INTEGRATED PROJECT DELIVERY (IPD)

Professional Engineering Firm Management

Guidance for Project Managers

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Table of Contents

List of Tables

List of Figures

1. Introduction and Purpose

Professional Engineering Firms, or "PEFs", are a vital component of the vibrant transportation industry, not only in North Carolina, but across the nation. While there is no doubt that transportation departments and agencies can deliver small and large transportation projects on time and on budget, there are several reasons why public agencies elect to retain PEFs to perform some or all of the work required by the agency, in this case, the North Carolina Department of Transportation (the "NCDOT" or "Department"), whether that be design, construction, or certain Professional or Specialized Services. Hence, there is a need for the Department's Project Managers and technical staff to understand what PEFs can do, when to retain them, what are the contractual and payment mechanisms available to the Department, and how their business practices correlate to the business practices of the Department.

The purpose of this document is to introduce new Project Managers with the Department to the basic concepts of PEF management, and to serve as a review of some of these PEF concepts for experienced Project Managers with the NCDOT. This document is also intended for staff in the Department's Technical Services Units, Divisions, central offices and any Department staff interested in learning the basic concepts of PEF management.

This document will generally define PEFs, the components of their fees, the various Contract structures and payment methods available to the Department, review the fee negotiation process, and introduce the reader to the monitoring and management of PEFs.

2. Professional Engineering Firms

A "PEF", also commonly referred to as a Consulting Firm or Consultant, is a private entity, whether a business or an individual, that provides qualified Professional or Specialized Services to the Department at any given time. Such services typically relate to the Department's core mission to deliver, operate and maintain transportation assets across the State. In addition, depending on the Department's needs, these services may expand into other areas, such as printing, information technology and any other services, products or goods that enable the Department and its staff to fulfill its core mission.

2.1. How do PEFs Work?

PEFs differ from the public sector in that they provide contractually required technical or management services for valid and legal consideration. Such consideration typically results in a revenue stream for the PEF that allows it to cover expenses incurred to deliver the final product, service or good, in addition to a profit that is generally negotiated with the Department.

Having the knowledge of how PEFs generally operate provides the Department's Project Managers with the necessary tools to estimate and negotiate, in good faith, reasonable fees to be paid to the PEF for their services. Because PEFs retained by the Department are working for the public sector and, ultimately, for the general public, the contractual parameters set by the Department, along with the documentation submitted by PEFs to demonstrate interest, capability and capacity to deliver certain projects or services, should be transparent and subject to scrutiny by the general public.

In order to understand the basic concepts included in an estimated fee submitted by a PEF, it is important to understand the building blocks of such fee. The following terms are widely used by PEFs to calculate their estimated fees.

2.1.1. Direct Labor Costs

"Direct Labor Costs" are those costs associated with the production of goods and/or deliverables contractually required by the Department from the PEF, or the cost associated with providing contractually required Professional or Specialized Services to the Department. Direct Labor Costs are most commonly associated with the hourly rates of the PEF staff working on a project or program for the Department. Such staff may include engineers, project managers, project analysts and quality reviewers employed by the PEF or its Subconsultants. From the Department's perspective, the NCDOT also incurs Direct Labor Costs through the payment of salaries to its staff.

The unit for Direct Labor Costs is dollars, and the amount is obtained by:

(a) Estimating the number of hours required per PEF employee to complete a task;
(b) Multiplying the total number of hours required by each PEF employee to complete a task by his or her hourly rate; and
(c) Adding the result obtained in item (b) above. The result is the Direct Labor Cost.

Table 1: Direct Labor Cost Calculation Example

	PEF Staff 1	PEF Staff 2	PEF Staff 3	Quality Reviewer
Task 1	10.0 hrs			2.0 hrs
Task 2	4.0 hrs	4.0 hrs		1.0 hr
Task 3	2.0 hrs		2.0 hrs	0.5 hr
Task 4	1.0 hr	1.0 hr		
Total Hours	17.0 hrs	5.0 hrs	2.0 hrs	3.5 hrs
Hourly Rate	$35.00 / hr	$45.00 / hr	$60.00 / hr	$40.00 / hr
Total Direct Labor Cost / Staff	$595.00	$225.00	$120.00	$140.00
Total Direct Labor Costs	$ 1,080.00			

2.1.2. Overhead

The term "Overhead" refers to costs and expenses incurred by the PEF that are necessary for its operations, but that are not directly attached to a specific Revenue-generating activity or service. Examples of Overhead include rent, property taxes, legal fees (i.e. for incorporation), utilities and other operational costs. As such, Overhead rates are unique to each PEF and are typically submitted to the Department for approval.

In order to get its Overhead rate approved by the Department, the PEF must calculate and submit its indirect costs to an audit conducted by a qualified certified public accountant (or "CPA") duly certified by the State of North Carolina to conduct audits in compliance with the Federal Acquisition Regulations ("FAR"). Once the CPA has conducted the audit and certified the PEF's Overhead rate is FAR-compliant, this Overhead rate is submitted to the Department for approval. In the event the PEF does not have a FAR-compliant Overhead rate, then the NCDOT imposes a "safe harbor rate" of 110%.

From the Department's perspective, the NCDOT also incurs Overhead costs that are essential for the proper operation of the Department. Examples of such Overhead costs include utility payments, stationery, building maintenance, information technology and networking services and maintenance, and vehicle maintenance, among others.

2.1.3. Fee Base

The "Fee Base" represents the actual costs incurred by the PEF when conducting its activities to fulfil the requirements of the Task Order assigned by the Department. Technically, this translates into the sum of Direct Labor Costs, Overhead costs, and Profit. The Fee Base would be the equivalent of "Revenue", which is the income generated by a PEF from the sale of Professional or Specialized Services, including the production of goods and/or deliverables for the Department.

It is important to note that "Revenue" does not equal "Profit". Depending on the type of contract and the payment method contractually required, it is possible for the PEF to not realize a "Profit" regardless of obtaining payment from the Department for services rendered or deliverables produced.

From the Department's perspective, NCDOT's revenues derive from funds allocated to the Department in the state budget or through federal allocations for its proper operation to fulfill its core mission.

2.1.4. Profit

The "Profit" is the PEF's realized financial benefit or monetary gains after subtracting Labor Costs, Overhead and Direct Non-Salary Costs from its "Revenue". The Profit is not generally imposed by the Department, but it is typically fully disclosed by the PEF in its fee estimation.

Since the Department is a governmental and a not-for-profit entity, the Profit does not apply to the NCDOT. It is important for the Department, however, to be as efficient as possible with its revenue (i.e. funds allocated by the State legislature) so that it can appropriately cover, not only the construction cost of projects, but also other associated, indirect costs of doing business, such as Overhead.

2.1.5. Cost of Capital

The "Cost of Capital" ("CoC"), also referred to as "Facilities Cost of Capital" or "Facilities Capital Cost of Money" ("FCCM"), is generally defined as the rate applied to the net book value of tangible and intangible assets that are subject to amortization. Tangible and intangible assets are items in the possession of the PEF that are expected to be held by the PEF beyond the current accounting period for the benefits such assets yield (48 CFR § 9904.414). In other words, tangible assets may refer to real estate or company vehicles owned by the PEF, the cost of which has been financed;

while intangible assets may refer to software licenses for which the PEF has paid and will hold for a long period of time.

The CoC is an audited percentage which is audited by a certified CPA and approved by the Department, in the same way as the Overhead rate. The CoC is in addition to the Fee Base and is not part of the PEF's Profit.

From the Department's perspective, the NCDOT also incurs such costs, which may include State vehicles and software licenses.

2.1.6. Direct Non-Salary Costs

"Direct Non-Salary Costs", also referred to as "Expenses", are costs incurred by the PEF that are directly related to the project or program on which it is working, necessary for the completion of such Professional or Specialized Services, but that are not Direct Labor Costs. Such costs may include the mileage rate paid to the PEF's staff to drive to and from off-site meetings, meals and stationery. As with the CoC, Direct Non-Salary Costs are added to the Fee Base, but since they are paid on a one-to-one (1:1) ratio, there is no Profit to be made on these costs.

Similar to the PEF's Direct Non-Salary Costs, the Department also incurs the same type of expenditures. Examples of this include, but are not limited to, statewide conferences and/or training, and the travel and lodging associated with such events.

Table 2: Total Cost Calculation Example

Total Cost Calculation		
Item		**Cost**
Direct Labor Costs		$ 100,000
Overhead Rate	140.00%	$ 140,000
Sub-total		**$ 240,000**
Profit	9%	$ 21,600
Fee Base		**$ 261,600**
CoC	0.22%	$ 220
Direct Non-Salary Costs		$ 1,000
Direct Labor Costs		$ 100,000
Total Cost		**$ 262,820**

Where:

Direct Labor Costs	=	Sum of the estimated hours for each task multiplied by each person's hourly rate
Overhead Rate	=	As approved by the Department
Profit	=	As approved by the Department
Fee Base	=	(Direct Labor Costs) + (Overhead) + (Profit)
CoC	=	As approved by the Department
Direct Non-Salary Costs	=	Expenses Estimated by the PEF
Total Cost	=	(Fee Base) + (CoC) + (Direct Non-Salary Costs)

3. Services Provided by Professional Engineering Firms

Generally, PEFs may be retained by the Department to perform and/or provide any of the following Professional or Specialized Services, without limitation, as duly prequalified by the Department to perform such services in accordance with Section 4 (Certification and Prequalification) of the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*:

(a) Project or program management
(b) Construction engineering and inspection
(c) Feasibility studies
(d) Planning and environmental (human and natural)
(e) Surveys and studies
(f) Preliminary engineering
(g) Design engineering, design and redesign services
(h) Engineering surveying and mapping
(i) Geotechnical investigations
(j) Architectural related services
(k) Visualization and simulation studies
(l) Technical assistance
(m) Transportation services studies

The type of service and role of the PEF will generally be dictated by the needs of the Department for a specific project or program. Such needs are determined by the Department's Project Manager, along with the need for retaining one of more PEFs.

Based on the aforementioned services, a PEF may be retained by the Department in one of the roles explained below.

3.1. Production Firm

A "Production Firm" is a PEF used by the Department to produce specific work products, such as a set of plans or an environmental report. In these cases, the scope of services is well defined, allowing the Department to set a list of deliverables that are tangible, quantifiable and measurable; and the efforts and resources (estimated hours required to complete a specific task) can be efficiently calculated.

3.2. General Engineering Services Consultant

Cases in which the services required by the Department are open-ended or cannot be fully defined require the Department to retain a PEF to act as a "General Engineering Services Consultant" or "GESC". Such services provided on behalf of the Department may include project or program management, construction engineering and inspection, staff augmentation and technical assistance of various projects and/or programs, among others. As in all cases, the Department's Project Manager or the Technical Services Unit will determine the need to retain a GESC and develop the definitions of services to be provided.

Some of the services for which a GESC may be retained by the Department are further explained below.

3.2.1. Staff Augmentation provided by GESC

Retaining a GESC to supplement and expand the Department's staff allows the Department to respond quickly to unforeseen program increases that may require more resources than the Department has available at any given moment. Staff augmentation allows GESC personnel to be embedded with Department staff in a full or part-time capacity and perform similar functions as a Department employee. Such functions may include, without limitation, providing support to technical units, providing oversight for some or all elements of a project or program, and managing other consultants or designers on behalf of the Department.

3.2.2. GESC as Project Manager on a Specific Project

Based on the Department's need for any given project or program, the resources and expertise available within the Department and the availability of such resources, the Department's Project Manager may elect to retain a GESC to act as Project Manager on behalf of the Department, or to assist the Department's Project Manager with various management functions. In such instances, the GESC would perform similar functions as a Department Project Manager, except for project scoping; evaluation, selection and fee negotiation with other PEFs; or managing other projects, programs or tasks that are the responsibility of the Department or other Consultants. In all cases and without exception, the Department, not the PEF, is fully responsible for these items. A GESC, however, is fully responsible for the selection, contract negotiation and management of Subconsultants on its own team.

Retaining a GESC as a Project Manager allows the Department to respond quickly to large program increases that may require more resources than the Department has available at any given moment.

In its role as Project Manager, the GESC's responsibilities may include, but are not limited to, managing all aspects of a project or program, including coordinating project schedules and identifying opportunities to request programmatic approvals for a group of projects through the Department's Project Manager.

3.2.3. GESC Providing Support to a Unit

Certain situations may require the Department to retain a qualified PEF for a determined amount of time to provide specific services or tasks for which the cost and schedule can be accurately defined, but the need of such services is difficult to predict.

An example of such a case would be a qualified geotechnical engineering firm retained by the Department to obtain soil boring and pavement cores. The Department's Geotechnical Engineering Unit, not having the necessary equipment to obtain such soil borings or pavement cores, may decide to retain a geotechnical engineering company for a predetermined period of time to obtain such data on a case-by-case basis and as needs arise.

3.3. Subconsultants

There are instances in which a PEF may not be prequalified to provide certain Professional or Specialized Services that are required as part of the scope of services for a program or project. In such cases, the PEF may retain the services of a Subconsultant that holds the necessary pre-qualifications for some aspects of the services to be provided, whether such services are professional or specialized. Typical examples of services provided by Subconsultants may include, but are not limited to, right-of-way (ROW) acquisition services; surveying, mapping and photogrammetry; geo-environmental surveys and studies; geotechnical investigations and studies; visualization and/or simulations; and architectural services.

3.3.1. Prime Consultant versus Subconsultant

Generally, the Prime Consultant is a PEF that provides qualified Professional Services, which, by themselves, compose the majority of services to be provided under a contract with the Department. A Subconsultant is generally a PEF that provides qualified Professional or Specialized Services which, by themselves, are not the majority of the services required by the Department but are necessary to satisfactorily complete the services provided by the Prime Consultant and contractually required.

While the Prime Consultant holds the master contract or agreement with the Department, the Subconsultant has a contract directly with the Prime Consultant. In this case, the Prime Consultant absorbs all the risk of retaining and managing the Subconsultant and is responsible for the completion of the deliverables required from the Subconsultant within the timeframe and budget negotiated between them. Such timeframe and budget are a subset of the timeframe and budget negotiated between the Prime Consultant and the Department for a specific project or program. In the event the Subconsultant is late in providing a deliverable to the Prime Consultant, the delay reflects on the performance of the Prime Consultant, who is fully responsible for such deliverable.

The advantage to the Department of allowing the Prime Consultant to manage its own Subconsultant(s) is that the Department's Project Manager deals with a single point of contact for the project or services being provided. The decision to employ Subconsultants or not typically falls on the Prime Consultant (PEF) leading the proposal effort. However, once the Contract between the PEF and the Department has been executed, the PEF cannot change Subconsultants on its team without obtaining written approval from the Department as stated in Section I.C (Subcontracts) of the standard NCDOT Contract:

> *"The CONSULTANT and/or subconsultant will not sublet any portion of the work covered by this AGREEMENT without prior written approval by the STATE."*

In these cases, the Department reserves the right to ask for additional information to ensure that the proposed Subconsultant replacement is as good or better than the original Subconsultant. This protects the Department from obtaining services from a company with lesser qualifications than those originally proposed by the PEF.

3.3.2. Risks and Opportunities

From the perspective of a PEF, retaining a Subconsultant may serve as a benefit in that such Subconsultant may be able to provide certain Professional or Specialized Services required by the Contract that the PEF cannot provide due to a lack of expertise, availability or capacity. The PEF, however, as the Prime Consultant, continues to bear the risk of the Subconsultant's performance and execution of the contractually required work.

Generally, the PEF who has executed an agreement with the Department is responsible not only for its quality of work, but also for the quality of work performed by its Subconsultants. While the Prime Consultant and the Subconsultant may have a legally-binding agreement in place, the Subconsultant's performance is managed by the Subconsultant's own project managers. Oftentimes, the PEF or Prime Consultant is in a "reviewer" position in which the PEF cannot manage the Subconsultant as it performs the required work but has only the ability to review such work.

While the PEF should account for this additional review time in its project schedule submitted to the Department, the PEF may not be able to fully account for those instances in which the Subconsultant performs poorly, causing the PEF to view this as a potential risk or liability.

From the perspective of the NCDOT, the Department also incurs such additional costs when a PEF is not performing in accordance with the contractually required expectations, causing the Department's staff to invest additional, unbudgeted time in reviews.

4. Why use a Professional Engineering Firm?

The decision to retain a PEF to perform some or all aspects of a project depends on several factors, including resources and expertise available within the Department, the capacity and availability of such resources and the Department's exposure to certain risks.

4.1. Resources

A key aspect in deciding whether to retain some or all of the work for a particular project within the Department may depend on the availability of the required staff needed to complete the project within the timeframe mandated by the State Transportation Improvement Program ("STIP"). A limited number of staff may prevent the Department from delivering its project on time, causing adverse impacts that may include increased planning, design and construction costs, and availability and/or allocation of project funds within a given fiscal year.

4.2. Expertise

Some projects may include, as part of their scope of work, specialized services that are not widely employed throughout the state and for which the Department has no available experts. In such cases, the Department may choose to utilize a qualified PEF that includes among its staff Subject Matter Experts ("SMEs") who specialize in that particular discipline. An example of this would be moveable bridges within the state. Moveable bridges are not widely used in the State of North Carolina, and the expert staff employed by the Department may be limited for a particular project, triggering the need to retain a PEF with the necessary qualifications and experience to design and/or build moveable bridges.

Conversely, the Department may have a limited number of SMEs among its current staff, in which case the Department may elect to retain a PEF with the ability to provide additional SMEs to assist the Department.

4.3. Capacity

The Department may employ several staff with the knowledge and expertise to perform the required tasks to complete a project, but current workload and workload projections may not allow for such staff to undertake additional obligations. In this case, the Department may elect to engage a PEF to perform such tasks and activities.

4.4. Risk

As part of the decision process to retain a PEF to perform some or all of the services required for a specific project or program, the Department's Project Manager must assess the risks and opportunities associated with the items mentioned in Sections 4.1 through 4.3 above.

As an example, if the Department elects to retain a project or program in-house, lack of available staff with the required expertise within the Department may cause delays to the project schedule, which may impact overall construction budgets and costs. As another example, the cost of gas or steel, which have been historically proven to be volatile, may have an unforeseen impact on delayed projects. Project delays may also affect State and/or federal funding allocation for a given project in a given year, requiring adjustments to the STIP and affecting the delivery of other projects included in the STIP.

Project delays may also affect the contracting industry and PEFs. For PEFs and contractors to efficiently manage their resource allocation and overhead, they need to be able to project the future workload and staff required to make a determination of the need to hire additional staff. Uncertainty in the execution of contracts with the Department may cause the PEF to have idle staff not able to generate the revenue stream necessary to keep the PEF in business. Of course, from the Department's perspective, there are unforeseen risks that may cause a delay or a shift in the delivery of projects, such as uncontrollable and unforeseen natural forces. It is important to note that both the private industry and the public sector understand (and are willing to accept) the risks caused by such events.

Another potential risk of planning or project delays would be the impact they cause to the planning process, approved environmental documents and permitting. Per FHWA and depending on the type of environmental document, such approvals and/or environmental permits may only be valid for a specific period. If a project delay extends beyond the validity period of an environmental document or permit, the Department would have to spend an additional amount of funds to update or revise these studies.

From the public perception perspective, project delays may consequently cause unforeseen economic impacts within the "area of influence" of such project. While projects may improve mobility and/or safety within a community, they may also contribute to the economic development of communities throughout the state. Project delays may cause a delay in the economic developments of such communities, or such delays may also cause a negative perception of the project delivery capabilities of the Department.

5. Contract Types and Applicability

A Contract is a mechanism by which two or more parties agree that certain services, products, goods and/or deliverables will be provided by one of more of the parties involved, in exchange for valid and legal consideration. In the case of a PEF, the services provided are generally of a technical nature and typically consist of those items listed in Section 3 (Services Provided by Professional Engineering Firms) and those services in the Department's prequalification list. More information about the prequalification process can be found at *https://connect.ncdot.gov/business/Prequal/Pages/default.aspx*. Contracts are legally binding documents and enforceable in a court of law, the purpose of which is to protect all parties involved by defining each party's legal responsibilities, including, among other things, scope of work, deliverables, submittal and review timeframes, and compensation.

The Department has, at its disposition, various Contract structures that apply to the unique needs of the Department, the purpose of which is to protect the Department as well as the public's interest. It is the responsibility of the Department's Project Manager and the Professional Services Management Unit ("PSMU") to select a Contract structure that best suits the needs of the NCDOT. The incorrect selection of a Contract structure may result in the inefficient delivery of the project or program through time delays or unforeseen project costs.

This Section 5 (Contract Types and Applicability) describes, at a high level, the different types of Contracts available to the Department, according to the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, and the best circumstances to use them. It is important to note that every project is different, and different challenges develop as the project progresses, making a Contract structure – or the selected payment mechanism, as defined in Section 6 (Contract Payment Methods) – inefficient.

5.1. Project-Specific Contract

The NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts* defines "Project-Specific Contract" as follows:

> *"A Project-Specific Contract is between NCDOT and a Consultant for the performance of services and defined scope of work related to a specific project or projects. The fully executed Project-Specific Contract represents the full scope of services required by NCDOT."*

A Project-Specific Contract allows the Department enough flexibility to retain a PEF as a Production Firm or a GESC, with the limitation that the PEF will only be contractually allowed to work on the project—or *projects*—specified in the Contract. This limitation would also apply to Subconsultants. For context, and as further explained in Section 5.3 (Limited Services Contract or Limited Services Agreement) below, a Limited Services Agreement is just one Contract that allows the PEF to work on different projects, depending on the Department's needs.

For example, if the Department had to deliver a large project requiring a vast number of resources for extended periods of time, the Department could retain various PEFs in the following roles, as long as the work conducted by each PEF is specific to the project:

(a) A Production Firm to prepare project-specific plans
(b) A GESC to conduct project-specific plan reviews

(c) A GESC to act as project manager
(d) A GESC to conduct construction engineering and inspection, among others

Project-Specific Contracts are best utilized for large projects for which the familiarity of the project team is key to the efficient and successful delivery and completion of the project. A key disadvantage, however, and the reason why Project-Specific Contracts are not widely used by the Department, is that they do not allow for flexibility of assigning the PEF's resources across projects and where they could be best utilized.

In addition, as stated in the definition cited above, the Project-Specific Contract represents the full scope of services, so it is in the Department's best interest to have a well-defined scope prior to initiating the procurement process.

5.2. Multiphase Contracts

"Multiphase Contracts" are defined by the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts* as follows:

> *"A Multiphase Contract is a contract where the solicited services may be divided into phases, whereby the specific scope of work and associated costs may be negotiated and authorized by phase(s) as the project progresses."*

An example of a Multiphase Contract may be a new construction corridor, for which the funding is being split into several fiscal years. Similar to the Project-Specific Contract, the scope of work, tasks, milestones and deliverables can be accurately defined for the current phase of a multiphase project. However, there would be no need to define future phases until it is determined that the funding is available and that the planning or design process may start.

Similar to a Project-Specific Contract, a Multiphase Contract may allow the PEF to become familiar with the project, enhancing its efficiency as the project progresses. This Contract type, however, does not allow the Department to efficiently use the PEF across various projects.

Whenever possible, a project with multiple phases should be broken down into a single procurement for each phase to provide opportunities to various PEFs and industry players to participate.

5.3. Limited Services Contract or Limited Services Agreement

According to the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, a "Limited Services Contract" ("LSC") or "Limited Services Agreement" ("LSA") is defined as follows:

> *"A Limited Services Contract is a contract for the performance of services for any number of projects, under task or work orders issued on an as-needed basis, for an established contract period."*

For the purposes of this document, the terms "Limited Services Contract" and "Limited Services Agreement," and their corresponding acronyms ("LSC" and "LSA") will be used interchangeably. Another term that is commonly used for these types of Contracts is "On-Call Contract." These

Contracts are for a predetermined amount of time and are most effectively utilized when the scope of work or services cannot be clearly defined.

An LSA is a Contract that is not tied to a specific project, allowing the Department to quickly mobilize retained PEFs to various projects or tasks as needs arise. Since LSAs are not tied to specific projects, a list of deliverables may not be available during the advertisement phase; however, it is in the best interest of the Department to develop a detailed list of the services and pre-qualifications required. Another advantage of LSAs is that the Department may utilize the PEF as a Production Firm or a GESC on specific Task Orders, depending on the Department's needs.

The typical time period for an LSA is three (3) years, with options to extend such services on a yearly basis for up to two (2) years, depending on the performance of the PEF under contract and the needs of the Department. These extensions allow the Department continuity of service in cases where the Task Order or project on which the PEF is working extends beyond the original term of the LSA.

An example of an LSA would be retaining a PEF to provide general services as a GESC, which may include staff augmentation, serving as project or program manager, or providing support to a specific technical services unit, as described in Section 3.2 (General Engineering Services Consultant). In such cases, the tasks to be performed by the GESC could be generally described at a high level, but it would be difficult to determine whether there will be any tangible deliverables or what those deliverables may include. Such cases may also include intangible deliverables, such as conducting certain tasks that may not result in, for example, a set of plans or a report. An example would be the management of a project or a task in which the GESC causes the supervised Production Firm to submit certain deliverables, but the GESC does not have a deliverable other than the product of the supervised Production Firm.

Another example would be when the Department's Geotechnical Services Unit requires the services of a PEF to provide soil borings and corresponding soil investigation reports. In such case, the Department's Geotechnical Services Unit may choose to retain a PEF, based on qualifications, for a period of three (3) years to provide soil analyses on various projects. The character of the services to be provided is fully known, but the number of projects for which these services must be performed is unknown.

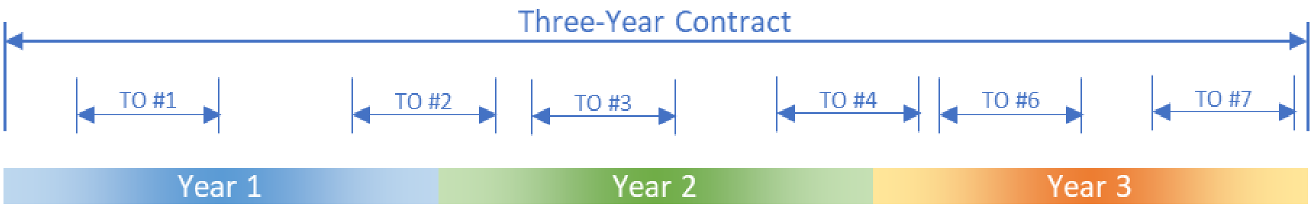
5.4. Contracts, Task Orders and Purchase Orders

To appropriately manage PEFs, the Department's Project Manager must understand the difference in the definitions of a Contract and a Task Order. This difference is typically most visible in the implementation of LSAs, as the deliverables for these Contracts can be difficult to define.

As defined in Section 5 (Contract Types and Applicability), a Contract is a mechanism by which two or more parties agree that certain services, products, goods and/or deliverables will be provided by one or more of the parties in exchange for a valid and legal consideration. In other words, under an LSA structure, the Department and the PEF legally agree that the PEF will be "on-call" to provide certain services, as generally described in the Contract, as the need arises, within the timeframe specified in the Contract.

A "Task Order" is a specific task that the PEF must complete under and in accordance with the Contract under which the Task Order is issued. Task Orders can be issued at any moment by the Department. The following figure graphically depicts the difference between a Contract and Task Order.

Figure 1: Contract versus Task Orders (TO)



5.5. Contract versus Purchase Orders

Another term that is important to understand when looking to retain a PEF is the concept of Purchase Orders. According to the NCDOT *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, a "Purchase Order" is essentially an unexecuted Task Order under an LSA.

A Purchase Order is a commercial document (as opposed to a legally binding document) which is sent by a buyer of Professional or Specialized Services (in this case, the Department) to a seller (in this case, the PEF). This commercial document generally specifies the Professional or Specialized Services required, along with the quantity, timeframe and milestones for such services. The Professional or Specialized Services required by the Department are provided by the PEF within the context of the LSA under which the Purchase Order is being issued. The Purchase Order becomes a legally binding document (or Task Order) after the PEF has accepted to perform the requested Professional or Specialized Services.

In general, the term Purchase Order is utilized by the Department as a Notice to Proceed for a new Task Order. It is important to understand, however, that a Purchase Order and a Task Order are not a Contract themselves, but a subset of a Contract.

5.6. Contract Amendments and Supplements

There are unforeseen situations in which the scope of services must be expanded or revised after the Contract has been executed or a Task Order under an LSA has been issued. Such circumstances may include, as examples, lengthening the project limits to include additional drainage considerations, acquiring additional ROW due to project limits expansion, expanding the scope of work to address deficient drainage features or the discovery of unknown conditions that require further study, among many others. Such revisions to the executed Contract may also be to reduce the scope of services, which may include, for example, reducing the length of a highway project because of unforeseen funding cuts.

The mechanism to legally manage such revisions to the Contract or Task Order is through an Amendment. An "Amendment" is essentially an attachment to the Contract or Task Order in which certain contractual clauses are revised to accommodate the new conditions of the scope of services. An Amendment must also include a revision to the cost of the services, goods or deliverables to be provided by the PEF to the Department. Depending on the situation, the price may be higher, in the case of an expansion to the scope of services, or lower if there is a reduction in scope of services. Certain circumstances may require the scope of services to be revised, but such revisions do not materially impact the amount of effort to be conducted by the PEF, consequently, not affecting the price.

Amendments are also commonly referred to as "Supplements" as the intent of most Amendments is to supplement the existing Contract or Task Order with additional funds to cover an expansion of the scope of services. As a rule of thumb, Supplements to increase the Not-to-Exceed amount are typically handled at the Contract level. Supplements regarding the scope of services are generally handled at the Task Order level.

In all cases, both the Department's Project Manager and the PEF's Project Manager should individually analyze the revisions to the scope of services to determine the amount of effort to be added or removed to the existing Contract. An individual analysis by both Project Managers will allow for a better and more reasonable estimation of costs, as well as a better and more effective negotiation process.

It is important to note that the use of Supplements generally lead to an increase in the Department's Project Manager administrative and management efforts. Hence, it is important for the Department's Project Manager to obtain an accurate initial estimate of the cost of services to be provided by the PEF.

For information on how to proceed with an Amendment or Supplement, refer to 7.C (Contract Amendments) of the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.

5.7. Notice to Proceed

Another term that is used interchangeably with some of the concepts explained under this section is "Notice to Proceed." A "Notice to Proceed" or "NTP" is simply a formal notification from the Department to the PEF stating that the PEF may begin with the activities stated in the Contract or Task Order. Within the context of a Project-Specific Contract, for example, the Notice to Proceed would be an authorization for the PEF to initiate the activities that are necessary for the completion of such Contract. With a Multiphase Contract, the Notice to Proceed would be issued on a "phase" basis, allowing the PEF to initiate the activities for the phase for which the NTP has been provided. Within the context of an LSA based on Task Orders, the NTP would be issued on a Task Order basis.

In addition, there are two forms of NTPs: (1) a formal NTP, which is an authorization from the Department to the PEF that allows the PEF to commence the required activities for the fulfilment of the Contract, phase or Task Order; and (2) a "Limited NTP," which is a temporary NTP with a maximum value of $50,000. A limited NTP allows the Department to authorize the PEF to begin the contractually required work while all the requirements for a full and executed NTP are fulfilled.

It is important to remember that the Department's Project Manager shall not issue a formal or full Notice to Proceed until all the steps in the selection and negotiation process have been completed.

6. Contract Payment Methods

All Contracts between the Department and a PEF must include a Payment Method, which is the mechanism through which the PEF and its Subconsultants generate revenue for the services and goods provided to the Department. It is important to understand that the Payment Method is a part of the Contract, and is not the Contract itself. The NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts* specify four different payment methods that can be used when retaining a PEF for any of the Professional or Specialized Services described in these guidelines, of which the two methods most commonly known and utilized are "Lump Sum" and "Cost-Plus."

6.1. Lump Sum

The NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts* defines "Lump Sum" as follows:

The Lump Sum is "a fixed price, including labor, overhead, non-salary direct costs, and fee for the performance of specific services."

6.1.1. When and How to Use

The Lump Sum payment method can be used under all three types of Contracts described above in Section 5 (Contract Types and Applicability). In the case of an LSA, the Lump Sum method would be applied on a Task Order basis, up to the Not-to-Exceed amount.

In addition, the Lump Sum payment method should only be used under the following circumstances:

(a) The scope of services can be clearly defined;
(b) A list of specific, tangible deliverables can be developed, based on the scope of services; and
(c) The effort (number of hours) required to produce each deliverable can be reasonably estimated based on known facts.

The better the scope of service is defined at Contract execution, the less the chances are there will be Amendments or Supplements to the Contract or Task Order.

Typically, Lump-Sum payments are structured so that, after the completion of a specific milestone, task or deliverable, as dictated by the Contract or Task Order, the Department is able to make a payment to the PEF for that milestone, task or deliverable. However, Sub-Article IV.C of the NCDOT's standard Contract states the following regarding Lump Sum payments:

"Payment (partial payment for lump sum task orders) will be made to the CONSULTANT on a monthly basis upon submission of a Progress Report/Project Schedule, an invoice stating the percent of completion of each task (for lump sum task orders) and appropriate supporting documentation."

Once the appropriate documentation is submitted to the Department, as required by the Contract, the Lump Sum payment shall match the cost of the PEF's efforts during that month. The Department's Project Manager will review the supporting documents to ensure that the efforts invested by the PEF are commensurate with the amount invoiced, as explained in Section 6.4 (Invoicing and Payment).

As an example, a Lump Sum payment method is preferred during those stages of the project in which the scope of work can be developed in a more detailed fashion, such as the design and construction phases.

6.1.2. Risks and Opportunities

(a) **Scope Creep:** When utilizing a Lump Sum payment method, both the PEF and the Department must take an active role in managing Scope Creep. “Scope Creep” is generally defined as continuous requests for activities, deliverables or tasks that are typically small in nature, and not part of the contractual requirements of the executed Contract. On the side of the Department’s Project Manager, Scope Creep may arise from the thought that the PEF’s incurred costs in performing such small tasks outside of the Contract or Task Order parameters is negligible when compared to the total cost of the contract. The PEF may accede to such requests with the thought of “pleasing the client,” thinking that it may lead to more work with the Department in the future.

If left unchecked, Scope Creep benefits none of the parties involved, as the PEF usually must take staff out of production roles for deliverables that are contractually required, which may, in turn, cause a delay in submitting such deliverable. The PEF also incurs additional unforeseen costs that may end up eroding its Profit. From the Department’s perspective, and in addition to potential project delays, Scope Creep may lead to additional unforeseen expenditures through a Supplement.

To mitigate this potential risk, it is extremely important for the Department’s Project Manager to actively manage the scope of services as provided to the PEF and avoid unnecessary additions.

(b) **Underestimation of Direct Labor Costs:** Although underestimating Direct Labor Costs may look like an opportunity for the Department to save money, it is a risk for both the Department and the PEF. Failing to accurately estimate for a Task Order may cause project delays due to the additional efforts required for the implementation and administration of Amendments and Supplements to the Task Order or Contract. Once the Lump Sum cost of services has been made part of a Task Order, the proper way to alter it is through a Supplement, as explained above in Section 5.6 (Contract Amendments and Supplements).

The PEF also carries the added burden of trying to complete a deliverable with hours (or Mandays, as the case may be) not enough for the task at hand. This may cause the PEF to submit deliverables without undergoing quality checks, which may result in lower quality deliverables submitted to the Department.

The most effective way to mitigate this risk is for the Department’s Project Manager to develop an in-house cost estimate. As stated below in Section 7.2 (Contract Negotiation), the reason for the Department’s in-house cost estimate is to ensure the reasonableness of the cost submitted by the PEF, not to limit the value of the Contract or Task Order. A marked difference between the Department’s in-house and PEF’s cost estimates should trigger an analysis, not only on the PEF side, but also by the Department, to determine its root cause, followed by the negotiation process.

(c) **Inefficient Utilization of PEF's Resources and Staff:** There are instances in which the price for the scope of services has been accurately defined by both the Department and the PEF, and negotiated in good faith, which should allow the PEF to produce high quality deliverables within a reasonable cost and timeframe. However, the PEF's Project Manager may make use of its resources, capacity and expertise in an inefficient manner, causing it to spend more time and money than originally budgeted. This represents a risk for both the PEF and the Department. An inefficient utilization of the available resources by the PEF may not only make the project go over budget, but also affect the PEF's reputation with the Department, risking opportunities to be selected for future projects.

In addition, the inefficient utilization of resources by the PEF may be a risk for the Department in that this may not only result in lower-quality deliverables, but may also impact the project schedule and, potentially, the budget and funding originally allocated to the project.

The Department's Quality-Based Selection methodology, explained in detail in the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, is an opportunity to mitigate this risk from the Department's perspective, as the evaluation and selection criteria may include factors such as past performance, the firm's applicable project experience and capabilities of the project team.

(d) **Efficient Utilization of PEF's Resources and Staff:** There may also be instances in which the Department and PEF are able to negotiate a fair and reasonable fee for the services to be provided, but the PEF is also able to efficiently engage resources that may cause an activity or deliverable to be completed under the number of negotiated hours. Since the price for such activity or deliverable has already been negotiated, and with the Department having an obligation to pay the agree-upon amount, this would mean that the PEF, while generating the same amount of revenue, the Profit margin would be higher.

While this may seem like a risk for the Department in the sense that the PEF is obtaining a higher Profit margin for the same negotiated amount, this is also a way to encourage PEFs to do the work efficiently and with a high degree of quality.

Using a Lump Sum payment method for a scope of services that is not clear or for activities without tangible deliverables may cause unnecessary delays as the Department's and PEF's Project Managers may have to revisit what the result of the PEF's work should be. This may in turn cause delays in delivering the required services, invoicing and payment.

6.2. Cost-Plus

The NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, defines the Cost-Plus payment method as follows:

> *"This type of contract is suitable where the general magnitude of services is known but the scope of services or period of performance cannot be defined clearly and NCDOT needs more flexibility in expediting the work without excessive amendments to the contract."*

All Contracts that utilize Cost-Plus as a payment mechanism will be capped to a maximum (or "Not-to-Exceed") amount that is estimated by considering, as the definition above states, a known general magnitude of services for a specified length of time.

6.2.1. When and How to Use

The Cost-Plus payment method is typically best employed with an LSA type of Contract under which the Department may require certain services rather than tangible deliverables. An example of the services that could be provided when utilizing an LSA with a Cost-Plus payment mechanism include: a GESC providing staff augmentation, project or program management services, or providing support to a Technical Services Unit. In such cases, and as the definition above implies, the character and magnitude of the services to be provided are known and can be defined, but the moment and length of time for which these services will be required cannot be reasonably foreseen.

Once the need to retain a PEF under a Cost-Plus payment method arises, the Not-to-Exceed estimation and negotiation procedures are the same as the Lump Sum method with the key difference being that the Department and PEF negotiate an estimated number of hours based on the description of services to be provided by the PEF, rather than negotiating a fixed number of hours for a specific deliverable.

For example, the Department may have a need for one additional full-time equivalent ("FTE") to conduct design reviews for various projects for a period of one year. While the activities conducted during a design review may be known and definable, both the Department's and PEF's project managers may not know the number of projects to be reviewed during that year. In such cases, to establish a Not-to-Exceed fee under the Contract, both the Department and the PEF may agree on a reasonable number of projects that may be expected during the term of the Contract. In the event the number of design reviews is less than the number originally established, the PEF only gets paid for the time invested in such design reviews. However, if the number of design reviews is higher, then the Department may have to supplement the Not-to-Exceed amount.

6.2.2. Risk and Opportunities

(a) **Efficient Utilization of PEF Resources:** The Cost-Plus payment method reimburses the PEF based on the number of hours worked, rather than on a deliverable basis. This allows the Department to add resources and staff as needed, on a temporary basis, rather than hiring permanent staff to deal with a temporary situation.

(b) **Flexible Use of PEF Resources:** When properly implemented, the Cost-Plus payment method allows for flexibility to allocate PEF resources on critical activities which require a quick turn-around.

6.2.3. Contract Ceiling or Not-to-Exceed

All Contracts or Task Orders that employ Cost-Plus as a payment method include a Not-to-Exceed amount that limits the Department's total cost for the services to be provided. This amount is the maximum value of the Contract or Task Order as stated in the Department's in-house estimate. The Not-to-Exceed amount helps the PEF manage expectations in terms of sales and revenue projections and helps the Department to establish its budget allocation for the projects and services required.

Due to the open nature of the circumstances under which a Cost-Plus payment method would be used, there are justifiable reasons why the Not-to-Exceed amount could be exceeded. For example, this maximum amount could be exceeded due to changes in the scope of services or project schedule due to unforeseen funding conditions. In this case, the Department's Project Manager should start the process for a Supplement in accordance with Section 5.6 of this document and the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.

In all, both the Department's and PEF's Project Managers should work together to avoid unnecessary Scope Creep and the inefficient or wasteful use of resources.

6.3. Other Payment Methods

Although utilized to a lesser extent than the Lump Sum and Cost-Plus payment methods, there are two other payment methods that the Department may utilize in accordance with the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts* and that are similar in nature to the Cost-Plus payment mechanism:

(a) **Cost per Unit of Work** – This type of payment method is suitable where the magnitude of services is uncertain, but the character of services is known and the cost per unit can be determined accurately. Like the Cost-Plus payment mechanism, this method, also known as "Unit Price," is best applied when a specific rate for a specific activity can be fully defined, but the total amount of such activities may be unknown. The "Unit Price" may include a fair dollar amount for a specific service or work to be performed, as well as a rate for materials to be utilized during the performance of such work.

A Cost per Unit of Work payment method is best used when the total sum of activities can be broken down into discrete sections for which the work to be performed is known, but the ultimate amount is not fully clear. As opposed to a Cost-Plus payment mechanism, when the PEF submits an estimated Cost per Unit of Work, such cost will typically include Overhead Rate, CoC and Profit.

(b) **Specific Rates of Compensation** – This type of payment method is suitable where the magnitude of services is uncertain, but the character of services is known and a cost per hour can be determined. This payment mechanism is like Cost-Plus and Cost per Unit of Work, but in this case, rather than the PEF setting the Unit Price, the Department sets a specific rate of compensation on a "role" or "position" basis (i.e. specific rates for Direct Labor Costs) that is typically non-negotiable. When calculating a fee that utilizes this specific type of payment method, the PEF needs to add other direct costs, such as expenses, Overhead Rate, CoC, Profit, etc.

6.4. Invoicing and Payment

All Contracts, regardless of the type and the payment mechanism, should specify an invoicing structure and frequency that is agreeable to all the parties involved. To understand the reason behind the different invoicing payment structures, it is important to understand that private companies and public entities generally operate on a constant stream of revenue, or cash flow, that allows them to cover Overhead and CoC costs. In the case of the Department, such cash flow comes from the allocation of funds by the state legislature, as well as the contribution of funds, grants or loads by federal agencies, such as the FHWA. When an entity, whether public or private, goes without a revenue stream for a long time, it typically runs into difficulties to pay for its Direct Labor Costs (i.e. its employees), Overhead (i.e. utilities) and its CoC costs (i.e. its offices). An interruption in cash flow or a relatively constant revenue stream is a risk that could potentially cause a PEF to go out of business, or a public agency to shut down. To mitigate this risk, invoicing and payment structures are usually spread out, as evenly as possible, over the life of the project or program.

Given that the vast majority of Contracts between the Department and the PEF consist of LSAs, Article IV (Compensation and Payments) of the standard NCDOT Contract allows for the utilization of both Lump Sum and Cost-Plus payment methods, providing the Department with the flexibility to select the most adequate method for individual Purchase Orders. Regardless of the payment method for a Purchase Order, Sub-Article IV.C (Payment and Retainage) states the following:

> *"Payment (partial payment for lump sum task orders; payment of actual costs incurred for cost-plus task orders) will be made to the CONSULTANT on a monthly basis…"*

Invoicing, in accordance to a specific timespan as generally required by the standard NCDOT Contract, has the following advantages:

(a) It helps the PEF maintain a more constant revenue stream;
(b) It helps the Department's Project Manager in the review of smaller, more manageable deliverables with a faster turn-around time; and
(c) It helps the Department in the disbursement of smaller funds, freeing up fund availability for other ongoing projects or programs.

The Department's general policies for invoicing and final payment are described in Section 7.E (Invoice Procedures and Retainage) and 7.F (Final Payment) of the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*. In addition, Article IV (Compensation and Payments) of the standard NCDOT Contract outlines the information that the PEF must submit with each invoice. Such information includes, at a minimum, a progress report of activities completed to date, and a project schedule.

Lastly, it is important for the Department's Project Manager to continually monitor the invoicing and payment activity of the project to ensure that the PEF is submitting invoices and that the Department is issuing payment in accordance with the Contract, helping the Department avoid an accumulation of outstanding payments. It is also good practice for the Department's Project Manager to monitor billed-to-date figures and remaining Contract amounts to ensure the work is on schedule and to anticipate any potential issues.

7. Retaining a Professional Engineering Firm

The specifics on how to retain a PEF are explained in more detail in the NCDOT's *Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, but some of the important aspects on how to retain a PEF in an effective, efficient and transparent manner will be summarized here.

When deciding to retain a PEF, it is important to understand the components of their fees, the best Contract structure for the services required and the most effective payment method for the type of contract and work to be performed by the PEF. The goal is to reach an agreement that is beneficial for all parties, understanding that the ultimate client is the general public and that both the PEF and the NCDOT have a responsibility to develop solutions and designs that are cost-effective and implementable within the stated timeframe, with the ultimate goal of improving safety and mobility to all users of the state roadway and transportation network.

In summary, the following items are key for successful negotiations with PEFs:

(a) **Understanding Private Sector Fees:** Understanding the composition of private sector fees allows the Department's Project Manager to have a better understanding in achieving the balance required between work-product quality and cost efficiency. While work-product quality and cost efficiency may have little proportional relation to one another, the Department's Project Manager should take both factors into consideration understanding that certain costs incurred by the PEF are also incurred by the Department, such as Direct Labor Costs and Overhead, which are explained in Section 2.1 (How do PEFs Work?). Once there is a mutual understanding that the composition of the PEF's fees is in many ways similar to the costs incurred by the NCDOT, a reasonable fee that is beneficial not only for the Department and the PEF, but also for the general public, can be negotiated.

(b) **Best Contract Structure:** Understanding which contract type fits the needs of the Department is essential for the Department's Project Manager to deliver the project or program in an efficient and transparent manner. As explained above, selecting the incorrect contract structure for a project or program may cause delays and cost overruns that not only impact the efficient delivery of such project or program, but may also influence the general public's opinion.

(c) **Best Payment Mechanism:** Selecting the most efficient payment mechanism for the selected contract type and project allows the Department to have the appropriate flexibility and structure to deliver a successful project or Program. It may also provide the proper leverage over the PEF by allowing the Department's Project Manager to withhold payment should the PEF become non-compliant with the Contract terms.

7.1. Procurement Process to Retain a PEF

Once the Department has determined that retaining a PEF is the best course of action and after obtaining the required approvals, the Department's Project Manager may start the procurement process. The various methods of procurement to retain a PEF are detailed in the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.

7.2. Cost Negotiation

Although negotiating the cost of a Task Order is a routine part of the process in engaging a PEF, it is one of the most important phases. Cost negotiation involves not only understanding the logic of completing a task in a certain number of hours or days, but also the emotions attached to a process that is competitive by nature. From the Department's perspective, that competitiveness is enhanced by the fact that the Department is often seen as the steward of the monies put forth by the general public through the payment of taxes. In this light, it is important for the Department's Project Manager to be able to justify the PEF's cost that is mutually agreed upon.

(a) **Understanding the Department's Needs:** To effectively negotiate the cost of services from the Department's perspective, it is essential for the Department's Project Manager to not only understand the scope of work of the project or program at hand but, more importantly, to understand the needs of the Department. Knowing and understanding the technical aspects of the project's scope of work is the main expertise of the Department's Project Manager and staff. However, to successfully negotiate a Contract, it is important for the Department's Project Manager to understand the technical aspects of the project or program and the Department's need in terms of available funding and budget, project schedule and the public's safety and mobility needs, along with project stakeholders' desires.

(b) **Selecting the Appropriate Contract Structure and Payment Method:** Understanding not only the scope of work, but also the needs of the Department, allows the Department's Project manager to select the adequate payment mechanism. As explained above, the selection of the appropriate payment structure should not only be fair to all parties involved but should also allow all parties to have a recourse of action in the unlikely event that one of the parties is not being contractually compliant.

(c) **Input from Subject Matter Experts:** There are very few people who are experts at every single discipline involved in a transportation project. This is the reason why it is extremely important for the Department's Project Manager, as well as the PEF's Project Manager, to consult SMEs in each discipline involved when developing a cost estimate for a project or program. When it comes to negotiating the cost of a Task Order, it is important for the Department's Project Manager to not only request a reasonable number of hours to accomplish a certain task from each of the Technical Units, but also to request a range of hours in which such task could be accomplished, to have leverage at the negotiating table. Ultimately, the Department's Project Manager is responsible for negotiating and agreeing to the final cost estimate.

(d) **Negotiation is a Two-Way Street:** It is important for all parties involved in a negotiation to have a "two-way" conversation and discussion of the proposal submitted by each party. When negotiating, the PEF may take an aggressive stand on certain tasks based on their understanding of the scope of services, but which the Department's Project Manager believes can be executed in fewer hours. This may be due to a lack of mutual understanding of the expectations needed to deliver the scope of work. Even though this may cause a delay in the execution of the Contract or Task Order, it is important to have an open conversation of the expectations in order to come an agreement. Conversely, the Department's Project Manager being overly aggressive in the negotiation process may cause a qualified and experienced PEF to turn down the job, which may, in turn, cause the Department to select a firm that, although prequalified, may value revenue over quality.

In the end, it is important for all parties to understand that while the negotiation process may be seen as a competitive step to execute a contract, the ultimate goal is to deliver quality projects to the general public in an efficient, transparent and cost-effective way. To achieve this goal, a mutual understanding of the components of the estimated cost and the negotiation process is an asset that aids in achieving a reasonable cost for certain services.

Section 6.D (Negotiate the Contract) of the NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts* details the policies and procedures to be followed for the development of in-house cost estimates and to negotiate the cost of services with a PEF.

7.3. Roles and Responsibilities

While both the Department's and PEF's project managers have important roles in the negotiation process, there are other persons within the Department who have key roles in executing a Contract or estimating the cost and payment method for a Task Order. These roles and responsibilities are explained in more detail in Section 3 (Roles and Responsibilities) of the Department's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.

7.3.1. Responsibilities of the Technical Services Director

In accordance with the Department's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, the Technical Services Director has the following reponsibilities:

(a) Obtaining the approval of the Secretary of Transportation on award of professional and specialized services contracts and approving Contract executions; and Contract Supplements and amendments
(b) Approving emergency procurements
(c) Approving Sole Source Contract requests
(d) Ensuring the organizational capacity and resources exist to manage and administer the procurement of engineering and design related Consultant services

7.3.2. Responsibilities of the Professional Services Management Unit

The PSMU has a number of critical responsibilities that the Department's Project Manager should understand so that the process of retaining and managing a PEF is executed appropriately and smoothly. The Department's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts* covers in detail PSMU's responsibilities, but a summary is presented below:

(a) Preparing and maintaining written policies and procedures for the procurement, management, and administration of professional and specialized services, and ensuring its coordination and approval by the FHWA and adoption by the North Carolina Board of Transportation;
(b) Establishing a procedure for estimating the level of effort, schedule, and costs of needed consultant services and associated agency staffing and resources for management and oversight in support of project authorization requests submitted to FHWA for approval
(c) Procuring engineering and design related consultant services in accordance with applicable federal and state laws, regulations, and approved policies and procedures

(d) Soliciting Letters of Interest, qualifications, or proposals from prospective consultants
(e) Preventing, identifying, and mitigating conflicts of interest for employees of both the contracting agency and consultants and promptly disclosing in writing any potential conflict to NCDOT and FHWA, as applicable
(f) Negotiating contract modifications or Supplements
(g) Assessing administrative, contractual, or legal remedies in instances where consultants violate or breach contract terms and conditions, and providing for such sanctions and penalties as may be appropriate
(h) Providing support to the Department's Project Manager as required

7.3.3. Responsibility of the Department's Project Manager and Divisions

In accordance with the Department's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*, the Department's Project Manager, with the support of the geographical Divisions or Technical Services Units, is responsible for:

(a) Ensuring adequate staffing is available to serve in responsible charge of projects to monitor and administer Consultant services Contracts.
(b) Preparing scopes of work
(c) Preparing the in-house estimate
(d) Establishing elements of contract costs, validating indirect cost rate(s) for application to contracts, and assuring consultant compliance with federal cost principles
(e) Ensuring consultant costs billed are allowable in accordance with federal cost principles and consistent with the contract terms including the acceptability and progress of the consultant's work
(f) Monitoring the consultant's work and compliance with the terms, conditions, and specifications of the contract
(g) Evaluating and participating in decisions for contract modifications;
(h) Being familiar with the qualifications and responsibilities of the consultant's staff and evaluating any requested changes in key personnel
(i) Ensuring the correct usage of proposed subconsultants per the selected Firm's Letter of Interest
(j) Preparing a consultant's performance evaluation when services are completed and using and/or supplying such performance data to the PSMU for use in future evaluation and ranking of consultant(s) to provide similar services
(k) Closing-out contracts or purchase orders
(l) Retaining supporting programmatic and contract records
(m) Determining the extent to which the consultant responsible for the professional quality, technical accuracy, and coordination of services may be reasonably liable for costs resulting from error and omission in the work furnished under its contract
(n) Initiating, implementing, and terminating POs under LSCs

7.3.4. Responsibilities of the PEF

Some of the responsibilities of the PEF are:

(a) Accounting for costs appropriately and maintaining records. The records should, include supporting documentation that is adequate to demonstrate costs claimed have been incurred are allocable to the contract, and comply with federal cost principles
(b) Ensuring the correct usage of proposed subconsultants per the selected Firm's Letter of Interest
(c) Updating indirect cost rates on an annual basis in accordance with the consultant's annual accounting period and in compliance with federal cost principles
(d) Ensuring that prequalification information is updated in accordance with the requirements prescribed by NCDOT's prequalification requirements.

8. Management, Monitoring and Evaluation of Work

After a Contract has been executed, and a PEF has been contractually retained, an essential responsibility of the Department's Project Manager is to ensure that the Contract terms are being met by all signatories, including the NCDOT. A breach of the Contract terms by any party only leads to project delays and cost overruns that, with appropriate management of the Contract, can be avoided. As stated throughout this document, the first step for the Department to select the appropriate Contract type and payment method in accordance with the Department's needs. Selecting the appropriate Contract type and payment method enhances the ability of the Department's Project Manager to manage the contract and increases the legal and contractual leverage that the Department's Project Manager has over the PEF in the event the PEF is non-compliant.

When it comes to Contract management and monitoring, the Department's Project Manager's responsibilities are detailed in the Department's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*. Therefore, this document summarizes the Department's Project Manager's responsibilities when managing PEFs.

8.1. Contract Management and Monitoring

From the Department's perspective, the process of "Contract Management" is to ensure that all parties that have executed the contract are compliant with the Contract requirements. The non-compliance of one or more parties that have executed a contract may lead to dispute resolution and litigation, which, in turn, only causes unforeseen project delays and additional costs.

As mentioned throughout this document, the selection of a qualified PEF, the selection of the appropriate contractual structure and payment method and the development of a sound scope of work or services, reduce the risk of contractual disputes, however, such risk is not completely eliminated. The Department's Project Manager is always responsible for ensuring that the PEF is meeting not only the Department's expectations but is also in compliance with the Contract requirements.

8.2. Earned Value Management

One tool that the Department's Project Manager can employ in the monitoring of a Contract is Earned Value Analysis and Management, in which the Department's Project Manager compares the amount of work produced by the PEF against the project schedule and contractual budget.

In the case of Contracts that utilize Lump Sum as a payment method, an easy way to determine the earned value of the project is to compare the deliverables submitted against the project schedule proposed by the PEF and/or the Department, and the budget remaining for that particular project.

In the case of Contracts that utilize the Cost-Plus payment method, the Department's Project Manager may elect to compare the PEF's monthly or weekly burn rate against the total budget for the project divided by the contract term.

8.3. Payment

If the PEF is not in compliance with the Contract terms, the Department may withhold payment of the invoice detailing the amount of work in question until such items have been clarified. Depending on the Contract terms, if it is determined that the PEF is not in compliance with the Contract, the Department may be under no obligation to pay the invoice for such work until such time when the PEF has satisfactorily completed the work in accordance with the Contract.

Appendix A

Acronyms and Definitions

Acronym	Definition
CFR	means Code of Federal Regulations.
CoC	means Cost of Capital.
CPA	means Certified Public Accountant.
FAR	means Federal Acquisition Regulations.
FCCM	means Facilities Capital Cost of Money.
FHWA	means the Federal Highway Administration.
FTE	means Full Time Equivalent.
GESC	means General Engineering Services Consultant.
LSA	means Limited Services Agreement.
LSC	means Limited Services Contract.
NCDOT	means the North Carolina Department of Transportation.
NTP	means Notice to Proceed.
PEF or PEFs	means Professional Engineering Firm(s).
PSMU	means the Professional Services Management Unit.
SME	means Subject Matter Expert.
STIP	means the State Transportation Improvement Program.

Term	Definition
Amendment	Has the meaning set forth in Section 5.6 (Contract Amendments and Supplements) of this document.
Consultant	Has the meaning set forth in Section 2 (Professional Engineering Firms) of this document.
Consulting Firm	Has the meaning set forth in Section 2 (Professional Engineering Firms) of this document.
Contract	Has the meaning set forth in Section 5 (Contract Types and Applicability) of this document.
Contract Management	Has the meaning set forth in Section 8.1 (Contract Management and Monitoring) of this document.
Cost of Capital	Has the meaning set forth in Section 2.1.5 (Cost of Capital) of this document.
Cost per Unit of Work	Has the meaning set forth in Section 6.3 (Other Payment Methods) of this document.
Cost-Plus	Has the meaning set forth in Section 6.2 (Cost-Plus) of this document.
Department	Means the North Carolina Department of Transportation.
Direct Labor Costs	Has the meaning set forth in Section 2.1.1 (Direct Labor Costs) of this document.
Direct Non-Salary Costs	Has the meaning set forth in Section 2.1.6 (Direct Non-Salary Costs) of this document.
Division	An administrative geographical region under the Division of Highways of the North Carolina Department of Transportation.
Expenses	Has the meaning set forth in Section 2.1.6 (Direct Non-Salary Costs) of this document.
Facilities Capital Cost of Money	Has the meaning set forth in Section 2.1.5 (Cost of Capital) of this document.
Facilities Cost of Capital	Has the meaning set forth in Section 2.1.5 (Cost of Capital) of this document.
Federal Acquisition Regulations	Means the version of the Federal Acquisition Regulations as codified in 48 CFR 1 of the United States, adopted by the State of North Carolina.

Fee Base	Has the meaning set forth in Section 2.1.3 (Fee Base) of this document.
General Engineering Services Consultant	Has the meaning ascribed to the term in Section 3.2 (General Engineering Services Consultant) of this document.
Limited NTP	Has the meaning ascribed to it in Section 5.7 (Notice to Proceed) of this document.
Limited Services Agreement	Has the meaning set forth in Section 5.3 (Limited Services Contract or Limited Services Agreement) of this document.
Limited Services Contract	Has the meaning set forth in Section 5.3 (Limited Services Contract or Limited Services Agreement) of this document.
Lump Sum	Has the meaning set forth in Section 6.1 (Lump Sum) of this document.
Mandays	Means a measure of time on job by one person within eight (8) hours.
Multiphase Contract	Has the meaning set forth in Section 5.2 (Multiphase Contracts) of this document.
Not to Exceed	Has the meaning set forth in Section 6.2 (Cost-Plus) of this document.
Notice to Proceed	Has the meaning set forth in Section 5.7 (Notice to Proceed) of this document.
On-call Contract	Has the definition set forth in Section 5.3 (Limited Services Contract or Limited Services Agreement) of this document.
Overhead	Has the meaning set forth in Section 2.1.2 (Overhead) of this document.
Payment Method	Has the meaning set forth in Section 6 (Contract Payment Methods) of this document.
Prime Consultant	Has the meaning ascribed to the term in Section 3.3.1 (Prime Consultant versus Subconsultant).
Production Firms	Has the meaning set forth in Section 3.1 (Production Firm) of this document.
Professional Engineering Firm	Has the meaning set forth in Section 2 (Professional Engineering Firms) of this document.
Professional or Specialized Services	Has the meaning set forth in the 2016 NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts.*

Professional Services Management Unit	Has the meaning set forth in the 2016 NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.
Profit	Has the meaning set forth in Section 2.1.3 (Profit) of this document.
Project Manager	Has the meaning set forth in the 2016 NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.
Project-Specific Contract	Has the meaning set forth in Section 5.1 (Project-Specific Contract) of this document.
Purchase Order	Has the meaning set forth in Section 5.5 (Contract versus Purchase Orders) of this document.
Quality-Based Selection	Has the meaning set forth in the 2016 NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.
Revenue	Has the meaning ascribed it this term in Section 2.1.3 (Fee Base) of this document.
Scope Creep	Has the meaning set forth in Section 6.1.2(a) of this document.
Sole Source Contracts	Has the meaning set forth in the 2016 NCDOT's *Policies and Procedures for Procurement and Administration of Major Professional or Specialized Services Contracts*.
Specific Rates of Compensation	Has the meaning set forth in Section 6.3 (Other Payment Methods) of this document.
State	Means the State of North Carolina.
Subconsultants	Has the meaning set forth in Section 3.3.1 (Prime Consultant versus Subconsultant) of this document.
Subject Matter Experts	An expert in a particular technical field or industry.
Supplements	Has the meaning set forth in Section 5.6 (Contract Amendments and Supplements) of this document.
Task Order	Has the meaning set forth in Section 5.4 (Contracts, Task Orders and Purchase Orders) of this document.
Technical Services Units	Administrative, discipline-specific units under the supervision of the Director of Technical Services of the Division of Highways of the North Carolina Department of Transportation.

Unit Price	Has the meaning set forth in Section 6.3 (Other Payment Methods) of this document.