages for all parties to the works contract. The consultant plays an important part, first in the planning stage and afterwards during the execution of large projects where, under contract, he acts as adviser to the principal, as authorised speaker, supervisor and controller of the works. His reputation profits from a smooth execution of the project, to which risk management, and, later on, a good insurance scheme can significantly contribute. In return for the insurer's service and advice, the consultant may help to arrange the most suitable insurance cover since he is able to influence the wording of the works contracts and insurance clauses. The consultant is, therefore, the person to talk to at an early planning stage if loss prevention measures of any importance are to be part of the contract specifications. He may also have valuable loss prevention experience from similar projects. Later, during construction, he is often the only person who has authority or influence in respect of acceptance or recommendation of supplementary loss prevention measures, even if the contract does not specify them. Additional costs incurred may be insignificant, but the benefit derived from improved working methods and prevented accidents may be impressive.

Insurers will certainly find the indirect loss prevention approach via consultant as rewarding as contacts with the contractor alone, who is squeezed between his bid and rising costs and so may be inclined to take chances, ultimately at the insurer's increased risk. In the event of damage, the consultant is again an important source of information because, according to the terms of the contract, he is usually obliged to keep complete records of materials used, of works and erection schedules and of working hours lost due to bad weather, strike or accidents. He also has to approve modification of design and execution which may be required when reinstating works after damage has occurred.

1.4 Call for tender

Tender documents comprise specifications (dimensions, quality and performance required), a bill of quantities, a time schedule as well as the wording of the proposed works contract. If the principal is a private party, he may dispense with a public tender procedure and invite offers direct from competing contractors.

In his tender or bid, the contractor undertakes to commence and complete the works in accordance with the specifications, at a certain price and within a specified number of months; he may also submit alternative proposals as to the manner of executing the works.

It is general practice or a requirement under the call for tender for the contractor to also attach a reference list of similar projects which he executed in the past.

A cost item for the insurance of contract works and other insurable interests will also be entered into the project budget. In fact, at this stage a specialist insurer can evaluate the risks inherent in the project and put forward estimates of the pricing of insurance covers. Also, this is the last opportunity to introduce loss minimisation measures to the blueprints, implying improved safety standards resulting in lower insurance cost.

1.5 Award of contract

The principal will now award the contract to the contractor who offers the best combination of price, know-how and financial and technical guarantees. The principal then appoints a consultant engineer to supervise the works. He may either be identical with the project design engineer or, as an independent consultant, a new party to the project. If the cheapest bidder is successful, the insurer should be aware of possible “cut-corner” methods used to save construction costs. However, the insurer may be faced with an aggravated risk.

1.6 Construction phases

During the construction period, the principal will pay the contractor at regular intervals, in accordance with the advancement of the works as certified by the consultant engineer. Sometimes insurance premium payments for large projects are similarly arranged in instalments to be prepaid each year for the following year. As a rule, the instalments are equal shares of the total premium, to simplify control.

Whilst construction is still going on and after it is completed, ancillary mechanical and electrical equipment may be erected and then tested. The testing of civil works is rarely a distinct and spectacular feature, with the exception, perhaps, of the load-testing of a bridge or the first filling of a reservoir.

1.7 Take-over and maintenance period

For the contractor, the last phase of contractual liabilities is of a mostly corrective nature. This phase, known as the maintenance period, starts when the employer's engineer, satisfied that the works have been completed in accordance with the contract, issues a provisional certificate of completion and it continues usually for 6, 12 or more months until the issue of the final certificate of completion.

During the maintenance period, the contractor is normally obliged to carry out, at his own expense, any rectification, amendments or repairs that become necessary and to make good any defects of imperfections that come to light in the works.

Upon the issue of the final certificate of completion the contractor is released from all his obligations under the works contract – although in some countries a legal responsibility may continue under statute for a number of years for certain structural defects, and the retention monies, being the last part of the contractual sum retained by the employer against non-fulfilment of the contract, are released to the contractor.

2 The works contract

The legal instrument dividing the financial risk responsibility between the principal and the contractor is the works contract. It will therefore, amongst many other stipulations, have clauses which oblige the contractor to insure the works against loss or damage. Obviously, a vigilant study of the contract wording is the starting point for a proper risk assessment. It must embrace the clauses regarding the obligations to insure, any special conditions, the drawings, the specifications and the bill of quantities.

Standard forms of contract have been proposed by professional associations and institutions. A standard wording, used mainly for civil engineering and building contracts, was issued by the Fédération Internationale des Ingénieurs Conseils (FIDIC). Another form was produced by the Joint Contracts Tribunal (JCT), London, in 1963 specifically for building contracts. However, both principals and contractors are free to draft their own forms or to modify standard wordings to their particular needs.

The following comments regarding certain features of a standard contract may be of special interest to the insurer.

Such features concern:
– general obligations and responsibilities of the contractor
– the obligation to insure
– information relevant to risk assessment, ie specifications, work program, excepted risks etc.

The FIDIC's conditions of contract (international) for works of civil engineering construction serve as example.

Many specifications and duties to be performed which are stipulated in the bid documents have a direct bearing on the exposure of a project to natural, technical and human hazards. It is, therefore, important risk information for the insurer, and the scrupulous review of all the documents and data should not be neglected.

2.1 Comments on contract clauses relevant to the insurer

FIDIC conditions of contract clauses (fourth edition 1987)

No. 4.1 Subcontracting
The contractor is deemed to be responsible for the acts, defaults and neglects of the subcontractor. This is one of the reasons why the CAR policy is conceived to insure also the subcontractor. Both parties, the contractor and the subcontractor, are therefore protected against accidental physical damage to the works.

No. 8.1 Contractor's general responsibilities
The contractor is obliged by this clause to act with due care and diligence and to execute and complete the works, remedying any defects in accordance with the contract provisions.

No. 8.2 Site operations and methods of construction
The contractor shall take full responsibility for the adequacy, stability and safety of all site operations and methods of construction. However, the general contractor is fully responsible himself for the part of design or methods done or adapted by him.

The insurer must also consider this situation whenever he is requested to extend cover to damage caused by design defects.

No. 11.1 Inspection of site (by the contractor)
This clause states that the contractor shall be responsible for his own interpretation of data on hydrological and subsurface conditions and shall be deemed to be informed as to risks and contingencies of a project at the specific site.

This means for the insurer that all risk aspects mentioned in the inspection clause as being the contractor's responsibility are to be covered under a CAR policy.

Rain, flood and climatic conditions can be heavy risks at many construction sites. An underwriter, therefore, should always carefully examine the hydrological and geological data relevant to a project site, together with the measures planned for loss prevention and protection of the works. He may want to make his insurance offer conditional on added protection against storms and flood.

No. 19.1 Safety, security and protection of the environment
This clause details the contractor's obligation to provide at his own cost lights, guards, fencing and watching for the protection of the works.

The insurer may refer to this clause whenever a site survey discloses that fencing, lighting, fire protection, guards or any other measures for the protection of human lives or the works are inadequate.

No. 20.1 Care of works
This clause states that the contractor is liable for any loss or damage to the works before the engineer has issued a certificate of completion. However, it goes without saying that the contractor is not liable for damage caused by risks borne by the principal (employer's risks).

No. 20.4 Employer's risks
These risks are mainly the political risks of war, warlike events, civil disturbances and nuclear explosion and contamination risks. The property insurer generally considers these risks uninsurable.

Use and occupancy by the employer is also an employer's risk, even though he is a named insured under the CAR policy. Use and occupancy terminates the construction period cover under the CAR policy. It is an operational risk which has to be carried or insured otherwise by the employer.

Another very significant employer's risk is "loss or damage to the extent that it is due to the design of the works, other than any part of the design provided by the contractor or for which the contractor is responsible". This is a clear demonstration of the contract partners to free the contractor from any design responsibilities in respect of design for which the employer or engineer is accountable. Engineer's design should better be insured by a professional liability insurance.

The employer is also responsible for losses due to the forces of nature for which an experienced contractor could not reasonably have been expected to take precautions.

The insurer may take clause No. 20.4 as a general reminder to limit the cover to the remaining insurable risks. He may also be aware of the fact that in some countries damage caused by forces of nature beyond a certain intensity is indemnified by the state under a public insurance scheme. The underwriter can therefore recommend an adjusted cover.

No. 21.1 Insurance of works and contractor's equipment
In respect of the sums to be insured, this clause states that the contractor shall insure

a) the works, together with materials and plant for incorporation therein, to the full replacement cost;
b) an additional sum of 15 per cent of such replacement cost, or as may be specified in Part II of the conditions, to cover any additional costs including professional fees and debris removal;
c) the contractor's equipment and other items brought onto the site by the contractor, for a sum sufficient to provide for their replacement at the site.

No. 21.2 Scope of cover
This clause requires the contractor to insure the works in the joint names of the contractor and the employer against any loss or damage from whatsoever cause arising during the construction period and also the contractor for his liabilities during the maintenance period for loss or damage arising from a cause occurring prior to the commencement of the maintenance period and, additionally, for loss or damage occasioned by the contractor in the course of any rectification works during the maintenance period. Overall, however, there is no requirement to insure loss or damage by any of the excluded perils set out in clause 21.4, which can be summarised as essentially war and nuclear risks, and pressure waves caused by aircraft.

No. 22.1 Damage to persons and property
This clause sets out the responsibility of the contractor as regards third-party bodily injury and property damage and, most importantly, makes it clear that it continues throughout the execution of the works and also during the remedying of any defects. It is, however, clearly stated in clause 22.2 "Exceptions" that claims, proceedings, damages and costs which are the unavoidable result of the principal's use of his or other land to realise the project, or injury and damage to persons and property unavoidably resulting from the realisation of the project, will be indemnified by the principal.

This clause directs the insurer's attention to information available from the contractor on material consequences deemed unavoidable and therefore not insurable with regard to the nature of the project, the location of the site with its surroundings, and the construction methods chosen.

No. 23.1 Third-party insurance
It is a condition that third-party injury or damage be insured by the contractor, in the joint names of the contractor and the employer, for the full duration of the contract including the maintenance period. This is one of the reasons that, under contract works policies, some third-party liability (TPL) cover is offered. It should only be ancillary and not replace the contractor's general liability insurance policy.

No. 24.1 Accident and injury to workmen
This clause states that the employer is not liable for accidents or injury to the contractor's employees. The contractor must insure against any liability he may incur in this respect.

Workmen's compensation insurance is not part of the CAR policy cover. It is either bought for the specific project or for all employees of the contractor on an annual basis, regardless of where they work.

No. 25.3 Remedy on contractor's failure to insure
This clause reserves the right of the principal to effect any such insurance as required under the previous clauses at the expense of the contractor. The principal or owner, guided by the consultant engineer, may also choose to arrange insurance cover himself.

The following clauses,
29.1 Interference with traffic and adjoining properties
30.1 Avoidance of damage to roads
30.2 Transport of contractor's equipment or temporary works
30.3 Transport of materials or plant and
32.1 Contractor to keep the site clear
may offer the insurer some useful arguments if the contractor should claim for

damage he incurred because he knowingly violated the rules set out (example: damage to a bridge by heavy traffic as a result of the requested measures of loss prevention having been neglected).

Defects liability (clauses 49.1-49.4 and 50.1)
It is quite important for the insurer to know the wording of this works contract clause, because in most parts of the world he will be requested to provide insurance cover during the maintenance period.

The insurer should ascertain that the contractor has not assumed maintenance obligations outside the normal rules, such as operational responsibilities, which should be covered by an annual policy for operational risks, eg fire and natural perils, machinery breakdown, third-party liability etc.

Nominated subcontractor (clauses 59.1-59.5)
If the insurer is not certain as to who is actually covered when he issues a policy insuring the principal, the contractor and all subcontractors, he should find a clause in the works contract with an exact definition of the subcontractors. It is good practice, however, to obtain the actual names of the subcontractors and the suppliers who are to be insured by the policy.

No. 70.1 Increase or decrease of cost
This clause says that if the costs used as the basis for the calculation of the contract price increase or decrease for any reason at all – be it the rise or fall in the costs of labour and/or materials or any other matters affecting the cost of the execution of the works as may be determined in accordance with Part 2 of the contract conditions. In that part, the clauses allow for three alternative methods of dealing with price adjustments, ie

(i) fixed price with no adjustment
(ii) acceptable variations in the price of labour and specified materials only, and
(iii) acceptable variations in the price of labour, materials and other matters affecting the cost of execution of the works.

These are followed by clause 70.2, which states that price changes brought about by new legislation or decrees will generally be payable by the employer.

Notwithstanding the costing basis between the employer and the contractor as described above, the contractor is under an obligation by FIDIC clause 21.1 to insure the works “for the full replacement costs”. This should therefore be the basis for arriving at the policy sum insured, which should be regularly reviewed during the policy period to ensure its adequacy. It is the figure on which the insurer will base his premium.

The sum insured indicated in the insurance policy is an estimated amount only and therefore needs to be adjusted at the end of the construction period.
The premium also has to be adjusted accordingly. Quite often an automatic increase clause (10-20% increase on estimated value) is agreed to give the

insured adequate protection. Such clause, however, does not release the insured to eventually declare the final value of the works and to pay the corresponding additional premium.

Certain insurers include in their policy wording a “full insurance” provision. Consequently, if in the event of loss or damage it is found that the insured has not complied with the condition and the sum insured is less than the amount required to be insured, then the amount recoverable by the insured under the policy will be reduced in such proportion as the sum insured bears to the amount required to be insured.

It is obvious that, just as the competitive situation will finally determine the contract price for a tender, a commercial decision will finally determine the premium for a project. However, insurers should realise that while contractors gamble with a profit or loss on the contract price of 2-4%, insurers may end up with a profit in the order of 0.1-1% or a loss of up to 100% in any individual case.

The premium being only one side of the coin, it is important to consider also the probability, the frequency and the size of the losses which must be carried by the insurer.

2.2 Risk management

2.2.1 Elimination and minimisation of risks

Without touching the subject of insurance, the term “risk” could be defined as the possibility that the contractor and/or the principal might be confronted with accidental losses representing an unknown potential expense to them.

The first step towards risk management is to identify and evaluate risks inherent in carrying out the contract, ie prepare an inventory of the property on and off the work site and assess the magnitude and frequency of possible physical loss together with the consequential loss of earnings and market, plus possible claims by third parties.

The second step is to implement a loss prevention and safety programme aimed at minimising these inherent risks.

Loss prevention is a far more demanding task on a large construction site than in an operative plant or building, where risk conditions are fairly stable and foreseeable.

In a third step the risks would – by contractual agreement – be assigned to the various parties involved, ie the principal, the contractors, subcontractors and suppliers. Insurance cover will now be sought, individually or jointly.

1 Contract works – exposures – available insurance

All main exposures are shown in table 2, "Insurance needs for contract works" on page 23.

Physical damage to materials to be used for the project – whether in transit, in storage or forming part of the contract works – constitutes a large part of the total exposure. This exposure is insurable under the Contractors' All Risks policy. Excluded risks are mainly war and warlike events, political public interference, loss and damage caused by nuclear accidents, wilful act of the management of the insured and consequential losses such as loss of use, penalties and performance guarantees of any kind.

Third party liabilities arising out of the construction activities may sometimes be heavy and the allocation of the responsibility for a third-party damage may cause endless discussion, if not litigation. An ancillary cover up to moderate limits of indemnity is therefore available under the CAR policy. It is not a replacement for the contractor's general liability insurance policy.

Purely financial exposures such as non-completion, consequences of financial failures etc must be insured separately in a specialised market or by bank guarantees.

Workmen's compensation insurance cover is also excluded under the CAR policy because in most countries the employer is obliged by law to subscribe to corresponding state insurance schemes or to insurance with specially authorised insurance carriers.

Table 2
Insurance needs for contract works

Exposure	Parties affected			Insurance or other compensation available	
	Principal (employers)	Contractor	Engineer, architect	Contractors' All Risks insurance cover	Other insurance or compensation
Physical damage to					
Property:					
Transit ocean	affected	affected	not affected	no	Marine insurance
inland	not affected	affected	not affected	yes (by endorsement)	Transport insurance
Storage offsite	affected	affected	not affected	yes	Property ins. (off-site)
onsite	not affected	affected	not affected	yes	
Works:					
permanent	affected	affected	affected	yes	
temporary	not affected	affected	not affected	yes	
if caused by defective design	not affected	affected	affected	yes (by endorsement, faulty element excluded)	Engineers' professional liability
Third parties:					
around/onsite property	affected	affected	affected	yes (ancillary cover)	On- and off-site: Contractors' general liability insurance Employers' liability ins. Engineers' professional liability insurance
persons	affected	affected	affected	yes (ancillary cover)	
Existing property:					
(or parts of works taken over)	affected	affected	affected	yes (by endorsement)	Annual property insurance cover
Contractors' plant and equipment:					
plant and equipment on site	not affected	affected	not affected	yes (by endorsement)	
self propelled machines on public roads	not affected	affected	not affected	no	Motor liability insurance
Workmen, employees on site:					
(sickness, accident)	affected	affected	not affected	no	Workmen's compensation insurance Employers' liability
Financial/trade risks					
Non-completion of project:					
technical obstacles	affected	affected	affected	no	Engineers' professional liability
contractor's financial failure	not affected	affected	not affected	no	Performance bond Principals' bank guarantee (works contract)
Late completion due to:					
insured damage	affected	affected	affected	yes (by endorsement)	Advance loss of profits (ALOP) insurance
major perils (no material damage)	affected	not affected	not affected	no	
bad planning, supply deficiencies	affected	affected	affected	no	Penalties (works contract)
Performance deficiencies:					
of finished works	not affected	affected	affected	no	Engineers' professional liability or penalties (works contract)

affected
not affected

2 The Contractors' All Risks insurance policy

In the preceding chapters, the spectrum of risks and responsibilities related to building and civil engineering works was investigated. The focus is now on the main instrument of risk transfer, Contractors' All Risks insurance.

The first CAR policies were drafted around 1920 to provide the parties to the works contract with an overall cover for accidental physical loss and damage and an ancillary third-party liability insurance. This ancillary cover is intended to simplify the settlement of smaller claims. Small subcontractors may also have a general liability policy with rather low indemnity limits or excluding liabilities incurred while working in a project consortium. The primary intention was and is to offer a policy which will respond to most insurance needs on a construction site.

Various other insurances and guarantees such as contract bonds, motor liability, marine and workmen's compensation insurance, were not incorporated in the scope of the CAR policy because, in many countries, motor and workmen's compensation insurance is compulsory and covered under separate standard policies, for which specialist underwriting expertise is readily available.

Despite a number of exclusions, the CAR policy offers protection in the fields of engineering and environmental perils beyond the scope of traditional property insurance. It should be appreciated that this wide cover often operates at work sites whose external risk configuration is not entirely known at the outset of construction activities, in contrast to locations where property has been in service and where for some time the build-up of local knowledge can supply statistical data on the evidence of fire damage, rain, inundation and windstorm.

In some projects, the sums insured for the construction part of a project and the erection part can be roughly equal: an example would be a hydroelectric power plant including the construction of a dam, river diversion and powerhouse buildings, and the erection of turbine generators with coolers, exciters and all auxiliary equipment. This normally entails issuing two separate policies – one for the construction works and one for the erection of the machinery. However, there is another possibility: in order to close any gaps in cover and to reduce administration, Swiss Re developed a Contract Works All Risks policy which is a combination of the Contractors' All Risks and Erection All Risks policies.

The following comments refer to the cover offered under the material damage section of a standard CAR policy like the Swiss Re specimen. The third-party liability section will form the subject of a separate paragraph at the end of this chapter.

2.1 Insured parties

It is a main feature of the CAR policy to cover those who have an immediate material interest in a project. These are the principal (employer), the contractor, and usually all subcontractors, often including suppliers of materials and equipment and more rarely, the consulting engineer or architect.

The names of the parties (or generic categories, ie all subcontractors) must be listed in the schedule and their interests (items insured) included in the sum insured.

The insured interest of suppliers may comprise plant or premises let to other insured parties, or services such as transport of materials and equipment. Such costs must always be included in the sum insured for the material damage section.

It is in the case of damage or loss when the advantage of insuring all parties under one policy becomes evident: there is no need to delay repairs for necessary investigations to identify the party at fault.

Repairs of the damaged portion may recommence almost at once and regular work in undamaged sectors may continue.

2.1.1 The principal (employer)

The particular advantages accruing to the principal by being insured under a CAR policy are:

– there is only one policy which covers all interested parties, including the subcontractors;
– the policy need only exclude the employer's risks, thus providing the employer with the same wide cover;
– unless otherwise stated, any indemnity should legally be payable to the insureds jointly, thereby giving the employer an important control over the policy monies, and the way in which they are used;
– it covers the acts of the employer and his employees should they visit the contract site during the construction period and thus avoids any possible policy disputes or subrogation matters as between the employer and the contractors.

Moreover, it is normally a contractual requirement covering the contract works and third party liability in the joint names of the contractor and the employer.

2.1.2 The contractor/subcontractors

For the contractor who is accountable to the principal for the care of the works, insurance is an essential protection. His capital and credit resources are usually limited and will be much less exposed. The inclusion of subcontractors and

suppliers under the policy is another advantage. Their contributions to the project are the main contractor's responsibility and he may now largely disregard their financial standing and does not have to fear serious disputes over responsibilities in the event of damage.

Conversely, subcontractors and suppliers will welcome the facility to insure their contribution to the works under the CAR policy because they will also be relieved of the threat of costly disputes in the event of damage.

2.1.3 The consulting engineer/architect

If the consulting engineer or the architect were insured under the CAR policy, all damage caused by faulty design, if insured by endorsement, would be covered and paid under the policy with no possibility of recourse, except in certain special cases where gross negligence could be proven. This would hardly ever be the case.

The insurer should, therefore, be reluctant to include the consulting engineer and/or architect as a named insured under the CAR policy.

Engineers and architects liabilities can be covered under a professional indemnity policy.

2.2 General policy conditions

Most of the general conditions in CAR insurance are identical with those of any other property insurance policy. Consequently, the following paragraphs only deal with those provisions which are peculiar to CAR insurances or otherwise important in this context.

2.2.1 Sound engineering principles and practice

The observance of reasonable precautions, closely linked to prevention of loss or damage according to the state of the art in engineering, is a prerequisite for the validity of the policy. To the civil engineer, sound practice means working to acknowledged safety rules and professional standards, according to a planned method of work and based on the state of engineering science and expertise. This principle applies from the drawing board all through the execution of the works, until they are definitely taken over by the principal at the end of the guarantee period.

In practice, damage is very seldom caused through clear violation of this condition by a responsible site official. A complement to this condition is also implicitly contained in the general exclusion of wilful act or omission or gross

negligence of any director, manager or responsible site official of the insured (see general exclusions).

Examples of non-observance (which actually occurred) are:
– to save time and expense, the contractor failed to drive sheet piles to the required depth, taking a deliberate risk of waterheave (which then occurred twice);
– wooden roof support of car park. The engineer/architect issued very loose indications as to the number and the dimensions of beams and omitted to call in a specialist firm to compute the maximum load and stress resistance of those beams. The carpenter to whom the contractor sublet the placing of a wooden support structure then followed his own intuition when choosing beams of a certain size. The small load of two inches of rain water collecting on the flat roof was already heavy enough to make the beams bend and collapse.

2.2.2 Maintenance of plant and equipment

A high standard of maintenance helps to avoid accidents of mobile plant. Plant in poor working condition may cause damage to the works in a roundabout way.

Training of operators must correspond with the requirements of a project. The insurer is well advised to check actual practice and to compare it with the requirements of the particular project.

2.2.3 Material change of risk

This is one of the very important insurance policy conditions. If, for example, the principal should decide to add two more storeys to a 5-storey building, or if for a river dam project the contractor should decide to reduce the cofferdam height, thus exposing the foundation work to flooding over a return period of 5 instead of 25 years, this would constitute a material change of risk or a deviation from the initial exposure insured under the policy. Generally, changes in the overall dimensions of a project or the employment of different construction methods with obviously smaller safety margins, as well as prolonged cessation of work, exceeding one month, would constitute material changes of risk.

If such a material change of risk is only discovered by the insurer after a loss has occurred, the contractor will resent not being indemnified. An underwriter should, therefore, draw the contractor's attention to the necessity of advising any material change as early as possible in order to enable the insurer to decide at what conditions he wants to continue to insure the project.

2.2.4 Information and right of access to the site

The general conditions state explicitly that the insurer may request access to the site and to all relevant documents, which include drawings and specifications, in the principal's possession.

Experience has shown that regular visits to work sites at all construction stages are essential in conducting CAR insurance. It is indispensable with larger projects to inspect the location both before writing the insurance policy, in order to assess the environmental perils, and during construction, to check the standard of loss prevention measures and for claims control.

2.2.5 Obligations in the event of damage

This condition is treated in more detail in part 3, section 5, "Claims handling and adjustment" on page 65.

2.2.6 Termination of cover

The period of insurance under a CAR policy is normally linked to the projected duration of the works and cannot be cancelled except for the following reasons:
– in certain circumstances, a major material change in the insured risk;
– abandonment of a project, ie withdrawal of the principal or any key contractor(s) from the works contract for political, financial, technical or other reasons. The cover may be reinstated with the insurer's agreement if work on the project is recommenced.

2.3 Exclusions from the insurance coverage

The material damage section of the policy provides an "all risks" basis of indemnity, subject to certain exclusions. Firstly, there is a set of generally known standard exclusions. Secondly, particular exclusions may need to be negotiated to suit a particular project at a specific site. For example, for trench work or well sinking, the insurer may propose cover restrictions in order to bring the risks within the realm of acceptability or to exclude specifically damage which is foreseeable (eg silting up of trenches after normal rainfall).

In the following, we shall comment on
a) the general exclusions which concern both the material damage and the liability covers and
b) specific exclusions of the material damage section alone. Particular restrictions of the third-party liability cover will be treated in section 2.7.

2. 3.1 General exclusions

– Excess amounts (deductibles) see section 2.9

– Liquidated damages or penalties
Liquidated damages or penalties contractually accepted by the contractor are excluded from the policy cover. The payments have to be made to the principal if the guaranteed performance or efficiency is not achieved or completion of a project is delayed. This reason for the delay must at all events be a covered loss under the policy.

– Wilful act or negligence
It is often useful to determine and list in writing those categories of construction project managers who are to be designated as responsible officials at the site and elsewhere. Thus, in the event of damage suspected to be caused by wilful act or negligence, no arguments about who is a responsible official can poison the customer-insurer relationship.

– War and political risks
The exclusion of war and political risks is standard. For minor localised political events the insurer may, from time to time, cover the risks of riot and strike and – possibly – civil commotion not reaching the proportion of a popular uprising. This extension can only be granted by an endorsement which minutely defines the boundaries of this special exception from the general exclusion.

– Nuclear phenomena
The insurance of nuclear phenomena is the domain of nuclear risk carriers, such as national insurance pools or captives, managed by specialist insurers and engineers. It is not an exception to this rule when CAR policies are written for the construction of nuclear power stations because no nuclear risk is present during the construction phase until fuel is delivered to the site.

2.3.2 Specific exclusions: material damage section

The insurance clause which introduces and defines the all risks coverage of material loss or damage restricts the indemnity to events which qualify as being of unforeseen and accidental nature. In a number of countries with Anglo-Saxon jurisdictional tradition, the terms “loss” or “damage” imply this qualification because local jurisdiction traditionally emphasises this fundamental rule of property insurance theory and practice. However, CAR policies are being issued to contractors or principals of many nationalities for projects in territories with different, undefined or unknown legal traditions and even variant interpretations of cover definitions. It is therefore recommendable to spell out in the policy wording that the cover is for physical loss of or physical damage to any of the property insured or described in the schedule.

Faulty design, material and workmanship
There are several clauses which provide various degrees of cover for defects in the design, material and workmanship of a project. In most cases, only the consequences of such defects are covered, which means that the faulty part itself is excluded.

Faulty design:
The importance in restricting cover to consequences of faulty design can be illustrated by the following examples of damage caused by defective design:

a) A tunnel was constructed in a fractured rock formation. A relatively thin lining had been specified since the engineer assumed the rock to be stable. After some kilometres of progress, the lining in some sections of the finished part began to show serious cracks. It was verified that the rock had moved. A heavy reinforcement lining and rock anchors had to be placed in the section where the initially-specified defective lining had failed.
   The faulty part, the faulty designed lining is excluded and only the removal of the collapsed soil material is covered. The stronger reinforcement of the lining and rock anchors are improvements and therefore not covered by the policy.
b) A 10-storey building was constructed on a pile-supported base plate. About two-thirds of the piles hit rock but on one side no rock layer was struck. The building subsided, developed heavy cracks and leaned over. It had to be set upright again, repaired and the weak foundation support strengthened. Repair work to the building had to be separated from improvement expenses in order to settle the claim.

The examples show that underwriters have to carefully evaluate the projects in respect of the design cover but also that a methodical approach becomes impracticable whenever speculative design is used to reduce costs and replaces safe design assumptions. The subjective decision of the designer engineer and not the fortuitous accident then determine the exposure to loss or damage. The insurer would undoubtedly further such a tendency if he assumed the entrepreneurial or trade responsibility of both the principal and the contractor, to

– ascertain the adequacy of the engineer's/architect's design, computations and advice;
– control the specified quality of material and workmanship;
– avoid underbidding based on cheaper, high-risk design, material and methods offered speculatively and in full knowledge of reducing safety and taking chances, for example, that no flash flood would wash down a dry river bed whilst critical foundations were being constructed without the protection of a cofferdam.

The exclusion of the faulty designed part, therefore, in the basic policy form is a precautionary measure, partly because the consequential material damage resulting from a defective design can be very serious. Before granting any extension of cover under this heading, additional information must be requested and carefully considered. Also, there are different degrees of design extensions – see later paragraphs regarding "extensions of coverage".

Faulty material and workmanship:
For most risks, insurers are prepared to grant cover in respect of fortuitous damage to sound parts of the works caused by defective material or workmanship. However, the defective part itself is always excluded.

Normal making good, normal upkeep
Under the terms of the works contract, it is the contractor's obligation to make good defects, faults or deficiencies. This means putting right portions of the work that prove defective or are not up to specification. It would also mean repairing petty damage which the contractor expects to occur in the course of construction, such as
– soiling of surfaces by rain or dirt,
– bending reinforcement steel rods by careless handling.

The insurer should propose an adequate excess amount to exclude the frequent small damage which the contractor can afford to repair on his own.

Mechanical or electrical breakdown (wear and tear, corrosion etc)
This exclusion refers to the contractor's plant and equipment used on the site, and is – often – quoted in a separate endorsement which circumscribes plant and equipment cover. It is a distinctive feature of contractor's plant to be subject to heavy wear and tear and, consequently, to have brief life spans and be prone to breakdown, even with the best of maintenance programmes.
The insurance coverage, therefore, above all excludes mechanical and electrical breakdown besides wear and tear, because, in the event of damage, and for all practical purposes, it would be difficult to separate normal maintenance from repair costs.

For example, if in the event of an internal breakdown further damage is caused to a plant unit and to other property, such consequential damage would not fall under the exclusion (eg a dumper truck, because of failure of its hydraulic system, loses steering ability and braking power and crashes into a supporting wall. The crash damage on the wall and also on the dumper is covered).

Other exclusions
The remaining exclusions from the material damage cover of the policy are self-explanatory.

2.4 The period of insurance

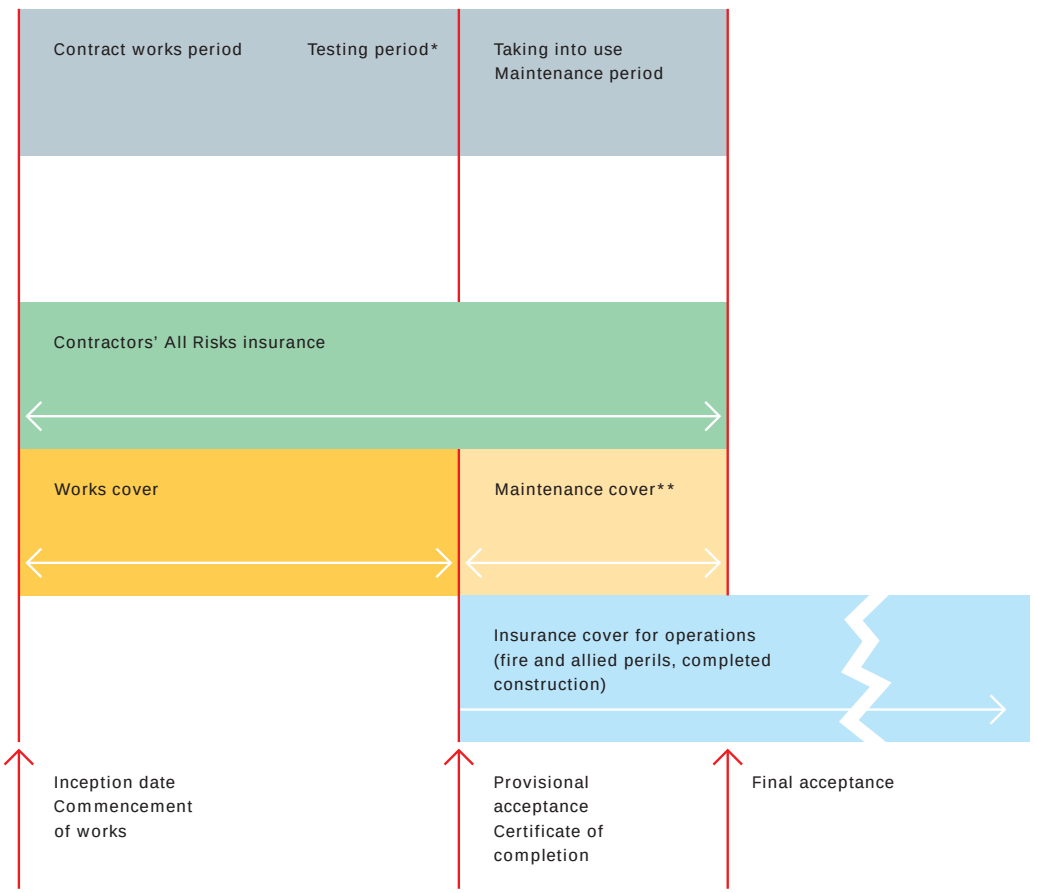
The length of the period of insurance must correspond to the duration of contract works. The exposure of a project to fire, flood, storm etc may change several times during the contract period. It is one of the basic functions of risk assessment and rating to investigate this aspect.

For smaller projects which are constructed and finished within one year (for example housing construction), the length of the insurance period does not pose any problem.

For projects with a construction period of 24 months or more, the exposure to perils of nature may extend over two or more seasonal peak hazard periods. The underwriter must assess the extent of property exposed for each progressive period to arrive at a reasonable assessment of the pertinent premium contribution. Fixing the period in the policy may seem to be only a minor administrative necessity. However, the consequences of a long period could be serious. Experienced underwriters often make a schematic drawing of the property at risk along the time progress axis, in order to be able to visualise the impact of seasonal peak exposures on the risk. Table 4 on page 37 conveys some notions on how seasonal flood exposures are examined and assessed.

The contractor's exposure during the maintenance period is reduced, because the employer/principal has taken over the works. However, the contractor will probably still be responsible, under the contract conditions, for damage to the works (taken over and now in the employer's possession) caused by him whilst rectifying defects, eg fire damage. The employer's fire policy will be in force which may contain extensions to cover perils like storm, water, theft etc.

Table 3
The project periods and the corresponding insurance covers



* May not be a clearly defined period since the testing affects only particular projects or parts of it (load tests on piles, load tests on bridges etc).

** Extension of CAR policy by special endorsement for a limited cover of loss and damage in connection with the contractor's maintenance obligations and activities.

2.5 Sums insured

All items which the principal and the contractor may choose to insure must be listed in the questionnaire and in the policy schedule (specimens available from Swiss Re). In contract works insurance, the sums insured should be equal to the new replacement value of the works. They represent the upper limits of indemnity and are the basis for the premium calculation. The following are some comments regarding items contained in the total sum insured.

Contract works – the influence of inflation
Inflation can be a serious problem for the principal and the contractor because of the additional financing required and for the insurer because of increasing repair costs. In order to protect himself, the insurer should insist on an underinsurance clause and also apply it. However, if inflation is in excess of 20% p.a., the underinsurance clause would put a rather heavy burden on the contractor, especially when the contract period is longer than a year. In such a case, preference should be given to a periodic adjustment of the sum insured, if necessary even monthly and automatic if the rate of inflation is very high.

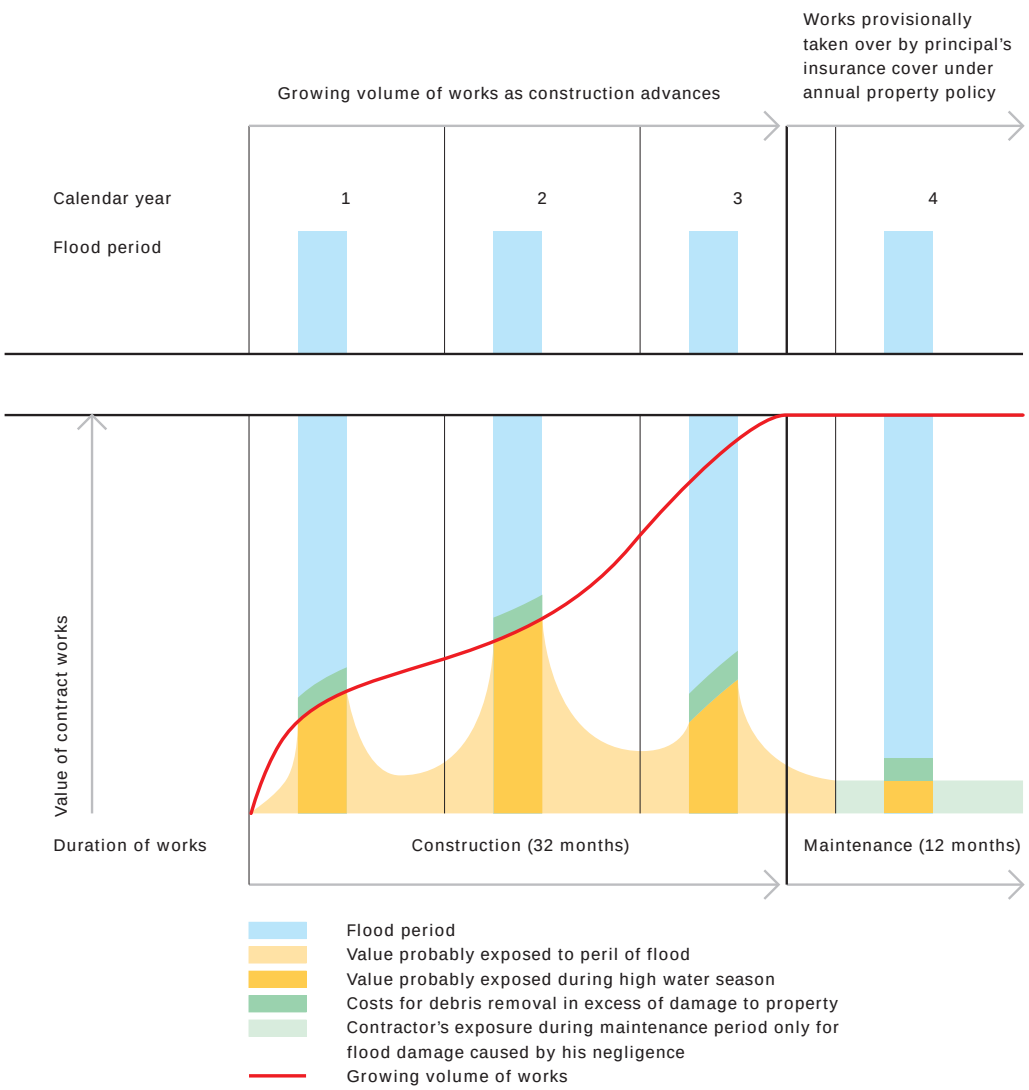
Removal of debris
A separate amount may be insured, on a first loss basis, for the cost of removing debris. In principle, this relates to the removal of the debris caused by indemnifiable damage to the insured object. However, past claims experience has shown that distinct definitions of debris removal are needed, if not for each works project then at least for each category of works. For instance, if removal of debris should include or exclude silt or debris carried onto the construction site by a flood, then a clear specific agreement should be attached to the policy. Depending on the nature of the works, this cost item could considerably increase the bill, even if the actual damage to the works is relatively small. The contractor will be well advised to estimate in advance an adequate amount for this contingency.

2.6 Extensions of coverage

For the majority of larger projects, the standard cover as provided by the basic CAR policy needs to be adapted with extensions and restrictions in order to satisfy the insured and the insurer. Both parties' experience has gone into the drafting of standard endorsements. Those used most often in conjunction with the standard policy wording are available from Swiss Re on request.

These standard endorsements will not suffice for very large projects or for unusual exposures. Tailor-made endorsements are the rule in such cases. The language used in such a special endorsement for specific conditions or situations should be plain, concise, clear and to the point, with only one possible interpretation. Unfortunately, this is not always the case.

Table 4
Insurance period and values at risk



2.6.1 Existing property

Existing property can be buildings, installations etc. belonging to or held in care by one of the parties to the works contract and located on or in the immediate neighbourhood of the work site. Sometimes renovation works are carried out within buildings, altering their appearance or structure.

Whenever such items, which obviously cannot be considered third-party property, are exposed to damage by construction activities, they should be insured separately under the material damage section and an additional sum entered into the policy schedule. This sum should be an amount for the duration of the works, estimated on the basis of the new replacement value of the affected property. The additional premium cannot be calculated by just applying the works rate to the value of the affected property. In most cases, insurance is taken out on a first loss basis. Because the insured amount is disproportionately small in relation to the exposed property, the underwriter has to calculate the premium in relation to the exposed values in order to arrive at a sufficient minimum premium.

The cover is normally restricted to loss or damage due to, or arising from, the execution of the contract works. It may exclude damage due to the forces of nature, but if the employer wishes to have cover for those particular perils where the damage comes about because of the contractors negligence, he has two choices, namely

(i) to extend his own annual property cover to include those perils (in circumstances of contributory negligence from the contractor or otherwise), asking the property insurers to note the contract work due to be undertaken and (so that those insurers do not proceed against the contractor if he is partly responsible for the damage) for the contractors interests to be noted and covered under that policy, or

(ii) to ask the CAR insurers to delete the natural perils exclusion of the existing property cover.

2.6.2 Contractors' plant and equipment*

Normally a contractor's permanent fleet of plant is insured through an annual plant policy. The facility to accommodate these items within the framework of the CAR policy was created because specialised contractors frequently buy or hire plant for the particular purpose that will remain for an unlimited time at the work site of a large project or be moved from one work site to another as specialised equipment. A wide variety of *mobile machinery* and *stationary plant* is used, depending on the nature of the work at hand:

– earth and rock moving plant
– pile driving and drilling machines
– cranes, stationary or mobile
– road surfacing machines
– lorries, etc.

* see also Swiss Re's bulletin on "Contractors' plant and equipment insurance in international markets"

Example of equipment are:
– scaffolding, temporary bridges, sheet piles, tools
– temporary housing and offices, stores etc.

The main perils for plant on site are:
– overturning
– collision
– landslide and rockfall
– flooding
– fire.

Plant insurance commands adequate premiums which reflect the adverse claims experience of insurers. In the case of large fleets, the contractor should update the list of plant on site and, thus, adjust the amount insured in yearly or semi-annual intervals during the construction period.

Sums insured for plant
The underwriter must verify that the sums insured for the plant correspond to new replacement values of machines on the site. Actual "written-off values" as a basis for premium calculation deprive the insurer of essential premium income for this heavy type of risk.

The insurer will have to indemnify repair costs at the then prevailing purchasing price of spare parts and at actual costs of labour. Values depreciated according to years of service are not acceptable as sums insured.

Values of certain items of plant should be checked with a reputable machinery dealer in order to make sure that the sums insured correspond to reality (see also Swiss Re's publication "Contractors' plant and equipment insurance in international markets").

For smaller projects with just one or two small cranes, some light machines and a tool store, the supply of information is no problem. For larger projects a list of plant (and equipment) is indispensable, giving type, manufacturer, year of manufacture, name plate number and new replacement value.

For equipment such as scaffolding, workshops and camps, actual market values are permitted as sums insured because most of the losses are small and can be repaired with local labour and material at reasonable costs. If houses of high quality are provided (for qualified staff) on a construction camp, such equipment should be included in the policy at new replacement values.

A word of warning: in adjusting claims for equipment, the adjuster should beware of old equipment being upgraded at the insurer's expense.

Deductible
The deductible for plant and equipment is indicated separately in most CAR policies. It should be high enough to exclude the everyday maintenance type of loss (for example at least USD 1 500 and preferably USD 3 000 to 10 000 for large projects with a large plant inventory or high value plant).

2.6.3 Faulty design

Today, for traditional type designs, the international insurance market is generally prepared to offer, on special terms, some cover against accidental damage to sound contract works caused by a defective design, but in doing so will usually wish to retain rights of recourse against the employer's consulting engineer/designer. Accordingly, it is important in this respect not to include the consulting engineer/designer amongst the policy insureds, otherwise these rights will be effectively waived.

The design risk becomes more onerous when the main contractor has carried out the design and is responsible for any design defects under the contract conditions, because in this case and especially as he will be one of the policy insureds, no recourse against him will generally be possible.

All consulting engineers/designers should consider arranging adequate professional indemnity insurance in order to protect themselves against any legal actions resulting from their design errors.

For designs of an unusual or non-traditional nature, insurers may still be reluctant to grant any design cover extension. However, no hard and fast rules can be laid down and each case must be judged on its merits. Whenever an insurer is asked to provide consequences of defective design cover, the following information should be obtained:

(i) who carried out the design of the permanent works;
(ii) who will design the temporary works;
(iii) who will be responsible for the design of the permanent and temporary works under the works contract;
(iv) what investigations (geological, hydrological, seismic, climatic etc) were undertaken prior to decisions being made regarding the design;
(v) what is the experience of the designer in producing designs of similar projects;
(vi) are there any features of novel or unproven design.

In order to limit the risks, the insurer might assume the faulty design cover can be restricted by introduction of indemnity limits and/or high deductibles.

2.6.4 Professional fees

The repair of extensive damage, especially when stability is threatened, may require the professional advice of engineers in order to check on the design and do the calculations for an effective reinstatement.

The fees of engineers are normally not included in the contract bid because the principal has separate contracts with them.

Under clause 21.1 of the FIDIC contract conditions, the contractor is obliged to insure additional costs up to a specified amount. This is to include amongst other things professional fees, which by insurance market practice are normally insured by a separate first loss item in the material damage section of the CAR policy.

2.6.5 Other extensions of significance

Additional extensions may be agreed upon as circumstances require, at an adequate additional premium, as for:
- expediting expenses for overtime and for work during holidays
- airfreight for speedy replacement of essential elements
- riot and strike (and civil commotion not reaching the proportion of a popular uprising). This extension is only granted if the political and/or labour situation is not already unsettled.

2.6.6 Insurance cover during the maintenance period

The maintenance period begins when the provisional certificate of completion is issued or when the works are taken into use. The principal is then at risk, the work being his property. The responsibility of the contractor is then reduced to his contractual obligations, which so far as insurance is concerned in the FIDIC civil engineering contract conditions, clause 21.2, are expressed as follows:

"The insurance ... shall cover ... the contractor for his liability

(i) during the defects liability period for loss or damage arising from a cause occurring prior to the commencement of the defects liability period, and

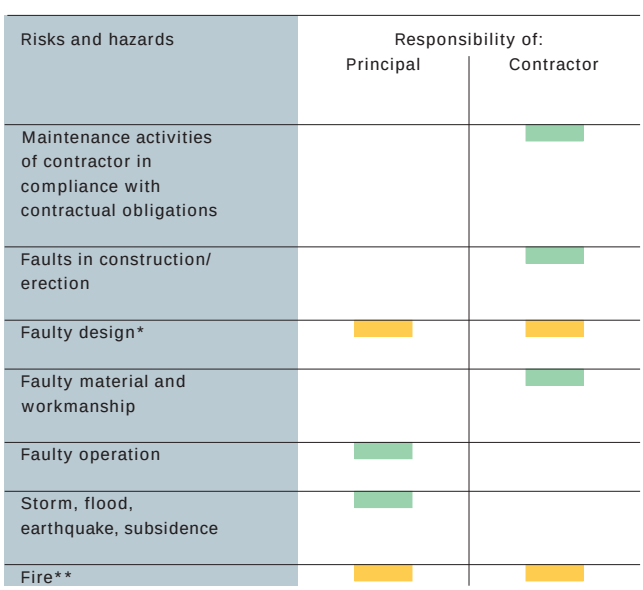
(ii) for loss or damage occasioned by the contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50".

So far as the CAR policy is concerned, the defects liability period is the maintenance period. Clause 49.2 of those same contract conditions makes it clear that the contractor shall "execute all such work of amendment, reconstruction, and remedying defects shrinkages or other faults as the (employer's) engineer may ... instruct the contractor to execute."

This particular requirement is quite onerous. Other contract conditions are more limited and may, for example, confine the obligation to just sub-paragraph (ii) above. Consequently, it is very important to make sure that the correct scope of cover is requested from insurers in each case.

The contractor would not generally be liable during the maintenance period for material damage to the works handed over caused by the employer or his employees.

Table 5
The contractor's risks during the maintenance period under normal contract conditions



Full responsibility
Partial responsibility

* The contractor is only responsible for the part of the design supplied by him but not for the design of the principal's consulting engineer.

** Primarily, the principal's fire policy has to idemnify such claims. However, in cases where the contractor can be held responsible, the fire policyholder may subrogate against the Contractors' All Risks policy.

In this table, other risks which the contractor is faced with as personal injury of employees, delay, performance guarantee etc are not shown because they figure among the general exclusions of the Contractors' All Risks policy.

2.7 Third-party liability cover

Why should a CAR policy contain liability coverage?

The answer is in two parts – firstly, it is required to comply with the contract conditions; and secondly, it is clearly advantageous for the employer and main contractor to be sure that none of the participants in the joint venture are without insurance protection against claims from third parties. The smooth working on the work site and co-operation would be greatly disturbed if for example one of the more important suppliers/subcontractors had to defend himself, without the financial resources and legal expertise of an insurer, against substantial claims either by parties extraneous to the works contract or by other contractors working on the site.

On the other hand, the liability coverage of a CAR policy need not extend to the activities of the contractors and subcontractors who are not directly related to the joint construction project. Individual in-house general liability policies are tailored to cover the overall activities of a contractor. The CAR policy restricts liability protection to occurrences immediately connected with the construction project, originating on the site or in its immediate neighbourhood. The minimum amount of third-party liability cover required by the employer will usually be set down in the contract appendix.

Still, in cases where activities on a work site present an exceptionally heavy pollution risk or may interfere with utility lines/pipes, air traffic or shipping, or if the environment is hostile, then the CAR insurers may only wish to provide a modest third-party liability limit, leaving it to the contractor to arrange any necessary top-up in the TPL cover to meet the contract TPL limit laid down.

2.7.1 Exclusions of liability cover under CAR policies

The exclusions relating to the liability coverage under the CAR policy also reflect the restricted nature of such cover.

The main exclusions are:

– Property which is or could be insured under the material damage section (including, eg, all plant and existing property). This should prevent participants from claiming against each other for damage to the works or the plant or for consequential losses which should have been insured otherwise.
– The work force, which should be protected by means of employer's liability, workmen's compensation, personal accident and sickness policies. In countries where this protection or part of it is subject to compulsory national security schemes, the possibility of recourse against the CAR/liability insurer should be excluded and one should also make sure that the policy does not cover any amounts in excess of the limits provided by the national schemes. Cover for such protection should be given under separate policies with corresponding rating.

– Vehicles licensed for traffic on public highways, vessels and aircraft. Their liability insurances should be covered by specialist motor, marine and aviation insurers.
– Vibration or lack of support. Damage caused to third parties' property by these causes are, from an engineer's view, foreseeable and rarely of an accidental nature.

Third-party claims stemming from removal and weakening of support, dewatering, vibration etc are excluded from the CAR policy cover. The insurer may, exceptionally, waive this exclusion if full particulars on subsoil conditions, methods of excavation and building, distance and state of neighbouring property are made available to him. He may then demand certain safeguards which should always constitute part of the policy in the form of warranties.

2.7.2 TPL cover during the maintenance period

The contractor who visits the work site in order to make good defects needs protection against claims from outsiders to the works project. His annual comprehensive TPL policy covers this contingency, of course. Still, it has become the practice in many markets to extend the TPL cover under the CAR policy to the maintenance period as well, though only for the contractor's legal liabilities and not for the owner's.

It is notable that under the FIDIC contract conditions the contractor is not liable for third-party damage to the works taken over by the employer and therefore if he caused such damage would have a strong defence under contract against any claim for loss of turnover or revenue. However, he could be liable outside the contract under tort, ie common law.

2.8 Restrictions of cover

Restrictions of cover may be necessary in order to
– limit damage which could be caused by one single event
– prevent or reduce a high probability of damage by adequate loss prevention measures.

Such cover restrictions are a means of control to make sure that certain technical conditions are observed and maintained by the insured. They are imposed on him by way of endorsement. However, because the set of conditions varies greatly from one project to another, they cannot be called standard endorsements. They must be adapted to the individual projects according to circumstances.

There follows a list of examples where technical conditions may have to be imposed. Sample endorsements are available from Swiss Re on request.

Examples of cases requiring technical conditions:
- dewatering of excavations, basements, foundations, tunnels, work sites in river beds, on lake and sea shores
- pipeline construction
- third-party liability in respect of existing underground cables or pipelines
- fire prevention measures (fire-fighting equipment and organisation)
- loss prevention and limit of indemnity for property in storage
- storage of construction material
- exclusion of flood damage
- exclusion of earthquake damage
- earthquake building code
- exclusion of damage to crops, forests, cultivated areas
- contract works time schedule
- debris, silt, erosion, landslide
- temporary access roads (general, limited length)
- abandonment of shafts
- subsidence, road construction (limit of work face)
- overbreak and grouting works
- exclusion of loss of stabilising fluid
- construction of conduits and mains (limit of open trench)
- piling construction

2.9 Excess amounts (deductibles)

At any work site, numerous small incidents causing loss or damage are the rule. Claiming indemnity for each of these events would unduly increase the administrative costs of both the contractor and the insurer.

Financial executives are sometimes very cautious and anxious to have a low excess, thus protecting themselves against an accumulation of small and medium-sized losses.

The insurer, in turn, hopes that policyholders will be more loss prevention minded if a reasonable proportion of their losses remains self-insured.

Whenever the control of elemental perils is a major issue at a work site, CAR insurers insist on policyholders being their own insureds for substantial amounts because of the catastrophic effects which perils of nature could have on the works. The insurer should always try to “sell” a higher excess for damage caused by perils of nature, inducing the insured to take adequate loss prevention measures.

This means in practice that for any larger project, four excess amounts should be actually stipulated:

a) one excess for all perils except perils of nature (acts of God);
b) an excess 5 to 10 times as high for perils of nature as a constraint for the contractor to make some additional effort to protect the works against perils of nature and subsidence and collapse;
c) a separate excess for plant and equipment to eliminate at least the "maintenance type" and the everyday small damage;
d) an excess under the TPL section.

a) and b), and sometimes even c), may be replaced by one excess only, which should be high enough to do justice to the minimum condition in respect of perils of nature.

In some cases, a risk or a peril may only be insurable if an unusually high excess is fixed. A certain amount of medium-sized damage is readily and reasonably foreseeable as likely to happen unless very special loss prevention measures are taken by the contractor (for example, the risk of frequent flood damage to works in a mountain river bed). Such foreseeable damage should either be prevented or accounted for as a trade risk in the project budget. The contractor might be induced by a special and onerous excess to take the necessary steps.

Run-away inflation in some countries may erode a deductible to insignificance in no time. For contracts lasting several years and in countries with high inflation it is essential to increase excesses in step with the price escalation clause of the contract. An adjustment to increases in labour rates is even more appropriate since labour is the main cost element in repair works. It may be practical to adjust the excess whenever inflationary price increases exceed the 20% mark compared to the previous (or original) price level.

III Underwriting, risk inspection and control

1 Preliminaries

Circumstances will dictate whether a particular project is within the average setting of possible hazards or whether it must be insured under special conditions to compensate for extraordinary exposure. Inside a heavy earthquake zone it may only be eligible for insurance if special limits for earthquake as well as higher rates and excesses render the risk acceptable.

Criteria to be considered are:

- Geography, topography and climate of the project location
- Infrastructure, especially transport and repair facilities
- Political and administrative situation in general
  Conditions in a particular territory may deteriorate to the point where the access to the site and normal execution of the works are greatly hampered.
- Size, complexity and value of the works
- Time required for the execution and exposure periods of the works
- Competence of the contractor(s)
  The underwriter will ascertain whether a contractor is qualified for a particular type and size of a project and whether he is familiar with the territory. His claims history is perhaps available directly or can be investigated by contacting other insurers.
- Number and qualification of supervisory staff at the site and of local labour
- The parties insured
  Inclusion of the designing and supervising consultant engineer as named insured would enlarge the cover substantially, as physical damage caused by design weakness or defect would be fully covered.

2 Assessment of risks

Consistent underwriting is equivalent to consistency in evaluation and rating of construction projects. It may be helpful, therefore, to develop an assessment system which allows risk factors to be dealt with in a constant sequence.
The rating forms recommended by Swiss Re may be helpful, permitting a simple and quick assessment. The following sections deal with the more important risk elements for assessment and evaluation procedures and then show some examples of risk assessment.

The information which the underwriter needs can be summarised under the following headings:

- insured parties
- distribution of risks and duties between principal and contractor according to the relevant contract clauses
- works contract provisions relating to insurance
- description of the works: construction method, specifications, plans and drawings, basic design specifications in respect of soil properties, or water flow statistics for a hydraulic project etc
- breakdown of contract value into specific works items
- time schedule
- location: geography, topography, climate, hydrology, seismology.

2.1 Value of property at risk

The most elementary information to be assessed is the total and the itemised values presented for insurance. They must also comprise contributions of materials, labour and services by the principal and the contractors. The underwriter's task is easier if the itemised values can also be fitted into the time schedule. The resulting tabulation or graph would then show the amounts at risk during the successive work phases. The values should be realistic rather than cut-throat prices offered simply to enter a market.

2.2 Engineering hazards

Another factor to be considered is the inherent technical risk of the works during the successive stages of construction, ie their propensity to collapse, subside tilt, catch fire etc. The exposure not only depends on design but also on the construction method chosen. Economic considerations may deter the contractor from choosing the safest working method.

The following aspects are of special interest to the underwriter:

- *Subsoil*
  It is not generally known that for many types of construction the consulting engineer may restrict the subsoil exploration at the tender stage to the bare minimum. It will often be the contractor's task to complete this sketchy knowledge before starting work at the site, and to effect such subsoil explorations and measurements of ground movements for some categories of work (eg tunnelling, dams) during the works period as cautious engineering practice may recommend. Should conditions actually encountered during the construction period show discrepancies with the results of preliminary investigations, it becomes a matter of conscience and of contractual obligation for the contractor to request the consulting engineer to adapt the design and the construction methods to changed conditions in order to

avoid major damage to the works. An experienced and knowledgeable underwriter may impose special conditions in respect of subsoil control.

The hazards presented by geological factors are of major importance whenever it becomes necessary to disturb the subsoil to a greater extent (tunnelling, deep excavations) or when the soil has to bear exceptional loads (high-rise buildings, dam foundations and abutments). For example, premium rates for buildings are loaded whenever excavations are for more than one basement.

– *Underground water control*
  Like the structure of the subsoil, underground water is a major risk factor. Moreover, it strongly influences the subsoil data. Constant observation of the water table during construction is a must, all the more so as ground water is apt to rise dramatically during and after rainfall or melting of snow. The conscientious contractor provides for standby pumps, preferably put in motion by an automatic device and alarm system. Negligence in this regard may have disastrous consequences: collapse of building pits due to rising water, heaving and floating of foundations, basements, tanks, basins, pipes and temporary structures due to the uplift of water.

  On the other hand, lowering the water table may have equally disastrous effects on surrounding property because certain types of subsoil subside appreciably. Neighbouring buildings may crack and be tilted to the point of being unsafe to occupy.

– *Testing and measurements*
  It is largely a matter of the contractor's judgement whether to spend money on tests in addition to those required by the consulting engineer.
  If tests are essential to the safe progress of a project – for example soil tests in large excavations – the underwriter may require such tests to be made and recorded.

Examples for items to be tested are:
– soil samples as well as materials such as concrete (load bearing properties) and steel, especially if properties required deviate from mass application standards;
– component parts, eg piles to be load tested, tunnel sections to be measured for movements and deformation, and foundations for settlement;
– the complete structure, eg bridges for behaviour under load;
– design and methods: circumstances may radically change during the construction period, and a revision of the original design and work methods may be necessary. They should be proposed by the contractor and approved by the consulting engineer. The parties to the works contract might be tempted to neglect necessary adaptations because of delay or additional expenses which may lead to arguments as to who should pay for them. Obviously, designs and methods which do not consider local hazards and

risks (eg a subsiding slab foundation that was not secured by piling) constitute a greatly aggravated risk. All the facts are often not known prior to construction and the underwriter can only protect himself by having critical projects regularly inspected every four or six months or even more frequently. He may also request the insured to keep a log book of subsidence measurements and agree on a danger limit which, when reached, the insurer must be advised of;
- temporary structures such as scaffolding, supports, bridges: these often have a very low safety factor because they are only needed during part of the construction period. A minimum and relatively high percentage deductible is recommended.

2.3 Elemental and fire hazards

These perils produce the largest amount of claims to the CAR insurer. Swiss Re's guidelines for fire loss prevention enable the less experienced underwriter to make a meaningful assessment of these hazards.

- *Rain, flood and inundation*
  The risk of water damage can be evaluated from rainfall statistics, and the geography and topography around and on the site. The underwriter needs to know the elevation of the lowest working level above the normal high-water mark and the distance to the nearest body of water likely to be a source of high water or flood. Even if there is no open water nearby, the hazard of surface water flash floods must be considered. The underwriter must also judge the sensitivity of the temporary and permanent works to water damage. Rain and flood records from control stations closest to the site, or other information on the probability and intensity of rainfall affecting the site are indispensable for rating. National maps on annual rainfall and its seasonal distribution are often available.
  Rainfall may be very irregular locally and low average annual precipitation may give the impression that inundation is no threat. Loss experience with projects in arid countries tells a different story. Lack of vegetation to absorb rain and dried-out hard soil preventing quick penetration into the ground cause so-called run-off water to concentrate quickly in valleys and low ground with sometimes devastating speed and volume. A special investigation of the flood hazard is also necessary in low and flat coastal areas.

- *Windstorm*
  All half-finished structures presenting surfaces to wind pressure (so-called windage) are more likely to be damaged by windstorm than completed constructions, for example:
  - steel structures for sheds which cannot withstand horizontal wind pressure before stabilising bracings are inserted;
  - shells of buildings with only partly clad siding panels which are very vulnerable;

- cantilever bridge decks which are highly exposed to wind before being linked in the middle of spans;
- steel tanks of wide diameter which can only be safely erected if a sliding stiffener ring on the inside of the hull prevents it from buckling.

Basic premium rates reflecting past experience should take into account a modest exposure to normal local wind. If wind exposure is more than modest or if size and type of a project warrant it, the underwriter should investigate the work phases presenting a major hazard with regard to the windstorm season of the area and also the probability of gales and their predominant wind direction.

– *Earthquake*

Constructions in seismic zones need to be accurately assessed. Aspects to be considered and weighed in the rating process are:

- probable return periods for earthquakes of various magnitudes;
- type of subsoil. This factor varies from homogeneous rock which is very safe to unsafe subsoil vulnerable to liquefaction;
- construction materials. Structures predominantly of steel are safe; brick or prefabricated buildings are highly vulnerable;
- asymmetry of design and heterogeneous construction materials make a structure more vulnerable.

Statistics on the severity of earthquake losses are mostly not conclusive. Older types and methods of construction tend to be more vulnerable to damage than modern structures, such as high-rise buildings of steel and glass.

– *Landslide*

Work sites vulnerable to landslide are situated

- on slopes generally;
- on sloping ground which is in continuous slow movement;
- on slopes likely to be set in motion by rain or water from melting snow infiltrating soft clay seams.

Human intervention may easily trigger a sliding of soil or rock layers at any time, where

- the balance of a slope is disturbed by horizontal cuts for roads, trenches or foundations which destroy its support by digging away its base;
- retaining walls or other temporary measures are inadequate.

There are no hard and fast rules which can be applied generally. Each site must be assessed on its own merits. Information on subsoil strata is indispensable for a responsible assessment, as well as a survey on the spot.

– *Fire*
  This is the most frequent threat in building construction and can also be the most devastating. Fire prevention and fire-fighting measures are important but also very difficult in a building under construction. To a lesser degree, this also holds true for other work sites. Full attention is specially warranted for the following terms:
  – temporary structures such as wooden scaffolding and shuttering;
  – stores of wooden and plastic building components;
  – hutments and store sheds;
  – stores, hangars and repair shops (presence of fuel and lubricants).
  The basic approach to rating is that of the fire underwriter.

– *Auxiliary structures and protective measures*
  The upkeep and the money to be invested in temporary buildings and structures are usually left to the contractor's judgement. Such items as cofferdams, temporary access roads and bridges, sheds for material and plant are therefore often allotted a minimum of expense and attention and are very vulnerable to damage by water and fire. They may be used throughout the construction period and thus present an exposed insured item. The experienced underwriter will make sure, however, that maintenance type of damage, ie inevitable normal seasonal washout of temporary roads or blocking by floating sand, is excluded by appropriate technical conditions. Damage to a temporary road or bridge at a time when it is no longer used for the construction of the works should not be indemnified by the insurer because the temporary structure does not constitute a real value. It takes an experienced person with an eye for such items to properly settle such a claim.

– *Transfer of liability for loss or damage due to forces of nature*
  In some countries, insurance pools or governments offer assistance for loss or damage due to forces of nature if a certain degree of intensity is exceeded. The underwriter should check, therefore, whether the maximum indemnity under a CAR policy due to forces of nature would be limited by the existence of national catastrophe relief programmes.

2.4 Third-party liability

Potential causes of loss sustained by third parties were already mentioned in chapter 2 on policy wording item 2.7 (page 45).

An evaluation of the third-party liability risk of a construction project would have to consider the following basic factors:

a) sensitivity and value of neighbourhood property (industrial or commercial activity);
b) number of persons normally present in the immediate vicinity;
c) site activities likely to cause loss or bodily injury to a) and/or b).

A practical assessment of the situation would enquire into the proximity of eg
– roads and railways;
– industrial plant, power lines and pipes;
– airports, shipping, storage facilities

and investigate the likelihood of harm being caused to third parties by the nature and extent of the works on site, such as
– excavation, tunnelling and dewatering;
– storage and use of readily inflammable materials and liquids such as fuel, paint etc;
– overhead transport of heavy weights;
– welding;
– temporary structures and cranes (collapse).

Even if the possibility of direct physical damage to property is evident – for example the cutting of underground power or telephone cables by an excavator – the probability of third parties sustaining and claiming for consequential losses must not be neglected. The cutting of an underground power cable during excavation works in town streets may bring a factory to a standstill. It is therefore strongly recommended to impose clear conditions, ie

a) that any underground facilities (cables, pipes etc) must be traced with the help of plans and detectors, and possibly by manual digging of check holes for exact location before mechanical excavators are set to work and
b) that the indemnity must in any case be restricted to the repair costs of such underground facilities. Also, consequential loss must be excluded from the policy cover.

Whenever pollution damage needs to be taken into account, the endangered property and the likely claimant should not necessarily be sought in the vicinity of the construction site. In the case of a dam being constructed across a river, pollution through concrete additives may occur many miles downstream of the dam site.

3 The rating system

3.1 The construction works

Only actual rating exercises of some projects will convey a meaningful insight into rating methods to the reader. Therefore, the introduction into the rating system will be limited to essential information.

Over the contract period, from site clearance to the takeover date, the total of the values invested at the site rises from zero to 100% of the contract value, ie the equivalent of the sum insured. CAR premium rates reflect the gradually increasing value of risk. The premium rate, applied to the total contract value, covers the entire duration of the works plus, usually, the maintenance period.

Table 6
Categories of construction projects

Light and medium type of risk	Single-unit residential buildings, except when of wood-frame type (fire hazard)
	Apartment blocks
	Private office blocks
	Community buildings such as offices, hospitals, schools, churches
	Industrial buildings
	Silos
	Water towers
	Underground parking, road intersections and metros in connection with deep open-air excavation
	Pipelines (oil, gas, water)
	Sewage systems
	Roads
	Highways incl. flyovers
	Rail tracks
	Airports
	Bridges (constructed and founded on or from land with single spans up to about 80 m. Usual or well-proven systems and reasonable subsoil conditions)
Heavy type of risks	Skyscrapers
	Buildings with high fire hazard
	Tunnels (roads, railways, water diversion)
	Shafts
	Bridges with large spans founded in water and/or special and difficult constructions
	Dams (earth and rock-fill, concrete gravity and arch dams)
	River structures: construction of new rivers, sluices and improvements on river banks
	Canals
	Harbour structures such as new harbours, quays, jetties, dolphins and breakwaters
	Docks
	Land reclamation works
	Seawater intakes

Note: Projects which have to be constructed, for instance, during periods of adverse weather conditions, in known flood, storm or earthquake areas or in bad geological conditions, would have to be classified as heavy risks.

– *Premium components*
  In theory every basic CAR rate contains:
  a) an element that reflects purely the engineering technical hazard of the construction (eg length of a bridge span, number of basements and storeys of a building) and which is for all practical purposes independent of the time of exposure, ie the duration of the works;
  b) an element which changes in accordance with such risk factors that are correlated to the time of exposure, such as the fire/explosion risk and the perils of nature up to a moderate intensity of hazard. Higher exposure to these elemental perils requires additional rates which are computed in accordance with probability estimates of intensity and frequency of each hazard (fire, windstorm, earthquake etc) and the correlated extent of probable damage.

– *Premium computation*
  Meaningful experience statistics, in the mathematical sense, such as have been built up over the years by fire insurers, may be available for buildings but less for large civil engineering works. For the latter, the number of projects (the volume of premiums and claims) per category in any one market is usually too insignificant to the professional statistician. Nevertheless, even incomplete figures will lend themselves to be critically compared to the personal factual experience of the underwriter. The result of this critical analysis may then become the starting point for the required prospective exposure rating of the hazards and circumstances at the construction site under consideration.
  Mathematical probability theories form the basis of such prospective rating with due regard to the variance resulting from only a small statistical entity.

– *Extensions of the insurance period*
  Most projects are finished on time, but some are not. Delays may be caused by project modification or design changes, shortcomings in finance, supply, planning, logistics, or by accidents resulting in major damage to the partly completed works.

  It is indispensable to have all the reasons for the extension of a period. Hitherto concealed risk factors may come to light. Additional premiums for extensions of the insurance period should, therefore, not just be pro rata calculations. They should reflect:
  a) the reasons for the delay;
  b) the differences in the build-up of values caused by the delay;
  c) the prolonged exposure to perils of nature, fire, impact. It may be necessary to reassess the entire situation. In order to illustrate this point, it is assumed that the policy for a road construction has to be extended, ie the half-completed road has to be taken through another rainy season. This means the policy cover must be extended into a period of increased exposure. The additional premium must be higher than if the policy cover had been extended only into the dry season.

– *Assessing the maintenance risk*
  Visits maintenance cover:
  Compared with the hazards during construction, the incidence of claims under the visits maintenance cover is negligible and may be dealt with by a nominal loading of the total works rate.

  Extended maintenance:
  This is a much wider extension than visits maintenance. It also covers risks which originate in the preceding construction period. Two examples may best illustrate the implications of this:
  – Poor subsoil conditions lead to settlement and collapse, but with a delayed effect, after provisional take-over.
  – Full load is brought to bear on structures after provisional take-over only (eg in the case of silos, basins, dams) and causes collapse. The occurrence could have its origin in the construction period due to defective material or poor workmanship.

  This type of maintenance cover not only shows a higher claims frequency, but claims can be very substantial in amount. The loading of the works rate must also be correspondingly high. It normally ranges between 10 and 20% of the basic works rate, depending on the type of project and the maintenance period.

  FIDIC maintenance:
  This is the maintenance cover required by clause 21.2 of the FIDIC contract conditions, as described in an earlier section of this brochure. It is the widest of the three maintenance types. The rate loading for this cover would be slightly higher than for the "extended maintenance" above.

3.2 Contractors' plant and equipment*

When dealing with the insurance of contractor's plant, the underwriter should consider the following aspects:
– The sum insured should equal new replacement values at the location of the site, ie include transit costs and customs duties;
– each item of plant must be identifiable in case of a claim; therefore the insurance cover is based on a list of items showing specifications, individual values (as above) and serial numbers;
– the underwriter should always inspect the plant at the work site, possibly before writing the policy and with large projects of long duration about 6 months thereafter, in order to ascertain the standard of maintenance and the mechanical condition of the plant with regard to safe operation.

The calculated annual premium rate applies to new replacement value because by definition rates are statistically calculated on this reference basis and repair costs correspond to new replacement cost at actual, often inflated labour rates.

* see Swiss Re's publication "Contractors' plant and equipment insurance in international markets"

The premium rate depends on the following factors:
– type of plant
– difficulty of terrain
– exposure to elemental perils
– qualification of operators
– standard of maintenance and repair facilities.

The underwriter should refrain from quoting a combined single rate for works and plant together. Quoting separate annual rates for plant is the only means of adjusting the premium in an equitable manner to the value of the plant actually at the work site at certain periods, especially when the CAR policy period must be extended. Depending on the number and the value of the plant needed at the site, the premium amount payable thereon may in fact be as high as the total works premium. This again shows the necessity of adequately calculating plant rates. The worst fallacy is to offer cut rates and low excesses for plant, in the hope of securing the CAR policy in the face of competition. Experience has shown that plant is vulnerable and may produce a series of costly losses which rapidly consume an insufficient plant premium and the works premium as well.

3.3 Third-party liability under the CAR policy (TPL)

The CAR policy was originally designed to cover the principal and the contractors against material damage to the construction works. Third-party liability was meant to be covered by the individual annual policies of the various parties to the contract.

In practice, this solution was not always satisfactory. It was often difficult to establish which contractor or subcontractor was responsible for damage caused to third parties, resulting in disputes about whose policy should cover the claims.

It was almost natural, therefore, to attach a TPL section to the CAR policy in order to cover all the insureds under the CAR policy against liability directly arising from the work performed on or around the contract site. The cover is thus restricted and of an ancillary nature. It ought to be limited also in amount and should, as a rule, not exceed 20% of the total contract value or approximately CHF 5 million or its equivalent, whichever is less. For cover in excess of this, it is recommended to issue a separate general third-party liability policy. The idea is to get liability specialists involved in the risk assessment and the pricing as well as the claims handling.

Since the various parties to the contract (ie principal, contractors and subcontractors) are all covered under the same policy against claims from third parties, they themselves cannot be considered as third parties. Any claims against each other would, therefore, not be covered under the TPL section of a CAR policy. This is sometimes regarded as a disadvantage and in order to get around it, the so-called “cross liability” endorsement was created. If attached, all parties are

considered to be separate entities and will be treated as if a separate policy had been issued to each of them. It is important, however, that the cross liability endorsement excludes damage to property which is or could be insured under the material damage section of the policy. If, for instance, contractor's plant is not an insured item, there will be no indemnification for damage to any plant, even if such damage was caused by subcontractor A to plant belonging to subcontractor B.

The same applies to existing property belonging to the principal. This should be insured separately in the material damage section. In actual practice, insurers are not always strict in applying this rule, allowing existing property to be covered by the cross liability endorsement. This cannot be recommended for various reasons. Firstly, the question of liability may not always be clear. Payment under the CAR policy would therefore have to be withheld until the true cause of the damage has been established or until a court decision has been obtained. Secondly, a claim may create considerable conflict of interest with the insurer, because the claimant is both insured client and third party at the same time. Further unpleasant side-effects may be encountered on the reinsurance side if the cause of damage is contested and the CAR policy and the property policy covering the existing property are not reinsured to the same extent, on the same basis or even with the same reinsurers. In order to avoid such problems both for the insurer and for the insured, cover should be arranged under the material damage section. The third reason why existing property should not be covered under the liability section is the loss of profits aspect. Unless specifically excluded, loss of profits claims would have to be paid under a cross liability endorsement.

Finally, it is important to have a very clear wording for the cross liability endorsement so as not to weaken or annul any of the general exclusions or the specific exclusions discussed in the material damage section.

3.4 Rating of the TPL cover

The frequency and importance of accidental damage which may be inflicted on third parties are generally determined by

a) the *surroundings* of a project site, ie of the situation of the project site with regard to distance to neighbouring property, its value, distance to or interference with traffic, public service installations for gas, water, power, telephone cables above or below ground, crowdedness, accessibility of the project site, sensitivity of neighbouring property or activities, subsidence due to lowering of the ground-water level or vibrations caused by piling or other harmful effects.
b) the *technical risk*, which is determined by the risk category to which the project belongs with regard to its technical characteristics and, as a consequence thereof, by the higher or lower likelihood that third parties could suffer damage caused by accidents or by activities on the site.

Consequently, *surroundings* and the *technical risk* have been determined as the main criteria for the assessment and rating of the TPL exposure.

In the Swiss Re rating guide, a basic rate is indicated as a function of these two criteria and the agreed indemnity limit. This rate is lowered if an excess higher than the minimum excess for TPL property damage is agreed upon. This rate must be applied to the *total contract value*.

If the indemnity limit is very small compared with the contract value, the rate is reduced since TPL exposure does not normally increase proportionately to the contract value for a given type of project. An additional rate is charged for cross liability and for the extension of the cover to the maintenance period.

4 Inspections and loss prevention

It is hoped that by now the reader will have come to the conclusion that the underwriting of CAR insurance with a reasonable chance of success requires repeated analysis and control. First, the works contract with its written particulars and drawings demands close scrutiny. So does the spectrum of hazards and perils threatening the construction, its ancillary equipment and its surroundings. The site should be inspected even before construction starts with an idea of what is going to be constructed, how it will be done and how site factors such as geology, topography and climate could interfere with the planned (safe) construction of the project. Indeed, whilst diligent paperwork and meetings with the policyholders generally produce realistic assessments and satisfactory cover instruments, the true picture of the risk situation emerges only from regular periodical risk surveys on the site during construction.

Who should carry out these surveys?
The ideal person is a civil engineer, familiar with the management of contracts and the organisation of work sites who, in the course of his insurance career, has gained experience in pinpointing hazards and finding ways to avoid them. Similarly, it may be a safety engineer who has accumulated knowledge of the typical hazard features of construction sites. The best choice is the insurance-trained engineer who gains his knowledge of risks and their avoidance through the continual handling of claims which offer an insight into a wide variety of loss histories.

If the underwriter is unable to conduct these surveys personally, it is important that he be in contact with consultancies. Also loss adjusters can provide this service to the criteria specified by the underwriter.

What are the engineer's tasks when inspecting the work site?
They may be loosely grouped under the following headings:
- Qualify general housekeeping and work organisation and request any improvement necessary to eliminate abnormal exposures, for example wooden shuttering kept in large quantities within finished building sections
- Check the written information previously submitted by the insureds against the real facts and fill in gaps in the risk assessment
- Review loss prevention measures and recommend complementary ones to the site manager
- Inspect damage and take action to minimise its extent after the event and to avoid a repetition
- Adjust the claim on the basis of data readily available at the site.

The practical knowledge gained during the first site visit is the best basis for a risk assessment. Further periodical visits then bolster the insurer's stock of information, which is the source material for further research into the nature of risks and their prevention. The main purpose of intermediate visits would be loss prevention or risk management in general. The surveyor would broadly insist on good housekeeping, which is the most effective contribution to loss prevention.

When is the right moment for an inspection?
To repeat the most important point: for large projects a visit to the location even before site preparation work has begun is indispensable, whilst for smaller projects it is at least highly recommendable and sometimes even necessary. The underwriter's state of knowledge about the local geography, climate, topography and vegetation is the best indicator as to whether additional information should be collected on the site.

When work is in progress, visits should be planned to coincide with critical phases.

Inspections are also called for when an emerging claims pattern points to hidden weaknesses at the site which need investigation and remedial action. Some CAR insurers favour frequent visits at regular intervals and Swiss Re recommends this practice emphatically. Permanent contact with the site management can be beneficial to both sides.

5 Claims handling and adjustment

This chapter will only deal with aspects of claims handling that are peculiar to CAR insurance. Basic principles and practice common to property insurance in general will nevertheless be observed. Moreover, the focus of attention shall be on large work sites whose sheer size and complexity may produce big or even catastrophic losses or, on the other hand, a multitude of small claims.

5.1 Organisation at the work site

Claims handling for large projects must be organised at the outset, when the policy is being prepared and the insureds are mobilising the site personnel and preparing the site.

This recommendation applies particularly to work sites which have difficult access or are located in areas lacking infrastructure, ie lines of communication, transport facilities for replacements and local workshops equipped to effect repairs on a major scale. Moreover, policy provisions put the onus of immediate notification on the policyholders – the penalty for non-observance of the delay being the rejection of the claim. It is imperative, in fact also a prime principle from the point of view of the insurer, that damage to works or plant, or liability towards third parties be investigated at the briefest notice, because all physical traces of the occurrence are likely to disappear as work is compelled to continue. It is true that the contractor is held to preserve evidence of anything that is not minor damage, but then what is to be considered minor damage? In any event, the main concern of the contractor's representatives on site will be to continue work or to catch up with the time schedule of the works programme and to avoid any action which might disrupt co-ordination between main contractor, consultant engineer and the numerous subcontractors and suppliers.

There is a latent conflict of interests here, between policyholders and insurer, which is bound to erupt at the occurrence of the first damage of any importance, unless claims procedures under the CAR policy have been planned and agreed among all parties, before the onset of activities on site.

To produce its beneficial effects, claims handling procedures should be written instructions to the site management, establishing in some detail the steps to be taken in the event of damage. It may be helpful to determine two classes of claims with regard to the expected claims amount. The lower class would be inspected on a case-to-case basis, either immediately or on the occasion of the next planned visit. The insurer would decide this according to the information received. The higher class of damage would be inspected right away.

The instructions should also record:

– whom to notify of any damage which might give rise to a claim; most of the time it will be the insurer's local representative. Advice of minor claims may be held over until the next site visit of the insurer's engineer, whereas major events require immediate notification by fax, phone etc to the insurer's head office;
– which records to have ready for the loss surveyor (it is useful to check beforehand whether the accounting system at the site is geared to documenting claims cost);
– which details the contractor must show in the claims invoice that he presents to the insurer for adjustment and settlement. It is indispensable to work with claims advice forms. Complementary information must be compiled by the surveyor delegated by the insurer.

In addition, it is a sensible precaution to appoint a responsible claims co-ordinator (usually a site official; on very large projects sometimes an independent specialist who takes up residence at the site) and to specify beforehand the rates (unit cost) of material and labour for repair work, plus the overhead if insured, and of anything else that is not a purely external contribution to repairs, such as rates for services supplied by the principal. However, more should not be organised beforehand than what a practical mind can readily see. Contractors are practical people and do not like bureaucrats.

For all damage originating from "excepted risks" as defined in the works contract, the contractor will present a claim to the consultant engineer for settlement by the principal. The analogous handling mechanism will make it easier to prepare those claims since the principal is usually also insured under the CAR policy.

5.2 Aspects of loss surveys and adjustment

– *Expertise*
  Another subject which should receive attention prior to the event is the choice of the loss surveyor. Either the insurer knows that one of his surveyor civil engineers will at all times be available to survey a damage or the insurer must ensure that the adjuster's firm has qualified staff to deal with the intricacies of CAR claims.

  For a larger and more complex projects, the parties to the CAR policy should agree on and entrust an independent international loss adjuster with the surveys.

– *Basis of settlement*
The policy provisions are explicit and do not really call for much comment. The experienced loss adjuster, however, will always direct his attention to alterations, additions or improvements which the insured tries to include at the insurer's expense. At the outset, when the insurer assumes the risk of accidental loss, he calculates his price or premium on the initial design and specification data as well as on the works programme submitted by the contractor. Going on from there, he undertakes to indemnify the cost necessary to restore the insured objects to their original condition. This principle is self-evident but nevertheless quoted among the loss settlement provisions of the policy wording, which adds that the insured may not recover the cost of alterations, modifications, betterment etc.

Damage which occurs during the maintenance period must always be examined to determine whether it falls under the limited coverage in force after provisional take-over.

Efficient claims handling is best guaranteed by nominating a loss adjuster at the outset to agree claims notifications/handling procedures and the basis of claim preparation, plant and labour rates etc *before* a claim occurs.

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