SCOPE DOCUMENT

FOR

IDFS, INC., 6.7 BILLION

SYNCHRONIZATION AND POWER PROJECTS

IN

TEXAS URBAN TRIANGLE

SCOPE OF THE WORK

PART ONE: PREAMBLE AND OUTLINE

1. **INTRODUCTION:** The preliminary **Scope Document or Statement** is the listing of the tasks to be done to the required quantity, quality, and variety, in the time and with the resources available and agreed upon, and the modification of those variable constraints by dynamic flexible juggling in the event of changed circumstance called as scope creep.

   This section of the Documentation will consist of the outline of the preliminary **Scope Statement** of the whole project. **Scope statements** can take many forms depending on the type of project being implemented and the nature of the organization. This preliminary scope statement will include details of the project deliverables and describes the major objectives of the overall project.

   This portion of the document will also include a preliminary, but more detailed, outline of the scope of **Phase One** of the **IDFS, INC.** power project. This section will also include some of the scope of the **Green/Sustainable** portions of the Power Project to be built in Matagorda County, Texas.

   Phase One is the creation of an Independent Power Production Company in the State of Texas and the licensing, construction and startup of a 560-600 MWe, Combined Cycle Power plant to be located in the vicinity of Bay City, Matagorda County, Texas.

2. **SUSTAINABILITY:** The **Green/Sustainable** portions of the project shall consist of the following:
   - Design, permit and build one 100 MWe Solar Farms in South Texas on the same property as the Combined-cycle power plant.
   - Design, permit and build one 100 MWe Wind Farms in South Texas on the same property as the Combined-cycle power plant.
   - Developing a synchronization and phase balancing technology to allow more wind and solar energy on the Texas Grid.
   - Research and development of new **carbon Sequestration technologies**
     a. Conversion of Carbon dioxide into syngas using the **Fischer-Trope** process.
     b. Conversion of Carbon Dioxide into limestone

3. **OUTLINE:** This **Scope Document** will be formatted in several parts which will include:

PART TWO: OVERALL SCOPE

1. **Project Definition (Overall)**
   a. **Independent Power Producer**
   b. **Renewable Component of the project.**
   c. **Grid synchronization and installation of FACTS Controllers**
2. **Project Owner, sponsors and major Stakeholders**
3. **Mission Statement**
4. **Code of Conduct**
5. **Feasibility Study** (Pre funding portion)

6. **Project Plan:** Project Plan can include any of the following Plans. These plans will be provided when requested by any of the **Stakeholders.**
    a. **Change Management Plan**
    b. **Communication Management Plan**
    c. **Cost Management Plan**
    d. **Procurement Management Plan**
    e. **Project Scope Management Plan**
    f. **Schedule Management Plan**
    g. **Quality Management Plan**
    h. **Risk Management Plan**
    i. **HR/Staffing Management Plan**
7. **Manuals**
    a. **Design Manuals**
        - **Power Plant Design Manual**
        - **Substation Design Manual**
        - **High Voltage Transmission Line Design Manual**
        - **Land Development Design Manual**
        - **Utilities Design Manual**
    b. **Operations Manual**
    c. **Construction Specifications**
8. **Corporate Entities** required for the successful delivery of the overall project.
9. **Bay City Corporate and Project Mobilization**
    - **Economic Development Zone in Matagorda County**
    - **First power plant project control**
    - **Research and Development Center**
10. **Computers and IT Infrastructure**
    a. **Computers**
    b. **Computer networks**
        - **Local Area Networks (LAN)**
        - **Fiber Optic Synchronization Network**
    c. **Servers**
    d. **Databases**
    e. **Content Management System**
    f. **SCADA (Supervisory Control and Data Acquisition)**
11. **Manpower Organization**
    A. **Manpower Staffing and Administration Program**
    B. **Manpower Training Program**

1. **Wharton Community College**
2. **Lone Star College System**

C. **Ethics, Six Sigma and Total quality Management**
   1. **Ethics**
   2. **Six Sigma**
   3. **Capability Maturity Modeling Integration (CMMI)**
   4. **Total Quality Management**

12. **Public Awareness, Education and Communication**

13. **Covid-19 Monitoring and Content Management System**: to include medical records of all our employees, vendors and strategic partners on the construction side of the project**.**

14. **Scope of the: BIM (Building Information Management), Secure networking for IT, security, Software,**

15. **Scope of LEED Components**

16. **Grid synchronization and installation of FACTS Controllers**

PART THREE: SCOPE OF FIRST DESIGN-BUILD PROJECT

PART TWO: OVERALL SCOPE

1. **Project Definition: IDFS, Inc.,** a Texas Corporation, wholly owned by the Senior Engineer of **AscenTrust,** is the Corporate Entity which will be registered with the **Public Utility Commission** of the State of Texas. We are seeking funding in the amount of **$2,000,000,000.00 (Two Billion Dollars American).** The preliminary **Scope** will be outlined below:
   - **a. Independent Power Production Facility:** The first phase of the project shall consist of the Engineering, Procurement, Construction and start-up of two **FRAME-7FA,** 171 MWe, natural gas fired turbine combined with a single heat recovery unit (**HRSG**) for a combined production of 560-640 MWe of power to be tied to the grid in the vicinity of the **South Texas Nuclear Power Plant.** All of the project documentation, procedures, specifications, contracts and design manuals for this facility will be re-usable in all sites. We intend to build the first facility as a prototype which can be used to create a power production facility.
   - **b. Renewable Component of the overall project:**
     - Design, permit and build one 100 MWe Solar Farms in South Texas on the same property as the Combined-cycle power plant.
     - Design, permit and build one 100 MWe Wind Farms in South Texas on the same property as the Combined-cycle power plant.
     - Developing a synchronization and phase balancing technology to allow more wind and solar energy on the Texas Grid.
   - **c. Grid synchronization and installation of FACTS Controllers:** The grid synchronization portion of the project shall consist of the Engineering, Procurement, Construction and installation of a **fiber-optic** communication network interconnecting all of our production facilities with the central dispatch center in **Bay City.** The fiber network will be used to carry the valuable **SCADA** information and control to our monitoring and dispatch center. It should be understood that our dispatch center has to co-ordinate with **ERCOT** for access to the **Texas Urban Triangle** portion of the Grid.

2. **Project Owner and EPC Engineering contractor**
   The corporate entity for which this feasibility study is being prepared is **International Diversified Financial Services, Inc. IDFS, Inc.** will be the single point of ownership for all the Corporate Entities outlined in this document. It will also be the single point of contact of the project with the **Funding Entity.**

   The Business planning, Feasibility study, Scope Documents, Front-End Engineering and Design, Project Management, contract Management and construction Management will be provided by **AscenTrust, LLc.**

3. **Mission Statement:** The mission Statement for this project will be outline presently as we move forward on the production and elucidation of the **Feasibility Study.**
   - **a.** The Mission Statement needs to include **Economic Development zone** for R&D research for frequency stability etc.

b. The Mission Statement needs to include eliminating coal-fired power plants in the state of Texas.

c. The Mission Statement needs to include language about Security and monitoring for the **Covid-19 Virus.**

4. **Code of Conduct:** A preliminary code of conduct has been developed for the employees, vendors and strategic partners of **IDFS, Inc.** This code of Conduct is attached to this document as **Appendix C.**

5. **Feasibility Study:** The **Feasibility Study will consist of the following Sections:**

SECTION ONE: NOTICE TO INVESTORS

This section will be used to provide mandatory disclosures to the **Funding Entity.** The Funding Entity should make their own investigations and evaluations of the merits and risks involved in this proposed **Energy Project.**

SECTION TWO: EXECUTIVE SUMMARY

This section will contain the **Executive Summary** of the first phase of our Texas Energy Project. **IDFS, INC.** is seeking funding in the amount of **$2,000,000,000.00 (Two Billion Dollars American)** for a total energy production of 800 MWe on a single piece of Property in Matagorda County, Texas.

SECTION THREE: NEEDS ANALYSIS

This section of the **Feasibility Study** will provide the background required The answer to the question (**Why does the Texas Triangle need another Combined-Cycle Power Plant?)** will be formulated first in this feasibility study. The urgent need for additional electrical power production will obviate our need for a detailed marketing plan. Instead we will present the plan which is already in motion to allow **IDFS, INC.** to create an **Independent Power Producer**

This section of the document will begin with a close look at the **Demographics** of the State of Texas and in particular the demographics of The Texas Triangle. The Texas Triangle is composed of the Dallas-Fort Worth Metroplex at the northern tip; Houston at the southeast corner; and Austin-San Antonio at the southwest corner.

The needs analysis will then consider the Energy demands and the growth rate of this demand in the Texas Urban Triangle of Texas. From this growth rate we will see that the Texas Triangle will require an additional two gigawatts of electrical production in the next two years. This requirement does not include any additional requirements from the closure of any operating coal-fired electrical production facilities.

SECTION FOUR: SCOPE DOCUMENT

This section of the document is the **Scope** Document.

SECTION FIVE: STRATEGIC PARTNERS (Utilities)

This section will provide a synopsis of the major Utilities involved in the production and distribution of electrical power in the **Texas Urban Triangle** of the State of Texas. These Utilities will become important to **IDFS** as it acquires access to the grid and becomes a qualified supplier of electricity to the Grid. The Grid in Texas is controlled by **ERCOT** and the **Public Utility Commission** of the State of Texas.

SECTION SIX: REGULATORY AGENCIES WITH JURESDICTION

This section will be used to identify the regulatory Agencies which have Jurisdiction over our projects in the **Texas Urban Triangle** of the State of Texas.

SECTION SEVEN: STANDARDS ORGANIZATION AND STANDARDS TO BE USED

This section will be used to identify the major standards organization which will be mentioned in any of the specific documentation concerning the licensing, project management and construction of these various power production facilities.

SECTION EIGHT: TECHNICAL FEASIBILITY (FRONT END ENGINEERING AND DESIGN)

This section will be used to outline the structure of phase one of the total project: The 560-600 MWe power plant in Matagorda County, Texas

- **A.** System Layout (Turbine-generator physical layout)
- **B.** System Layout (Electrical One-line diagram)
- **C.** System Layout (Computer system, Servers, SCADA system, Security Systems and Corona Virus Mitigation via temperature monitoring.
- **D.** Environmental Report
- **E.** Storm Water Pollution Prevention Plan
- **F.** Site Development Permit
- **G.** Construction Permitting
- **H.** Application to become an **Independent Power Producer** in Texas
- **I.** Application for a Grid Upgrade Survey
- **J.** Application for Environmental Permit for Power Plant.
- **K.** Site and Building Site Survey.
- **L.** Equipment Selection
- **M.** Utility Design
- **N.** Building Plans
- **O.** Application to become our own Utility District (Water and Sewer)
- **P.** Application to Connect to the Existing Natural Gas Pipeline

SECTION NINE: TECHNICAL FEASIBILITY (CONSTRUCTION)

This section will be used to outline the components of the physical construction and to address the Environmental and regulatory risks involved in a power project in Texas. Some of the basic items to be included in this section are:

- **A.** Civil Work.
- **B.** Foundations and underpinning
- **C.** Structural Steel
- **D.** Mechanical Systems
- **E.** Electrical Systems
    - a. Upgrade transmission line to STPP Highline
    - b. Build Substation at new Power Plant
    - c. Underground electrical System from Power Plant to Substation
    - d. All commercial and industrial wiring required

F. SCADA Systems (Supervisory Control and Data Acquisition)

G. Water and Sewer Systems

H. Natural Gas Pipeline Interconnect

I. Safety and Environmental Considerations

J. Regulatory Approvals and clearances required to connect to **ERCOT**

K. Application for a Grid Upgrade Survey

L. Preliminary Construction Disbursement Schedule

SECTION TEN: PROJECT MANAGEMENT STRUCTURE OF PROJECT

This section will outline the Project Management structure of the total project within the Corporate boundary. There are two distinct part to the Corporate and Project Management relationships between **IDFS, INC.** and **AscenTrust, LLC.** This section will also provide an outline of the structural relationships between the project Corporate Entities and the regulatory entities of the State of Texas.

SECTION ELEVEN: CORPORATE STRUCTURE AND TEAM FOR IDFS,INC.

This section will be used to outline the Corporate team structure of the total project within the Corporate and regulatory boundaries.

SECTION TWELVE: RESPONSIBILITIES OF ASCENTRUST, LLC.

This section will be used to outline the overall responsibilities of **AscenTrust.** The Engineering staff and Consultants of **AscenTrust** are responsible for the production of this **Feasibility Study** and will manage all aspects of the project initiation which will involve the acquisition of properties, **FEED** (Front End Engineering and Design), licensing and regulatory issues.

SECTION THIRTEEN: MANPOWER REQUIREMENTS

This section will address the overall manpower requirements and the methodology to be used to access the expertise required to bring the multiplicity of projects to a successful end.

SECTION FOURTEEN: FINACIAL DATA AND EXIT STRATEGY

This section will include a summary of the financial data which will be attached to this feasibility study, in **Appendix-Six** of the attached **Appendix.**

SECTION FIFTEEN: APPENDIX

This section is actually an attachment to the **Feasibility Study** but it is included with the document because it contains all the supporting documents required to make our case in the text of the document.

6. **Project Plan:** The **project plan** is a formal, approved document used to guide both **project execution** and **project control.** The primary uses of the project plan are to document planning assumptions and decisions, facilitate communication among *project stakeholders*, and document approved scope, cost, and schedule *baselines*

The latest edition of the PMBOK (Project Management Book of Knowledge) uses the term *project charter* to refer to the contract that the project sponsor and project manager use to agree on the initial vision of the project (scope, baseline, resources, objectives, etc.) at a high level. In the PMI methodology described in the PMBOK v5, the project charter and the project management plan are the two most important documents for describing a project during the initiation and planning phases.

AscenTrust, LLc. will creates the **project management plan** following input from the project manager of **IDFS, Inc.** team and key project stakeholders. The plan should be agreed and approved by at least the project team and its key stakeholders.

Plan contents: To be a complete project plan according to industry standards such as the PMBOK or PRINCE2, the project plan must also describe the execution, management and control of the project. This information can be provided by referencing other documents that will be produced, such as a procurement plan or construction plan, or it may be detailed in the project plan itself.

The project plan typically covers topics used in the project execution system and includes the following main aspects:

- Scope management
- Requirements management
- Schedule management
- Financial management
- Quality management
- Resource management
- Stakeholder management
- Communications management
- Project change management
- Risk management

In addition to the creation of a complete project plan according to industry standards for each of the production facilities the project plan shall include at a minimum the following specialized plans:

- Change Management Plan
- Communication Management Plan
- Cost Management Plan
- Procurement Management Plan
- Project Scope Management Plan
- Schedule Management Plan
- Quality Management Plan
- Risk Management Plan
- HR/Staffing Management Plan

7. Manuals

a. Design Manuals: A **Design Manual** is a plan or specification for the construction of an object or system or for the implementation of an activity or process, or the result of that plan or specification in the form of a prototype, product or process. The design manual has to provide a set of guidelines and provide boundaries in the form of goals and constraints. The design Manual shall take into account aesthetic, functional, economic, environmental and socio-political considerations. The following is a list of the most important **Design Manuals** which will be incorporated into this **Feasibility Study** as a separate attachment

- Power Plant Design Manual
  - ❖ Combined-Cycle, Natural Gas fired Power Plant Design Manual
  - ❖ Solar Farm Design Manual
  - ❖ Wind Farm Design Manual
- Substation Design Manual
- High Voltage Transmission Line Design Manual
- Land Development Design Manual
- Utilities Design Manual

b. Operational Manual: The **operations manual** is the documentation by which an organization provides guidance for members and employees to perform their functions correctly and reasonably efficiently. It documents the approved standard procedures for performing operations safely to produce goods and provide services. Compliance with the operations manual will generally be considered as activity approved by the persons legally responsible for the organization.

The operations manual is intended to remind employees of how to do their job. The manual is either a book or folder of printed documents containing the standard operating procedures, a description of the organizational hierarchy, contact details for key personnel and emergency procedures. It does not substitute for training, but should be sufficient to allow a trained and competent person to adapt to the organization's specific procedures.[4]

The operations manual helps the members of the organization to reliably and efficiently carry out their tasks with consistent results. A good manual will reduce human error and inform everyone precisely what they need to do, who they are responsible to and who they are responsible for. It is a knowledge base for the organization, and should be available for reference whenever needed. The operations manual is a document that should be periodically reviewed and updated whenever appropriate to ensure that it remains current.

Contents: Content will vary depending on the organization, but some basic structure is fairly universal. Typical sections include:

- Organizational hierarchy
- Job descriptions
- Contact details
- Documented processes and systems
- Occupational health and safety instructions
- Emergency procedures
- Company History
- Products & Services
- Policies and position statements

There are two basic categories of information: Information that is relevant to all people in the organization, and often also to clients and the general public, and information that is relevant to specific positions.

There may be statutory or regulatory requirements for specific content. In some cases the CEO may be required to authorize the operations manual by signature, and this authorization may be required to be present in the document. A version number and date of commencement may be required, and it may be a controlled document.

8. **Corporate Entities** required for the successful delivery of the overall project.
   - **A. Existing Corporations**
     - **a. IDFS, INC.**
     - **b. AscenTrust, LLC.**
   - **B. Corporate Entities (Required)**
     - **a. Synchronization System Corporation**
     - **b. SCADA systems Corporation**
     - **c. IT Systems Corporation**
     - **d. Software Systems Corporation**
     - **e. Security and first responders Corporation**
     - **f. Manpower Corporation**
     - **g. Insurance Corporation**
     - **h. Corona Virus and monitoring Corporation**

9. **BAY CITY CORPORATE OFFICE AND PROJECT MOBILIZATION**
   The Primary Corporate Office of **IDFS, Inc.** will be headquartered in the Bay City **Wharton Community College** building shown below.

Bay City and the surrounding areas of Matagorda County are targeted for the first **Combined-cycle Power Plant** and the Global Corporate Office of **IDFS, INC.**

- The Company will design and build an Annex to the existing Wharton Community College to train the employees of the Power Plant and the Molten Metal Syngas production facility.
- The created Corporations will all be resident of the Corporate Office located in the Bay City Wharton Community College Building
- The Company will provide temporary housing for the construction of the Power Plant and the Syngas facilities.
- The company will develop an **Economic Development Plan** with the Bay City official for the re-invigoration of Matagorda County. This project will include downtown redevelopment of Bay City as well as the construction of a substantial number of new homes to accommodate the influx of trained individuals to operate the Research and Development projects and the Power Plant.
- Matagorda County is designated as an **Opportunity Zone:**

  An **Opportunity Zone** is a designation and investment program created by the Tax Cuts and Jobs Act of 2017 allowing for certain investments in lower income areas to have tax advantages. The purpose of this program is to put capital to work that would otherwise be locked up due to the asset holder's unwillingness to trigger a capital gains tax.

  To qualify, the Opportunity Fund must invest more than 90% of its assets in a Qualified Opportunity Zone Property located in an Opportunity Zone. The property must be significantly improved, which means it must be an original use, or the basis of the property must be double the basis of the non-land assets. Capital gain taxes are deferred for investments reinvested into investments in these zones and, if the investment is held for ten years, all capital gains on the new investment are waived. Opportunity zones are census tracts designated by state authorities.

10. COMPUTERS, SERVERS, DATABASES AND IT-INFRASTRUCTURE

a. Computers

A **computer** is a machine that can be instructed to carry out sequences of arithmetic or logical operations automatically via computer programming. Modern computers have the ability to follow generalized sets of operations, called *programs.* These programs enable computers to perform an extremely wide range of tasks. A "complete" computer including the hardware, the operating system (main software), and peripheral equipment required and used for "full" operation can be referred to as a **computer system**.

Computers are used as control systems for a wide variety of industrial and consumer devices. This includes simple special purpose devices like microwave ovens and remote controls, factory devices such as industrial robots and computer-aided design, and also general purpose devices like personal computers and mobile devices such as smartphones. The Internet is run on computers and it connects hundreds of millions of other computers and their users.

The first digital electronic calculating machines were developed during World War II. The first semiconductor transistors in the late 1940s were followed by the silicon-based MOSFET (MOS transistor) and monolithic integrated circuit (IC) chip technologies in the late 1950s, leading to the microprocessor and the microcomputer revolution in the 1970s. The speed, power and versatility of computers have been increasing dramatically ever since then, with MOS transistor counts increasing at a rapid pace (as predicted by Moore's law), leading to the Digital Revolution during the late 20th to early 21st centuries.

Conventionally, a modern computer consists of at least one processing element, typically a central processing unit (CPU) in the form of a metal-oxide-semiconductor (MOS) microprocessor, along with some type of computer memory, typically MOS semiconductor memory chips. The processing element carries out arithmetic and logical operations, and a sequencing and control unit can change the order of operations in response to stored information. Peripheral devices include input devices (keyboards, mice, joystick, etc.), output devices (monitor screens, printers, etc.), and input/output devices that perform both functions (e.g., the 2000s-era touchscreen). Peripheral devices allow information to be retrieved from an external source and they enable the result of operations to be saved and retrieved.

b. Computer Networks: A **computer network** is a group of computers that use a set of common communication protocols over digital interconnections for the purpose of sharing resources located on or provided by the network nodes. The interconnections between nodes are formed from a broad spectrum of telecommunication network technologies, based on physically wired, optical, and wireless radio-frequency methods that may be arranged in a variety of network topologies.

The nodes of a computer network may be classified by many means as personal computers, servers, networking hardware, or general-purpose hosts. They are identified by hostnames and network addresses. Hostnames serve as memorable labels for the nodes, rarely changed after initial assignment. Network addresses serve for locating and identifying the nodes by communication protocols such as the Internet Protocol.

Computer networks may be classified by many criteria, for example, the transmission medium used to carry signals, bandwidth, communications protocols to organize network traffic, the network size, the topology, traffic control mechanism, and organizational intent.

Computer networks support many applications and services, such as access to the World Wide Web, digital video, digital audio, shared use of application and storage servers, printers, and fax machines, and use of email and instant messaging applications.

- **Local Area Network**

  A **local area network** (**LAN**) is a computer network that interconnects computers within a limited area such as a residence, school, laboratory, university campus or office building.[1] By contrast, a wide area network (WAN) not only covers a larger geographic distance, but also generally involves leased telecommunication circuits.

  Ethernet and Wi-Fi are the two most common technologies in use for local area networks.

- **Fiber Optic Synchronization Network**

  Fiber-optic communication is a method of transmitting information from one place to another by sending pulses of infrared light[1] through an optical fiber. The light is a form of carrier wave that is modulated to carry information.[2] Fiber is preferred over electrical cabling when high bandwidth, long distance, or immunity to electromagnetic interference is required.[3] This type of communication can transmit voice, video, and telemetry through local area networks or across long distances.[4]

Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and cable television signals. Researchers at Bell Labs have reached internet speeds of over 100 petabit × kilometer per second using fiber-optic communication.[5]

Optical fiber is used by telecommunications companies to transmit telephone signals, Internet communication and cable television signals. It is also used in other industries, including medical, defense, government, industrial and commercial. In addition to serving the purposes of telecommunications, it is used as light guides, for imaging tools, lasers, hydrophones for seismic waves, SONAR, and as sensors to measure pressure and temperature.

Due to lower attenuation and interference, optical fiber has advantages over copper wire in long-distance, high-bandwidth applications. However, infrastructure development within cities is relatively difficult and time-consuming, and fiber-optic systems can be complex and expensive to install and operate. Due to these difficulties, early fiber-optic communication systems were primarily installed in long-distance applications, where they can be used to their full transmission capacity, offsetting the increased cost. The prices of fiber-optic communications have dropped considerably since 2000.

The price for rolling out fiber to homes has currently become more cost-effective than that of rolling out a copper-based network. Prices have dropped to $850 per subscriber in the US and lower in countries like The Netherlands, where digging costs are low and housing density is high.

Since 1990, when optical-amplification systems became commercially available, the telecommunications industry has laid a vast network of intercity and transoceanic fiber communication lines. By 2002, an intercontinental network of 250,000 km of submarine communications cable with a capacity of 2.56 Tb/s was completed, and although specific network capacities are privileged information, telecommunications investment reports indicate that network capacity has increased dramatically since 2004.

c. **Servers:** In computing, a **server** is a piece of computer hardware or software (computer program) that provides functionality for other programs or devices, called "clients". This architecture is called the client–server model. Servers can provide various functionalities, often called "services", such as sharing data or resources among multiple clients, or performing computation for a client. A single server can serve multiple clients, and a single client can use multiple servers. A client process may run on the same device or may connect over a network to a server on a different device.[1] Typical servers are database servers, file servers, mail servers, print servers, web servers, game servers, and application servers.

Client–server systems are today most frequently implemented by (and often identified with) the request–response model: a client sends a request to the server, which performs some action and sends a response back to the client, typically with a result or acknowledgment. Designating a computer as "server-class hardware" implies that it is specialized for running servers on it. This often implies that it is more powerful and reliable than standard personal computers, but alternatively, large computing clusters may be composed of many relatively simple, replaceable server components.

d. Databases: A **database** is an organized collection of data, generally stored and accessed electronically from a computer system. Where databases are more complex they are often developed using formal design and modeling techniques.

The database management system (DBMS) is the software that interacts with end users, applications, and the database itself to capture and analyze the data. The DBMS software additionally encompasses the core facilities provided to administer the database. The sum total of the database, the DBMS and the associated applications can be referred to as a "database system". Often the term "database" is also used to loosely refer to any of the DBMS, the database system or an application associated with the database.

Computer scientists may classify database-management systems according to the database models that they support. Relational databases became dominant in the 1980s. These model data as rows and columns in a series of tables, and the vast majority use SQL for writing and querying data. In the 2000s, non-relational databases became popular, referred to as NoSQL because they use different query languages.

e. Content Management System: The creation and maintenance of the Content management system for the **IDFS** Project is one of its most critical components. We intend the content management system to reside on a Linux cluster powered by Dell Server Blades. The **User Interface (UI)** to be used will be a Free Software Foundation **Integrated Software Development (IDE)** environment created by **IBM** in the late nineties called **Eclipse.** Eclipse is a Java powered IDE which is easily extended. Eclipse has been extended to develop code in Fortran, Ada and Lisp. The secure portions of the system will ultimately be carried on optical fiber only without the use of **TCP/IP.**

The content management system, the Project information, the Project Documentation and the CAD files will all be generated under the corporate name of **Advanced Software Development, Inc., (ASD).**

ASD will also develop the Web sites and the communication infrastructure between the various vendors, Manufacturing facilities, Turbineers and Scientists. The protocol for electronic communications between vendors will be XML. We are not going to be interfacing with X25 and the old EDI transaction sets.

f. SCADA/ FACTS Controllers

1. **Supervisory control and data acquisition** (**SCADA**) is a control system architecture comprising computers, networked data communications and graphical user interfaces (GUI) for high-level process supervisory management, while also comprising other peripheral

devices like programmable logic controllers (PLC) and discrete proportional-integral-derivative (PID) controllers to interface with process plant or machinery. The use of SCADA has been considered also for management and operations of project-driven-process in construction.

2. A **flexible alternating current transmission system** (**FACTS**) is a system composed of static equipment used for the alternating current (AC) transmission of electrical energy. It is meant to enhance controllability and increase power transfer capability of the network. It is generally a power electronics-based system.

   FACTS is defined by the Institute of Electrical and Electronics Turbineers (IEEE) as "a power electronic based system and other static equipment that provide control of one or more AC transmission system parameters to enhance controllability and increase power transfer capability".

   According to Siemens, "FACTS Increase the reliability of AC grids and reduce power delivery costs. They improve transmission quality and efficiency of power transmission by supplying inductive or reactive power to grid.

11. MANPOWER ORGANIZATION

A. **Manpower Staffing and Administration Program:** In order to create a manpower system which we will be able to use for the global reach of the **IDFS** Project we will need to set in place a comprehensive manpower staffing and Administration Corporation. We are presently considering the creation of a joint-Venture to provide the framework for the staffing company which would be able to supply us with the manpower and technical expertise to ensure the success of our Energy Production Project.

B. **Manpower Training Program:** The following is an abbreviated list of the Junior Colleges and Universities which have agreed in principle to partner up with us to provide the Technical training and Academic Training which will be required to staff the manpower required to launch the **IDFS, Inc. Energy Project** whose epicenter will be in the Texas Triangle area of Texas.

   1. **Wharton Junior College:** is a public community college with its main campus in Wharton, Texas. The college also has campuses in Richmond, Sugar Land, and Bay City. WCJC is accredited by the Southern Association of Colleges and Schools (SACS).

      WCJC is a comprehensive community college offering a wide range of postsecondary educational programs and services including associate degrees, certificates, and continuing-education courses. WCJC prepares students for a broad understanding of the liberal arts in order for students transferring to baccalaureate degree-granting institutions.

   2. **Lone Star College System:** is made up of five comprehensive community campuses located throughout the North Houston metro area of Texas serving 1,400 square miles in Harris and Montgomery Counties.

      - Lone Star College-CyFair
      - Lone Star College-Kingwood

- Lone Star College-Montgomery
- Lone Star College-North Harris
- Lone Star College-Tomball (This College will move to the newly acquired campus. This new campus is the old Corporate headquarters for Conpac Computers which is now a part of Hewlett-Packert.

C. **Ethic, Six Sigma and Total Quality Management:** The downfall of the initial attempt at creating energy with the use of Nuclear Energy was the lack of a comprehensive system of ethical requirement through the industry, a total lack of trust between the stakeholders and finally a total lack of transparency. Because Nuclear power production arose out of the programs inaugurated by the Nuclear navy Department of Defense, it became by nature very secretive and proprietary. This compartmentalization led to the accident at Three Mile island.

1. **Ethics:** The lack of ethics in our modern business world is striking. We believe that it is possible to develop a business model for the **IDFS** Project which is based on the long-range goals of the global community and does not involve any motivation attached to personal gain. Every individual or corporation involved with the **IDFS** Project will be required to sign the ethics document which can be obtained from the Senior Turbineer.
2. **Six Sigma:** A business management strategy, initially implemented by Motorola, that today enjoys widespread application in many sectors of industry. Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and variation in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization ("Black Belts" etc.) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified financial targets (cost reduction or profit increase). For a more detailed look at Six Sigma and it's integration into the **IDFS** Project contact the Senior Turbineer.
3. **Capability Maturity Models Integration (CMMI)** is a process improvement approach that provides organizations with the essential elements of effective processes. It can be used to guide process improvement across a project, a division, or an entire organization. CMMI helps integrate traditionally separate organizational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes.
4. **Total Quality Management** Holistic approach to long-term success that views continuous improvement in all aspects of an organization as a journey and not as a short-term destination. It aims to radically transform the organization through progressive changes in the attitudes, practices, structures, and systems. TQM transcends the 'product quality' approach, involves everyone in the organization, and encompasses its every function administration, communications, distribution, manufacturing, marketing, planning, training,

etc. Coined by the US Naval Air Systems Command in early 1980s, this term has now taken on several meanings and includes

a. Commitment and direct involvement of highest-level executives in setting quality goals and policies, allocation of resources, and monitoring of results,

b. Realization that transforming an organization means fundamental changes in basic beliefs and practices and that this transformation is everyone's job

c. Building quality into products and practices right from the beginning doing things right the first time

d. Understanding of the changing needs of the internal and external customers, and stakeholders, and satisfying them in a cost effective manner

e. Instituting leadership in place of mere supervision so that every individual performs in the best possible manner to improve quality and productivity, thereby continually reducing total cost

f. Eliminating barriers between people and departments so that they work as teams to achieve common objectives

g. Instituting flexible programs for training and education, and providing meaningful measures of performance that guide the self-improvement efforts of everyone involved

12. Public Awareness, Education and Communication

One of the biggest issues facing the Electrical Production Industry is **Global Warming.** Mitigation or elimination of CO_2 from our production facilities is one of our chief goal. We will be creating an independent department within the **Global Sustainability Alliance, Inc.** which will provide information to the public about proposed **Carbon-Capture Technologies.** The broad scope of this information, education and communication department will be:

- Plan, manage, create and implement communications supporting the building of the prototype **IDFS** in Matagorda County. Strategy includes coordinated advertising and community outreach; creation of educational informational and other communications materials; campaign to sustain and strengthen existing strong community support; and efforts to proactively neutralize the substantial opposition anticipated.
- Develop Public Awareness of the ongoing **LEED** certification program being inaugurated for our Prototype Combine-Cycle, Solar and Wind Integration Project in South East Texas.
- Designed and developed public access web site for **IDFS, INC.** and related Corporate Entities Provide user-friendly approach to Web-site navigation.
- Develop guidelines for online crisis communications.
- Manage crisis communications. Meet with executives, and write and control all external and internal communications.
- Hosted video crews, reporters and official delegations (regularly, for U.S. State Department) from Japan, Australia, Russia, plus NASA and other U.S. agencies.

- Developed corporate brochure, pamphlets, fact sheets, backgrounders and other publications and presentations.

13. SCOPE OF EMPLOYEE COVID-19 MITIGATION PLAN

A. Introduction: Part of managing an infectious disease outbreak is trying to delay and decrease the epidemic peak, known as flattening the epidemic curve. This decreases the risk of health services being overwhelmed and provides more time for vaccines and treatments to be developed. Non-pharmaceutical interventions that may manage the outbreak include personal preventive measures such as hand hygiene, wearing face masks, and self-quarantine; community measures aimed at physical distancing such as closing schools and cancelling mass gathering events; community engagement to encourage acceptance and participation in such interventions; as well as environmental measures such surface cleaning.

Simulations for Great Britain and the United States show that mitigation (slowing but not stopping epidemic spread) and suppression (reversing epidemic growth) have major challenges. Optimal mitigation policies might reduce peak healthcare demand by two-thirds and deaths by half, but still result in hundreds of thousands of deaths and overwhelmed health systems. Suppression can be preferred but needs to be maintained for as long as the virus is circulating in the human population (or until a vaccine becomes available), as transmission otherwise quickly rebounds when measures are relaxed. Until now, the evidence for public health (nonpharmaceutical) interventions such as social distancing, school closure, and case isolation comes mainly from epidemiological compartmental models and, in particular, agent-based models (ABMs). Such models have been criticized for being based on simplifying and unrealistic assumptions. Still, they can be useful in informing decisions regarding mitigation and suppression measures in cases when ABMs are accurately calibrated Long-term intervention to suppress the pandemic has considerable social and economic costs.

In August 2020, a working paper by the National Bureau of Economic Research (NBER) questioned major effects of many mitigation and suppression measures. The authors compared the development of casualties connected to SARS-CoV-2 until July 2020, in 25 US states and 23 countries that had counted more than 1.000 overall deaths each. From the date a state passed a threshold of 25 deaths, the statistical study observed a largely uniform development, independently from type and time frame of governmental interactions. Thus, the growth rate of casualties dropped to zero within 20–30 days, and the variability between regions was low, except at the beginning of the epidemics. The authors computed the effective reproduction number R_{eff} with the aid of different models like the SIR model, and found it hovering around one everywhere after the first 30 days of the epidemic. Hence, they did not find evidence for an influence of lockdowns, travel restrictions or quarantines on virus transmission. For contradicting studies, they assume an omitted variable bias. Candidates for ignored effects could be voluntary social distancing, the structure of social interaction networks (some people contact more networks faster than others), and a natural tendency of an epidemics to spread quickly at first and slow down, which has been observed in former Influenza pandemics, but not yet completely understood. The reviewer Stephen C. Miller concludes “that human interaction does not conform to simple epidemiological models”

B. Contact tracing

a. Introduction: Contact tracing is an important method for health authorities to determine the source of infection and to prevent further transmission. The use of location data from mobile phones by governments for this purpose has prompted privacy concerns, with Amnesty International and more than a hundred other organizations issuing a statement calling for limits on this kind of surveillance.

Several mobile apps have been implemented or proposed for voluntary use, and as of 7 April 2020 more than a dozen expert groups were working on privacy-friendly solutions such as using Bluetooth to log a user's proximity to other cellphones. (Users are alerted if they have been near someone who subsequently tests positive.)

On 10 April 2020, Google and Apple jointly announced an initiative for privacy-preserving contact tracing based on Bluetooth technology and cryptography.[17][18] The system is intended to allow governments to create official privacy-preserving coronavirus tracking apps, with the eventual goal of integration of this functionality directly into the iOS and Android mobile platforms. In Europe and in the U.S., Palantir Technologies is also providing COVID-19 tracking services.

In public health, **contact tracing** is the process of identification of persons who may have come into contact with an infected person ("contacts") and subsequent collection of further information about these contacts. By tracing the contacts of infected individuals, testing them for infection, isolating or treating the infected and tracing their contacts in turn, public health aims to reduce infections in the population. Diseases for which contact tracing is commonly performed include tuberculosis, vaccine-preventable infections like measles, sexually transmitted infections (including HIV), blood-borne infections, Ebola, some serious bacterial infections, and novel virus infections (e.g. SARS-CoV, H1N1, and SARS-CoV-2). The goals of contact tracing are:

- To interrupt ongoing transmission and reduce the spread of an infection
- To alert contacts to the possibility of infection and offer preventive services or prophylactic care
- To offer diagnosis, counseling and treatment to already infected individuals
- If the infection is treatable, to help prevent reinfection of the originally infected patient
- To learn about the epidemiology of a disease in a particular population

Contact tracing has been a pillar of communicable disease control in public health for decades. The eradication of smallpox, for example, was achieved not by universal immunization, but by exhaustive contact tracing to find all infected persons.[1] This was followed by isolation of infected individuals and immunization of the surrounding community and contacts at-risk of contracting smallpox.

In cases of diseases of uncertain infectious potential, contact tracing is also sometimes performed to learn about disease characteristics, including infectiousness. Contact tracing is not always the most efficient method of addressing infectious disease. In areas of high disease prevalence, screening or focused testing may be more cost-effective.

Partner notification, also called partner care, is a subset of contact tracing aimed specifically at informing sexual partners of an infected person and addressing their health needs.

Contact tracing generally involves the following steps:

- An individual is identified as having a communicable disease (often called the *index case*). This case may be reported to public health or managed by the primary health care provider.
- The index case is interviewed to learn about their movements, whom they have been in close contact with or who their sexual partners have been.
- Depending on the disease and the context of the infection, family members, health care providers, and anyone else who may have knowledge of the case's contacts may also be interviewed.
- Once contacts are identified, public health workers contact them to offer counseling, screening, prophylaxis, and/or treatment.
- Contacts may be isolated (e.g. required to remain at home) or excluded (e.g. prohibited from attending a particular location, like a school) if deemed necessary for disease control.
- If contacts are not individually identifiable (e.g. members of the public who attended the same location), broader communications may be issued, like media advisories.

Although contact tracing can be enhanced by letting patients provide information, medication, and referrals to their contacts, evidence demonstrates that direct public health involvement in notification is most effective.

b. Technology

1. **Case management:** Case management software is often used by contact tracers to maintain records of cases and contact tracing activities. This is typically a cloud database that may have specialized features such as the ability to use SMS or email directly within the software to notify people believed to have been in close contact with someone carrying an infectious disease.

2. **Mobile phones:** Smartphones can provide proximity information useful for contact tracing using GPS, Bluetooth or Wifi signals. Facebook Labs patented the use of Bluetooth on smartphones for this in 2018. On 10 April 2020, Apple and Google, who account for most of the world's mobile operating systems, announced COVID-19 apps for iOS and Android. Relying on Bluetooth Low Energy (BLE) wireless radio signals for

proximity information, the new tools would warn people that they had been in contact with who are infected by SARS-CoV-2.

3. **Protocols:** Various protocols, such as Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT), Whisper Tracing Protocol, Decentralized Privacy-Preserving Proximity Tracing (DP-PPT/DP-3T), TCN Protocol, Contact Event Numbers (CEN), Privacy Sensitive Protocols And Mechanisms for Mobile Contact Tracing (PACT) and others, are being discussed to preserve user privacy.

   The DP-3T and TCN protocols are currently used by Switzerland, Austria, Estonia, Finland, and Italy. While the UK, France, Australia, New Zealand, and Singapore use PEPP-PT or BlueTrace based systems.

14. SCOPE OF BIM (Building Information Management System)

A. Definition: ISO 19650:2019 defines BIM as:

Use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions.

The US National Building Information Model Standard Project Committee has the following definition:

Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.

B. Introduction:

Traditional building design was largely reliant upon two-dimensional technical drawings (plans, elevations, sections, etc). Building information modeling extends the three primary spatial dimensions (width, height and depth), incorporating information about time (so-called 4D BIM),[32] cost (5D BIM),[33] asset management, sustainability, etc. BIM therefore covers more than just geometry. It also covers spatial relationships, geospatial information, quantities and properties of building components (for example, manufacturers' details), and enables a wide range of collaborative processes relating to the built asset from initial planning through to construction and then throughout its operational life.

BIM authoring tools present a design as combinations of "objects" – vague and undefined, generic or product-specific, solid shapes or void-space oriented (like the shape of a room), that carry their geometry, relations, and attributes. BIM applications allow extraction of different views from a building model for drawing production and other uses. These different views are automatically consistent, being based on a single definition of each object instance. BIM software also defines objects parametrically; that is, the objects are defined as parameters and relations to other objects so that if a related object is amended, dependent ones will automatically also change. Each model element can carry attributes for selecting and ordering them automatically, providing cost estimates as well as material tracking and ordering.

For the professionals involved in a project, BIM enables a virtual information model to be shared by the design team (architects, landscape architects, surveyors, civil, structural and building services Engineers, etc.), the main contractor and subcontractors, and the owner/operator. Each professional adds discipline-specific data to the shared model - commonly, a 'federated' model which combines several different disciplines' models into one. Combining models enables visualization of all models in a single environment, better coordination and development of designs, enhanced clash avoidance and detection, and improved time and cost decision-making.

C. Usage throughout the project life-cycle

Use of BIM goes beyond the planning and design phase of the project, extending throughout the building life cycle. The supporting processes of building lifecycle management includes cost management, construction management, project management, facility operation and application in green building.

D. Management of building information models: Building information models span the whole concept-to-occupation time-span. To ensure efficient management of information processes throughout this span, a BIM manager (also sometimes defined as a virtual design-to-construction, VDC, project manager – VDCPM) might be appointed. The BIM manager is retained by a design build team on the client's behalf from the pre-design phase onwards to develop and to track the object-oriented BIM against predicted and measured performance objectives, supporting multi-disciplinary building information models that drive analysis, schedules, take-off and logistics. Companies are also now considering developing BIMs in various levels of detail, since depending on the application of BIM, more or less detail is needed, and there is varying modeling effort associated with generating building information models at different levels of detail.

E. BIM in construction management: Participants in the building process are constantly challenged to deliver successful projects despite tight budgets, limited manpower, accelerated schedules, and limited or conflicting information. The significant disciplines such as architectural, structural and MEP designs should be well-coordinated, as two things can't take place at the same place and time. BIM additionally is able to aid in collision detection, identifying the exact location of discrepancies.

The BIM concept envisages virtual construction of a facility prior to its actual physical construction, in order to reduce uncertainty, improve safety, work out problems, and simulate and analyze potential impacts.[39] Sub-contractors from every trade can input critical information into the model before beginning construction, with opportunities to pre-fabricate or pre-assemble some systems off-site. Waste can be minimized on-site and products delivered on a just-in-time basis rather than being stock-piled on-site.

Quantities and shared properties of materials can be extracted easily. Scopes of work can be isolated and defined. Systems, assemblies and sequences can be shown in a relative scale with the entire facility or group of facilities. BIM also prevents errors by enabling conflict or 'clash detection' whereby the computer model visually highlights to the team where parts of the building (e.g.:structural frame and building services pipes or ducts) may wrongly intersect.

BIM in facility operation: BIM can bridge the information loss associated with handling a project from design team, to construction team and to building owner/operator, by allowing each group to add to and reference back to all information they acquire during their period of contribution to the BIM model. This can yield benefits to the facility owner or operator.

Dynamic information about the building, such as sensor measurements and control signals from the building systems, can also be incorporated within BIM software to support analysis of building operation and maintenance.

There have been attempts at creating information models for older, pre-existing facilities. Approaches include referencing key metrics such as the Facility Condition Index (FCI), or using 3D laser-scanning surveys and photogrammetry techniques (both separately or in combination) to capture accurate measurements of the asset that can be used as the basis for a model. Trying to model a building constructed in, say 1927, requires numerous assumptions about design standards, building codes, construction methods, materials, etc., and is, therefore, more complex than building a model during design.

One of the challenges to the proper maintenance and management of existing facilities is understanding how BIM can be utilized to support a holistic understanding and implementation of building management practices and “cost of ownership” principles that support the full product lifecycle of a building. An American National Standard entitled *APPA 1000 – Total Cost of Ownership for Facilities Asset Management* incorporates BIM to factor in a variety of critical requirements and costs over the life-cycle of the building, including but not limited to: replacement of energy, utility, and safety systems; continual maintenance of the building exterior and interior and replacement of materials; updates to design and functionality; and recapitalization costs.

15. SCOPE OF LEED: Leadership in Energy and Environmental Design

A. Definition: The LEED green building certification system is the foremost program for the design, construction and operation of green buildings. The U.S. Green Building Council’s LEED rating system is the preeminent program for the design, construction and operation of green buildings. 35,000 projects are currently participating in the LEED system, comprising over 4.5 billion square feet of construction space.

B. Scope for Power Project: It is our intention to acquire **LEED** Certification for our **IDFS** Prototype project and the associated manufacturing facilities. This certification, plus a large public awareness program will go a long way towards our goal to make the public aware of the direct pathway to a sustainable and green energy future.

16. SCOPE OF: Grid synchronization and FACTS Controllers

A. Definitions:

a. Synchronization: In an alternating current electric power system, **synchronization** is the process of matching the speed and frequency of a generator or other source to a running network. An AC generator cannot deliver power to an electrical grid unless it is running at the same frequency as the network. If two segments of a grid are disconnected, they cannot exchange AC power again until they are brought back into exact synchronization. An AC generator must match both the amplitude and the timing of the network voltage, which requires both speed and excitation to be systematically controlled for synchronization.

b. FACTS Controllers: FACTS is defined by the Institute of Electrical and Electronics Turbineers (IEEE) as "a power electronic based system and other static equipment that provide control of one or more AC transmission system parameters to enhance controllability and increase power transfer capability".

B. Synchronization

a. Conditions: There are five conditions that must be met before the synchronization process takes place. The source (generator or sub-network) must have equal line voltage, frequency, phase sequence, phase angle, and waveform to that of the system to which it is being synchronized..

Waveform and phase sequence are fixed by the construction of the generator and its connections to the system. During installation of a generator, careful checks are made to ensure the generator terminals and all control wiring is correct so that the order of phases (phase sequence) matches the system. Connecting a generator with the wrong phase sequence will result in a short circuit as the system voltages are opposite to those of the generator terminal voltages.

The voltage, frequency and phase angle must be controlled each time a generator is to be connected to a grid.

Generating units for connection to a power grid have an inherent droop speed control that allows them to share load proportional to their rating. Some generator units, especially in isolated systems, operate with isochronous frequency control, maintaining constant system frequency independent of load.

b. Process: The sequence of events is similar for manual or automatic synchronization. The generator is brought up to approximate synchronous speed by supplying more energy to its shaft - for example, opening the valves on a steam turbine, opening the gates on a hydraulic turbine, or increasing the fuel rack setting on a diesel turbine. The field of the generator is energized and the voltage at the terminals of the generator is observed and compared with the system. The voltage magnitude must be the same as the system voltage.

If one machine is slightly out of phase it will pull into step with the others but, if the phase difference is large, there will be heavy cross-currents which can cause voltage fluctuations and, in extreme cases, damage to the machines.

c. Scope of Synchronization: The scope of the synchronization portion of the project will have long range impact on the stability of the grid in the **Texas Urban Triangle** of Texas. The preliminary scope is to interconnect the two Nuclear Power production facilities in the Urban

Triangle via optical fiber. This will allow us to synchronize the two power production facilities to one part in 10^3.

C. FACTS Controllers:

a. Introduction: A **flexible alternating current transmission system** (**FACTS**) is a system composed of static equipment used for the alternating current (AC) transmission of electrical energy. It is meant to enhance controllability and increase power transfer capability of the network. It is generally a power electronics-based system.

FACTS is defined by the Institute of Electrical and Electronics Turbineers (IEEE) as "a power electronic based system and other static equipment that provide control of one or more AC transmission system parameters to enhance controllability and increase power transfer capability".

According to Siemens, "FACTS Increase the reliability of AC grids and reduce power delivery costs. They improve transmission quality and efficiency of power transmission by supplying inductive or reactive power to grid.

b. Shunt compensation: In shunt compensation, power system is connected in shunt (parallel) with the FACTS. It works as a controllable current source. Shunt compensation is of two types:

1. **Shunt capacitive compensation:** This method is used to improve the power factor. Whenever an inductive load is connected to the transmission line, power factor lags because of lagging load current. To compensate, a shunt capacitor is connected which draws the current leading the source voltage. The net result is improvement in power factor.
2. **Shunt inductive compensation**: This method is used either when charging the transmission line, or, when there is very low load at the receiving end. Due to very low, or no load & nbsp;– very low current flows through the transmission line. Shunt capacitance in the transmission line causes voltage amplification (Ferranti effect). The receiving end voltage may become double the sending end voltage (generally in case of very long transmission lines). To compensate, shunt inductors are connected across the transmission line. The power transfer capability is thereby increased depending upon the power equation

PART THREE: SCOPE OF FIRST DESIGN-BUILD PROJECT

SUB-PART ONE: GENERAL

1. International Diversified Financial Systems (IDFS) will sign a Design-Build Power Plant Building and Facilities from a contractor and/or professional consulting and Engineering firm with experience in Design (including Architectural & Engineering) and Build (constructing) Diesel Generating Power Plants and related facilities. The New Power Plant Building and related facilities will be situated next to the old Bay City Power Plant location as designated by the land area outlined in the map and diagrams in the Exhibits section.
2. The selected EPC Contractor will develop detailed design from a pre-designed conceptual

layout of 23 MW diesel turbine power plant building which consists of seven (7) each GE16V250GSU Diesel generators & all associated auxiliary equipments, two (2) each, black start generators, 480V, 13.2 kV switchgears, distribution to feeders of 13.2 kV power grid system with a centralized control room and related facilities for the smooth operation of the plant. All local and federal required Permits for Design and Construction of the 23 MW Power Plant and its ancillary structures, cable trenches/runs between the power plant and the existing distribution grid for underground transmission, and distribution lines must be complied with and be included. The Generator, Switchgear, and Auxiliary equipment information and layout will be provided to the EPC contractor.

3. The selected EPC Contractor will construct the Bay City Power Plant Electrical Earth/Ground Grid System as per design specification for Generators, Switchgear & Auxiliaries as listed in Exhibit 7 page 4.

4. The proposed design for construction will have detailed layouts, descriptions, project schedule and costs estimates. The proposed plan will address location, size, parking, landscape, utilities, ingress and egress within the Bay City Power Plant IDFS Compound as related to the new building.

5. The Design and Build Contractor will survey, design and perform any required construction for the best cable route and layout for duct work, conduit runs, and cable runs to interconnect with the Bay City Power plant with the Bay City Medium Voltage and Low Voltage substation, and distribution grid system for all 13.2 kV Feeders.

6. The selected Design and Build Contractor will be responsible for the final detail architectural design & Engineering of the New Power Plant Building, Facility and Facility grounds to include Bulk Fuel Storage Tanks, Waste Liquid Storage Tanks, runoff water separator, etc. If required by IDFS, the Design and Build Contractor shall prepare all bid documents for the purpose of issuing the request for bid for the construction of the New Power Plant Building. All Engineering & design, selected materials and equipment are required to be submitted to IDFS project manager for final approval before actual construction.

7. The selected Design and Build Contractor will be tasked with coordinating all work with the IDFS Project Manager, and work with IDFS technical team, Generators & Switchgear supply contractor for timely completion of project as per standard best work practices with the Building Construction Contractor. The scheduled timeline for this project is part of the evaluation criteria.

8. The selected Design and Build Contractor will design the new Power Plant Building to include Noise Attenuation for the surrounding residential area. Noise level must be 65 dB or lower, measured at 10 meters from the corners of the power plant. Other design criteria should also be applied to further reduce the noise level of the plant from the residential homes nearby, such as trees/plants or other natural or man made barriers.

9. The new power plant and entire power plant facility shall include security & boundary fencing, security guard post, and security lighting.

SUB-PART TWO: SCOPE OF WORK FOR NEW POWER PLANT BUILDING

1. The EPC Contractor will be required to design the new power plant building on the proposed IDFS Bay City site, outside of the VE Zone in accordance with the map in Exhibit 2.
2. The EPC Contractor will be required to plan and design the new Bay City power plant to meet the most current industrial and local building codes as well as regulations established by Federal and local government (See page 23, Section II, Code and Design Criteria). The Bay City Power Plant design must meet all required environmental regulations and local permits.
3. The EPC Contractor shall perform the required work for site survey, soil testing, Geotech and site mapping.
4. The EPC Contractor will prepare a site layout and building design for the new Power Plant building and facility as shown in the layout provided in Exhibit 3 and Exhibit 7, page 3 for the Generators, Switchgear & Auxiliaries.
5. The Building will be designed to withstand wind loads up to 150 mph , and accommodate all the generating units, switchgears, auxiliaries, operator controller room, support staff facility, integrated with fuel, lube oil and other ancillary components, fixed overhead crane for maintenance of generators, and connections to support utilities such as water, wastewater and station service.
6. The EPC Contractor shall design the new building per Equipment Contractor's (EC) conceptual design with some modification per IDFS requirements. The EPC Contractor will design building layout with EC's recommended spacing and equipment layout, to house the following major equipment components:
   - Seven (7) 3.5MW, 13.2kV, 60Hz Generators
   - Two (2) 500 kW, 480 V, 60Hz Emergency Generators
   - Electrical Maintenance Overhead Crane – 10 Ton
   - 34.5KV & 13.2 kV and 480V Switchgear
   - Motor Control Centers (MCC) for each Generator
   - Earth Resistors, DC Supply and Battery system and other auxiliaries
   - Other components as required for the Generators, Switchgear & Auxiliaries in conceptual drawings in Exhibit 3
7. The new Power Plant Building shall incorporate energy efficient designs and plans for electric, water and waste water utilities with out sacrificing the artistic design of the building.
8. Apart from the Generator Bay, the new Power Plant Building shall be designed into two story or floors for the control room, offices, workshops, restrooms, etc. with a basement or Ground floor for cable room for all cable runs. All offices, meeting rooms and kitchen shall be fully furnished with appropriate furnishing and appliances – desks, chairs, sinks, refrigerator, etc. The New Power Plant building floors shall be designed to accommodate the following minimum requirements (EPC contractor may also propose alternate design that is equivalent or better than IDFS's requirement – to be approved by IDFS):

A. Ground Floor or Basement: Cabling room for HV/MV/LV; Control; LAN/FIBER & SCADA; Telephone etc.

B. First Floor:

- **a.** Turbine Room: Seven (7) –GEV16250GSU, 3.5MW, 13.2 kV Gensets with generator LCPs
  - Two (2) Cummins, 500 kW, 480 V Emergency Gensets Overhead Crane – 10 tons
  - MCC Panels/CB
  - Air ventilation and circulation system for proper cooling of the power plant (ventilation intake openings should be elevated as part of flood proofing)
  - Flood proofing doorways and entry ways – entire plant building will be designed to withstand flooding and water inundation of turbine room and vital equipment rooms
  - All Entrance/Exit ways should be water tight when closed in case of flooding, but also allow for containment of any spills within the power plant
- **b.** Switchgear Room - located next to the Turbine floor
  - 480V Switchgear/CB
  - 13.2 kV Switchgear/CB
  - 34.5 kV Switchgear/CB
  - Auxiliaries – MCC boards, Battery chargers, Environmental Control (Air conditioning and dehumidifiers) AC, DC panels.
  - Battery Room
- **c.** Restroom Lockers and Showers- located next to the Turbine floor
- **d.** Maintenance crew room (Electrical and Mechanics) - located next to the Turbine floor
- **e.** Material Storage/Warehouse & Tool Room - located next to the Turbine floor

B. Second Floor:

- **a.** Operator Control Room
- **b.** Office Room – Mgr/Supervisor
- **c.** Meeting Room
- **d.** Rest Room
- **e.** Kitchen
- **f.** Public Entrance/Reception Area

C. Generator Bay viewing platform/cat walk with stairway to first floor

D. For general lighting inside and outside, the latest energy efficient lighting shall be used (for example: LED lightings)

E. Air-conditioning for the Control Room and High/Low Voltage Switchgear Room

F. Security surveillance control & monitoring with back up power supply located inside the Operator control room to monitor the entire facility

G. Building and entire facility will be located near the ocean, therefore it must be designed to withstand corrosion and tropical climate

H. Fire detection, Fire suppression system or sprinkler system and emergency exit doors
I. Americans with Disability Act (ADA) compliance where required
J. Rain water harvesting system with adequate storage tank(s) from roof drainage of the building that serves a second purpose of minimizing any runoff within the compound
K. The Operator Controller room shall have windows to allow view of the entire turbine bay. A viewing platform along the length of the second floor with stairs shall also be included outside the controller room. The Noise level inside the control room and offices shall not exceed 55dB.
L. Floors shall have adequate space to accommodate moving of desks and equipment between the first and second floor (wide & tall doorways for control room and other critical operational space).
M. A roof platform with railings with easy access for roof and ventilation maintenance.

SUB-PART THREE: FACILITIES PLAN LAYOUT

The successful EPC Contractor will also design and provide a compound plan layout and location for other support facilities for the new Power Plant Project activities to include but not limited to the following:

1. Two (2) each, 50,000 Gallon Bulk Storage Fuel Tank system with Off-loading Refueling Rack Facility; to include mass flow fuel metering, fuel management system, valves, pipe work, spill prevention, fire fighting & detection system, and all associated equipment and materials.
2. Waterlines and Wastewater Installations, including back up Water Storage Tank system for turbine cooling water, and Sludge & Waste Oil Storage Tanks with spill prevention (containment structure)
3. Station services transformers – located outside of the Power plant building; to include containment to prevent oil spills
4. Perimeter Concrete & Rock Wall
5. Oil & Water Separator System for treatment of all run-off water from power plant grounds (USEPA and US Coast Guard compliant). The new Power Plant Building and power plant grounds should have adequate containment in case of oil or fuel leak inside the power plant facility.
6. Design the Layout and install for the entire compound the lighting electrical system
7. Re-route Existing Drainage System and Construct Drainage system where required
8. Internal/External Drainage System for Fuel and Oil Spill Prevention and Runoff
9. Fuel and Lube Oil Storage & Secondary Containment Facilities
10. Parking Space with handicap parking, Security Building, and Machine Shop
11. Drainage shall be designed and constructed properly to avoid flooding of power plant building during heavy rain storms. Building foundation should be high enough to prevent flooding from

runoff and heavy rains

SUB-PART FOUR: GENERATION EQUIPMENT, SWITCHGEAR, AND AUXILIARIES

1. The Successful EPC Contractor will be coordinating the New Power Plant building Design with the Equipment Contractor (EC) for the new Bay City power plant.
2. The Successful EPC Contractor will work with the EC group for any needed civil structure detail layout for the design of the generator foundation and any other required equipment foundation.
3. The Successful EPC Contractor will assist and work with the IDFS technical Staff to completely address all schedules and plans for completion of the tasks which are specified in EC's scope of work (SOW) for the Base Load Generators, Switchgear & Auxiliaries specifications as required by IDFS.

SUB-PART FIVE: DETAIL ARCHITECTURE AND DESIGN

1. The EPC Contractor shall arrange and conduct a series of meetings with the IDFS technical team during the scope design phase of the project to fully understand the specific project elements and to define the basic requirements for each of the project scope elements.
2. The EPC Contractor and IDFS shall arrange and conduct a series of meeting with the contractor for the Generator, Switchgear & Auxiliaries layout and installation.
3. The EPC Contractor shall be required to develop a comprehensive set of safe and constructible plans and specifications for the construction of the Project. The EPC Contractor is required to ensure that these are in full compliance with all Federal, State and the IDFS codes, regulations and ordinances. The EPC Contractor shall be responsible for development of all details for any feature or function that is not covered by applicable standards. All design, construction materials and its specification require pre-approval from IDFS before actual construction.
4. The design and construction of this project is to be achieved in the shortest time period, at the most economical cost, and with minimal disruption to IDFS daily operation and minimal inconvenience to IDFS customers. Therefore, all work during design and construction must be staged so as to maintain IDFS operation and minimize traffic impacts and disruptions to the surrounding areas. The EPC Contractor shall develop staging and phasing plans which will ensure that the construction can be accomplished in this manner.
5. The EPC Contractor shall be responsible for developing constructible contract documents that are sufficiently clear and complete, so that they can be easily interpreted and competitively bid out. The EPC Contractor shall anticipate the need to develop construction documents in accordance with local and federal law.
6. The EPC Contractor shall develop all necessary submissions as required by Federal and Local government, and IDFS. Submissions shall include, but not be limited to, sketch plans, phasing plans, zoning plans, and permit applications. Further, the EPC Contractor shall attend and participate in all meetings necessary to satisfy the Federal and Local governments and IDFS requirements.

7. The EPC Contractor is required to satisfy all Federal, Local, and IDFS ordinances, statutes and other stipulations. If required, the EPC Contractor shall obtain any and all approvals and/or obtain all zoning variances necessary to acquire approval from the relevant agency.

8. Whether or not it is expressly stated, the EPC Contractor shall be responsible for the performance of any work that is either incidental to, or a prerequisite for, any of the tasks or services identified herein. Furthermore, the EPC Contractor shall be responsible for performing tasks and services that may not be specifically identified herein, but are clearly included in the intent of this section. Wherever in this section a task is described, without specifically stating who is responsible for performing said task, it shall be implicit that the responsibility for the completion of the work is that of the EPC Contractor. Sub- Contractor may perform portions of the work subject to the conditions of this Contract with review and supervision by the EPC Contractor.

SUB-PART SIX: TASK PHASING

The work comprises distinctive design and construction phases as described below:

1. **PHASE 1: TURBINE ENGINERING & DESIGN**

   A. Collection of information and data (IDFS & EC; the Generator and Switchgear Supplier)
   B. Establishment of design requirements
   C. Design development
   D. Preparation and delivery of construction documents, inclusive of technical specifications and drawings.

   Phase 1 will include Scope Definition (30%), 45%, 90% and 100% design submittals and Bid Documents. The formal design submission review meeting(s) shall be held at a minimum of fifteen (15) calendar days after the design presentation meeting for the 45%, 90%, and 100% stage submittals.

   IDFS stresses the significance of the design review and discussion of the details presented during the 45% design submittal. The 45% design submittal provides the focal point for critical decision making with respect to the project budget and design direction. IDFS will “freeze” the design at the completion and acceptance of the 45% submittal, preventing any fundamental changes in the design unless directed and deemed necessary by IDFS. Changes in design beyond the 45% milestone shall be incorporated at no added cost should the design element revision in question be determined to be the result of errors or omissions.

2. **FURNISHED INFORMATION & DATA**

   A. References: The references listed below were used in compiling this Request for Proposal and are available for review. Additional information as it is available will be provided upon request.

   TOPOGRAPHIC MAP OF THE IDFS BAY CITY COMPOUND

   IDFS BAY CITY – LAND DEED/LEASE AGREEMENT BETWEEN IDFS AND THE ASG – FOR PERMITTING PROCESS

UTILITIES MAPS AND LAYOUTS – (ELECTRIC, SEWER, WATER.)

EXISTING FOOTING AND FOUNDATION DESIGN OF EXISTING FREEZER SLAB

EPA ASSESSMENT OF PROJECT SITE AND ADJACENT SITE

B. IDFS will provide the EPC Contractor with topographical map in electronic data format. IDFS will also conduct the route survey and provide ground elevations, coordinates, and related data required for preparation of the plan and profile design sheets for the facilities to be designed under this RFP.

C. IDFS can provide field survey work if requested by the EPC Contractor if more data is required for the project site.

3. ADMINISTRATION

A. The EPC Contractor shall provide administrative project management. Administration shall include, but is not limited to, quality control / quality assurance, design procedures and criteria, coordination of the design team and project elements, monitoring schedules, document control, submittal review, submitting of design deliverables, organizing and conducting progress meetings, monitoring the progress of work, and oversight of value Engineering implementation and construction estimates.

B. The EPC Contractor shall be expected to coordinate the documentation for all design disciplines; including that of the sub-contractors, so that the initial project research and the resulting contract documentation is complete, concise, and without omission, contradiction, or ambiguity.

4. SITE EVALUATION & INVESTIGATION

The EPC Contractor shall conduct all research and perform all investigations necessary to develop the design documents for the project. This shall include but not be limited to surveys, geotechnical research, hydraulic and hydrological studies, drainage investigations, environmental research, hazardous materials research and assessments of existing conditions.

A. EXISTING CONDITIONS

Comprehensive Code Review - The EPC Contractor shall research and identify all codes, requirements, guidelines and standards pertaining to the work for inclusion in the Design Manual. If requirements are unclear or contradictory, the EPC Contractor shall obtain clarifications from code enforcing bodies and the Equipment Contractor (EC). Existing Information Review - The EPC Contractor shall review all existing information. This effort shall be used to verify information regarding the site, and to augment or revise it as the existing conditions warrant.

B. IDFS EXISTING FACILITIES

- IDFS and EPC Contractor shall work together to locate and identify existing condition plan of all IDFS facilities, both above and below ground that are within the vicinity of the Project.

- These facilities shall include, but are not limited to power transmission lines and poles, power systems, waterline, sewer line, cable TV, and communications systems.
- This effort must also include details regarding proposed facilities, including types and locations.
- In addition, IDFS and the EPC Contractor shall work together to identify other utilities (Telecommunication & Cable TV) infrastructures/facilities that will require relocation or adjustment, temporary or permanent, for this project.

C. SURVEY REVIEW

IDFS shall provide a survey of the site with the following information:

- Conventional topographical field property survey that determines the condition, nature, dimensions, elevations, grades and locations of all necessary, existing natural and physical features and facilities within the limits of the proposed work or adjacent areas needed to address changes to the tract, signals, communication, and other systems.
- Boundary land survey, as required by local statutes and ordinances, for all parcels that are within a minimum of 500 feet of the limits (but not less than that required by governing entities) of the proposed work. All boundaries of the identified parcels have been verified through an independent title search.
- Surface and known subsurface features shown within the limits of the project area.

The survey control points have been performed by IDFS surveyors and Public Works surveyors with adequate details to establish horizontal and vertical control with offset ties for recovery and maintenance of all control points.

- The EPC Contractor will review and confirm that the surveys have been performed in adequate detail for their preparation of design documents.
- The EPC Contractor shall provide a fully dimensioned existing condition plan based on the survey. The plan must show all utilities, property boundaries, set back requirements, and other existing features accurately including, but not limited to, the location, size and type of all structures, roadways, and other salient features that are within the limits of the project and those features which may affect or be affected by the project including all aerial and underground utilities within ten (10) feet of the project limits.
- The EPC Contractor shall provide a list of potentially affected property and utilities including telephone, storm water drains, water and sewer, communication tower

5. INFRASTRUCTURE INVESTIGATION

The EPC Contractor shall be responsible for performing a detailed investigation of the infrastructure at and surrounding the project area. This infrastructure investigation shall include all items necessary to develop the design documents for the project. This effort shall include, but is not limited to, the following items:

A. Levels of Service: The EPC Contractor shall evaluate the level of service provided by other utility that will provide basic services to this facility. If the service is deemed to be inadequate for use in this building, the EPC Contractor must develop a design for providing adequate service levels to the facility. Any additional services shall be part of contractor responsibilities.

B. Oil & Water Separator System: The EPC Contractor shall investigate and identify all applicable regulatory requirements (e.g. USEPA and US Coast Guard compliant) for treatment of all run-off water from power plant grounds.

C. Storm water Management: The EPC Contractor will identify all applicable regulatory requirements and develop a Storm water run off Management Plan for the site.

D. Existing Storm Water: The EPC Contractor shall investigate the existing storm water drainage that will require relocation or adjustment, temporary or permanent for this project. The EPC Contractor shall identify if the Army Corp of Engineers 404 section 10 is required.

6. GEOTECHNICAL ANALYSIS

A. Subsurface Conditions: The Contractor shall investigate the subsurface conditions in the area of the project. Substantial effort must be made to minimize the potential for unforeseen conditions. This investigation shall study all affected areas, potentially including, but not limited to, platforms areas, foundations, yard areas and areas requiring slope stabilization. The subsurface investigations shall include digging test pits and/or taking soil borings in numbers and locations necessary to develop an accurate profile of the soil conditions in all areas where construction operation will take place and is appropriate for the planned work.

B. Soil Borings: The EPC Contractor shall conduct soil borings as required at the area of the proposed work. Test pits may be substituted where deep (four feet +/-1 or greater) foundations are not needed, (e.g., in areas to be paved only). The borings shall be developed to refusal depth, with approximately 33% to include rock sampling. Rock sampling shall be a minimum of 10 feet into rock. A minimum of 20 additional borings shall be taken at areas specified by the IDFS Project Manager and analyzed to provide data and to confirm assertions and assumptions regarding subsurface conditions. The borings delineated above are considered a minimum. If the EPC Contractor determines that it is in their best interest to further the quality of the design, i.e., that additional borings are required, they shall be provided.

C. Soil Boring Analysis: Soil borings are to be coordinated so as to provide samples for environmental evaluation and to expose such subsurface conditions for analysis.

D. Soils Report: The EPC Contractor shall provide a full conditions report on the subsurface conditions. The report shall identify subsurface soil layers, including soil type and pertinent soil properties for each layer, identify underground utility locations, including depth, as well as any other important subsurface locations and items. The report shall also include the soil boring logs and soil design criteria. The EPC Contractor shall provide a plan locating all soil borings. The drawing shall have the proposed foundation system projected on it as a reference overlay. The subsurface report, including geotechnical Engineering data and plot of the subsurface conditions shall be produced in paper and electronic forms suitable for review by IDFS PM and technical team and compatible with IDFS's current software.

7. ENVIRONMENTAL CLEARANCE

A. Environmental Site Assessment (ESA): The EPC Contractor has to commence a Phase 1 ESA. The EPC Contractor shall incorporate the "recommendations for further action" of the ESA in the final contract documents.

B. Environmental Assessment (EA): The EPC Contractor has to commence an Environmental Assessment including Section 106 of the National Historic Preservation Act.

The EPC Contractor shall address the findings of the EA in the final contract documents:

- **a. Subsoil Evaluation**: The EPC Contractor shall report the results of soil sampling, including sampling done in conjunction with structural soil borings, and incorporate necessary environmental remediation efforts into the final contract documents.
- **b. Permit Applications:** Applications for all applicable federal and local permits will be prepared and submitted to respective agencies upon determination of the appropriate action to pursue in order to satisfy NEPA requirements. The A/E pre-design plan shall provide sufficient and adequate environmental data for preparation of permit applications.
- **c. Compliance to Environmental Assessment:** The EPC Contractor must comply with all aspects of the EA.

SUB-PART SEVEN: SITE DEVELOPMENT

The EPC Contractor shall refine the master development plan and prepare detailed design drawings. The drawings shall include, but not be limited to, plans for the building, parking, pedestrian crossing, and other infrastructure improvements such as roadway and sidewalk improvements.

If additional data are required to meet and comply with the recommendations resulting from the Design Engineering efforts that were accepted by IDFS, the EPC Contractor shall conduct the surveys, studies, investigations, inspections, and research necessary to obtain this data and use it in modeling their design.

SUB-PART EIGHT: STRUCTURAL

Building - The EPC Contractor shall design a two-story building with office facilities for the ground floor and Power Plant main functions for the second floor.

Building Wall should be reinforced concrete, Doorways should be water tight, ventilation openings should be elevated, all pipe and ductwork entry into the plant building should be sealed to withstand water intrusion against flooding force from a tsunami wave or storm surge.

Architectural Site Plan - This plan will include the site area generally within the IDFS Bay City compound. The plan will show the proposed location of the Power Generation Building, the parking configuration, side walks, and surrounding roadway improvements.

Schematic Floor Plans - These drawings include the ground floor plan with all the IDFS requirements; ADA compliant bathroom, waiting area, new stairs, new ADA elevators (if required), etc. The drawings will also include schematic plans for upper levels that will be used for office space.

SUB-PART NINE: SCHEMATIC SECTIONS OF BUILDING STRUCTURE

Based on the results of the geotechnical investigation, the EPC Contractor shall review and compare alternative foundation systems for the building that will also meet the Turbine footprint and foundation requirement and Over Head (OH) crane requirement. The EPC Contractor shall develop cost comparisons for the alternatives. The advantages and disadvantages of each scheme must be noted with respect to construction cost, life cycle cost, constructability and future maintenance.

The EPC Contractor will be responsible for the design of retaining structures necessary to stabilize and support elements of the project.

The EPC Contractor will be responsible for the proper design structures necessary to support the overhead crane rated at 10 tons.

The EPC Contractor shall provide calculations in support of all elements of the building site design with regard to sizing, loads, volumes, area, flows, controls, consumption levels and capacities. All calculations shall reference the specific code, requirement or criteria that are the subject of the calculations.

1. Turbine Foundation - Design Consideration:

The foundation will have the required mass and base area, assuming installation on firm soil and the use of high quality concrete. Before final details of the foundation design are established by the designer, the bearing capacity and suitability of the soil on which the foundation will rest will be determined. Modification of the manufacturer's recommended foundation may be required to meet special requirements of local conditions. Modifications required may include:

A. Use of a reinforced mat under the regular foundation.

B. Support of the foundation on piles.

C. Piling may require bracing against horizontal displacement

D. The Adjustment of the mass.

E. Additional reinforcing steel.

F. The turbine foundation may extend below the footings of the building and the foundation will be completely isolated from the walls and floors of the building. The foundation block will be cast in a single, continuous pour. If a base mat is used, it will be cast in a separate continuous pour and be provided with vertical re-bars extending up into the foundation block.

G. Generator foundation shall be designed to avoid transfer of vibration to adjacent area (generator foundation is to be isolated from power plant floor).

b.

2. **Generator Bay Ventilation**

   A. Heat from the turbine is radiated to the surrounding air. It is essential that provision be made for removal of this heat. Turbine room temperature rise should be limited as much as possible.

   B. Contractor must provide in any calculations and design plans to provide adequate ventilation of the Generator Bay

   C. The selected design ventilation system should also help lower parasitic loads.

   D. Ventilation cool air shall be drawn in, and allow for natural air movement to force hot air out through vent openings in the roof. There shall be adequate ventilation openings with noise attenuation to allow hot/exhaust air out and to keep the ambient air inside the building cool

   E. Intake Ventilation shall be elevated or mounted on top – to avoid flooding from future storm surge or tsunami, and fresh air drawn in shall be ducted to bottom of turbine room

3. **ARCHITECTURAL**

   The EPC Contractor shall develop the architectural designs provided by their own Design Architect for the Building and parking. The design of the building, compound layout and parking must be consistent with the use of the building. The EPC Contractor shall incorporate changes as requested and approved by the IDFS Project Manager and technical team. The review and coordination process will apply for the design of all elements.

   The architectural design shall ensure that the spaces are sized properly, have appropriate correspondence and are suitably finished and conditioned for all users and programmed functions, including mechanical, electrical and building systems without sacrificing aesthetics and general appearance.

4. **ELECTRICAL**

   The EPC Contractor shall provide the necessary details for all electrical systems necessary for the proposed New Power Plant Building and illustrate all electrical spaces with full dimensions. Drawings will show the development of panels and circuits for all electrical systems. Electrical elements comprise all items associated with electrical service and distribution, including but is not limited to, conduits, telephone service, fire alarm systems, cable, emergency back-up power, radio and telephone communications, lighting, and CCTV and/or security systems.

   A. All electrical systems and distribution shall meet all applicable local, state, and federal codes, requirements and guidelines.

   B. All services shall be distributed from centrally located panels.

   C. Connections between systems designed by the EPC Contractor shall be specifically noted and detailed such that the systems are properly and fully integrated, fully functional as intended, with specific directions provided as to who is responsible for making the connections.

D. The lighting design must conform to IDFS standards. Lighting shall be provided with emergency back-up systems. The EPC Contractor shall incorporate an energy management system and Energy Efficient Design (LEED) components into the lighting design.

E. The Building Electrical system should be designed and linked to the Emergency Supply system provided in the EC Electrical switchgear.

F. The EPC Contractor shall ensure the Building Emergency Equipment and Critical electrical Load is connect to the EC's Emergency back up circuit on the Switchboard.

G. Emergency wiring for the emergency systems must be entirely independent of the wiring used for normal lightning and other circuits, also in separate ducts/cable trays, cables and boxes.

H. All of the New Power plant building Electrical wirings must be labeled and color coded.

I. Electrical wiring and cable material selection shall comply with the latest industrial standards.

5. ACCESSIBILITY

A. The EPC Contractor shall provide for ADA compliant access into and through the Building facility where ADA access is required.

B. For all ramps and platforms, the EPC Contractor shall be responsible for developing all related aspects of the design of these elements including, but not limited to, lighting, signage, warning strips, tactile edging, and railings.

6. MECHANICAL

A. The EPC Contractor shall design and prepare drawings, details, specifications and calculations for all mechanical systems for the Building.

B. Mechanical design shall include, but not be limited to, all items associated with the plumbing, water supply, waste water disposal, garage, storm/rain water collection, heating, air conditioning and ventilation.

C. The EPC Contractor shall prepare a Life Cycle Cost Analysis for major mechanical systems (e.g. heating, cooling, and ADA elevators if required).

7. DESIGN DOCUMENTATION

A. The EPC Contractor shall design the necessary elements and prepare complete and coordinated Engineering drawings, specifications and calculations for anything related to construction of the Power Plant Building and Facility.

B. The Power Plant Building and Facility is to be constructed in accordance with the latest standards and guidelines including any other supporting documents provided in the Existing Information, Data, Code & Design Criteria.

8. CONSTRUCTION DOCUMENTS

A. The EPC Contractor shall develop construction drawings to depict all the details, layout, configuration, notes, schedules, and dimensions necessary to enable accurate and reliable estimates of the quantities, quality, character, and costs of the labor, materials and equipment required to furnish and install the work in a skillful and well executed manner.

B. The EPC Contractor shall prepare the specifications to enable accurate and reliable estimates of the quantities, quality, character, and costs of the labor, materials and equipment required to furnish and install the work in a skillful and well executed manner.

C. The EPC Contractor shall prepare the final documents in electronic format, in addition, three (3) sets of hard copies and a copy in reproducible CD in word and PDF format shall be submitted to IDFS.

9. DESIGN MANUAL

A. The EPC Contractor shall document all codes, requirements, guidelines and standards pertaining to the work. If requirements are unclear or contradictory, the EPC Contractor shall obtain clarifications from code enforcing bodies.

B. The Design Manual shall incorporate approved resolutions to Value Engineering comments.

C. The Design Manual shall incorporate all prior comments and their resolutions, including documented references to correspondence, meeting minutes, telephone conferences, emails, memos or other documents supporting the resolution of the comments or specific directions in the Manual.

D. The Design Manual shall include the data and Engineering systems criteria for civil, architectural, structural, electrical, mechanical, communications and other Engineering disciplines, which may have a potential impact on the project.

E. In addition, this manual shall clearly, concisely and logically compile pertinent information regarding the size, capacity, layout, spacing, quantity, style, type, location, etc. for all material elements of the design, including structures, hardware, finishes, furnishings, amenities, graphics, signage, and specialty items.

F. The final approved Design Manual shall be considered the basis on which the EPC Contractor shall proceed with their final design efforts. Should the EPC Contractor not be able to progress their design or proceed in accordance with the information contained in the final approved Design Manual, the EPC Contractor shall bring the non- compliant issues to IDFS's attention for resolution. IDFS's decisions on these matters shall be final and binding on the EPC Contractor. Subsequent design work by the EPC Contractor shall be based on IDFS's decisions.

G. No requests for additional compensation by the EPC Contractor will be entertained by IDFS for items that either were not found or were not able to be completed based on the final approved Design Manual.

10. AGENCY COORDINATION & PERMITTING

A. The EPC Contractor shall list all regulatory authorities, agencies, utilities and jurisdictions that may have regulations relevant to the project.

B. The EPC Contractor shall also provide a detailed written report of all regulatory requirements, approvals and variances for which compliance may be necessary based on the defined scope of the project. The report will also identify permits required for construction.

C. The EPC Contractor shall be responsible for all coordination with relevant agencies that have jurisdiction over the intended work, and to obtain necessary approvals and permits. Requests for modifications or out-of-scope work must be approved by the IDFS Project Manager. In particular, the EPC Contractor shall satisfy all land development requirements and obtain site plan approval from IDFS.

D. The EPC Contractor shall contact in writing all affected utility companies and private property owners or entities to determine their requirements for protection, relocation or replacement of their facilities as necessitated by the design. The EPC Contractor shall schedule and conduct any necessary meetings between IDFS and the affected utilities and private entities to obtain the necessary approvals or develop the necessary agreements so that the work may progress.

E. The EPC Contractor shall confirm the necessity for any utility relocations or special maintenance provisions with the affected utilities and determine if the utilities will accomplish the relocations or maintenance provisions with their own Force Account personnel or request/allow one construction contractors to perform the work.

F. The EPC Contractor shall coordinate all traffic, vehicular, and pedestrian related activities with other agencies that might be affected during or as a result of this project. The EPC Contractor shall also prepare application(s) for, and obtain, all required permits from American Samoa Department of Public Works (DPW) and American Samoa Department of Public Safety (DPS) such as curb-cuts for ingress and egress , street closures or traffic detours at locations under their respective jurisdictions.

G. The EPC Contractor shall engage an ADA compliance specialist that is independent from the design process and that is acceptable to IDFS to review the construction documents for compliance with ADA regulations. The ADA specialist must submit to IDFS, prior to the start of the ADA review, credentials attesting to his experience and knowledge.

11. CONSTRUCTION PHASING

A. The EPC Contractor shall provide a comprehensive phasing plan that indicates all construction sequencing necessary to minimize impacts to Operational, adjacent properties and roadways.

B. Preliminary construction phasing plans shall be included with each submittal package. Final phasing plans shall have been submitted and approved by the requisite authorities and agencies.

C. The construction phasing plans will detail the limits of work, the specific work elements, and the duration of the phases to meet other related requirements as stated in this scope of work.

These phasing plans shall be in accordance with IDFS and other agency requirements and guidelines.

D. The EPC Contractor shall keep their construction phasing efforts current with IDFS throughout their entire design effort.

E. The EPC Contractor shall identify means of minimizing disruptions to existing IDFS parking, as well as locations and methods of providing temporary and contractor parking during construction. The EPC Contractor shall develop and finalize plans for alternate parking to be used by IDFS customers, IDFS fleet vehicles and IDFS employees displaced during phased construction.

F. The EPC Contractor shall identify all temporary construction required to maintain safety and Operational; provide details of how new construction will be coordinated with temporary Operational measures.

G. The EPC Contractor will be responsible for the design of all temporary work necessary to stabilize and suitably support any element affected by the scope of the project.

H. Construction access, including access for material loading, unloading and storage, shall be developed and maintained so as to minimize the interference with businesses, adjacent properties, pedestrian flow, and vehicular flow. Construction access shall be coordinated with the phasing of the project.