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ACEC British Columbia

Budget Guidelines for Engineering Services
Document 1 – Transportation & Infrastructure

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Version 2, August 2025

This document is part of a series on *Budget Guidelines for Engineering Services*. This document provides an update including alignment with changes in professional regulation and replaces Document 1 Version 1 of the Transportation and Infrastructure component of Budget Guidelines for Consulting Engineering Services.

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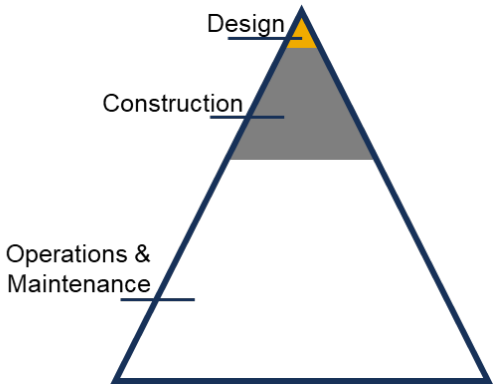
FOREWORD

The success of infrastructure and transportation projects can be greatly influenced by obtaining the most suitable engineering expertise. Selection of qualified firm(s) for a specific project will result in a well-planned and designed, economical and successful project. Selecting a consulting engineer is, therefore, one of the most important decisions a client makes. Over the lifecycle of a typical infrastructure and transportation project, design represents the smallest fraction of the total cost, although it can have the most significant impact on overall project implementation and long-term operating and maintenance costs.

Project Lifecycle Costs – from conception to decommissioning



The Consulting Engineer is a Professional Engineer in private practice who offers services to the public and private sectors.

Since 1976, the **Association of Consulting Engineering Companies British Columbia** (ACEC-BC) has been the voice of consulting engineering companies in BC. Our purpose is to advance the business of consulting engineering firms in BC. We do this by advocating for fair business practices, raising awareness of the industry's contributions to society, and the industry's innovative technical expertise.

Engineers and Geoscientists British Columbia (EGBC) is the business name of the Association of Professional Engineers and Geoscientists of the Province of British Columbia. Only individuals licensed by EGBC (a **Registrant** or collectively **Registrants**) are permitted by law, under the *Professional Governance Act*, to undertake professional practice and assume responsibility for engineering and geoscience projects in BC. EGBC regulates and governs the practice of engineering and geoscience under the authority of the *Professional Governance Act* and is charged with protecting the public interest by setting and maintaining robust standards for entry to the professions and comprehensive regulatory tools to support Registrants in meeting professional and ethical obligations.

1.0 PURPOSE OF THIS GUIDELINE

This document is a guideline for budgeting consulting engineering fees for infrastructure and transportation projects in British Columbia. The guideline is created for the purpose of providing information to support development of project budgets based on generally accepted appropriate fees for services by qualified professionals. The guideline:

- Considers the professional work required to meet necessary standards of engineering care and quality.
- The professional's obligations under the Professional Governance Act and associated EGBC Bylaws.
- Supports continuing education and skills training required to maintain high standards and professional qualification.

The fees identified in this guideline reflect the level of service professional engineers must provide to meet the standard of practice identified in EGBC practice guidelines and advisories[1]. For reference, guidelines and advisories identify the level of effort, responsibilities, professional activities, and due diligence a Registrant must provide to fulfil their professional obligations under the *Professional Governance Act,* EGBC Bylaws, and Code of Ethics.

Providing long-term value for project partners is achieved only through proper planning and engineering work performed during the entire project lifecycle. Decisions made in planning and design not only determine whether the project delivers the intended service and satisfies the original need but will also directly affect the entire service life – and overall lifecycle cost – of the project. Reducing investment at the design stage can result in not achieving project objectives or significantly higher capital, operating, and maintenance costs through the life of the project.

This guideline is intended to support owners, constructors, and other partners to understand how project budgets are developed and to support the practice of all engineering professionals providing consulting engineering services for infrastructure and transportation projects such as highways, bridges, ports and marine terminals, rail infrastructure, airport airside / landside infrastructure, water and wastewater systems. The guideline focusses on *core consulting services*, including advisory services, preliminary design, final design, tender support, and construction support services. This guideline is applicable to the consulting disciplines of structural, electrical, mechanical and civil engineering including the subdisciplines of drainage, highway design, utility design and traffic engineering. Geotechnical engineering and environmental engineering are not contemplated in this guideline as the general fee guidelines provided do not lend themselves to the scope and complexity of these disciplines. Architectural services, where applicable, should be considered separately and are not included herein.

[1] EGBC Practice Resources, Individual Practice, Guidelines & Advisories

This guideline cannot adequately describe the approach for all types of projects; hence this should be considered a general cost guideline for consulting engineering services. Projects that are more complex, for example because of location, site characteristics, procurement approach integration of unusual or sustainable design elements, and other factors will affect the scope of work and design costs. These guidelines are currently suitable for use on the conventional design-bid-build method of project delivery. They are not applicable to alternative project delivery methods.

2.0 SELECTION AND APPOINTMENT OF A CONSULTING ENGINEER

Nineteenth century author and Oxford University scientist John Ruskin is believed to have said:

"It is unwise to pay too much, but it is worse to pay too little. When you pay too little, you sometimes lose everything because the thing bought was incapable of doing the thing you bought it to do."

– attributed in Chicago Daily Tribune, 29 Jan. 1928

A successful project is one which meets the requirements of the owner at an acceptable project lifecycle cost. Lifecycle cost comprises the long-term operation and maintenance of assets, and generally accounts for the total cost of design, construction, operation and decommissioning of infrastructure.

While the relative cost of engineering design is small, the role of the engineer is pivotal in meeting the owner's objectives. During the design phase the parameters that affect the cost for construction, operation and maintenance are set. Selecting a consulting engineering firm based on cost of services alone is a false economy and can be a disservice to the project, the owner and all other partners.

Ongoing relationships between a client and a consulting engineer are encouraged as they can provide many advantages including:

- The consulting engineer's familiarity with the client's infrastructure and systems,
- Consistency in long-term strategies for infrastructure development and improvements,
- In depth understanding of the clients' needs and project risks,

Should a client wish to procure the services of a consulting engineering firm through a qualification-based evaluation process then, it is recommended that it be done using a *Qualifications Based Selection* (QBS) process. This allows the client the benefit of developing the scope and consulting engineering budget collaboratively with the selected consulting engineer.

ACEC-BC and partner organizations recommend the use of QBS for identifying and selecting an appropriately competent and qualified consulting engineer for most projects. There are instances where it may be suitable to single source a consulting firm based on previous experience with a particular project.

For some consulting assignments, a formal RFP process for selection of a consulting firm may not be desired or practical. Selection of consulting engineering services shall adhere to applicable procurement policies.

Selection of a qualified consulting engineer provides the foundation for achieving the best outcomes for the project. Hiring consultants for various categories may be beneficial such as a planning consultant for the concept phase. However, the initial planning consultant, who may be the most qualified for the initial phase of the work, may not be the most qualified to undertake the subsequent design phase of the work.

For more information about **Qualification Based Selection**, please consult the InfraGuide *Best Practice for Selecting a Professional Consultant*. The QBS process is supported by the Federation of Canadian Municipalities and used by infrastructure owners around the world. For more information, please visit the ***Yes2QBS* website**.

ACEC-BC recommends appointment of a consulting engineer through a formal agreement that protects the rights of the owner (or client) and the consultant, identifies the scope of the project, and clearly describes the terms of engagement. Agreements must also support the consulting engineer to comply with professional regulation. The specific terms of the agreement depend on the size, complexity, risk, duration, and effort in carrying out the assignment. Several standard agreements are available for use in design assignments; wherever possible ACEC-BC advocates for use of the Canadian Construction Documents Committee *CCDC 31 – 2020 Service Contract Between Owner and Consultant*[2].

In January of 2024, ACEC-BC, together with the Architectural Institute of British Columbia (AIBC) and the Province of British Columbia (the Province), announced the release of standard contracts for architectural and engineering design assignments for use by all provincial Ministries and agencies. The contracts support fairness, transparency, and efficiency for architectural and engineering consultants and government. The standard engineering agreement are Supplementary Conditions to CCDC31 – 2 020 that were developed collaboratively with representatives from ACEC-BC, AIBC, and the Province. The Supplementary Conditions to CCDC 31 – 2020 are consistent with the Supplementary Conditions to RAIC Doc 6 developed by the same representatives for the purposes of engaging an Architect.

3.0 QUALITY MANAGEMENT REQUIREMENTS

Under the *Professional Governance Act*, all individuals and firms practising professional engineering in BC must be registered with EGBC. An individual practising engineering must do so in accordance with applicable quality management requirements, guidelines, advisories, codes, and other relevant regulations,

[2] CCDC 31 – 2020 Service Contract Between Owner and Consultant

and must maintain documented evidence of such. A firm regulated under the EGBC Permit to Practice program (i.e., any firm practising professional engineering in BC) has responsibility for quality management of engineering practice for the firm. In this way, firms have the responsibility to support individual engineers in meeting their professional obligations under the *Professional Governance Act* and associated EGBC Bylaws.

For example, documented quality management practices must include:

- Retention of project documentation for a minimum period of 10 years after the later of the date of completion of the project or the date when the documentation is no longer used.
- A process for checking of engineering work
- Independent review of structural engineering design or other high-risk professional activities[3]
- Independent review of high-risk professional activities or work
- Field review during construction or implementation of the work
- Use of the professional engineer's seal (authentication) and Permit to Practice number
- Practices for direct supervision of people performing engineering work
- Application of relevant professional practice guidelines

Quality management practices are a necessary and important part of the consulting engineer's *scope of work* and must be accounted for in agreed fees for services.

To support professional engineers in meeting the intent of quality management requirements, EGBC maintains guides and other material[4] which describe the standards that Registrants in BC are to comply with as per the *Professional Governance Act* and EGBC's Bylaws. Consulting engineers' responsibilities include providing assurance that the work completed under their area of responsibility on the project substantially comply with applicable codes, and that field review is sufficient to verify that construction substantially complies with the design documents. These assurances are documented in the form of field reviews and signing of schedules as required by various authorities having jurisdiction.

Registrants in each discipline must use their professional discretion to determine the extent and number of field reviews required for them to ascertain whether the implementation or construction of work substantially complies in all material respects with the professional engineering concepts or intent reflect in their design documents. Registrants should be provided with the opportunity to perform any requested field reviews for

[3] Practitioners should be familiar with EGBC Practice Resource, General, Peer Review, Section 3.1.2 Peer Review versus Independent Review, Section 4.1.7 Documented Independent Review of Structural Designs, and Section 4.1.8 Documented Independent Review of High-Risk Professional Activities or Work. Link.
[4] EGBC Practice Resources, Individual Practice, Quality Management Guides

the items for which they are responsible[5]. It is common to have full time resident inspection for civil works in the transportation and infrastructure sector.

For the purposes of continuity of understanding, responsibility, accountability, and coordination, the field review responsibility should be undertaken by the same professional engineering firm that has completed the detailed design and tendering services. Moreover, the Professional of Record (POR) has an obligation to ensure their work is constructed in accordance with the design. Additional requirements on the duties of the POR may be found in the Bylaws of EGBC[6]

For high risk or high complexity projects the integration of an independent review may be required which would result in an additional cost to the project[7].

4.0 TYPICAL SERVICES OFFERED BY CONSULTING ENGINEERS

Establishing fees is highly specific to a project, site, time, and circumstances. ***Table A1 – Categories of Service Offered by Consulting Engineers for Infrastructure and*** **Transportation Projects** in the Appendix to this guideline provides a list of typical services offered by consulting engineers.

The nature of the individual project determines the scope of required services and the necessary form of agreement. Projects of higher complexity generally require a higher level of service and proportionally higher fees. A suitable engineering budget is based on a well-defined scope or work program and clearly defined parameters.

[5] Guide to the Standard for Documented Field Reviews During Implementation or Construction
[6] Bylaws of Engineers and Geoscientists BC
[7] Independent Review of High-Risk Professional Activities or Work

5.0 METHOD OF REMUNERATION

Engineering fees for a project can be based on one or more of the following calculation methods:

- Method 1: Time Basis
- Method 2: Percentage of Cost of Construction
- Method 3: Fixed Fee or Lump Sum

The method selected largely depends on the stage of the project, project complexity, and how well the project is defined. The recommended method of remuneration associated with a category of service is described in **Table 1**. The methods of remuneration are further described later in this section. Rates and disbursements should be determined and invoiced according to the most recent ACEC-BC Consulting Engineers Fee Guideline[8].

Table 1: Method of Remuneration for Engineering Fees by Category of Service

Category of Service	Recommended Method of Remuneration
1. Advisory Services	Time Basis
2. Concept Design Services	Time Basis
3. Preliminary Design Services	Time Basis, Fixed Fee
4. Design Development and Contract Document Services	Time Basis, Fixed Fee or Percentage Cost of Construction
5. Tender Services	Time Basis, Fixed Fee or Percentage Cost of Construction
6. Construction Support Services	Time Basis
7. Resident Engineering Services	Time Basis
8. Project Management Services	Time Basis
9. Construction Management Services	Time Basis

5.1 METHOD 1: TIME BASIS

The Time Basis (also referred to as Time and Materials) method is recommended when the scope of engineering services is difficult to determine, cannot be determined in advance, is not well defined, or when the consultant is not in control of the required time at any stage of a project.

[8] The ACEC-BC Consulting Engineers Fee Guideline

All time expended on the assignment is billable including travel, time at the consulting engineer's place of work, and time at the project site or other location required for the project. Unless the consulting engineer's overhead clearly covers administrative services, billable time also applies to technical and administrative service including, for example, scheduling and engaging administrative and technical support staff to produce correspondence and documents like reports and specifications.

The consultant can also be expected to closely monitor progress and provide regular status reports on the project to the owner.

Time Basis of remuneration may incorporate an *Upset Limit*, which is only appropriate when developed in consultation with the owner and ensures adequate allocations for additional work. This method is common practice for projects delivered under a design-bid-build model in the transportation sector.

It is recommended that the fees determined using the time-basis method be developed in accordance with the current ACEC-BC Consulting Engineers Fee Guideline[9] as the minimum rates for service.

Where projects extend over multiple calendar years, budgets should incorporate adjustment (escalation) to charge out rates to support continuity of professional service and to reflect changing economic and market conditions.

5.2 METHOD 2: PERCENTAGE OF COST OF CONSTRUCTION

To provide a budget for consulting fees based on cost of construction, a cost estimate for the project must be developed. The accuracy of construction cost estimates developed for individual projects can vary. Section 5.2.1and **Table 3** describe the approximate accuracy of estimates as a project matures and **Table 2** suggests approximate percentages that may be reasonable for this method at different construction cost estimates.. Inherently, the accuracy of engineering budgets defined in this way are subject to the accuracy of the construction cost estimate.

Basing engineering fees on the Percentage of Cost of Construction may be suitable where the cost of the consulting engineering service is a function of the construction or installation cost, and where the project scope and construction (or installation) budget is well defined. Engineering service agreements should clearly define whether the cost of construction is based on an estimate established at commencement of a project, or on the completed actual construction cost.

Fees for full-time resident engineering are in addition to fees determined under this method. For full-time resident engineering, Method 1 – Time Basis is recommended. The following table assumes that the preliminary design has been completed.

[9] The ACEC-BC Consulting Engineers Fee Guideline is updated annually, and available on the ACEC-BC website.

The budgets proposed in the **Table 2** are considered baseline fees which may increase relative to the cost of construction due to various factors. Projects that are more complex, for example because of location, site characteristics, procurement approach integration of unusual or sustainable design elements, and other factors will affect the scope of work and design costs.

Table 2 Engineering Services Budgeting (Final Design and Tender Services)

Cost of Construction	Fee	
Less than $1,000,000	Use other methods	
$1,000,000 - $2,000,000	7%-9%	
$2,000,000 - $5,000,000	7%-10% on first $2,000,000	plus 6-8% on next $3,000,000
$5,000,000 - $10,000,000	7%-10% on first $5,000,000	plus 6-8% on next $5,000,000
$10,000,000 - $15,000,000	7%-10% on first $10,000,000	plus 6-8% on next $5,000,000
$15,000,000 - $20,000,000	6-8%	
$20,000,000 - $100,000,000	5-7%	
Over $100,000,000	4-6%	

1. Fees do not cover disbursements or reimbursables. Reference should be made to the current ACEC-BC Consulting Engineers Fee Guidelines.
2. Fees assume that preliminary design has been completed.
3. Fees exclude construction support services.
4. Fees do not include any applicable taxes.
5. See **Table 5** for basic services that these fees cover.
6. For Rail Projects, fees can vary significantly where the cost of materials is high in relation to a relatively low engineering effort (e.g. new freight rail lines).

5.2.1 Calculating the Cost of Construction

Until a project is constructed, a construction cost estimate represents the best estimate based on the information available at the time. Completeness and accuracy of a cost estimation is influenced by many factors, including the project status, market conditions, and development stage. Estimates have a limited life and are subject to inflation and fluctuating market conditions.

The following estimates and their classification definitions are suggested for engineering projects:

Table 3 Definition of Class of Cost Estimates

Class A Estimate (±10 – 15%)	A detailed estimate based on quantity take-off from final drawings and specifications. It is used to evaluate tenders or as a basis of cost control during day-labour construction.
Class B Estimate (±15 – 25%)	An estimate prepared after site investigation and study has been completed and the major systems defined. Class B is based on a project brief and preliminary design and is used for obtaining effective project approval and for budgetary control.

Class C Estimate (±25 – 40%)	Estimate is prepared with limited site information and based on probable conditions affecting the project. Class C represents the summation of all identifiable project elemental costs and is used for program planning, to establish a more specific definition of owner needs and to obtain preliminary project approval.
Class D Estimate (±50%)	A preliminary estimate which, due to little or no site information, indicates the approximate magnitude of cost of the proposed project, based on the owner's broad requirements. This overall cost estimate may be derived from lump sum or unit costs for a similar project. It may be used in developing long term capital plans for preliminary discussion of proposed capital projects.

The calculation of construction cost is dependent on the preliminary design having been completed. Once completed, a Class B estimate for the construction, which has an assumed accuracy of +/- 25%, can be used as a basis for the calculation of the expected range of consulting engineering fees for detailed design and tender services. It is noted that the estimate of engineering fees would be based on a construction cost with significant cost uncertainty (+/-25%) and may therefore be subject to change.

The cost of construction includes all of the following:

- The total cost of all materials, equipment, and labour (including duty, taxes, grants-in-aid, and general and subcontractors' overhead and profit) necessary to complete the work for which the consulting engineer prepares drawings and specification or for which the consulting engineer is responsible to the owner.
- If the owner furnishes material, equipment, services, or other labour that is incorporated in the work, the cost of construction includes the fair market value of those materials or equipment as if newly purchased. In addition, the cost of construction includes the current prices of labour or other services at the time of construction. If construction does not proceed, market prices at estimated time of construction shall prevail.
- If the owner or contractor furnishes used material or equipment at the owner's request, the cost of construction includes the fair market value of those materials or equipment as if newly purchased.

Fee budgets that are based on the cost of construction should be increased in the case that extras to the original construction contract materialize as these will require additional effort to review and manage by the design team. No deduction may be made from the consulting engineer's fee because of penalties or damages claimed by the owner from the contractor, or other sums withheld from the contractor. The cost of construction does not include professional fees and disbursements payable to the consulting engineer.

If the owner reduces the scope of the construction for a portion of the work for which the design has already been completed, then no reduction in engineering fees shall be applied.

5.3 METHOD 3: FIXED FEE OR LUMP SUM

This method is generally only applicable to preliminary design services, design development and contract documents, tender services, and construction related services for some projects.

A Fixed Fee or Lump Sum contract is suitable if the scope and schedule of the project are sufficiently defined to allow the consulting engineer to accurately estimate the effort required. This type of fee is frequently developed from time-based projections or specific service requirements for tasks and may also be derived from the appropriate percentage fee method. Disbursements may or may not be included in the lump sum.

This method provides cost certainty for owner and encourages innovation and efficiency by the consultant. However, this fee method also requires the consultant to make an evaluation of and include allowance for risk elements that could result in higher costs but are agreed with the owner to be within the consultant's control and are expected to be managed as such.

For fixed fee projects the anticipated duration should be established. Should a project extend over the originally anticipated duration then it would be customary to allow for an increase in fees related to an increase in charge out rate over the extension period and additional efforts expended by the consultant.

Additionally, for multi-year projects it is customary to allow for an increase in the hourly rates of professional staff which is typically affected by inflation and other factors. The consumer price index may be used as a guideline for escalation but is not always directly applicable.

6.0 DISBURSEMENTS, SPECIAL CONSIDERATIONS, AND TAXES

6.1 DISBURSEMENTS

Unless otherwise agreed between the consulting engineer and the owner, and properly reflected in the fee, separate charges are made for disbursements borne by the consulting engineer. It is recommended that disbursements are determined and invoiced according to the most recent ACEC-BC Consulting Engineers Fee Guideline[10].

Disbursements are *not* included in the percentage fees in **Table 2** and are to be charged in addition to calculated fees.

[10] The ACEC-BC Consulting Engineers Fee Guideline is updated annually, and available on the ACEC-BC website.

6.2 SPECIAL CONSIDERATIONS

Special considerations include ownership of documents, and insurance, all of which are relevant in determining appropriate fees for service.

Professional Liability Insurance

Registrants of EGBC are required to comply with their Bylaws including those regarding primary and secondary professional liability insurance[11]. Should a design assignment require insurance beyond that which is in place and disclosed by the consulting engineer, then the costs associated with placement of additional insurance may be borne by the owner and charged as a disbursement. The owner may choose to carry a project-specific professional liability insurance policy and may request that the engineer support placement of the policy. Costs for a project-specific policy are the responsibility of the owner.

6.3 TAX

All relevant taxes are additional and applicable to both fees and disbursements. Consulting engineers should ensure taxes are appropriately understood and applied when invoicing for services and disbursements.

6.4 OTHER FACTORS

There are other factors that can influence perceived engineering effort when preparing an engineering budget. Although not considered as comprehensive, the factors below are common project considerations that can impact the project team in executing engineering projects from initial planning, design and construction phases.

Past Direct Experience with Project

Project cost is usually associated with the amount of experience with the project or work scope. A project team with experience brings in knowledge, tools, and ultimately efficiency and quality to the project. Limited experience with a project or scope typically tends to result in higher costs. On the other hand, relevant, significant experience with a project will allow for a well-defined scope of work.

Past Direct Experience with Client

Requirements of project delivery including, but not limited to, contract document package assembly, procurement process, design standards and specifications, special conditions, permit notifications and approvals, and engineering services during and post-construction may be different for each client at municipal, provincial, First Nations and federal levels, as well as for private clients. The time and effort

[11] EGBC Bylaws s. 7.5

invested to become familiar, initially, with these requirements from a consultant are typically significant. Recurring work or similar project scope can, therefore, reduce such overhead or mobilization costs and help the project team (client and consultant) focus more on developing solutions and executing the project and achieving project goals more consistently.

Location

The remoteness and accessibility of a project site typically have direct influence on the project cost. Additional travel and mobilization costs for a remote site are usually significant compared to a site near a major center, where most consultants and contractors are based. Relevant to the remoteness of a site, the added challenges from weather, such as fire and freezing climate, are also important considerations for increased project costs.

Complexity

Typically, projects with a high scale of complexity require more engineering investigations, analysis, and evaluation, and, therefore, result in higher costs. In contrast, projects with a lower scale of complexity, such as repeated project scope, tend to need less engineering effort and have lower costs. The complexity of a project may depend on the size and project risks, like overhead or buried utilities, project duration, site characteristics, conventional versus unconventional design, and delivery methods, such as design-bid-build versus alternative delivery.

Understanding of Site

The scope of consulting engineering services is affected by understanding site characteristics, such as geotechnical and environmental conditions. For example, if a site's subsurface soil spectrum is thoroughly understood, it may reduce the perceived effort in geotechnical investigations, and, therefore, may be favorable to budget control and schedule. In addition, the level of understanding of a site has influence in geotechnical analysis and foundation design (higher understanding leads to a higher resistance factor and a more cost-effective solution) and risks (higher understanding can lower risks and cost).

Historical and Cultural Value

Despite the unique value gained from preserving historical and cultural sites, and what doing so brings to the project team, community, and future generations, projects involving heritage preservation require the project team to have unique skills, knowledge, and possibly additional design iterations, as well as increased collaboration with partners having the interest of heritage preservation. Project teams often need to find the right balance between preservation of historic and cultural values and engineering efficiencies and economics. In contrast, projects for which heritage preservation is not an issue, the consulting engineer may adopt conventional and standard delivery models at a relatively low cost.

7.0 PROJECT RISK

7.1 PROJECT RISK EFFECT ON CONSULTING FEE BUDGETS

During the planning and design stage a risk assessment may indicate high risk and complex tasks within a project. This could initiate an independent review that may result in additional fees to the project. However, such reviews could offset potential unforeseen risks and associated costs during later stages of the project.

During the project delivery phase of the work, land issues related to property acquisition, lease agreements, approvals to access, and permitting can have a significant impact on the project. Such issues can influence the duration and scope of project management and advisory services.

Following tender services, most of the uncertainty of the project is resolved. The extent of engineering services has been established, the contractor has been selected, the contract price has been established, and the length of construction time is known. At this point, the consultant can give the owner a more precise estimate of the remaining engineering services required and a more refined contingency for construction and additional engineering services that may be needed. However, project risks such as environmental contamination, geotechnical and unforeseen conditions such as fluctuation of groundwater elevation or variability of soil stratum may arise during the project which could significantly impact the schedule and overall project costs. Although geotechnical and environmental engineering are outside of the scope of this document, the risk associated with these scopes has the potential to affect other disciplines like structural and civil engineering design. The above-mentioned project risks should be considered in the initial budget for the work by allowing for additional consulting fees. Should these risks arise during the construction project then the owner should expect that the level of effort for consulting and/or project management services will increase with an associated increase in the fee.

The importance of a project specific risk register needs to be considered for each project and the uncertainties associated with scope changes and budgets should be evaluated.

7.2 RISK SHARED CONSULTING ASSIGNMENTS

Risk-shared consulting assignments like Alliance or Integrated Project Delivery utilise alternate delivery arrangements that differentially share financial risk between project partners. Undertaking the necessary design work to assist with proposal preparation within a risk-shared consulting assignment involves considerable effort and risk on the part of the consulting engineer. For that reason, the consultant should be provided full remuneration for proposal development services.

8.0 BEST PRACTICES FOR SCOPE DEVELOPMENT IN ENGINEERING PROJECTS

Scaling consulting budgets up or down based on previous similar projects may not be a suitable approach for projects as the complexity of the project, site conditions, and project risks will likely be different than previous projects.

Some owners have found benefit in developing project budgets by utilizing existing relationships with engineering consultants to collaborate on the development of a written scope of work. When multiple consultants review the same RFP, there can be variations in how the scope of work is interpreted and these variations can have a wider range if the scope of work is relatively vague; however, if the scope of work is well defined with measurable deliverables, there is less room for misunderstanding in the owner's expected level of effort and subsequent submitted fee budgets.

In some cases, an owner may wish to provide nominal consulting hours beside each task in the requested scope of work which prescribes the level of effort expected on the assignment. This can lead to engineering consultants competing on hourly billing rates, rather than competing on the technical merits and professional qualifications in delivering the assignment. Therefore, a QBS approach is recommended with a two-envelope system where the consultant's qualifications and project approach are evaluated separately from price. The ACEC-BC annual fee guidelines can be used as a reference to support firms practicing consulting engineering in BC and BC based owners in determining appropriate fees for consulting engineering services.[12]

One approach that owners can take in prescribing the level of effort on a typical design assignment would be to state the level of design required, including each document to be delivered, for each of the expected milestone submittals (i.e. 30%, 60%, 90%, 100%, IFT, IFC). Design documents may include drawings, Engineer's cost estimates (opinions of probable construction cost), technical specifications, and engineering reports/memorandums. As an added benefit, a preliminary drawing index could be developed to provide an example of what requirements the owner is expecting in order to proceed the project to construction phase. By defining the type and quantity of design documents required in each submittal, including the expected number of drawing sheets required for the project, the RFP is clear on what consultants are required to price when competing for the work. If an owner is uncertain about how to scope out the project deliverables, engineering consultants are often cooperative in assisting owners to prepare the list of deliverables as part of the scope of work development mentioned above. Should a high level of deliverables be required, the higher level of percent of cost of construction in **Table 2** should be used.

[12] 2024 ACEC-BC Consulting Engineers Fee Guideline

Once the RFP closes and proposal submissions are under review, a quality-based selection process is the best practice for selecting a design professional. Guidelines endorsed by ACEC-BC[13], and recognized by the Canadian federal government, the National Research Council of Canada, and the Federation of Canadian Municipalities support consultant selection. With respect to evaluating fee estimates included in engineering consultant proposals, some owners will consider the aggregate average billing rate of a consultant in their evaluation (i.e. total labour cost / total hours forecasted). This evaluation technique provides a comparison metric between consultant fee estimates, regardless of the quantity of hours interpreted for the project and different billing rate tables that may be utilized.

Alternatively, an owner may specify a total available budget with an associated general scope. A detailed scope would be provided by the consultant that falls below the maximum project allowance provided by the owner. The scope and assumptions provided by the consultants could then be evaluated by the owner to choose a preferred proponent. For this scenario it is recommended that the owner provide a significant weighting to the technical proposal and a low weighting for the fee proposal.

[13] ACEC-BC User Guide to Implementing Qualifications Based Selection

APPENDIX

Categories of Service Offered by Consulting Engineers for Infrastructure and Transportation Projects

NOTE: When remuneration Method 2 – Percentage of Cost of Construction is used, “Basic Services” for Design Development and Contract Document Services and Tender Services are those covered by the fees in **Table 2**.

Table A1 – Categories of Service Offered by Consulting Engineers for Infrastructure and Transportation Projects

Legend: ▪ **Basic Services** ○ **Additional Services**
1. ADVISORY
○ Preparation or review of engineering program ○ Expert testimony ○ Appraisals, valuations, reports ○ In-service safety reviews and collision investigations ○ Existing conditions traffic analysis ○ Industry scans and state-of-practice reviews ○ Development of work estimate ○ Litigation / Claims / Insurance assistance ○ Detailed analysis of owning
2. CONCEPT DESIGN SERVICES
○ Concept Sketch ○ Draft Specification ○ Scoping option studies ○ Concept sketch ○ Feasibility analysis ○ Studies ○ Traffic planning studies ○ Road Safety Audits

3. PRELIMINARY DESIGN SERVICES

- Preliminary design reports, alternative conceptual proposals, sketches, schematics, specifications
- Scope of project
- Statement of probable cost
- Scheduling
- Documents for financing
- Investigative surveys, geotechnical
- Permits and licenses
- Environmental assessments
- Revision of existing designs
- Life cycle costing
- Preliminary cost estimates
- Engineering surveys, profiles, and cross-sections
- Sustainability studies
- Energy and other forms of modelling services
- Sustainability charrettes
- Preliminary Traffic Design
- Road Safety Audits

4. DESIGN DEVELOPMENT AND CONTRACT DOCUMENT SERVICES

- Detailed design
- Working drawings
- Specifications and tender documents
- Letters of Assurance
- Statement of probable cost
- Independent peer review.
- Detailed cost estimates
- Reinforcing bar schedules
- Demolition documents
- Tenant improvements
- Fast-track construction or sequential tendering
- Preparation of shop drawings
- Environmental design
- Energy and other forms of modelling services
- LEED® or other sustainability program documentation
- Detailed Traffic Design
- Road Safety Audits

5. TENDER SERVICES

- ▪ Preparing tender call documents
- ▪ Reviewing tenders submitted and advising
- ▪ Prequalification of contractors
- ○ Coordinating other consultants' documents
- ○ Non-tender construction contracts
- ○ Bills, materials, detailed cost estimates
- ○ Tender advertisement

6. CONSTRUCTION RELATED SERVICES

- ○ Review of shop drawings
- ○ Field review
- ○ Progress review
- ○ Monitoring of testing
- ○ Change order costing review
- ○ Document interpretation
- ○ Payment recommendation
- ○ Substantial performance review
- ○ Advising owner and contractor of continuing or newly observed defects or deficiencies
- ○ Letters of assurance
- ○ Yearend warranty review (as required)
- ○ System start-up and documentation
- ○ Post-warranty period follow-up
- ○ Fast-track construction or sequential tendering
- ○ Maintenance of manuals and drawings
- ○ Certification and testing of systems
- ○ Commissioning / training
- ○ Environmental monitoring
- ○ Record drawings
- ○ Contract administration
- ○ LEED® or other sustainability documentation and certifications services
  LEED® or other sustainability program compliance energy model

7. RESIDENT ENGINEERING SERVICES

- ○ Supplying resident staff on the project to determine if the contractor is carrying out their work in general conformance with the contract documents

8. PROJECT MANAGEMENT SERVICES

- Consultant selection
- Conceptual studies
- Economic feasibility
- Planning / scheduling / monitoring and controlling
- Estimating / budgeting and cost control
- Arranging financing
- Procurement
- Risk management
- Commissioning

9. CONSTRUCTION MANAGEMENT SERVICES

- Contract strategy, administration and expediting
- Construction logistics, planning, scheduling, and labour forecasts
- Labour relations, safety
- Field office management, temporary facilities
- Materials receiving and warehousing
- Progress monitoring, trending, and reporting
- Cost performance monitoring, trending, and claims processing