

APPENDIX 7

Construction Monitoring Services

Construction monitoring is a service which provides the client with independent verification (to the extent of the consultant's engagement) that the works have been completed in accordance with specified requirements.

Most construction projects are unique, but unlike manufactured products which are often thoroughly tested and evaluated during construction and prior to being brought into service, the completed project is rarely for all design requirements. Construction works are also complex in detail and skilled professional involvement is necessary for the successful executive of such projects.

Five levels of construction monitoring service are defined. The decision as to which level is appropriate will be project dependent.

Factors influencing the level of construction monitoring for a project are:

- The size of the project
- The importance of the project
- The complexity of the construction works
- The experience and demonstrated skill in quality management of the constructor

The primary responsibility for completing the contract works in accordance with the requirements of the plans and specifications is the constructor's.

The involvement of the consultants is important during the construction phase to ensure that;

- The design is being correctly interpreted,
- The construction techniques are appropriate and do not reduce the effectiveness of the design and
- The work is completed generally in accordance with the plans and specifications

The risk of non-compliance can be reduced by increasing the involvement of the consultant. Because the cost of monitoring increases with increasing levels of service the client should consider all factors before deciding upon the most appropriate level of construction monitoring for the project.

Table 1 sets out the five levels of construction monitoring, describes the types of review and indicates where a particular level of monitoring is appropriate.

Tables 2 and 3 provide rating values for various aspects of a project to enable an assessment of an appropriate monitoring level to be made.

An increase in the quality monitoring of the project works by the consultant significantly reduces the risk that the materials or components do not meet specified requirements, the design has been incorrectly interpreted, and/or poor quality workmanship has been incorporated in the project.

Table 1

CONSTRUCTION MONITORING SERVICE		
LEVEL	REVIEW	COMMENT
CM1	Monitor the outputs from another party's quality assurance programme against the requirements of the plans and specifications. Visit the works at a frequency agreed with the client to review important materials of construction critical work procedures and/or completed plant or components. Be available to advise the constructor on the technical interpretation of the plans and specifications	This level is only a secondary service. It may be appropriate where: <ul style="list-style-type: none"> - For the design consultant when another party is engaged to provide a higher level of construction monitoring or review during the period of construction or - When the project works are the subject of a performance based specification and performance testing is undertaken and monitored by others.
CM2	Review, preferable at the earliest opportunity, a sample of <u>each</u> important work procedure, material of construction and component for compliance with the requirements of the plans and specifications and review a representative sample of <u>each</u> important completed work prior to enclosure or completion s appropriate. Be available to provide the constructor with technical interpretation of the plans and specification.	This level of service is appropriate for smaller projects of a routine nature being undertaken by an experienced and competent constructor and where a higher than normal risk of non-compliance is acceptable. It provides for the review of a representative sample of work procedures and materials of construction. The assurance of compliance of the finished work is dependent upon the constructor completing the work to at least the same standard as the representative sample reviewed.
CM3	Review, to an extent agreed with the client, <u>random samples</u> of important work procedures, for compliance with the requirements of the plans and specifications and review <u>important</u> completed work prior to enclosure or on completion as appropriate. Be available to provide the constructor with technical interpretation of the plans and specifications.	This level of service is appropriate for medium sized projects of a routine nature being undertaken by n experienced constructor when a normal risk of non-compliance is acceptable.
CM4	Review, at a frequency agreed with the client, <u>regular samples</u> of work procedures, materials of construction and components for compliance with the requirements of the plans and specifications and review the <u>majority</u> of completed work prior to the enclosure or on completion as appropriate.	This level of services is appropriate for projects where a lower than normal risk of non-compliance is required.
CM5	Maintain personnel on site to <u>constantly</u> review work procedures, materials of construction and components for compliance with the requirements of the plans and specifications and review completed work prior to enclosure or on completion as appropriate.	This level of service is appropriate for <ul style="list-style-type: none"> - Major projects -Projects where the consequences of failure are critical - Projects involving innovative or complex construction procedures. The level of service provides the client with the greatest assurance that the completed work complies with the requirements of the plans and specifications.

SELECTION OF AN APPROPRIATE LEVEL OF CONSTRUCTION MONITORING

The level of construction monitoring suitable for a project can be obtained as follows:

1. Select value of KA to KD from Table 2 and sum total. A value for each K Factor must be included

Table 2

CRITERIA	K	ASSESSMENT				SELECTED VALUE
Project Status	KA	Small 1	Medium 2	Large 3	Major 4	
Complexity of work procedures	KB	Routine 2	Difficult 4	Complex 6		
Relevant experience of constructor	KC	Inexperienced 6	Experienced 2	Certified ISO 9000 1		
Consequences of non-compliance	KD	Minor 1	Moderate 4	Serious 6	Critical 12	
KTOTAL = KA + KB + KC + KD						

2. Use K Total to select the level of construction monitoring appropriate from Table 3.

Table 3

KTOTAL	LEVEL OF CONSTRUCTION MONITORING				
	CM1	CM2	CM3	CM4	CM5
5-6		Sampling only	-	-	-
7-8		N/A	Weekly	-	-
9-10	A	N/A	Twice Weekly	-	-
11-12	Secondary	N/A	N/A	Twice Weekly	-
13-14	Service	N/A	N/A	Every second day	-
15-16		N/A	N/A	Daily	-
17-		N/A	N/A	N/A	Constant

N/A = Not Appropriate

Secondary Service - This level of service is only appropriate when another party is responsible for undertaking the primary review of construction standards.

Table 3 indicates the frequency of review considered to be appropriate for the project concerned. Not indicated is the time input requirement at each review. The time on each occasion will increase with the increased size and complexity of the construction works and should be agreed with the consultant at the time of engagement.

Frequency of inspection is intended to be indicative of involvement with actual frequency dependent on the rate of progress of the works.