



Private financing of underground transport infrastructures

Position Paper of the ITA

1. Introduction

In view of the fact that the capacity of public authorities to finance the construction of transport infrastructure is decreasing, Owners are seeking more private financing contributions, and sometimes also a total transfer to the private financing.

To obtain a share of private financing, Owners turn to Project financing, which is appealing to a number of contributors: Owners, property developers or concessionaires, financing bodies, project designers, builders and developers; they fix clear rules of procedure and clarify the share of responsibilities.

The risks linked to Project financing were the main topic of the opening session of ITA's annual congress in 2001 in Milan (*see Tribune n°20*).

The present position paper is based on five reports presented on this occasion in Milan: it reiterates the role, obligations and responsibilities of each of the contributors, defines the risks linked to these operations and deals with the specific case of tunnels. It states which points should be the object of specific treatment when carrying out this type of work.

The document defines rules which could guarantee the proper development and success of the operation at every development stage of the project.

2. Role, obligations and responsibilities of the contributors

2.1 The Owner

To implement transport infrastructure, the Owner, in general the government and its administration (national or local), must:

1. Choose and promote the project.
2. Define the conditions of integration of the work in the environment.
3. Define the quality of the work to be carried out (sustainability, level of safety, etc.).
4. Specify the conditions of its financing and operation (length of concession, risk and/or guarantee of income, etc.).
5. Specify the physical constraints in which the work will have to be carried out.
6. Establish the conditions of exploitation. The private sector has developed great competencies in this field (organization, financing).
7. Follow-up the progress of construction and operation.



Part of these tasks may be delegated to a concessionaire. The procedure of awarding of the concession will have to comply with the laws and regulations in force in the country concerned.

More general, tasks 1, 2, 3 and 4 are inalienable and must be carried out by the Owner.

As for task 5, qualified studies carried out by the Owner will make it possible to establish a strong file of calls for concession tenders, thereby reducing the risk of speculation amongst tenders.

A private entity may of course take the initiative in launching a project, but in order to succeed, this project has first to be approved by public authorities.

2.2 The concessionaire

The concessionaire will carry out the tasks allocated to him in a contract by the Owner, including also : toll collection, financial operation, interface with the brigades, police and finance institutions.

2.3 The financing body

On the basis of the quality of the documents elaborated by the Owner and/or the concessionaire and of the guarantees provided by the different contributors, the financing body, which can also be chosen with a call for tender, will look for the best conditions of financing characterized by:

- A high percentage of private financing;
- long periods of grace;
- low interest rates;
- long periods of redemption;
- forecast of cash flow along with concession period.

2.4 The project designer

The tasks of project designer are very broad, and include mastering all the intellectual performances necessary for the carrying out of the project: geological, hydro geologist, geotechnician, engineer (traffic, structure, underground work, electro mechanics, data processing, safety, environment, topography, general coordination). All these professions can be found within a single planning department or within an association (of companies), including subcontractors.

The main qualities required of the project designer should be:

- understanding of the particular mechanisms of ppp-projects;
- strong and recent references on similar projects;
- to have a united team of available, competent engineers/planners with the required experience;
- to possess an organization and methodology which guarantee the coordination, the proper implementation and quality control of all the activities;
- to have sufficient financial solidity to assume its technical or financial responsibilities in the long term;
- to have a dispute review board agreed by the parties.

The choice of the project designer is generally made by means of a call for tenders on comparable basis, according to the Fidic rules where the selection criterion is the most favourable tender economically and technically (and not the cheapest tender!).

Among the selection criteria (references of the project designer, experience of the members of the task force, organization of the project designer, proposed method, financial solidity, etc.), price should only rank fourth or fifth in order of importance respectively during evaluation.



The main responsibility of the project designer is to establish a project which corresponds to the requirements of the Owner and the concessionaire (no more and no less). This project should:

- remove or mitigate all the uncertainties concerning the feasibility of the work;
- reveal geologic, geotechnical, hydro geologic difficulties and provide reliable solutions to them;
- establish a global economic project, the optimization of the capital and operational costs, and the overall payment to carry out the work;
- obtain licenses to build from competent authorities (environment, safety). These documents are generally delivered by the technical and juridical services of the Owner.

2.5 The Contractor

Similarly to the project designer, the contractor can provide all the skills necessary for the whole realization alone or consist in a consortium of companies. His main responsibilities are to guarantee costs and time of construction, which are defined in his tender, as well as the quality prescribed by the work. The builder is the successful tendering party chosen at the term of a tendering procedure, like Fidic, based on the documents of call for tenders prepared by the project designer. Here too, the price should not be the main selection criterion. Experience, competence and availability of the proposed teams, quality of the methods of realization and the facilities of the construction site as well as the financial solidity of the builder should all be preponderant selection criteria.

2.6 The Operator

This contributor is in charge of the operations within the conditions of safety and protection of the environment required as well as of insuring the work is done in an optimal way, to hand it over to the Owner in the required state at the end of the concession.

3. Main risks related to the private financing of transport infrastructures

The main risks are:

- political risks,
- economic risks,
- technical risks.

The first two are general risks related to all types of concessions and works; they are not specific to underground work; we shall deal with them quickly.

However, the third one is central for the field of underground work.

3.1 Political risks

Usually political risks of the contractual obligations with one of the parties (owner concessionaire, financing bodies, project designer, contractor, etc.), are covered by national insurances of guarantee to export, e. g.

- in France: COFACE (Compagnie Financière d'Assurance pour le Commerce Extérieur)
- in Germany: HERMES (Hermes Kredit-Versicherung AG)
- in England: ECGD (Exports Credits Guarantee Department)

3.2 Economic risks

This type of risk is generally settled in the contract between the host government concerned and their partners.



In case of insufficient income (if the toll is too low, or the traffic weaker than foreseen), the contract can stipulate, on the basis of a predefined presentation of the accounts:

- a limited continuation of the concession;
- a minimum annual income;
- a continuation of the period of grace.

3.3 Technical risks related to the project and to the construction

As indicated above, these risks are central to underground work because it is impossible to know exactly what the physical and geochemical specificities of the work environment are.

For underground works their assessment has to be subject of a specific approach; the few following recommendations enable to define these risks correctly.

3.3.1 Definition of the geological and hydrogeological conditions

The geological and hydrogeological conditions must be determined by investigation in situ with sufficient precision to:

- Confirm the feasibility of the work;
- Define the type of work (plan, number of tubes, intermediate access, well of ventilation, etc.);
- Fix the optimal mode of execution of the work (traditional or mechanized methods);
- Acknowledge all the major interferences with the environment;
- Reduce speculations related to the uncertainties concerning the geological, hydrogeological and geo-technical conditions of the various contributors at the time of the establishment of their tender as much as possible.

These investigations should be phased in the various stages of the project.

At the stage of **preliminary studies**, geological conditions will be determined on the basis of the previous studies and survey of surface geology. Test drills will be reserved to eliminate uncertainties concerning the feasibility of the work.

Before writing the **detailed draft** of the work and drafting the documents for the call for tenders of works, the investigation must clearly identify:

- the variants of the project which come into consideration;
- the accepted modes of implementation;
- the impact of the solutions selected on the environment.

At this stage, depending on the complexity of the geology, the thickness of the coverage and the type of work, it may be necessary to construct investigation galleries for technical and economic reasons. These galleries of investigation can then be integrated into the definitive work (safety, drainage, ventilation, temporary intermediate access, etc.)

The cost of investigation depends on the complexity of the work and on the geological conditions, and on the proximity of existing works. Usually it represents a 1 to 5 % of the work. There are a lot cases in which there are insufficient investigations, leading to disputes among the various contributors; that can cost several million Euros.

For projects of a high importance, it is common to use methods of probability based on the Monte Carlo method (help programme to decide the MIT and EPFL for example) to identify the importance and the most adequate mode of implementation of the works of investigation.



It is important that the investigation reports make a clear distinction between the factual and the interpretation, as well as between the elements clearly defined and those where there are still.

3.3.2 Drafting the final project

A **final project** shall be drafted on the basis of the best assessment to geological and hydrogeological conditions defined by means of the methodology given in § 3.3.1.

A "quality" project must be:

- a project which is assessed feasible and which gives a breakdown of costs and time of construction of $\pm 20\%$;
- a project which provides for a definition that recognises all the impacts on the environment of the construction and the execution of the work and which gives a solution to minimize these impacts and make them acceptable for competent authorities;
- a project which provides for the drafting of documents of call for tenders of works with all the necessary information influencing geological conditions in which the work should come true and the identification of possible residual risks. This information will allow the builder and the developer to appreciate the risks involved during the construction and during the use of the underground work;
- a good definition of the best option on the basis of safe geological, hydrogeological and geomechanical conditions;
- a clear definition of conditions to offer another option of project of work;
- a definition of the options of implementation. These two documents have to result from a project idea, and the author of the project must know how he wants to carry out the work rather than describe all the possible and conceivable manners to realize the work.

3.3.3 Drafting the tender documents

- The responsibilities have to be clearly and fairly distributed among the contributors. Some clauses such as "the Contractor is required to know all the geological, hydrogeological and geomechanical conditions" whereas it is the Owner or the concessionaire who made all the investigations, are unfair and/or unfeasible; in case of dispute they are not recognized by courts. This type of clause goes against search for reliable working relations among the contributors.
- The criteria of tender must be clearly described in the tender documents (they must never be modified during the procedure, because courts would invalidate the call for tender in case of appeal of a tendering party).
- Price should not, on any account, be the only determining criterion. Works must be awarded to the tendering party who presented the most advantageous tender (value for money), and not to the one that presented the cheapest tender, which means:
 - that the criteria concerning the competence of the proposed team, the experience of the company, the quality of the installations of construction site, the proposed schedule of works, the quality of the given guarantees are dominating criteria;
 - that the evaluation of tenders, then the proposition of tenders must be made on the basis of evaluation rules by a competent team with a large experience in projects and construction of underground work and independent of the signing parts of the contract prior to contract award.

3.3.4 Drafting the contract

The contract should clearly define the allocation of risks across the parties. It should clearly define the possible situations which may occur during the progress of the work. In underground work, the investiga-



tions will not identify all the geological, hydrogeological and geomechanical uncertainties. The risks (technical, geological, financial, etc.) influence the type of contract that is appropriate to the project.

A type of contract which favours partnership rather than confrontation where each of the parties has the same interests (to achieve some work of a given quality in delays as short as possible and in economic conditions as favourable as possible) is particularly adequate and adapted to underground work.

3.3.5 Execution

During the progress of work, an arbitration committee or dispute review board should be created to settle disputes at short notice which could appear during the construction swiftly (within one to two months) and in a definitive way. This method has proved success from several construction sites. The maximum amount of disputes that can be handled by this committee should be fixed in the contract. This committee generally consists of two senior engineers (every part appoints one of them) and of a legal president unanimously appointed by the two parties.

This committee can also be asked for an opinion in more important disputes.

4. Final Remarks

An underground project is inevitably associated with risk. The only way to get out of the risk-taking picture is either to shuffle it on another part of the project or to pre-investigate every inch of the future whole in the ground. None of these solutions are desirable, as the cost need to be taken by someone. The insurance companies may get away from their risk-taking. Most likely the tax-payers or the users will have to pay, which at the end of the day means you and me.

To ensure the good progress of underground work projects with a private financing, the following conditions must be fulfilled:

1. The project must be viable to be necessary.
2. The uncertainties related to the project (geology, geomechanics, hydrogeology, impact on the environment, etc.) should be reduced to an acceptable (foreseeable) level by investigation and on-going work and appropriate studies.
3. The residual risks related to geology or to traffic for instance should be fairly distributed between the various contributors.
4. The choice of the successful tender could be made in an independent way for the various stages of the realization: concession, project, construction, operation, so as to obtain the best contributors for every task; once the various contributors are appointed, they can be gathered in a consortium, if this is desirable for everybody. This mode of choice enables to optimise the competencies of each intervener.
5. The bases of submission must be clear and solid, and the criteria of invitation for tender defined so as to select the most advantageous tenders economically speaking, so as to reduce at most the possibilities of speculation amongst the tendering parties.
6. The consequences of unexpected situations can indeed be very serious for projects with private financing (risk of bankruptcy). The Engineer needs to take the same care for controlling costs of a private project as he does for a public project. Continuity is an important factor which should be particularly taken into account during the different phases of realisation.
7. The contractual documents binding the Owner to the contractor should clearly identify the contractual bases, and the mechanisms to be applied in case of modification of execution because of the appearance of unexpected events.
8. The contractual documents should finally favour partnership among the various contributors rather than confrontation by installing e.g. a dispute review board.