

Fee Guidelines for Consulting Engineering Services

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FEE GUIDELINES FOR CONSULTING ENGINEERING SERVICES

Disclaimer

These Fee Guidelines for Consulting Engineering Services have been compiled from a selection of past experiences on real projects.

The graphs included within these Fee Guidelines provide a best practice method for the estimation of fees. Clients are advised to discuss the project and Fee Guidelines with their consultant so that both parties thoroughly understand the project.

This first edition is dated January 2004. It may be re-issued as market conditions change. Users are cautioned that using an out of date version for the estimation of fees, or applying fee graphs to an unusual set of conditions in a project, may be misleading.

For the purposes of this document all costing is expressed in New Zealand dollars.

1 Total Percentage Fee

1.1 Introduction

The basis for the determination of the consulting fee when a percentage fee is to be used (refer Section 6.2 of the Briefing & Engagement document ¹) is set out below.

The consulting fee is based on the total contract price and consists of the sum of two parts:

- design percentage fee;
- construction percentage fee.

This Guideline sets out a methodology for establishing the design percentage and the construction percentage.

1.2 Construction Contract Price

The construction contract price is the total construction contract cost of all elements for that particular discipline either designed, and/or detailed, and/or specified by the consultant for the project, excluding only consulting fees. It includes a percentage of preliminary and general costs in the same proportion as the discipline cost is to the total cost.

In the case of a multi-discipline engagement, the total construction contract price will be used.

2 Methodology – Design Percentage

2.1 Type and Class of Project

The percentage fee for design is based on the following factors:

- cost of project;
- type of project;
- scope of work required;
- type of engineering.

The type of project is selected from Table 1.

¹ Guideline on the Briefing & Engagement of Consulting Engineering Services 2004

Select the nearest project, or the nearest projects either side of the project, to establish the class. Interpolation between classes will generally be required because of the diverse types of projects undertaken for clients.

Select the appropriate graph (or graphs) on the following page to read off the design fee for the particular construction contract cost and for the particular expertise required.

Interpolations between class graphs and within graphs will often be required.

The percentage fee for design is then adjusted for deletions or additions as set out below.

2.2 Normal Design Service

For a normal commission the Design Percentage is read directly from the graph.

For buildings, the scope of service is as set out in the Design Documentation Guidelines ². This covers:

- concept design;
- preliminary design;
- development design;
- detailed design;
- construction design.

2.3 Partial Design Service

Where the scope of work required is less than those elements listed above, deductions should be made to the normal design percentage.

2.4 Additional Design Service

Similarly, the design percentage will be increased for services additional to the normal design services. Examples might be:

- feasibility studies;
- preparation and advice on estimates;
- geotechnical investigations and reporting;
- site survey of levels;
- investigation of ground water conditions;
- evaluation of different design solutions;
- liaison with local authorities and obtaining building consent and/or resource consent;
- life cycle costing and considerations;
- schedule of quantities;
- economic studies;
- alteration and strengthening;
- acting as principal advisor for the project;
- fast tracking the project.

A good description of the range and nature of consulting engineering services is given in the Briefing & Engagement document referenced above.

² Design Documentation Guidelines, NZCIC 2002

TABLE 1: TYPE & CLASS OF PROJECT

TYPE	CLASS
Buildings	
<u>Commercial</u> <ul style="list-style-type: none"> • Single storey • Multi storey up to 4 floors, no basement. • Multi storey up to 3 floors with basement and sloping site. • Parking Building: 2 floors • Parking Building: 4 floors 	AA BB CC BB CC
<u>Industrial</u> <ul style="list-style-type: none"> • Single Storey Warehouse • Single Storey Warehouse, with 2 storey office building. • Cool Store: Single Storey • Cold Store: Single Storey • Production Floors Single Storey • Production Floors Two Storey • Chimney 	AA BB BB CC CC DD DD
<u>Civic</u> <ul style="list-style-type: none"> • Single Storey Library or Museum or Art Gallery. • Multi Storey up to 4 stories Library or Museum or Art Gallery 	BB CC
<u>Health & Education</u> <ul style="list-style-type: none"> • Single Storey District Hospital or School • Two Storey General Hospital or School 	BB CC
<u>Enforcement</u> <ul style="list-style-type: none"> • Prison: Minimum Security • Prison: Maximum Security 	CC DD
<u>Entertainment</u> <ul style="list-style-type: none"> • Theatre: Single Storey • Theatre: Two Storey Ancillary Area • Swimming Pool: 50m with 8 lanes • Gymnasium: Single Storey • Gymnasium: Two Storey Ancillary areas 	CC DD GG CC DD
Utilities	
<ul style="list-style-type: none"> • Underground water & drainage, urban • Underground water & drainage, trunk mains • Tanks: Non corrosive • Tanks: Corrosive Substances • Pumping Stations • Sub Transmission Lines: 66kV and less • Transmission Lines: Greater than 66kV • Substations • Switchrooms 	EE FF FF HH HH FF GG GG HH
Roading	
<ul style="list-style-type: none"> • Rural Road • Urban Road • State Highway • Motorway • Rural Shape Correction • Urban Shape Correction • State Highway State Correction • Rural Pavement Rehabilitation • Urban Pavement Rehabilitation • State Highway Rehabilitation • Motorway Rehabilitation • Bridges: Rural • Bridges: Urban • Bridges: State Highway • Bridges: Motorway 	EE FF GG HH EE FF GG EE FF GG HH FF GG GG HH
Industrial	

TYPE	CLASS
• Boiler equipment and plant	HH
• Hoppers, bins and silos with non hazardous materials.	FF
• Hoppers, bins and silos with hazardous materials	GG
• Conveyors: Belt	EE
• Conveyors: Chain	FF
• Processing and Production equipment incorporation into total operation.	HH
• Pipelines: Non hazardous Substances	FF
• Pipelines: Hazardous Substances	GG

Note to Table 1: This table covers only the more common building projects. One-off or less common projects such as stadiums, high-rise buildings etc are not listed. Fees for special projects should be discussed between the client and consultant and be related to the level of innovation involved in the project.

In future editions of the Fee Guidelines, additional classes or project types may be added, as familiarity with the method increases. Users are advised to check the current version of this document from the ACENZ Website.

2.5 Note to Graphs

Both the client and consultant should recognise that the fee curves presented below, are “best fit” curves derived from real data which has a degree of scatter. Therefore the fee estimate for any one particular project will not necessarily lie on the line, but in the vicinity of it, depending on the level of complexity within that project.

Definitions of the “disciplines” referred to on the graphs are given in Appendix 2.

2.6 Fee Curves for Roading Design

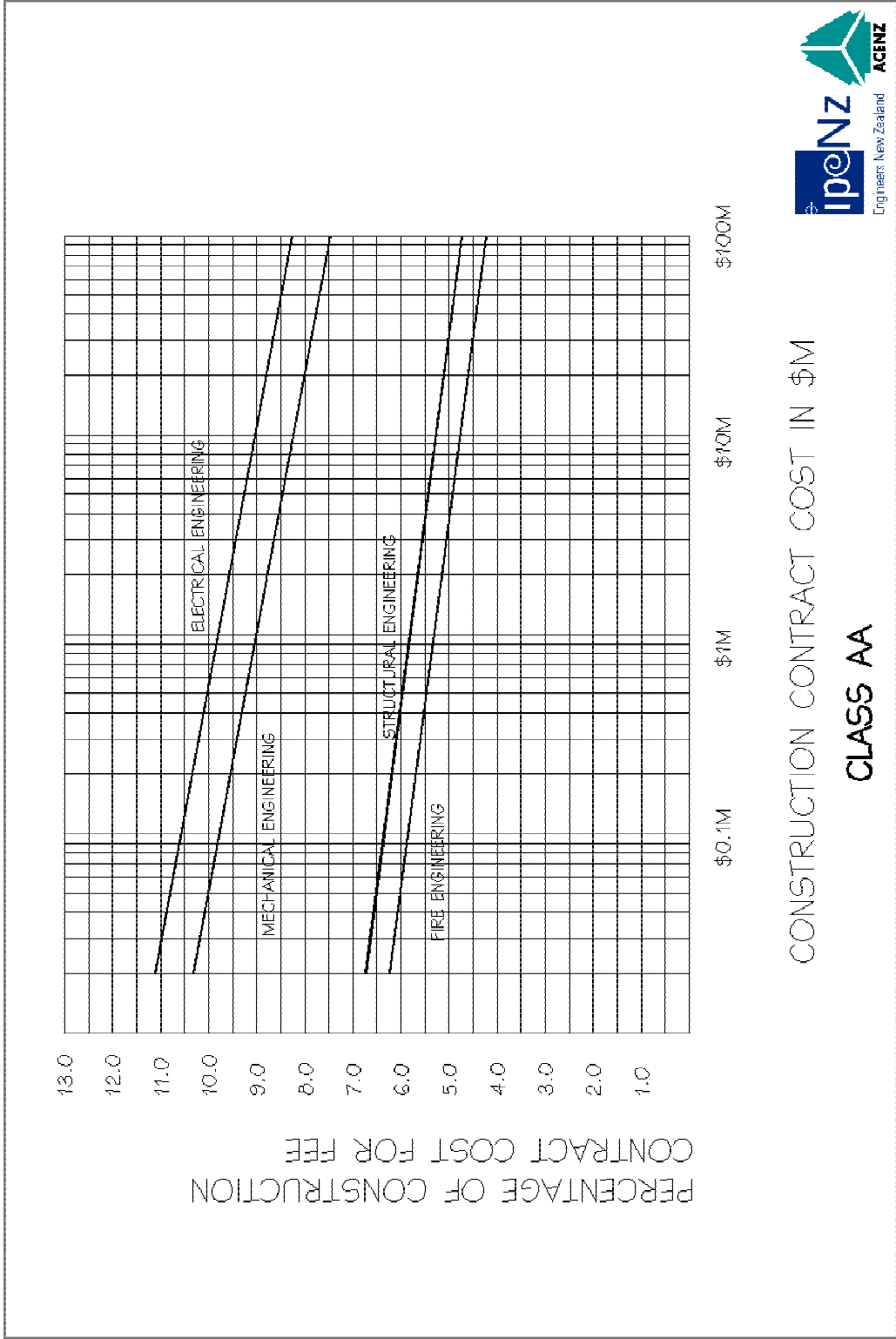
For Transport Projects, roading-only projects have relatively lower fees than bridging-only projects.

Users of the curves should be aware that Graph GG for Bridges (including urban bridges) represents a complex highway project with many intersections or special structures. Another curve (not provided here) for rural green fields state highway roading projects could be considered. In such case this other curve would show fees as being below the bridge projects curve.

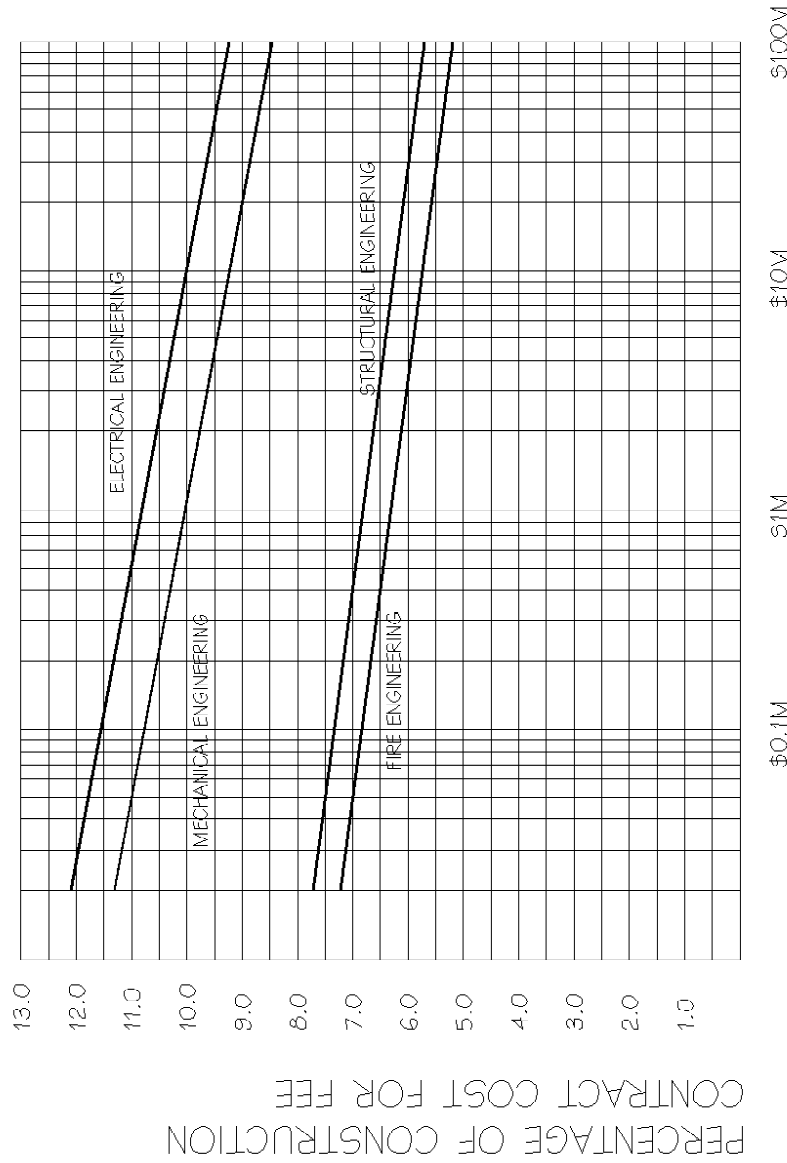
Roading and bridging projects will generally include cost components for:

- project estimates;
- economic studies (benefit/cost studies);
- comparisons between alternatives (involving benefit cost evaluations);
- schedules of quantities (for contract tendering).

A discussion on the special nature of roading contracts over other “building projects” is given in Section 1.5 of the Guideline on Briefing & Engagement for Consulting Engineering Services.



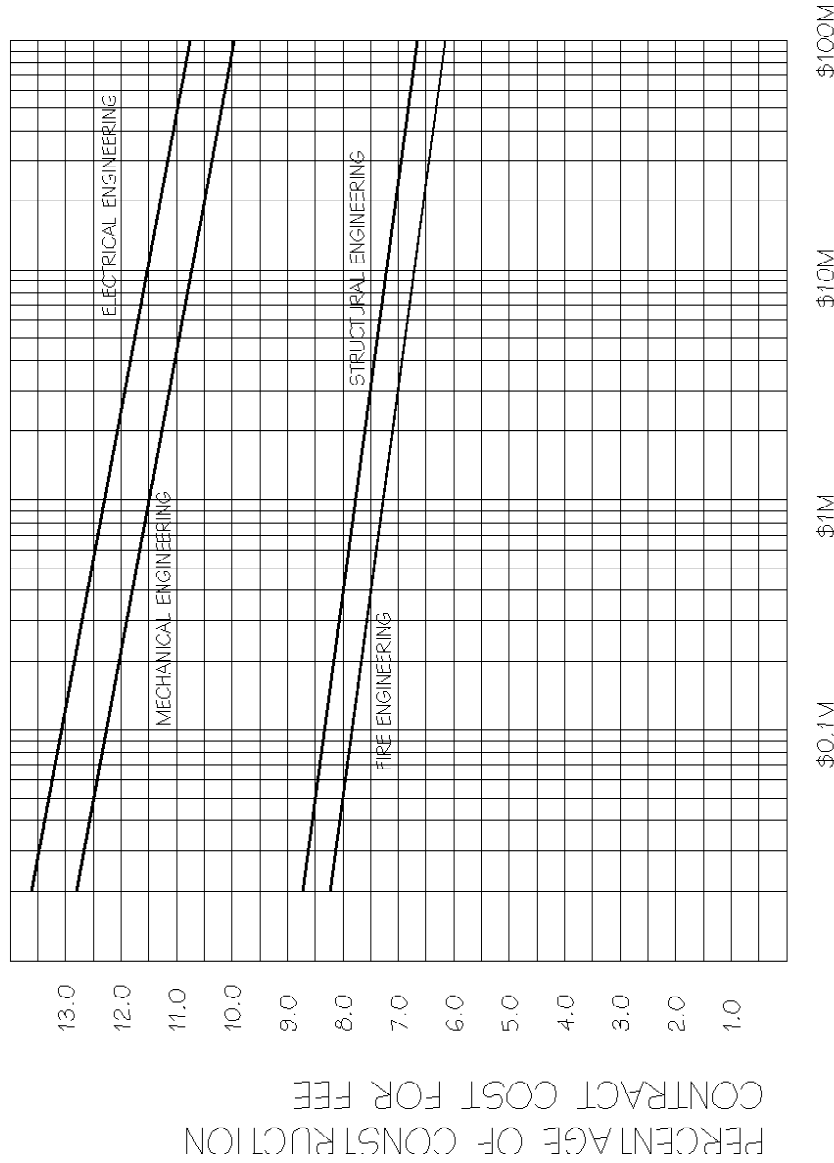
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CONSTRUCTION CONTRACT COST IN \$M
CLASS BB

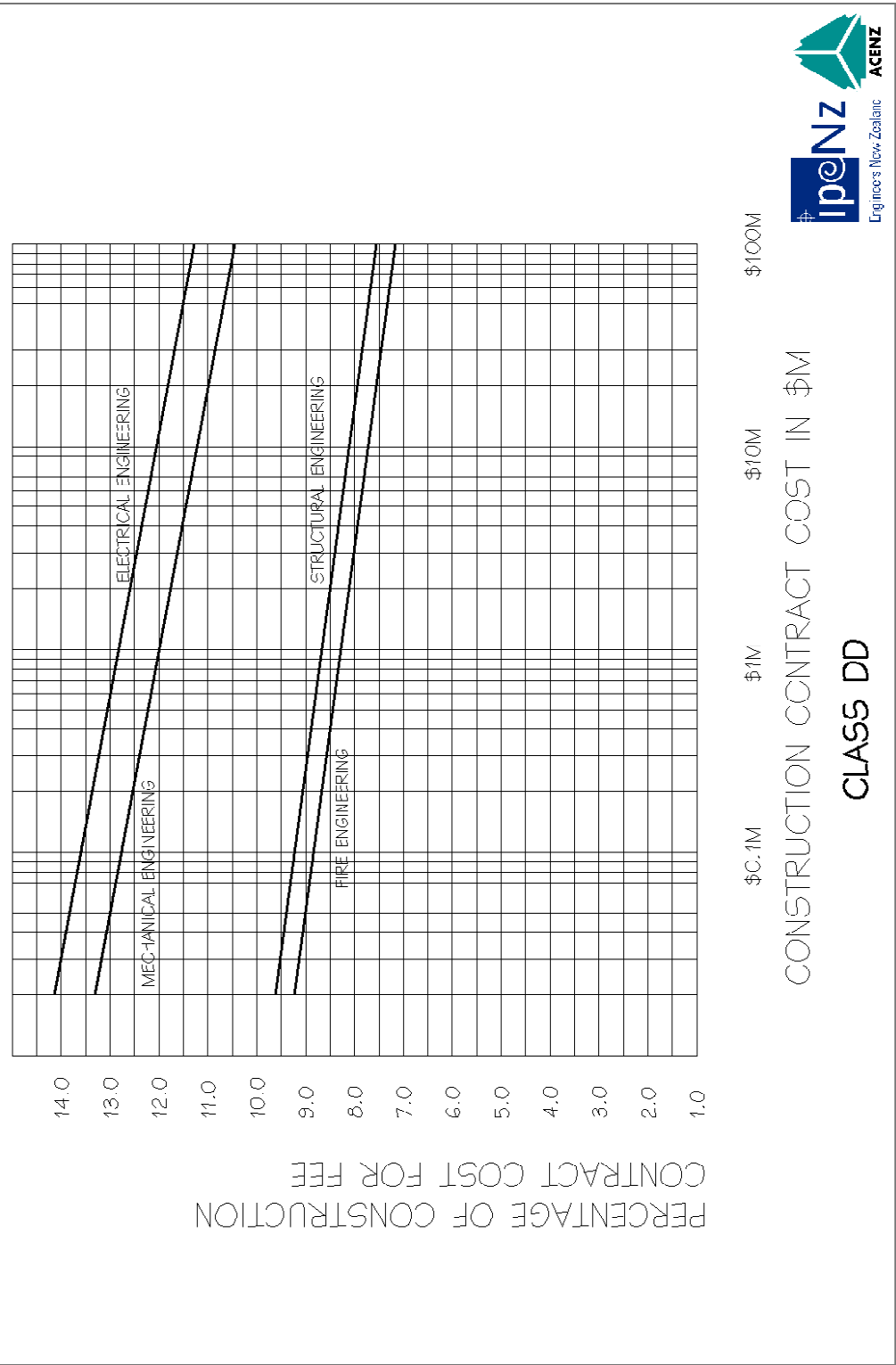


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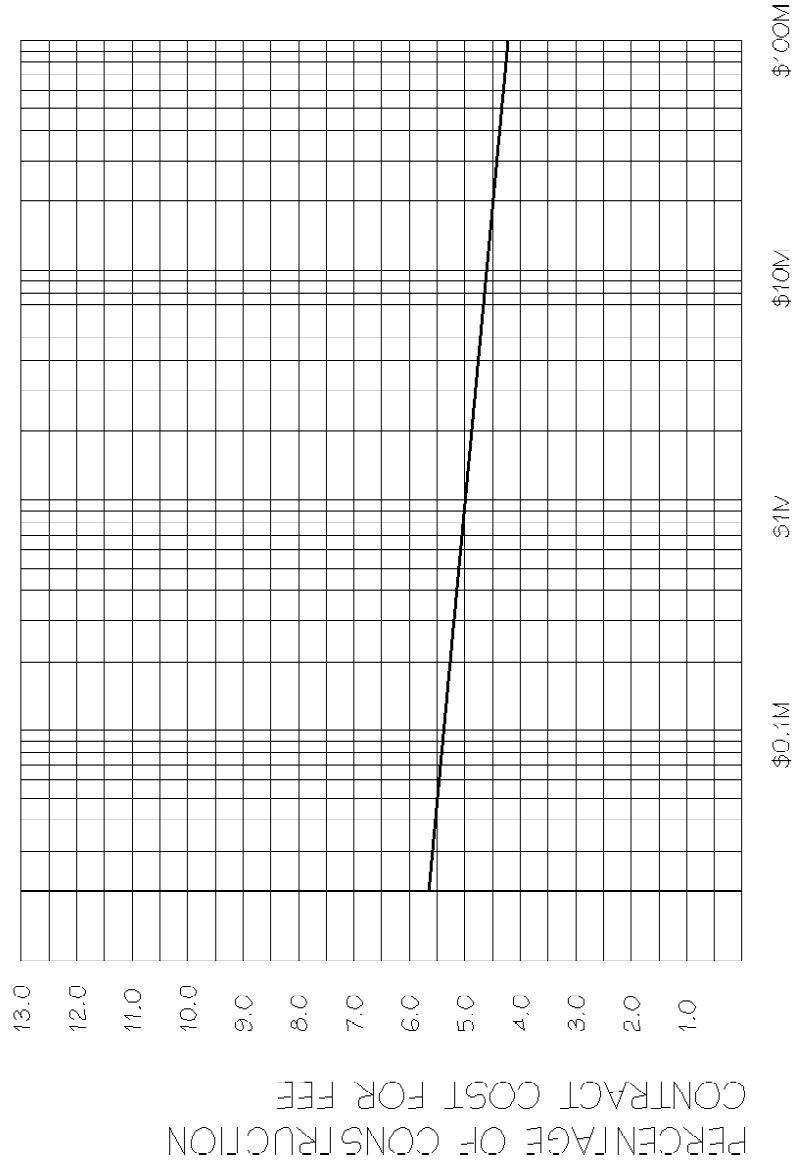
CONSTRUCTION CONTRACT COST IN \$M
CLASS CC





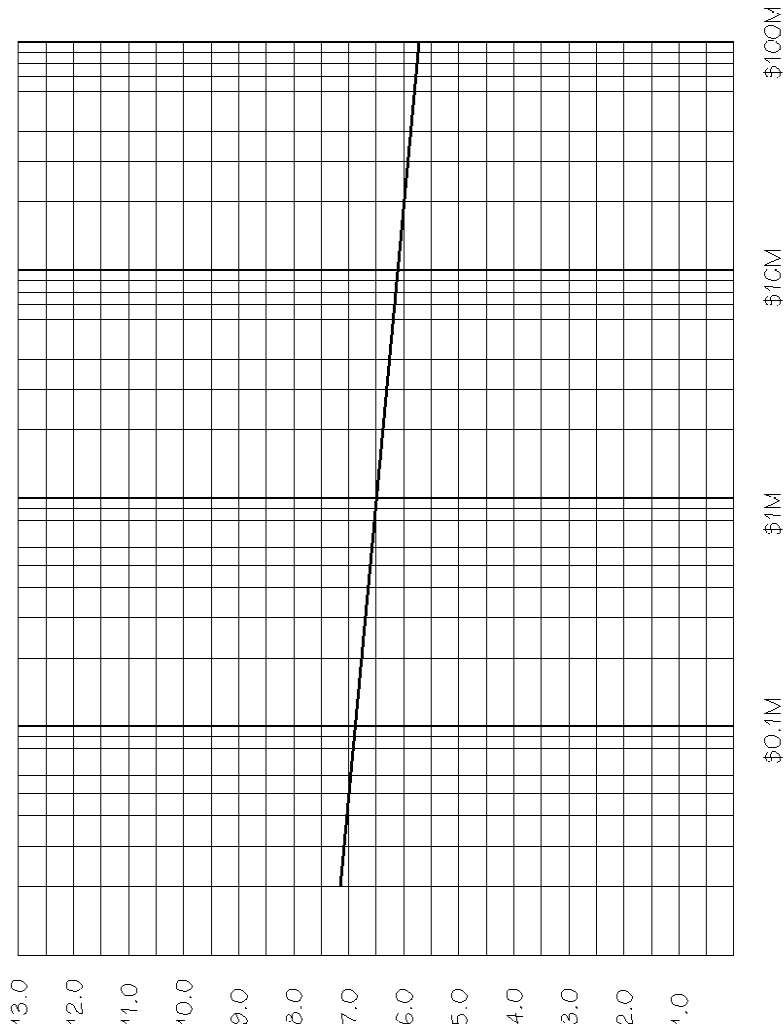
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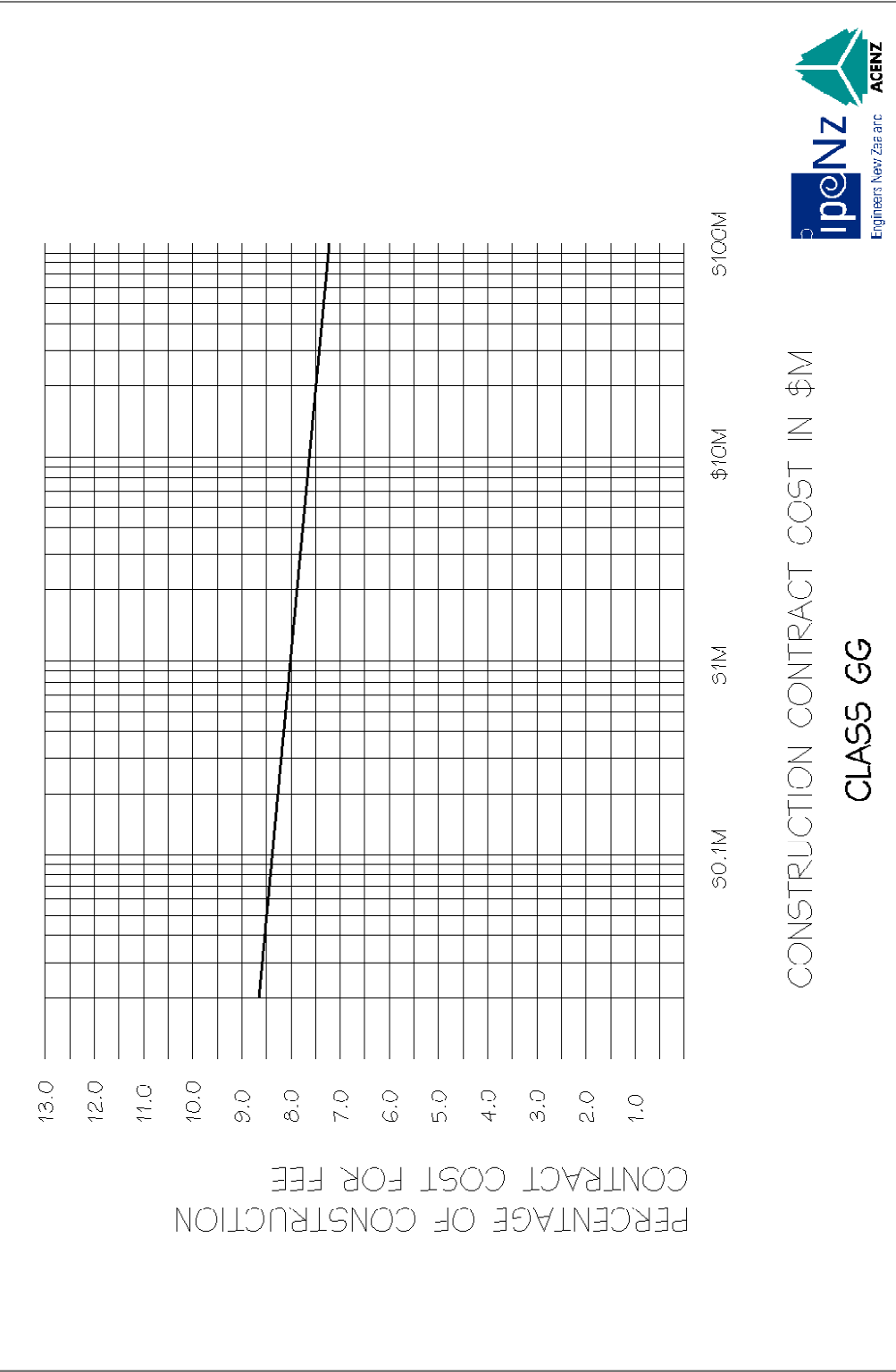
CONSTRUCTION CONTRACT COST IN \$M
CLASS EE





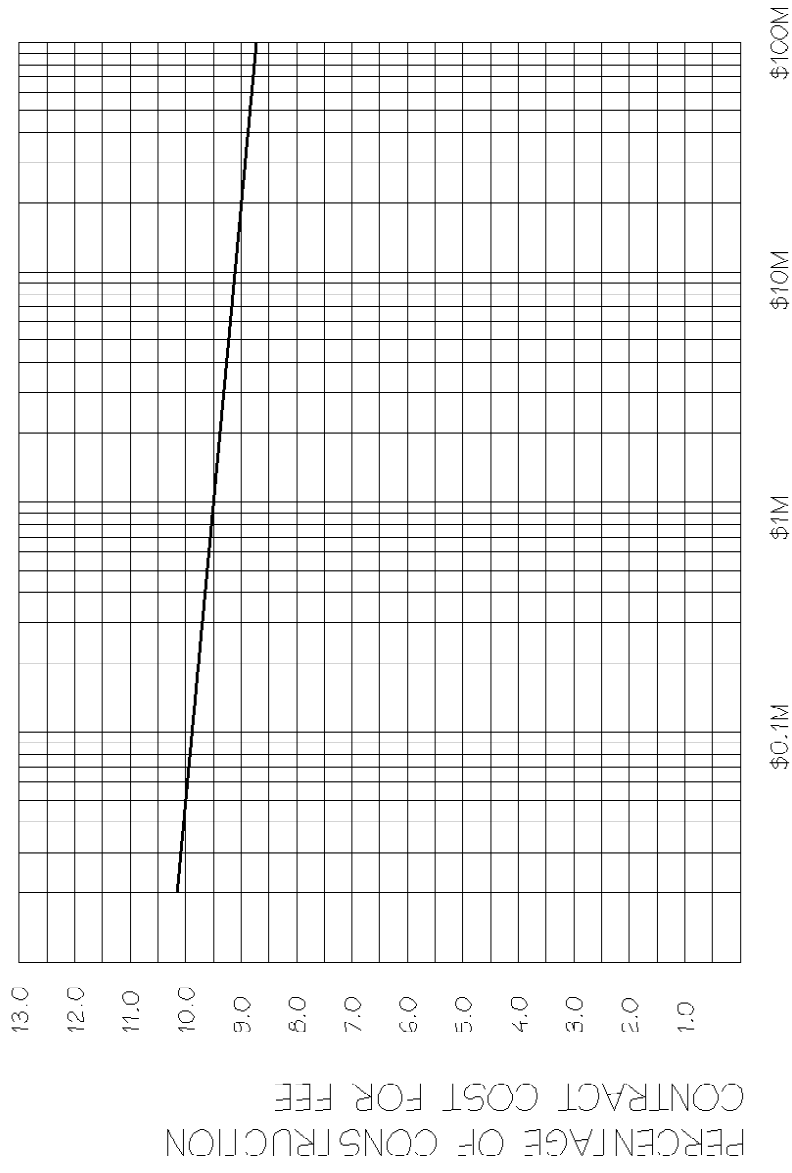
CONSTRUCTION CONTRACT COST IN \$M
CLASS FF





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CONSTRUCTION CONTRACT COST IN \$M
CLASS HH



3 Methodology – Construction Percentage

3.1 Introduction

Five levels of construction monitoring service are defined in Table 2.

The appropriate level 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 contractor.

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

The involvement of the consultant 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 2 sets out the five levels of construction monitoring, describes the types of review and indicates where a particular level of monitoring is appropriate.

Tables 3 and 4 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 requirement, the design has been incorrectly interpreted, and/or poor quality workmanship has been incorporated in the project.

The final graph (page xx) gives the percentage fees for the different levels of construction monitoring.

TABLE 2: LEVELS OF CONSTRUCTION MONITORING SERVICE

LEVEL	REVIEW	COMMENT
CM1	<p>Monitor the outputs from another party's quality assurance programme against the requirements of the plans and specifications.</p> <p>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.</p> <p>Be available to advise the constructor on the technical interpretation of the plans and specifications.</p>	<p>This level is only a secondary service.</p> <p>It may be appropriate:</p> <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	<p>Review, preferably at the earliest opportunity, a sample of <i>each</i> important work procedure, material of construction and component for compliance with the requirements of the plans and specifications and review a representative sample of <i>each</i> important completed work prior to enclosure or completion as appropriate.</p> <p>Be available to provide the constructor with technical interpretation of the plans and specifications.</p>	<p>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.</p> <p>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.</p>
CM3	<p>Review, to an extent agreed with the client, <i>random samples</i> of important work procedures, for compliance with the requirements of the plans and specifications and review <i>important</i> completed work prior to enclosure or on completion as appropriate.</p> <p>Be available to provide the constructor with technical interpretation of the plans and specifications.</p>	<p>This level of service is appropriate for medium sized projects of a routine nature being undertaken by an experienced constructor when a normal risk of non compliance is acceptable.</p>
CM4	<p>Review, at a frequency agreed with the client, <i>regular samples</i> of work procedures, materials of construction and components for compliance with the requirements of the plans and specifications and review the <i>majority</i> of completed work prior to the enclosure or on completion as appropriate.</p>	<p>This level of services is appropriate for projects where a lower than normal risk of non compliance is required.</p>
CM5	<p>Maintain personnel on site to <i>constantly</i> 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.</p>	<p>This level of service is appropriate for:</p> <ul style="list-style-type: none"> • major projects; • projects where the consequences of failure are critical; • projects involving innovative or complex construction procedures. <p>The level of service provides the client with the greatest assurance that the completed work complies with the requirements of the plans and specifications.</p>

3.2 Selecting an Appropriate Level of Construction Monitoring

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

Select value of K_A to K_D from Table 3 and sum total.
A value for each K Factor must be included.

TABLE 3: ASSESSING THE VALUE OF THE CONSTRUCTION WORK

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

Use K_{TOTAL} to select the level of construction monitoring appropriate from Table 4.

Table 4: LEVEL OF CONSTRUCTION MONITORING

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

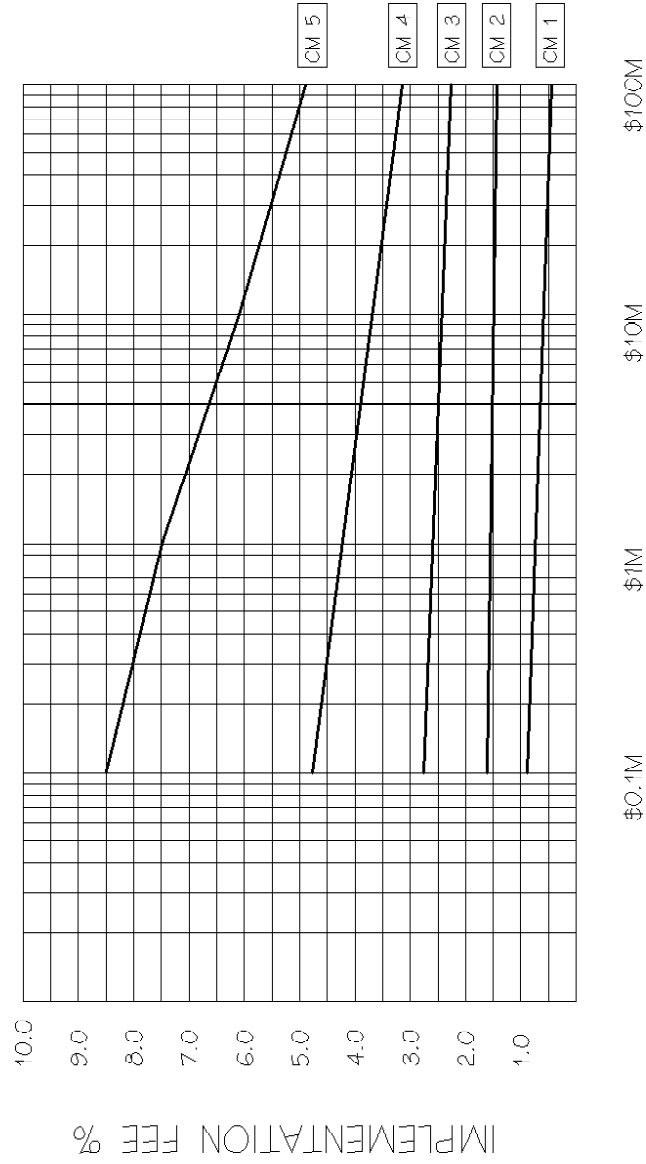
N/A = Not Appropriate
Secondary service = This level of service is only appropriate when another party is responsible for undertaking the primary review of construction standards.

Table 4 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.

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CONSTRUCTION CONTRACT VALUE \$

IMPLEMENTATION PHASE - CONSTRUCTION MONITORING



4 Acknowledgements

Tables 2, 3 and 4 are taken from The Briefing & Engagement of Consultants (1997).
Graphs and Table 1 derived from material accumulated from actual projects.

5 References

ACENZ 2004a Guideline on the Briefing & Engagement for Consulting Engineering Services 1st edition, January 2004
ACENZ 2004b Sample Charge-out Rates for Consulting Engineering Services 1st edition, January 2004

ACENZ/IPENZ 1997 The Briefing & Engagement of Consultants.

NZ Construction Industry Council 2002 Design Documentation Guidelines. *Note, the 2002 version is a working draft. The first edition is expected in the first part of 2004. This is available from www.nzcic.co.nz*

ACENZ Website www.acenz.org.nz
A list of useful related documents and contracts is included in ACENZ 2003a above.

6 Definitions

Normal Design Service – refers to five stages of design (see 2.2, or Design Documentation Guidelines)

Additional Design Service – refers to the normal services plus other services performed as part of the whole project (see 2.4)

Simple Design – (as referred in 1997 Briefing & Engagement document) refers to standard designs for the building type, with standard services provided

Complex Design – (as referred in 1997 Briefing & Engagement document) refers to more complex or innovative design for the building type, with a number of services provided and/or additional services (as above)

On the graphs, disciplines listed *typically* include:

Structural Engineering = foundations, strength elements of the building (not architectural design);

Fire Engineering = provision of fire protection services, not special fire engineering design;

Mechanical Engineering= heating, ventilation, air conditioning, but not plumbing;

Electrical Engineering = lighting and power supply, including services for Information Technology reticulation.