Engineering Capability Statement

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HUBZone
Historically Underutilized Business Zone
CERTIFIED

Key Services

Engineering Business Unit:

- Electrical Design
- Mechanical Design
- Structural Design
- Drafting Services

Our Mission: *TerraGraphics develops holistic and resilient engineering and environmental solutions in partnership with our clients and communities worldwide.*

Service Description

TerraGraphics provides Electrical Design of low and medium voltage systems. TerraGraphics' staff experience includes electrical distribution system design for new installations as well as modification to existing facilities that meets industry codes and standards, and client-specific design criteria. Expertise includes low voltage (<600 VAC) power distribution systems design, short-circuit and arc flash incident energy calculations, load flow and voltage drop analysis, lighting analysis, motor control, grounding, and equipment specification. TerraGraphics' staff includes electrical engineers with an average of more than 20 years of experience in the areas of electrical design (pre-conceptual to definitive design), engineering support during construction, testing support, and general field support (walk-downs, as-builts, etc.).

TerraGraphics provides Mechanical Design for plants, facilities, and equipment. Expertise includes piping (ASME B31.1, B31.3, and B31.9), tanks and pressure vessels (ASME B&PV and API), heating, ventilation and air conditioning (ASHRAE), and nuclear applications (ANSI N13.1, ASME N509, N510, and AG-1). TerraGraphics engineers are experienced in developing design drawings, preparing equipment specifications, and conducting engineering analysis for all phases of design including scoping, conceptual, and definitive design. Design projects range from large production facilities to small specialized equipment. Experience includes equipment procurement, installation and site construction, as well as the start-up, testing, and operation of plants and facilities.

TerraGraphics Structural Design services include providing design and evaluation of equipment for natural phenomena hazards (NPHs). These services have included the stress and structural evaluation of various planned modifications and proposed enhancements of nuclear waste facilities, as well as the analyses of piping/equipment supports and restraints. TerraGraphics engineers are experienced in the application of finite element analysis and applying the applicable codes and standards (DOE-STD-1020, IBC, AISC, and ASCE 7).

TerraGraphics strives to provide our clients with the highest quality deliverables by performing these services under the auspices of a complete quality assurance program. Our quality assurance program is developed to meet the highest quality standards specified by the ASME Quality Assurance Program Requirements for Nuclear Facilities (ASME NQA-1). All design activities are conducted under the general guidance of this quality assurance program.

Example Projects

Electrical Design Projects

Hanford Tank Retrieval Systems – TerraGraphics engineers worked closely with WRPS to develop and design 480 VAC electrical distribution systems to power their retrieval equipment loads for numerous waste retrieval systems. The retrieval equipment loads consisted of motors (100 HP, 30 HP), heat trace, convenience power,

and instrument power. TerraGraphics engineers provided distribution system analysis for load flow, short circuit, arc flash, and lighting analysis.

WESF Stabilization and Ventilation Project – TerraGraphics engineers provided CHPRC with design and engineering services to extend 480 VAC power from existing switchgear to newly installed exhauster and ventilation equipment. TerraGraphics engineers provided short circuit analysis and arc flash analysis of the electrical distribution system modifications, as well as lighting analysis and design of the area lighting system.

Hanford Pump and Treat Systems – TerraGraphics engineers provided CHPRC with the electrical distribution system design for their groundwater treatment system. The design included extending 13.8 kV overhead lines to serve various buildings and equipment, as well as transforming power from 13.8 kV to 480 VAC, 208/120 VAC, and 240/120 VAC for facility loads. TerraGraphics engineers provided the distribution system design and load flow, short circuit, and arc flash analysis, as well as lighting analysis and lightning protection analysis.

Mechanical Design Projects

Hanford Waste Treatment Plant Shield Doors – TerraGraphics engineers provided the design of the drive system for the various horizontal and vertical traveling doors. The drive system for the vertical shield doors consisted of two vertically oriented roller screws with dual planetary roller nuts along with a thrust bearing for each screw - to carry the axial loads during the door vertical operation. The drive system is driven by a single electric motor which is directly mounted to a center primary worm gear drive reducer. This primary worm gear then drives two secondary worm gear drives which drive the two roller screws that actuate the door. The horizontal shield doors are opened and closed using a drive system consisting of a planetary roller screw and nut along with two end support thrust bearings to carry the axial loads during the door operation. The drive system is driven by a single electric motor which is directly mounted to an inline helical gear reducer.

Pacific Northwest National Laboratory (PNNL) Helium Reclaim System – TerraGraphics engineers provided engineering support for the upgrade of the cryogenic helium system at the Environmental Molecular Sciences Laboratory (EMSL) on the campus of PNNL. The cryogenic helium system is associated with the insulated, sealed enclosure containing a large magnet used for nuclear research. During operation of the magnet, helium was lost and not recovered. To provide a more energy-efficient system, a design was developed that would recover the helium gas and condense it to liquid for reuse. The system added a liquefier unit, a new liquefier compressor, helium buffer tanks, stationary dewar, and liquefier transfer piping.

Pacific Northwest National Laboratory (PNNL) Retrofit Steam to Hot Water Heating – TerraGraphics engineers provided engineering and design to complete the conversion of the 325 Building heating system from a steam system to a hot-water heating system. Due to gradual deterioration, hundreds of feet of aging steam pipe and associated equipment had been taken out of service over a period of years at the Radiochemical Processing Laboratory (RPL) in Hanford's 325 Building. Design and engineering tasks included:

- Modification of the existing steam boilers to hot water heating boilers;
- Installation of new primary and secondary pumping systems in the boiler;
- Installation of expansion tanks, chemical feed system and other hardware to support the hot water system;
- Upgrade of electrical service to the boiler annex;
- Interface of new heating water piping from the boiler annex to retrofitted 2nd floor heating system; and
- Coordination of boiler controls with RPL's Facility Management Control System (FMCS).

Structural Design Projects

Los Alamos National Laboratory – TerraGraphics engineers performed the design evaluation of potentially radioactive equipment (i.e., gloveboxes, piping, etc.) to a combination of operating and natural phenomena hazards (such as seismic and tornado wind) for design qualification to DOE PC2 and PC3 criteria.

Hanford Tank Farms – TerraGraphics engineers performed the structural evaluation of electrical racks and equipment. The components were designed to resist sliding and overturning due to the anticipated wind and seismic events. In addition, the racks were analyzed for stability and bearing capacity on the soil.

Company Data:

Office Locations	Contracting Specifics	
• Pasco, WA (Principal Office) • Richland, WA • Moscow, ID • Kellogg, ID • Boise, ID	• NAICS Service Codes: 541330 – Engineering 541370 – Surveying and Mapping 541620 – Environmental Consulting 541690 – Other Scientific and Technical Consulting Services 541990 – All Other Professional, Scientific, and Technical Services 562910 – Remediation Services 611430 – Professional and Management Development Training	• HUBZone Certified #15952 • DUNS #623036621 • CAGE Code 2S723 • Protégé firm to Washington River Protection Solutions, a DOE Tank Operations at Hanford