CDM Smith
3860 GS Richards Blvd.
Suite 100
Carson City, NV 89703
Tel: 775 883-2583
Fax: 775 883-7928

October 19, 2012

City of Sparks
Attn: Kim Laber, Plant Manager
8500 Clean Water Way
Reno, Nevada 89502

Subject: TMWRF Standby Generator System – Engineering Study Proposal

Dear Mr. Laber:

CDM Smith is pleased to submit this letter proposal to provide Engineering Services for the standby generator study for the Truckee Meadows Water Reclamation Facility (TMWRF). The study will focus on the potential selection of a standby generator system to provide power to the facility in the event of the failure of the plant utility feeders or a utility service interruption.

This project is the result of the recent failure of the main circuit breaker "A" and "B" at the medium voltage switchgear MVSWGR-1, which affected the plant's ability to operate and required the installation of several temporary emergency generators throughout the facility. This proposal includes the following:

1. Project Understanding and Approach
2. Project Organization
3. Management Control Program
4. Related Experience
5. Proposed Schedule
6. Project Fee

1. Project Understanding and Approach

TMWRF currently has a dual ended (secondary selective) 2300V voltage primary system providing the entire daily electrical demand at the facility. After the failure of the main circuit breakers at the medium voltage switchgear MVSWGR-1, TMWRF requested a planning level study for a new standby emergency generation system for the entire facility. The new emergency generator(s) will be planned and sized to provide full operations capacity during the event of a power loss, and will bring the plant into compliance with the requirements of "Ten State Standards."

CDM Smith will look into the most feasible preliminary design concept to match the TMWRF plant load requirements. This issue plus the location and type of generator units will be considered. The generators can be installed outside on concrete pads in weatherproof walk-in enclosures in a centralized arrangement, or in a distributed generator power system arrangement. In other words, install multiple units near the key load centers of the plant. The most convenient location for a centralized generator system is near the existing electrical room since this will reduce the amount of cabling and conduit required, therefore reducing the project capital costs. As discussed with TMWRF, site availability could be an issue and other feasible locations will need to be considered. The exact location will be discussed during a proposed design workshop.

TMWRF currently has a single cogeneration engine which is capable of providing 10% of the power of the facility. This cogeneration engine is not in service and by design cannot be used as a standby source of power for the facility. The new emergency generator system will be preliminarily sized to provide full operating plant capacity during the event of a power loss.

The power requirement for the emergency generation system lends itself to splitting the loads evenly between multiple emergency generators to manage the load requirements. Medium voltage generators (2300V) and low voltage generators (480V) will be considered during the study; we anticipate several units rated at 1500, 1750, or 2000 kW depending on the most efficient way to match the TMWRF plant load requirements.

The generators will include automatic start-up and transfer controls in the event of a power outage. The stand-by engine generator system considered during the study will include a PLC based automatic controls to allow the automatic return to the utility power feed when the source is restored. In addition, ancillary equipment such as control panels, fuel supply, and other required equipment will be considered and accounted for the project capital budgeting development. The design and installation will meet Federal, State, County, and local codes and regulations.

For standby service, CDM Smith prefers diesel fueled generators be considered over natural gas generators. Although gas engine generator emissions are cleaner, gas engine generators are not considered in this scope since the units would have to be provided with a dual fuel source (propane, light diesel) in order to operate during a gas curtailment situation. Gas engine generators can be rendered inoperable if the gas supply line is compromised due to a terrorist act or during a gas curtailment event. For those reasons, CDM Smith recommends the study focus on diesel generators. This selection will provide a more robust and reliable solution to TMWRF needs.

Using multiple generator units can present difficulties to the plant operation in the event one of the generators is out of service. For this reason, the study will include considerations for load shedding PLC that will automatically shed specific programmed loads and sequences required to maintain the operation of the plant at a lower capacity until the remaining units are brought back to service.

The tasks to be considered as part of this study scope are the following:

- Determination of the appropriate size and ratings of the Emergency Power Generator Units. CDM Smith will review the existing facility load characteristics, determine the preliminary generator size, and the appropriate load step sequencing for each station during generator start-up.
- Develop the conceptual tie in options available from the new stand-by generators to the existing electrical plant switchgear system.
- Develop preliminary design for permanent standby generator electrical disconnect and interface means with the existing electrical system. This will include safety switch and necessary interlocks to allow the connection of a temporary standby generator to the critical power distribution centers in the facility. The following locations will be considered during the study:
  - Blower Building (4 generator sets)
  - Headworks (2 generator sets)
  - Electrical Room (LVDC No. 1)
  - Nitrification Building (1 generator set)
  - LVDC No. 2 and No 3 (1 generator set)
  - Nitrification Building (1 generator set)
  - Filter Building (1 generator set)
- Discuss with TMWRF and investigate the system to interface with the engine generator controls and provide interface to the existing DCS system.
- Discuss with TMWRF and determine the potential location(s) of the distribution switchgear with respect to the generator units.

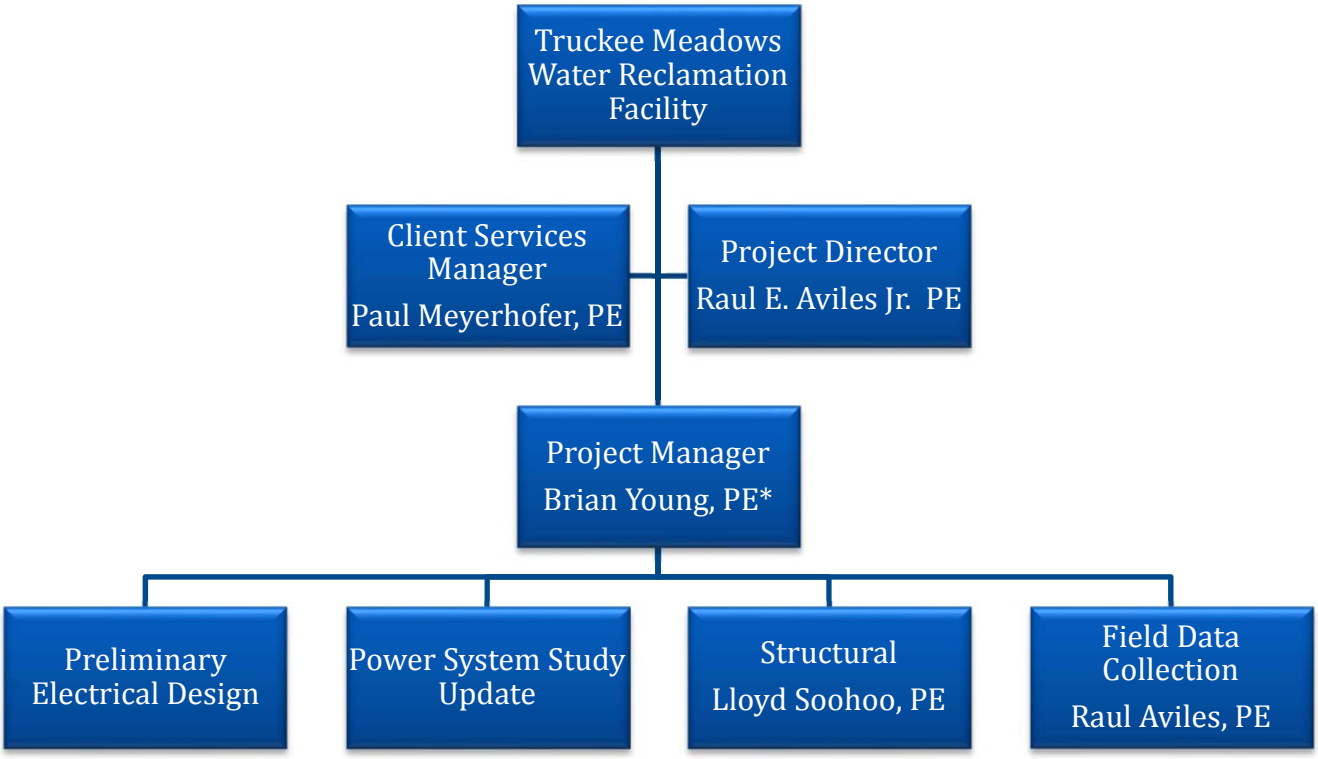
- Discuss with TMWRF and determine area security issues as well as flooding, fire, and icing.
- Utilize the current power system study developed by CDM Smith to coordinate with the new engine generator system. Size the equipment electrical conductors and required raceways.
- Discuss with TMWRF and determine the proper conduit and cable routes.
- Determine the optimal grounding ring and electrode configuration that may be required for separately derived system and equipment grounding.
- Discuss with TMWRF and determine if a containment area is required for spill containment.
- Discuss air permitting considerations with Paul Shapiro. Information will be used to determine the type of permit modifications (if needed) for the generator installation.
- Discuss with TMWRF and determine the optimal engine generator housing to meet the internal minimum 40 degree F ambient required by the applicable code.
- Discuss with TMWRF any emissions and permit requirements that can impact the facility current air permit.
- Maximize the service access for major repairs, component replacement (such as the radiator or the alternator), and overhauls.
- Locate the generator in areas that will provide easy access for refueling. CDM Smith will consider the local codes in the determination of the fuel storage tank capacity. CDM Smith will consult with the local fire marshal to determine the maximum amount of fuel storage allowed.
- Provide the preliminary design estimate of the required reinforced concrete slab to support the weight of each assembled generator, accessories, and enclosure. CDM Smith assumes that the engine generator units will be mounted in a slab on grade pad that will support the sub-base diesel tank for each unit.
- The preliminary design of the concrete slab will consider the applicable seismic codes for earthquake resistance.
- Discuss with TMWRF and determine of the required property line setbacks.
- Locate the enclosure so the engine exhaust will be directed away from vents and building openings.

- Consider the basic site grading of the selected area to allow proper access and drainage away from the engine generator.
- Review soil data provided by the TMWRF. It is assumed that there is sufficient geotechnical information available from the original design CDM Smith has not included the additional costs and scope to perform geotechnical field work
- Provide a preliminary design study memorandum presenting the findings of the design study and construction requirements with the Cities staff and confirm the design criteria.
- Provide three (3) alternative layouts for the proposed generator system configurations.
- Provide an engineer's opinion of probable cost within +/-50% which will include the equipment cost and an estimate of design/construction intervals required for the standby generator system installation.
- Modify the existing power flow, short circuit analysis, and protective device coordination study performed on the existing system to verify that the new electrical system modifications to meet the Arc Flash Study requirements.
- Provide data collection and field work to support the development of the engineering study. TMWRF maintenance staff time is limited; CDM Smith will provide engineering support to collect data, field measurements and documentation necessary to produce the design study report submittal. This includes a single plant site visit and working in the existing plant drawing archives located in the maintenance building of the facility.
- The following 11 x 17 drawings will be prepared:
  - (1) Site plan
  - (3) Alternative preliminary layout arrangements
  - (3) Proposed one-line diagrams.
- At the conclusion of the study, five copies of a draft report will be submitted and a meeting will be held to discuss the results with the TMWRF staff.
- The draft report will be finalized and five copies of the final will be submitted.

CDM Smith's proposal includes a separate detailed scope of work and estimates of expenditures provided as the following appendices:

- Attachment A – Detailed Scope of Services
- Attachment B – Estimate of Expenditures – TMWRF Standby Generator Study

2. Project Organization



***Not registered in Nevada**

CDM Smith - A Reputation Founded on Exceptional Client Service

CDM Smith is a leading provider of consulting, engineering, construction and operations services, headquartered in Cambridge, Massachusetts, with a multi-disciplinary staff of about 6000 in more than 100 offices worldwide. CDM Smith ranks among the world's premiere consulting firms specializing in water and wastewater treatment services, a focus the firm has maintained throughout its 60 year history. We have been engaged in a multitude of wastewater treatment plant designs for new facilities and existing plant upgrades. Integral to plant designs

have been electrical power improvements and modifications to allow necessary expansions and reliability improvements. CDM Smith has a committed team of electrical engineers that work together with our process and environmental engineers to deliver electrical solutions specific to each plant.

CDM Smith's Carson City, Nevada and Phoenix, Arizona Offices

Our firm is committed to having a core team available and responsive to the Cities of Sparks and Reno Truckee Meadows Water Reclamation Facility (TMWRF) project needs. CDM Smith is prepared to support the Cities from its Carson City, NV and Phoenix, AZ offices.

We are providing an engineering team that understands local requirements and TMWRF design requirements to ease design, construction permitting, and to improve the electrical system reliability. That understanding not only improves the quality of the design, it serves to further reduce the time needed in the design phase, allowing us to meet your schedule and reduce overall project costs. Presented below is CDM Smith's organization chart depicting the lines of communication and the roles for each proposed professional staff. Bio sketches for key personnel are included on the following page:

CDM Smith Team Member Collaborative Experience

To meet the aggressive schedule requirements, CDM Smith has assembled the most qualified group of engineers to perform the project. The team selected to support this project has extensive experience with electrical retrofits and equipment replacement. We have been involved with over 500 electrical replacement projects in the last 10 years.

CDM Smith is a matrix based organization with a "Virtual Office Team Environment" that allows us to perform projects in different locations in "Real Time" using a state of the art high speed network and project management and delivery tools such as "Project Wise" to manage the project deliverables.

With these capabilities CDM Smith can meet the schedule requirements for this project. We have the ability to perform work in several design centers in order to get the best available technical resources, knowledge, and experience while meeting the schedule requirements. The proposed team has recently worked together using these technological methods to deliver the Seattle Public Utilities Chester Morse Lake Pump Station Power Service project.

Responsibilities of CDM Smith's Key Personnel:

Raul E. Aviles, Jr., PE, CPE, CEM, CEA, GBE Mr. Aviles will serve as the Project Director and direct point of contact for the Cities. He has over 20 years of experience in the field of design

engineering and maintenance. His design experience involves electric power engineering, including power distribution, power generation, control and power system analysis, cogeneration, steam turbines, and standby engine generator systems. His experience includes control system integration, including programmable logic controllers, instrumentation, control panel design, PLC logic development, and programming. Mr. Aviles has managed and provided engineering support for numerous projects that included feasibility studies, energy audits, development of capital investment proposals, cost justifications, equipment specifications, procurement, bid contracts, installation, field supervision, inspection, instrument calibration, cost estimation, budget management and start-up of electrical, instrumentation and control systems for wastewater and water treatment, industrial, electronics, and research facilities.

Paul Meyerhofer, PE* Mr. Meyerhofer has over 37 years of experience focused on the planning, design and construction of water and wastewater projects. The total construction value of projects designed and constructed under his supervision exceeds $500 million. Mr. Meyerhofer is also experienced in several aspects of alternative project delivery, including CM-at-risk, design build, and concurrent design and construction. He has also taught engineering courses and seminars at universities in California, Colorado, and Utah. He will be supporting Mr. Aviles to insure he has the resources and full support of the firm in completing this important project and meeting the Cities' expectations.

Brian G. Young, PE* Mr. Young is an electrical engineer with 24 years of experience in consulting engineering and management for the design of electrical systems for water and wastewater plants, industrial facilities, and primary electric transmission and distribution lines. He has provided technical leadership, quality assurance, design, and analysis of electrical distribution and generation systems including multiple services and generators, using software tools such as SKM PowerTools. In addition to his power system experience, he has designed instrumentation and controls including programmable logic controller (PLC) and human machine interface (HMI) programming. Designs have included power distribution, standby power generation, lighting, fire alarm, communications, and other life safety and special systems.

Lloyd Soohoo, PE, SE Mr. Soohoo has 13 years of experience in the structural design of reservoirs, industrial buildings, pump stations, and water treatment plants. A licensed structural and civil engineer, he has also designed seismic strengthening of existing structures and performed technical structural peer reviews.

3. Management Control Program

CDM Smith's project management approach focuses on control and communication of scope, schedule, and budget. Once we receive notice to proceed on a project, we prepare a project

management plan that references the scope of work and describes the workplan with roles, responsibilities for the team, and highlights the appropriate and preferred forms of communication to keep you informed and involved.

The project will be executed by CDM Smith under the direction of Mr. Paul Meyerhofer, serving as Client Services Manager, and Mr. Raul E. Aviles serving as Project Director and Technical reviewer. To maintain consistency with the current plant electrical projects, Mr. Brian Young will serve as project manager focusing in the effective execution of the engineering study. Mr. Meyerhofer's responsibility will be to ensure that all of CDM Smith's quality management practices, budget, and schedule are adhered to and the appropriate personnel are dedicated to this project. Mr. Young's role will be to oversee the day-to-day execution of the project and by coordinating the work of CDM Smith staff and communicating project status and issues to TMWRF. Mr. Young will communicate the progress of the project on a monthly basis. In addition to managing the design portion of the project, we will work with you in managing and meeting the project goals.

Cost and Schedule Control Methodology

Mr. Aviles will use CDM Smith's computer-based Project Management Control System consisting of numerous tools and reports to control all elements of project costs. This produces weekly and monthly reports that provide accurate, complete, up-to-date information that will aid Mr. Aviles in effectively tracking the progress of project tasks, and to identify early any deviations to planned budget and schedule so that corrective actions can be implemented. System reports show details of expenditures versus estimates and provide budget tracking on an earned value basis and the analysis and updating of budget projections. These reports have been established so we can answer your questions such as "How is the project proceeding?" "Are we on schedule?" and "How will the project stand at completion?"

Clear and timely decisions are critical to project progress and avoiding rework that is often associated with budget overruns and schedule delays. CDM Smith will manage the engineering and project scope by informing the Cities of pending and actual decisions. We will use a decision log as a tool to document the impact of a decision on capital cost, engineering cost, operation cost, and schedule. The Cities will benefit by avoiding cost creep and by knowing the impact of a decision early in the project.

Proposed Project Status Reporting System

At the beginning of the project, CDM Smith will develop a cost and resource loaded schedule to track project progress and keep the project on schedule and budget. These tools will enable Mr. Aviles to quickly compare CDM Smith's progress against cost. Any deviation between the two will be quickly addressed. This information will also be provided to the Cities' staff in the

project meetings and progress reports. Our tools will identify issues early and mitigate surprises to the Cities project manager, as well as any impacts to the project scope, schedule, and budget.

Quality Control

Overarching all of these systems is CDM Smith's commitment to quality to assure that the Cities are satisfied with the end result. Procedures for maintaining quality include:

- A project kick-off meeting with the Cities and key CDM Smith team members.
- Personal commitment by all team members to provide high quality products.
- Internal cross checking and coordination procedures on all deliverables.
- A quality assurance sign-off sheet completed by each responsible professional for every project deliverable attesting that all quality control procedures have been performed.

4. Related Experience

The Cities of Sparks and Reno can be confident that CDM Smith has unmatched experience and expertise in electrical design, electrical retrofits, and equipment replacement including:

- CDM Smith provided the Cities of Reno and Sparks with the design services for the Electrical Systems Improvements 2011 Project. CDM Smith has worked closely with the Cities and understands the needs and requirements of the Facility.
- Multiple large scale standby generating facility studies and design. We have been involved with over 100 electrical generator projects at water and wastewater treatment plants in the last 10 years.
- Projects that require operations during construction. Maintenance and reliability engineering.
- Risk analysis and risk management.
- Fast-track project delivery.
- Power generation – design, construction, operations and maintenance.
- 90+ design professionals in the electrical engineering design group, with offices in almost every major city of the US.

5. Proposed Schedule

Our team is available and ready to begin working immediately on this important system design effort. Our proposed schedule, as shown below, shows anticipated progress of work, key milestones, and review periods.

Task	**Task Duration (in working days)**
Kick off and Workshop	1 day
Data Collection	5 days
Draft Report	15 days
Final Report Development	10 days
Final Report Review	5 days
Final Submittal	2 days
Project Schedule	43 days

Using a proven sequence of events from planning and pre-design through detailed design and construction will result in timely deliverables.

6. Project Fee

CDM Smith proposes to complete the work defined in the CDM Smith's scope of services (see Attachment A) on a lump sum basis not to exceed $87,630. CDM Smith will invoice the City of Sparks on a monthly basis.

CDM Smith appreciates the opportunity to work with TMWRF on this important project. CDM Smith is very excited about this opportunity to team with both the City's staff and the TMWRF Operations and Maintenance Staff in delivering a successful project. Please feel free to contact Raul at 775-883-2583 or any of our team members, should you have any questions. We would be happy to meet with you to review our proposal in detail.

Very truly yours,

Paul F. Meyerhofer, PE
Senior Vice President
CDM Smith Inc.

Raul E. Aviles PE, CPE, CEM, CEA, GBE
Vice President
CDM Smith Inc.

cc: Stefan Schuster, PE – CDM Smith
Marlene McKenzie – CDM Smith

Attachment A

Standby Generator System – Engineering Study Proposal Scope of Services

The following scope of service defines the preliminary study services to be provided for the Truckee Meadows Water Reclamation Facility (TMWRF) standby emergency generator preliminary design study.

In order to accomplish these goals, the CONSULTANT will perform the following tasks:

1.0 Project Management and Quality Control

1.1 Project Management

The objective of this task is to manage the project to produce a preliminary design report and support documents, on time, and within budget. Major activities include project administration, meetings and workshops, and quality assurance/quality control.

1.1.1 Project Administration:

1. Prepare a Project Management Plan (PMP). The PMP will provide team members information on the project-specific procedures to be employed on the project. The PMP will be an internal CONSULTANT working document but will be made available to TMWRF.
2. Oversee and coordinate the activities of CONSULTANT project team members assigned to this project.
3. Communicate regularly with TMWRF's project manager.
4. CONSULTANT will prepare a Gantt chart at the subtask level that will be used to show the Schedule.
5. CONSULTANT will submit monthly invoices to TMWRF's project manager.
6. CONSULTANT will provide an electronic document room (e-room) for document management and sharing throughout the duration of the project.

1.1.2 Project Meetings:

Regular team meetings and specific project meetings will maintain effective communication between CONSULTANT and the Cities of Reno and Sparks staff. The following meetings will be conducted during the project:

1. Organize and conduct a series of project team meetings. Project team meetings will occur regularly during the core period of the design. Budget for discipline lead team members is allocated under their specific tasks. CONSULTANT staff will be joining via teleconference.
2. Attend a kick-off meeting. Meeting will be held at TMWRF and include design team and all appropriate TMWRF staff to discuss the overall goals of the project and learn key issues that need to be addressed in the preliminary design report phase.

3. Conduct a workshop to define the three (3) standby alternative configurations and document the selection of the electrical systems upgrades to be included in the project. The basic concept is a central stand-by generator plant with two (2) parallel generator units. These three options will be defined in the kick off meeting and will address potential locations of the new standby generator system.
4. Pre-design Draft Report Review Meeting. Meeting to review the preliminary design report and support documents.
5. Final Pre-design Draft Report Review Meeting. Meeting to review the final draft design report documents.

1.2 Quality Assurance (QA)/Quality Control (QC):

1. CONSULTANT will conduct reviews of major design criteria and calculations on an ongoing basis. Basic design calculations performed by the various disciplines involved will be reviewed.

2. CONSULTANT will provide reviews of the Preliminary, Draft and Final Design report documents.

Assumptions: The following assumptions were made in preparing the budget for the above described task items.

- Prior to all specific project meetings, an agenda will be prepared and provided to the TMWRF project manager.
- Subsequent to all meetings minutes of the meetings will be prepared and sent to the TMWRF project manager.
- TMWRF staff will review and make comments prior to review meetings for specific project milestones.
- TMWRF staff will consolidate comments into a single document to be provided to the CONSULTANT at the review meetings for specific project milestones.

Work Products:

1. One copy of the original and one copy of all significant updates of the Project Management Plan.
2. Initial project schedule and updates.
3. Monthly invoices.
4. Agenda for each of the above described meetings.
5. Minutes from each of the above describe meetings.

2.0 Preliminary Design Services

CONSULTANT understands that TMWRF currently has a dual ended (secondary selective) 2300V voltage primary system providing the entire daily electrical demand at the facility. After the failure of the main circuit breakers at the medium voltage switchgear MVSWGR-1, TMWRF has requested a planning level study for a new standby emergency generation facility for the facility. The new emergency generator(s) will be planned and sized to provide full operations capacity during the event of a power loss, and will bring the plant into compliance with the requirements of "Ten State Standards." This effort will require the determination of the most feasible preliminary design standby

generator concept to match the TMWRF plant load requirements. This will include the definition of the preliminary electrical design criteria, develop the necessary design concept, and define the proper equipment required.

CONSULTANT scope of services includes the following:

- Determination of the appropriate size and ratings of the Emergency Power Generator Units. CONSULTANT will review the existing facility load characteristics, determine the preliminary generator size, and the appropriate load step sequencing for each station during generator start-up.
- Develop the conceptual tie in options available from the new stand-by generators to the existing electrical plant switchgear system. Prepare basic single line diagrams showing the necessary modifications.
- Develop the preliminary design for permanent standby generator electrical disconnect and interface means with the existing electrical system. This will include safety switch and necessary interlocks to allow the connection of a temporary standby generator to the critical power distribution centers in the facility. The following locations will be considered during the study:
  - Blower Building (4 generator sets)
  - Headworks (2 generator sets)
  - Electrical Room (LVDC No. 1)
  - Nitrification Building (1 generator set)
  - LVDC No. 2 and No 3 (1 generator set)
  - Nitrification Building (1 generator set)
  - Filter Building (1 generator set)
- Discuss with TMWRF and investigate the system to interface with the engine generator controls and provide interface to the existing DCS system.
- Discuss with TMWRF and determine the potential location(s) of the distribution switchgear with respect to the generator units.
- Discuss with TMWRF and determine area security issues as well as flooding, fire, and icing.
- Utilize the current power system study developed by CDM Smith to coordinate with the new engine generator system. Size the equipment electrical conductors and required raceways.
- Discuss with TMWRF and determine the proper conduit and cable routes.
- Determine the optimal grounding ring and electrode configuration that may be required for separately derived system and equipment grounding.

- Discuss with TMWRF and determine if a containment area is required for spill containment.
- Discuss air permitting considerations with TMWRF Health and Safety Officer. Information will be used to determine the type of permit modifications (if needed) for the generator installation.
- Discuss with TMWRF and determine the optimal engine generator housing to meet the internal minimum 40 degree F ambient required by the applicable code.
- Discuss with TMWRF any emissions and permit requirements that can impact the facility current air permit.
- Maximize the service access for major repairs, component replacement (such as the radiator or the alternator), and overhauls.
- Locate the generator in areas that will provide easy access for refueling. CDM Smith will consider the local codes in the determination of the fuel storage tank capacity. CDM Smith will consult with the local fire marshal to determine the maximum amount of fuel storage allowed.
- Provide the preliminary design estimate of the required reinforced concrete slab to support the weight of each assembled generator, accessories, and enclosure. CDM Smith assumes that the engine generator units will be mounted in a slab on grade pad that will support the sub-base diesel tank for each unit.
- The preliminary design of the concrete slab will consider the applicable seismic codes for earthquake resistance.
- Discuss with TMWRF and determine of the required property line setbacks.
- Locate the enclosure so the engine exhaust will be directed away from vents and building openings.
- Consider the basic site grading of the selected area to allow proper access and drainage away from the engine generator.
- Review soil data provided by the TMWRF. It is assumed that there is sufficient geotechnical information available from the original design CDM Smith has not included the additional costs and scope to perform geotechnical field work
- Provide a preliminary design study memorandum presenting the findings of the design study and construction requirements with the Cities staff and confirm the design criteria.
- Provide three (3) alternative layouts for the proposed generator system configuration.
- Modify the existing power flow, short circuit analysis, and protective device coordination study performed on the existing system to verify that the new electrical system modifications meet the Arc Flash Study requirements.
- Provide data collection and field work to support the development of the engineering study. TMWRF maintenance staff time is limited; CDM Smith will provide engineering support to collect

data, field measurements and documentation necessary to produce the design study report submittal. This includes a single plant site visit and working in the existing plant drawing archives located in the maintenance building of the facility.

After determining the preferred sequencing plan and configuration of the new standby generator power plant, CONSULTANT will prepare a single line diagram for the preliminary design report showing connections to the existing system. CONSULTANT will evaluate the necessary modifications and identify issues associated with long delivery and extended outage requirements. In addition, CONSULTANT will evaluate up to three equipment options and determine the most economically feasible option to reduce the outage duration and O&M costs for the plant. CONSULTANT will provide technical memoranda to be included in the pre-design report with the recommended options and the equipment selected.

2.1 Project Workshops

During the project workshop, the TMWRF/CONSULTANT team will prioritize a list of project objectives, create a list of the potential standby generator configuration options, and evaluate the list using the identified objectives to validate and confirm the electrical system upgrade solutions. This workshop will provide a documented decision path to arrive at the most appropriate stand-by generator options for TMWRF. The documentation and buy-in that results from this process will establish a firm foundation for confidently moving ahead with the design.

In preparation for the workshop CONSULTANT will review current information on your current electrical system and prepare list of alternatives. CONSULTANT will facilitate the comparison of alternatives in terms of ability to meet prioritized objectives. By evaluating the cost, risk, and the practical aspects the alternatives, CONSULTANT working with the Cities will present the best economic alternatives for the standby power generation plant.

The workshop will focus on the strategy for implementing the proposed stand-by generator system. By combining the plant's maintenance staff knowledge and CONSULTANT experience, the team will develop the three alternative plans to be considered during the pre-design phase.

2.2 Preliminary Design Report

CONSULTANT will prepare a pre-design report and supporting preliminary drawings which will describe the approach recommended by the design team for development of the stand-by generator design. The Preliminary design report is described in Subtask 2.2.1and content of the Preliminary Design Documents is described in Subtask 2.2.3.

The following preliminary design report will be prepared by the CONSULTANT. The report will address the items identified by TMWRF as key to the electrical requirements for the stand-by power generation needs for the facility. The report will serve as the basis of design and will provide direction to determine appropriate equipment selected for and priorities for replacement.

2.2.1 Standby Generator Report

The standby generator preliminary design report will cover the concept development of a permanently installed parallel stand-by generator plant. Interconnection requirements to the existing system will be

described. The existing electrical system will be evaluated to determine most feasible interface to the existing plant system. Any problems that are discovered during preliminary review of the electrical system will be addressed. Significant impacts that could affect the plant operability and any equipment installation constraints such as size, access, and clearances will be identified. Recommendations for design directions will be made to resolve any deficiencies identified. Detailed scope covered is shown in Section 2.0.

As part of the standby generator report, CONSULTANT will develop the preliminary design for permanent standby generator electrical disconnect and interface means with the existing electrical system. This will include safety switch and necessary interlocks to allow the connection of a temporary standby generator to the critical power distribution centers in the facility. The specific locations are listed in Section 2.0 of this document.

2.2.2 Preliminary Design Report

The preliminary draft design report documents will cover the following areas to allow TMWRF to approve a design approach for the project. The preliminary design documents will include the following items:

- Draft equipment layout drawings
- Draft single line demolition diagrams
- Draft single line diagrams
- Draft Preliminary site layout drawings
- Draft Equipment list

Layout drawings will include major equipment and will be generic in nature until final equipment selection for the paralleling switchgear and auxiliary support equipment are completed.

- Draft paralleling switchgear enclosure
- Draft standby generator enclosures.
- Draft selection of electrical support equipment such as switchgear, panelboards, and transformers.

2.2.3 Final Design Report

The final design report documents will include the following TMWRF approved documents:

- Approved preliminary equipment layout drawings
- Approved preliminary single line demolition diagrams
- Approved preliminary single line diagrams
- Approved preliminary site layout drawings
- Approved Equipment list

Layout drawings will include major equipment and will sufficient to assist in the preparation of the engineer's opinion of probable cost.

- Paralleling Switchgear Enclosure
- Standby Generator Enclosures
- Electrical support equipment such as switchgear, panelboards, and transformers.

2.2.4 Standby Generator Equipment Selection
CONSULTANT will provide preliminary standby generator size and selection for the scope listed above. CONSULTANT will meet and work with several electrical equipment vendors to identify the proper equipment selection. CONSULTANT will work with the plant electrical staff to identify the necessary equipments and modifications to the existing electrical system.

CONSULTANT will provide the following:

- CONSULTANT will prepare preliminary specifications to obtain budgetary quotes and preliminary drawings to prepare the preliminary design documents.
- CONSULTANT will review the vendors documentation and quotes to make sure the required equipment will fit in the existing location and develop the opinion of probable cost.
- CONSULTANT will use the information obtained in this task in the preparation on Task 4.0 – Engineer's Opinion of Probable Cost.

Assumptions:
The following assumptions were made in developing the scope and budget for this task:

- The number of preliminary design drawings for the project is estimated as follows by discipline:
    - General - 1
    - Electrical – 8
    - Structural – 2
- The Pre-design Report will consist of a single stand alone document that is associated with the preliminary design documents to provide additional background and descriptions to support the information provided in the drawings.
- Paralleling switchgear considerations will be limited to the main equipment manufacturer's providers that the CONSULTANT has successful experience with.
- This scope assumes that modifications to the existing buildings will be limited. Any unforeseen modifications will be considered outside the scope of this document. Only containerized or prefabricated enclosures will be considered.
- The preliminary design documents will include the above mentioned drawings and a list of specifications. Drawings will be provided in half size (11″ x 17″) hard copy format in the quantities described below and in AutoCAD 2012 format. AutoCAD drawings will conform to CDM Smith CAD standards.

Work Products:

1. One original and five copies of the draft preliminary design report to TMWRF for review and comment.
2. One original and five copies of the final preliminary design report to TMWRF for review and comment.
3. Copy of the Electronic Files located in the current CDM Smith/TMWRF E-Room.
4. One original and five copies of the Preliminary Design Report.
5. Preliminary Construction Cost Estimate.

3.0 Consultant provided Maintenance and Coordination Services

At TMWRF request, CONSULTANT is providing efforts required to assist the OWNER's maintenance staff in coordination of information gathering and field services. This will be used to properly schedule the time and availability for the assigned staff to work with the OWNER's project team. CONSULTANT level of effort estimate is the following:

- Kick off facility tour and CONSULTANT staff familiarization with new work areas – 16 hours
- Field Investigation – 24 hours
- Weekly conference calls – 8 hours
- Total estimated effort for support staff– 48 hours

4.0 Engineer's Opinion of Probable Cost

CONSULTANT will prepare a probable construction cost and preliminary schedule will be developed based on the anticipated design direction determined through the pre-design phase documents. CONSULTANT will provide an opinion of probable cost within +/-50% which will include the equipment cost and an estimate of design/construction intervals required for the standby generator system installation.

Project: **Estimate of Expenditures - TMWRF Standby Generator System - Engineering Study Proposal**
Parts: B
Agreement No:
Consultant: **CDM Smith**

Prepared by: REA
Date: 10/19/2012
Version: verFINAL

TASKS	Officer	Rate	Vice President	Rate	Principal/ Associate	Rate	Senior Professional	Rate	Professional	Rate	Engineer/CAD	Rate	Admin.	Rate	Contract Administrator	Rate	Total
Part A - Electrical System Upgrades	Meyerhofer	$ 250	Aviles	$ 230	Blomberg Young	$ 200	Fransen	$ 165	Garrs	$ 150	Yarborough	$ 110		$ 100		$ 130	
1.0 Project Management and Quality Control																	
1.1 Project management	2		4		40								24		8		
1.2 Quality Assurance (QA) / Quality Control (QC)			8				16										
Subtotal	2	$ 500	12	$ 2,760	40	$ 8,000	16	$ 2,640	0	$ -	0	$ -	24	$ 2,400	8	$ 1,040	$ 17,340
2.0 Pre-design services																	
2.1 Project Workshops			16		24						16		8				
2.2 Preliminary Design Report					80				50		60		8				
Subtotal	0	$ -	16	$ 3,680	104	$ 20,800	0	$ -	50	$ 7,500	76	$ 8,360	16	$ 1,600	0	$ -	$ 41,940
3.0 Field Data Collection and Coordination Services																	
3.1 Owner provided Maintenance and Coordination Services (supported by CDM)			8		24				0		24		8				
Subtotal	0	$ -	8	$ 1,840	24	$ 4,800	0	$ -	0	$ -	24	$ 2,640	8	$ 800	0	$ -	$ 10,080
4.0 Engineer's Opinion of Probable Cost																	
4.1 Electrical, Structural and Mechanical Estimates			4		8		50										
Subtotal	0	$ -	4	$ 920	8	$ 1,600	50	$ 8,250	0	$ -	0	$ -	0	$ -	0	$ -	$ 10,770
Reimbursable Expenses																	
Materials																	$ 1,500
Travel																	$ 5,000
Reproduction																	$ 1,000
Subtotal		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 7,500
Total	**2**	**$ 500**	**40**	**$ 9,200**	**176**	**$ 35,200**	**66**	**$ 10,890**	**50**	**$ 7,500**	**100**	**$ 11,000**	**48**	**$ 4,800**	**8**	**$ 1,040**	$ 87,630