



SOLAR POWER STATEMENT OF QUALIFICATIONS

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RRC
experience matters

At the heart of a successful project lies a team of experts who can convert their knowledge to project results. Our successful business model starts with listening to our clients' objectives and applying our experience to develop a project approach that optimizes value. We provide solutions our clients can trust, added value through our innovative abilities, and exceptional service. With project experience and a value engineering approach, we provide economical solutions to complex problems. Our engineers, scientists, and surveyors are among the most experienced in their fields.

We believe that **experience matters**. It's more than a tag line. It's how we define ourselves.

SOLUTIONS YOU CAN TRUST



Integrity

We conduct our business honestly and ethically. We take responsibility for both our words and actions and provide solutions our clients can trust.

Exceed Client Expectations

We exceed our clients' expectations with our exceptional service. We strive to be our clients' first choice for the industries we serve by delivering more value than they expected.

VALUES DEFINE A COMPANY

Accountability

We expect high standards from our services and our people. We commit to consistently improve the services we provide and we are accountable for the quality of those services.

Innovation & Continuous Improvement

As the industry evolves and advances, we maintain an innovative perspective and seek to continuously improve and incorporate the latest industry advancements. We are constantly expanding our expertise.

Employee Development

We understand that exceeding our clients' expectations can only be achieved with great people. We invest in professional development of our team and work hard to retain and recruit top talent.

Positive Attitude & Teamwork

A company benefits most from a collaborative work environment. We recognize that a positive work environment includes one that promotes safety and allows for a healthy work-life balance.



MARKETS

SOLAR POWER

WIND POWER

OIL & GAS

POWER DELIVERY

SERVICES

CIVIL ENGINEERING

CONSTRUCTION MATERIALS TESTING

ELECTRICAL ENGINEERING

GEOTECHNICAL ENGINEERING

LABORATORY SERVICES

LAND SURVEYING

STRUCTURAL ENGINEERING



Our team of professionals and support staff has the multi-disciplinary capability to take on a wide variety of projects serving the utility, industrial, municipal, and commercial sectors. From strategic planning and conceptual design to project management and construction testing, we get the job done.

By hiring key experienced staff and following the same founding principal of delivering value, we continue to grow and diversify our services to support the evolving industry.

Our **vision** is to be the recognized leader of value-added technical services for the energy industry as defined by the successes of our clients and our people.



SOLAR power

We provide engineering services for utility-scale solar energy projects throughout the United States. **Our goal** is to deliver tailored recommendations to keep projects low-risk technically while saving on overall project construction cost through optimized and concurrent engineering. Our value driven engineering philosophy has contributed to the development of strong relationships with owners, developers, and contractors. These relationships continue to evolve as we deliver results on technically challenging projects with tight project deadlines. RRC has completed **over 1,000 MW** of solar projects across the U.S. within the last 2 years.

We maintain an innovative perspective as the industry advances. From 1500 V PV systems to battery storage integration, we provide the insight needed in the evolving solar market. With project experience and a value engineering approach, we provide economical solutions to complex problems including time-of-day pricing, fixed and tracked PV system optimization, and installations on landfills and brownfields.

Services provided for Solar Energy projects include:

- Site Evaluation and Feasibility Assessments
- Geotechnical Investigation and Engineering
 - Driven Pile Foundation Testing and Optimization
- Structural and Foundation Design Services
- Electrical Engineering
 - Interconnection Consulting and Studies
 - AC and DC Cabling Design
 - Substation Detailed Design
 - Transmission Design
 - Collector System Detailed Design
 - Control and SCADA Engineering and Design
 - Engineered Designs, Calculations, and Drawing Packages
- Construction Material Testing and Quality Assurance Testing
- Solar Engineering and PV Solar Design
 - Solar Resource Assessment (SRA) and Economic Evaluation
 - PVSyst Calculations and Estimates
 - Site and System Layout Design
 - Modules/Inverter Matching, Selection, and Engineering
 - Tilt, Azimuth, and Inter-Row Spacing
 - Shading Analysis
 - Power Prediction/Loss Estimates
 - Tracking System Recommendations
- Civil Engineering, Stormwater Pollution Prevention Plans (SWPPP), Grading and Drainage Studies

SOLAR ENGINEERING AND PHOTOVOLTAIC (PV) SOLAR DESIGN

RRC has the expertise and tools to evaluate the feasibility, options, and optimum configuration of simple to complex solar projects. From laying out the array to designing the complete collector system, we have the ability to meet our clients' needs for constructability, O&M cost, and energy production, designing over 1 GW of solar energy projects.

RRC can provide a basic feasibility study covering:

- Assessment of needs such as time-of-day pricing, peak output, and specific land features
- Desktop geotechnical studies
- Solar Resource Assessment and basic economic evaluation including LCOE & ROI analysis on basic designs
- Energy Production Modeling (8760 Analysis, P50-P90 Probabilistic Evaluations)

The second step is a 30% design and option evaluation, which helps to make critical decisions early and narrow in on the optimum design. We can help navigate:

- Site and System Layout
- Shading Analysis
- Power Prediction/Loss Estimates
- System Performance Analysis/Degradation Analysis
- Tracking System Recommendation – Fixed, 1 Axis and 2 Axes

Next, we proceed with the detailed design of the optimized field, resulting in final stamped designs ready for procurement and construction:

- Modules/Inverter Matching, Selection, and Engineering
- Array Optimization (Tilt, Azimuth, and Inter-row Spacing)
- DC and AC Collector System Design and Optimization

We have experience with battery storage system integration, production and analysis of bifacial PV systems, and integration of CITC tax advantaged equipment.

RRC has transmission, substation, collector, and system study design capabilities to provide complete project engineering as one entity.



CIVIL ENGINEERING

RRC's civil engineering group is ready to take your project from conceptual design through construction support. Our experienced staff have created designs for a broad range of clients including wind and solar project owners, developers, and contractors. RRC engineers have extensive knowledge of hydrology, hydraulics, floodplain and scour analysis, roadway design, utility, and pavement designs. Our firm has also assisted our clients with permitting and prepared Storm Water Pollution Prevention Plans (SWPPP), and Spill Prevention Control and Countermeasure (SPCC) Plans for their projects. RRC uses state of the art software and implements a QA/QC program to deliver solutions and successful completion of projects on time and on budget.



DRIVEN PILE FOUNDATION TESTING & OPTIMIZATION

Optimal sizing of driven pile foundations on a project is key to achieving the lowest total project cost while maintaining compliance with applicable building codes and safety factors. The steel piles can be a significant cost to the project and failure can lead to tilting arrays, binding of tracking systems, or even piles that move, heave or pull-out of the ground.

RRC employs a multi-disciplinary approach for driven pile foundation design and optimization. The process begins with a careful evaluation of the project site's geotechnical conditions to understand subsurface soil types and properties, and variability across the site. The findings are discussed internally with the structural engineering team and several foundation solutions are developed, along with an anticipated design window to use for in-situ pile load testing. Suggested in-situ pile load testing locations are strategically selected with emphasis on developing data that will be representative of the entire site or zones chosen. The potential for different designs for different areas and soil conditions is considered. As the piles are driven and tested, data is collected to correlate the soil types and tested parameters to the actual soil capacity. This results in optimal steel section sizing and embedment depth for the array. Test pile driving data can also be potentially used to develop appropriate quality control guidelines for use during production pile installation.

This concurrent engineering approach for pile designs and optimization that RRC provides can often save weeks on the project schedule compared to traditional linear approaches. The resulting optimized designs reduce excess steel pile quantities, while meeting code and design requirements as well as decreasing risk.

BAYSHORE A, B, AND C SOLAR PROJECT

PROJECT SPOTLIGHT

- Location: Los Angeles County, California
- Capacity: 60 MWAC
- Year Commissioned: 2017

The Bayshore A, B, and C Solar Project consisted of 3 phases comprised of 20 MWAC each in capacity. RRC provided professional land surveying, civil engineering, geotechnical engineering and pile load testing, structural engineering and pile design optimization, and electrical engineering services.

PECAN SOLAR PROJECT

- Location: Northampton, North Carolina
- Capacity: 75 MWAC
- Year Commissioned: 2018

The Pecan Solar Project consisted of 111.6 MWDC, 74.9 MWAC in capacity. RRC provided electrical DC/AC collector system and SCADA engineering design services.

LITHIA SOLAR PROJECT

- Location: Tampa, Florida
- Capacity: 75 MWAC
- Year Commissioned: 2018

The Lithia Solar Project consisted of 90.1 MWDC, 74.9 MWAC in capacity. RRC provided electrical DC/AC collector system design with the full SCADA design including Power Plant Controller (PPC) and HMI interface for engineering design services.

DESERT GREEN SOLAR FIELD

- Location: Borrego Springs, California
- Capacity: 5 MW
- Year Commissioned: 2014

The Desert Green Solar Project consists of a 5 MW solar farm with 240 dual-axis trackers, each supported on a single vibratory driven steel pile. Each tracker is mounted with a 25' x 40' tracker table covered in CPV panels. The large diameter piles required to support the panels are custom fabricated from rolled and welded steel plates. RRC met the project's tight schedule and worked with our client to limit cost increases that resulted from increased loading requirements due to changes in the tracker design.

93.16 MWDC PV SOLAR PLANT

- Location: Lyon County, Minnesota
- Capacity: 93.16 MWDC/62.25 MWAC of energy
- Year Commissioned: 2016

This project entailed the design of a 93.16 MWDC PV solar plant, with an optimized solar photovoltaic array and related infrastructure in Lyon County, Minnesota. Design employed a fixed tilt racking system with 330 W solar modules and a system design voltage of 1500 V. RRC provided the electrical design, from the solar panels to the project main site substation/switchyard, optimizing the PV plant design to achieve the lowest overall lifecycle costs. RRC also provided structural engineering for the site including reconfiguration and optimization of the racking and foundations resulting in project savings. The soil conditions and freeze susceptible soil impact was mitigated with special attention to the structural design while maintaining cost competitiveness and constructability. RRC also provided construction support, project management, and as-built drawings.



95.6 MWDC PV SOLAR PLANT

PROJECT SPOTLIGHT

- Location: Near Roswell, New Mexico
- Capacity: 95.6 MWDC/70 MWAC of energy
- Year Commissioned: 2016

This project entailed the design of a 95.6 MWDC PV solar plant, with an optimized solar photovoltaic array and related infrastructure near Roswell, New Mexico. Design employed a NexTracker single-axis tracker system with 290 W, 315 W and 330 W solar modules and a system design voltage of 1500 V and CITC voltage of 1000 V.

RRC provided the electrical design, from the solar panels to the project main site substation/switchyard, optimizing the PV plant design to achieve the lowest overall lifecycle costs. This project included CITC equipment, which provided a special challenge to integrate. Creative design allowed the CITC use and captured a 30% project savings. RRC also provided civil engineering for the site, a Stormwater Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasure Plan (SPCC), structural engineering for the 4 MVA inverters, and corrosivity analysis for the direct buried copper grounding conductors, thermal resistivity testing, construction support, project management, and as-built drawings.

1.34 MWDC SOLAR PILOT PLANT WITH BATTERY ENERGY STORAGE

- Location: New Orleans, Louisiana
- Capacity: 1.34 MWDC/1.08 MWAC of energy
- Year Commissioned: 2016

This project is a new photovoltaic generating facility utilizing conventional polycrystalline PV modules in a NexTracker Single-axis tracking system. A 0.5 MWAC Battery Energy Storage System (BESS) is co-located, and for maximum flexibility is capable of charging from the grid or the PV system.

RRC optimized the PV plant design to achieve the lowest overall lifecycle costs and provided the land surveying, civil engineering, Stormwater Pollution Prevention Plan (SWPPP), geotechnical engineering, corrosion analysis, electrical engineering, pile loading testing, SCADA design and hardware engineering services, construction staking, construction support, permitting support, project management, and as-built drawings for the project.

4.39 MWDC PV SOLAR ARRAY – PHASE II

- Location: Fort Campbell, Kentucky
- Installed Capacity: 4.39 MWDC/3.1MWAC of energy
- Year Commissioned: 2016

The objective of this innovative solar project was to design a project that locally generated renewable solar electricity to enhance energy security and provide price stability for Fort Campbell and meet the Army's renewable energy goals. The project was divided into two phases with Phase II located on approximately 25 acres of a capped landfill.

RRC provided land surveying, preliminary civil engineering, geotechnical engineering, preliminary electrical engineering, preliminary SCADA design, and project management services for the Phase II project site. RRC optimized the PV plant design to achieve the lowest overall lifecycle costs.



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