TIER 1™
UTILITY DESIGN, INC.

Tier 1 Utility Design, Inc.
Statement of Qualifications



SBA WOSB
Woman Owned Small Business

WOMEN OWNED™
CERTIFIED BY WOMEN'S BUSINESS ENTERPRISE NATIONAL COUNCIL

Who We Are

Tier 1 Utility Design, Inc. is a Certified Women's Business Enterprise (WBE) and Women-Owned Small Business (WOSB) full-service substation and transmission engineering and design firm.

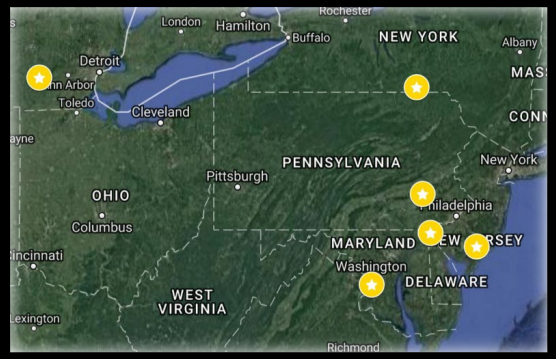


Trusted partner to the power utility industry providing qualified engineering, design, drafting, 3D modeling, LiDAR and construction services support. We have **over 300 subject matter experts** including engineers, project managers, designers, drafters, and construction support personnel located in our East Coast and Midwest office locations.

Our expertise is focused on substations, switchyards, and transmission & distribution projects with ranging from voltages 4kV through 765kV. LinkedIn



Tier 1's headquarters
Reading, PA



We are conveniently located in the Mid-Atlantic area with easy access to our clients across Pennsylvania, Midwest – Northeast with offices in Reading, PA; Allentown, PA; Vestal, NY; Alexandria, VA; Owings Mills, MD and Jackson, MI. Additionally, we have staff members working directly in client offices in several states.

Our Services



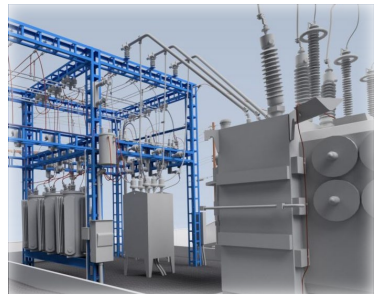
Substation
Engineering & Design



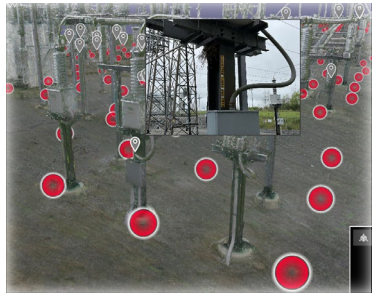
Transmission
Engineering & Design



Distribution
Engineering & Design



Intelligent
Design Services



LiDAR Scanning
& Processing



Project
Management

Substation Engineering & Design



Substations are a key component to delivering affordable and dependable power safely. At Tier 1 we offer complete Substation Services from Conceptual Design to Detailed Engineering to deliver the highest quality designs at reasonable costs to our valued clients.

Tier 1's experienced team of engineers and designers provide the quality and personnel resources for any Electrical Substation project from Brownfield to Greenfield stations. We apply our vast experience and expertise with a firm understanding of power industry infrastructure to help develop your substation project.

Conceptual, basic, and detailed engineering for substations including:

- Concept Design
- Substation Physical Design
- Gas Insulated Substation (GIS) Design
- Grounding Design
- Bus Design
- Lightning Protection
- Equipment Specifications
- Civil Design
- Structural Design
- Protection & Control Design
- System Studies & Analysis
- Wiring Design
- SCADA Design
- Reactive Power Compensation Systems
- Substation 3D modelling
- Optimization
- Structural & Foundation Design
- Material & Construction Specification
- Material Procurement
- Contract Administration
- Permit Assistance
- Owner's Engineer
- Relay Setting & Coordination
- System Modeling & Study Services
- Substation Automation / Control Engineering

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Representative Project Experience



Client: **Confidential**
Project: **TR 12.** Replaced one 230kV lattice tower, added all-new 230kV transmission line; Added new Transformer 12 (TR 12) to existing 69kV substation; New 230/69kV, 224 MVA Transformer with foundation and oil containment; New high & low-side disconnect switches; All new transformer and transmission line relaying; Temporary 69kV wood poles for low-side tap into existing ring bus position; Exceptionally small footprint to leave space for future GIS conversion.

Client: **Confidential**
Project: **Greenfield 115kV BAAH Substation, 345kV Upgrade.** Modified the existing 345kV BAAH configured switchyard, added a new 345kV control house, designed a new 115kV BAAH configured switchyard with a new 115kV control house. Provided all detailed design including: Civil/Structural, Electrical/Physical and Protection & Control.

- Added new 345/115kV, 300 MVA autotransformer to an expanded 345kV bay.
- Relocated existing 345/115kV, 300 MVA autotransformer into a new bus position with 345kV underground cable supply to new transformer position.
- New four bay BAAH configured 115kV substation with OH supplies from upgraded 345kV substation.
- New 46kV switchyard with outgoing underground conductors.
- Developed cutover packages to keep existing 345kV substation energized and cutover circuits/loads from the existing substation to the new substation.



Transmission Engineering & Design



Our team has expertise in overhead and underground transmission projects with voltages ranging from 34.5kV-500kV.

At Tier 1 we offer a complete range of Transmission engineering and design services for all aspects of line extensions, rebuilds, and major transmission additions to deliver the highest quality products at reasonable costs to our valued clients.

Overhead Transmission

- Transmission Line Ratings
- Transmission Line Reconductoring
- Planning
- Environmental & Planning Studies
- Route Selection
- Line Condition Assessment
- Aerial Line Survey Services
- Cost Estimating
- Optimization
- Structural & Foundation Design
- Material & Construction Specification
- Material Procurement
- Contract Administration
- Permit Assistance
- PLS-CADD

Underground Transmission

- Project Management
- Topographic Surveys
- Manhole Inspections
- Geotechnical Investigations
- GPR Services & Test Holes
- Routing Study
- Conceptual Design
- Detailed Civil & Electrical Design
- Grounding Design
- Cable Pulling Calculations
- Ampacity Calculations
- Electromagnetic Field (EMF) Study
- Environmental Studies
- Material & Construction Specifications
- Permitting Support
- Construction Drawings
- Construction Support

We support all phases of a project cycle. From conceptual design studies through final engineering and design, project management services, routing recommendations and identifying equipment and materials best suited to the development of the transmission system, we work to provide consistent quality with economic balance, investment efficiency, and reliability to meet our client's expectations.

Representative Project Experience

Client: **Confidential**
Project: **230kVOverhead Line.**
Replaced one (1) 230kV lattice tower with monopole (pictured to the right) for a reconductor project. Another all-new 230kV transmission line was also added. Relocated / replaced turning pole in Sub 401 yard.





Project: **New York State Underground Transmission Line.** Six (6) miles of a parallel 138kV underground line. The new Line project provided an additional 138kV source into the area, and its termination into a new 138/69kV auto-bank improved source reliability and capacity.

Project: **138kV Underground Transmission Line Relocation.** Relocation of approximately 2000 linear feet of an existing 138kV high pressure fluid filled (HPFF) underground transmission line. The project was completed in three (3) phases. Phase 1 study was the development and recommendation of possible routes. Phase 2 engineering consisted of topographic survey, electric utility manhole investigations, geo-technical investigations, development of composite utility base drawings, civil design drawings (for the proposed installation of new transmission line), test holes, soil borings, construction layout, coordination with sub-consultants and submission of final civil design package to the client for construction. Phase 3 included construction support resolving field issues and development of final record drawings for client's reference/mapping.

Project: **Transmission Switch Replacement.** Replacement of failed switch at a tap feeding a federal penitentiary. Due to limited outages, two new switch poles needed to be installed adjacent to existing switch pole so that the bulk of construction could be done while the line was energized. The site was rough mountainous terrain with long adjacent spans. Project utilized steel poles with concrete foundations.

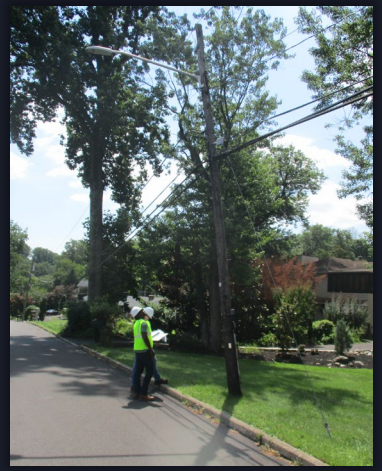
Distribution Engineering & Design

We fully understand the increased complexity and demand for highly reliable electricity from the ever-evolving power grid. Whether you are looking into upgrading existing outdated infrastructure, expanding to meet demand and load growth, or to improve your system's durability against severe weather, our team of experienced engineers and designers are ready to help provide quality service to your projects.

Overhead & Underground Distribution

- Site Visits & Data Collection
- Conceptual Design
- Complete Detailed Design Packages
- Automation
- Drafting Services
- Structural Analysis
- Make-Ready Engineering
- Building Investigations
- Utility Pole Inspections
- Manhole Inspections
- Topographic Surveys
- Boundary Surveys
- Project Management
- Power Outage Planning
- Circuit Clearance Requests
- Procurement
- Permitting Support
- Construction Work Order Packages
- Construction Management & Support
- Environmental Services
- Geotechnical Services (Soil borings, Test holes, Data collection, etc.)
- As-Built Documentation





Representative Project Experience



Client: **Confidential**
Project: **2001 Beach St., Philadelphia.** Provided Engineering and Design Services for New Business. The SOW included: Install 10' of 6-5” PVC duct from MH 259005 to new MH. Install 175' of 2-5” PVC duct from new MH to new terminal pole. Install 10' of 6-5” PVC duct from MH 258987 to new MH. Install 50' of 2-5” PVC duct from new or existing MH 258987 to new terminal pole. Install dual-wheel switch in existing or new MH. Install 3-ph terminal pole with 600A disconnects. Extend 450' of 4/0 AAC overhead primary.



Client: **Confidential**
Project: **Line – 800CR-RM3.** Installed aerial cable along Bodine Rd to remove open wire from ROW. Tier 1 provided services such as site visits, pole inspections, field data collection, PA Design One Call, electrical design drawings, bill of materials, work order packages, permitting support, IFC drawings and construction support.



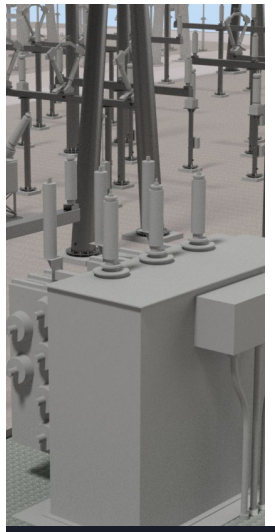
Client: **Confidential**
Project: **LTIIP North Wales-363 URD Replacement (Lewis Ln).** Provided engineering and design services for Underground Residential Development (URD) Replacement projects in Philadelphia and Montgomery counties. As part of this program, the utility will be replacing existing equipment to implement URD throughout the entire service territory. The bulk of the work includes installing new terminal poles, aerial cables, underground cables, electrical duct banks, manholes, switches, pad-mounted transformers and street and sidewalk restoration.



Client: **Confidential**
Project: **LTIIP Page Unit Substation Retirement.** Provided engineering and design services under Long Term Infrastructure Improvement Program (LTIIP). As part of the LTIIP commitment, will be retiring multiple substations, circuits, equipment throughout the entire service territory. The bulk of the work includes installing new terminal poles, aerial cables, underground cables, electrical duct banks, manholes, switches, pad-mounted transformers and street and sidewalk restoration.

Intelligent Design Services

Tier 1 has a strong team of in-house experts in Substation 3D modeling making us your trusted partner in 3D Substation Design implementation.



- **40+ in-house experts** in Substation **3D modeling utilizing Inventor** with the Substation Design Suite (SDS) add-on.
- **Workflow and library development** and setup.
- **Automate redundant tasks** for above-grade, below-grade and equipment design. E.G.: Automated lightning studies.
- Model-based automation **reduces errors and improves construction accuracy.**
- **Develop models** for all voltage levels and for all standard conventional bus configurations.
- Expertise with **integrating LiDAR scans** of existing stations with **3D model overlays of new and existing facilities.**
- Develop **full-structure assemblies**, as well as create **standardized drawings** based on client structure designs.

State-of-the-art Intelligent Design Software

- Autodesk Inventor 2023 or later (3D physical design)
- AutoCAD Electrical 2023 or later (automated wiring & controls design)
- Autodesk Vault 2023 or later (3D model storage library including association and revision management)
- Spatial Business Systems Substation Design Suite plugin for Physical (version 8.2.0 or later) Substation specific plugin for physical design
- Spatial Business Systems Substation Design Suite P&C Substation specific plugin for P&C design
- Leica Cyclone Register 360
- Leica Field 360
- Xeno Mobile

AUTODESK® INVENTOR®

AUTODESK® AUTOCAD® ELECTRICAL

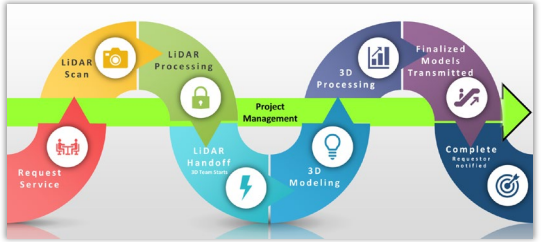
AUTODESK® VAULT



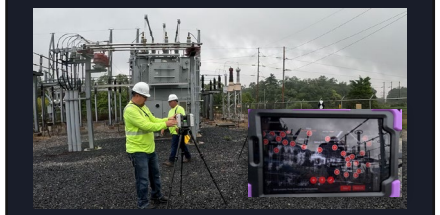
Full-Service Capabilities

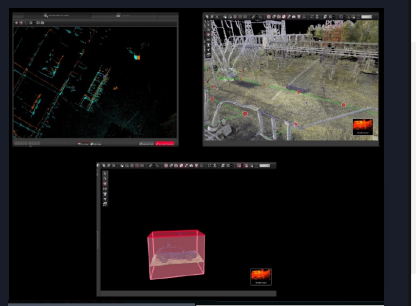
Typical LiDAR to 3D Model Processing Roadmap

- Step 1: Field Data Collection
- Step 2: Processing Captured Data
- Step 3: Finalizing Data for Inventor
- Step 4: Inventor As-built Creation
- Program Management
- Provide continuous support to our clients

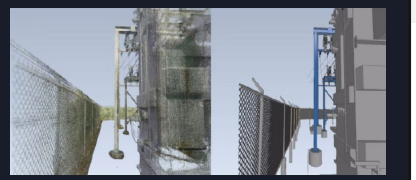


Fully customizable to meet your needs!









Step 1: Field Data Collection

- Based on substation equipment and structure locations a scan is initiated on either a tablet or manually on the scanner.
- Scanner produces a 360-degree digital representation of the current location and Geo-Tagging equipment nameplates are included.
- Tier 1 utilizes Leica equipment with typical scanning accuracy requirements of 1.9mm @ 10m; 2.9mm @ 20m; 5.3mm @ 40m

Step 2: Processing Captured Data

- Raw LiDAR data is imported into a secure location and uploaded into the processing software
- Data is adjusted and aligned until they match to create the 3D map of the location.
- Removal of any non-permanent objects from the scans.
- Finalize project to output desired file formats for 3D design creation.

Step 3: Finalizing Data for Inventor

- Remove any extraneous points which are not needed in the Recap File. (Trees, Birds, Distant Points)
- Modify Recap File
- In the case of a very large station, the point cloud will be broken up into smaller General Arrangements typically by Voltage

Step 4: Inventor As-built Model Creation

Program Management

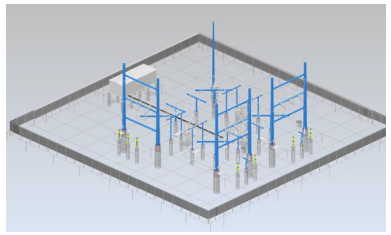
- Manage program from LiDAR scan to 3D as built creation, AutoCAD Electrical conversion and apply a universally accessible platform to report adoption and effectively implement collaboration between all parties.

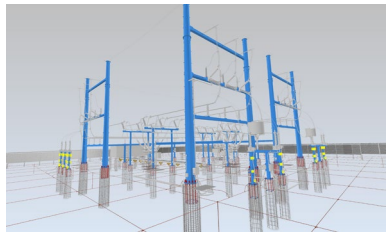
Representative Projects

Project: Greenfield Solar Substation, 115kV three (3) Breaker Interconnection

Scope: Design of a 115kV Greenfield three (3) breaker ring bus substation utility for a solar interconnection.

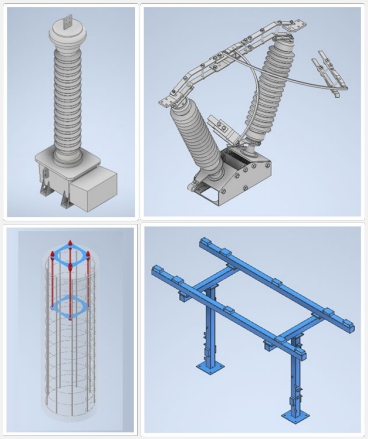
- Substation physical design using BIM process (3D).
- Full physical design and coordination with developer on interconnection T-line and site plan.
- Three-115kV breakers and manual disconnect switches.
- The new control house includes all relay protection design, communication automation schematics and panel interface using AutoCAD Electrical.
- Three-115kV line moabs and interlocks.
- Create one line diagram, AC and DC distribution one lines, three lines, DC schematics, communication.





Notes: 1) Physical design was developed in 3D utilizing a previously developed library of components – see model cut on the above. 2) Schematics & wiring developed using AutoCAD Electrical. The right figure shows an example of the Interface between the panels and the yard equipment.

Services Provided: Civil/Structural, Electrical /Physical and Protection & Control detailed designs.



Project: Standard Model Development

Scope: Creation of Standard Equipment based on the requirements of the Client.

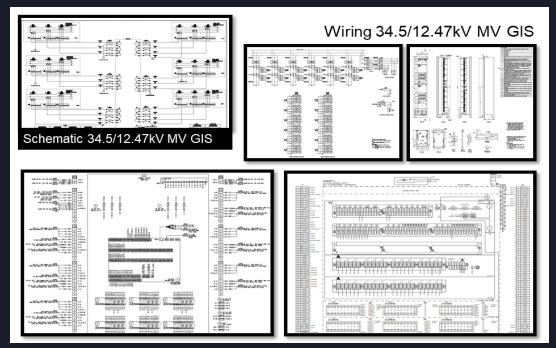
- Equipment modeled to vendor specifications while limiting the amount of graphical strain by reducing the number of features.
- Developed standardized Foundation models that can be modified quickly and easily to using parameters and forms.
- Using Inventor weldment assemblies and individual parts of the assembly, we can accurately calculate structure weight and a full structure galvanized weight for fabrication drawings.

Representative Projects

Project: Standard ACADE Drawings Development

Creation of Standard ACADE drawings based on the requirements of the Client.

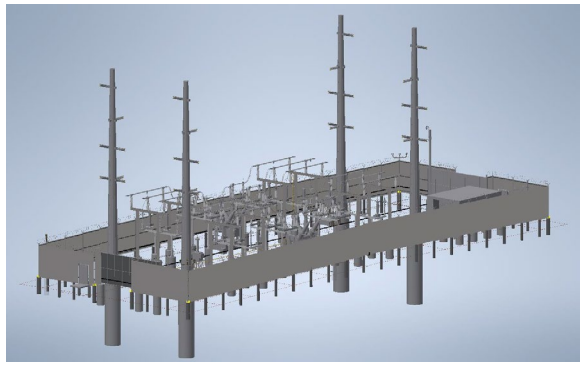
- 34.5/12.47kV MV GIS straight buses P&C standard design
- 115kV Ring Bus configuration P&C standard design
- Wiring 34.5/12.47kV MV GIS
- Transmission Line and Bus protection standard
- Creation of standard and AutoCAD Electrical Manual based on the requirements of the Client
- Develop Manual for design substation using AutoCAD Electrical/SDS
- Creation of Standard P&C and RTU drawings based on the requirements of the Client



Project: 138kV Standard In-Line Switchyard

Scope: New greenfield standard transmission substation

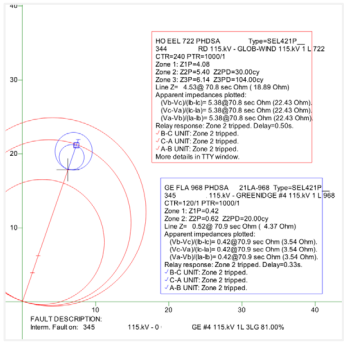
- Designed to fit inside the Transmission Right of Way
- Combination of new and existing standard components and structures



Project: As-Built Model Leveraging LiDAR information



Protection, Control, & Automation



Protection Schemes

- Breaker Failure Protection
- Bus Differential
- Capacitor Bank Protection
- Distance Protection
- Line Differential
- Over/Under Frequency and Load-Shedding Protection
- Over/Under Voltage Protection
- Over-current Protection
- Pilot Relaying Protection
- Bank Differential
- Bank 3V0 Protection

Relay Settings and Programming

- Extensive relay experience
- System Studies for setting calculations
- Computer Aided Protection Engineering ASPEN, CYMDIST, ETAP
- Wide range of relay models & manufacturers
  - Electromechanical Relays
    - GE
    - Westinghouse
  - Digital Relays
    - SEL
    - GE
    - Basler
    - Beckwith
    - Siemens

SEL	251 411L 2411	311L 651R 2440	351 751 3530	351A 787	421 2240
GE	B30 JBC	B90 JGBC	C70	IAC	IFC
Westinghouse	CO-7	CO-8	CO-9	CO-11	
Basler	BE1-51	BE1-25	BE1-27/59		
Beckwith	2001C	2001D			
Siemens	7SJ512				

Substation Automation / Control Engineering

Automation Design & Programming

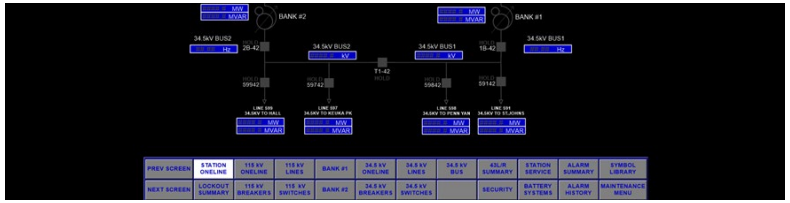
- DNP 3.0 or Legacy protocol
- Remote engineering access
- Ethernet switches

HMI CPU Programming

- HMI Hardware
- HMI Software
- HMI Screens
- HMI Control Capabilities

RTU Design & Programming

- RTU Hardware
- RTU Data Map
- RTU Software
- Control and visualization capabilities



Representative Project Experience



Project: Confidential Substation, Transformer Addition. This project added second 115-34.5kV transformer in parallel with existing transformer, a new 115kV 4 - breaker ring bus, and expanded the 34.5kV system to include a second 34.5kV bus and a normally closed tie breaker. A new control house was installed to house a fully upgraded relay system for the entire substation. Scope of work included all necessary protection setpoint calculations, relay coordination studies, logic diagrams, relay setting files, DNP maps, RTU configuration, HMI design and configuration using GE Cimplicity software, and substation fiber ethernet LAN network configuration.

Project: Confidential Substation

Produced detailed design, relay and SCADA settings packages for the 69kV/13.8kV Grid Modernization project. Protection and control scope included upgrading the legacy substation LTC controller to a Beckwith M-2001D, installation of a new SEL-3530 RTAC to become the station's Master RTU, while keeping the existing SAGE 2400 as a sub-RTU, installation of an SEL-2730M ethernet switch to incorporate the new relays into the corporate LAN, and upgrading of the 13.8kV feeder protection from electromechanical relays to an SEL-351A as the primary protection and an SEL-501 as the backup.

Project: 12kV Distribution Substation Upgrade Program

Provide detail design and relay setting packages for a number of 12kV distribution substations in support of utility client's 2024 distribution substation upgrade program. Typical scopes include:

- Feeder relay replacements which would replace legacy relays to dual SEL-751Rs.
- Substation rebuilds that include the replacement of all feeder relaying as well as the addition of transformer and bus differential protections.
- Evaluation and selection of transformer bank high side fuse protection to ensure proper short circuit protection and coordination with downstream relaying

CAPE is being utilized to perform short circuit analysis and review coordination with surrounding transmission protection relays as required. CYME is being used for coordination studies on the 12kV feeder.

Health & Safety



Tier 1's uncompromising commitment to the safety of its employees, customers, and community is crucial to our culture.

We know that safety must be integrated into our designs for the ultimate health and welfare of those who will utilize and operate the facilities we design.

Tier 1 complies with all applicable safety and security laws and regulations such as:

- The Occupational Safety and Health Act (OSHA)
- The EPA (Environmental Protection Agency)
- The DOT (Department of Transportation)
- NECA (National Electrical Contractors Association)
- ISO (International Organization for Standardization)
- Project Owner Environmental Health & Safety Rules
- All other applicable federal, state, and local safety and health regulations

OSHA® Occupational Safety and Health Administration

DEPARTMENT OF TRANSPORTATION · UNITED STATES OF AMERICA

NECA NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Tier 1's Health and Safety Manual was developed as a checklist to guide and assist our team so they understand their individual and collective responsibilities for the safety of themselves, the safety of other team members, the contractors, and the general public while working in the office or visiting a client site.


TIER 1
UTILITY DESIGN, INC.

Health & Safety Plan
Rev. 3
January 6, 2024

Tier 1 Utility Design, Inc.
6 Commerce Drive
Reading, PA 19607

Proprietary Information
The information contained herein is proprietary information belonging to Tier 1 Utility Design, Inc. and should not be copied, shared, or disseminated to any third party without written consent from Tier 1 Utility Design, Inc.

Quality Assurance

Tier 1 strives to provide deliverables of the highest quality such that we will be your engineer of choice (EOC) for any future projects.

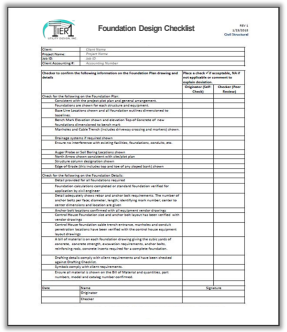


Our Quality Assurance (QA) is a multi-layered quality program with checklists and milestone checks. At the basic level the QA program consists of self check, 100 % independent peer review, constructability checks and check list completion and documentation.

QA starts with a culture where everyone is responsible for the quality of their work and is cognizant of the impact on the rest of the organization. Should an error or mistake arise, we perform a root cause analysis in order to take corrective action; learn from the mistake; and ensure it does not happen again in the future. Tier 1 has quality check lists in place that are applicable for each stage of project development.

Our checklists are routinely revised to accommodate specific client requirements and includes items such as:

- Structures
- Foundations
- Grounding
- Conduit/Trench
- General Arrangements
- Single Line Diagrams
- Three Line Diagrams
- Control House
- Relay Single Line Diagrams
- Relay Three Line Diagrams
- Schematics
- Wiring Diagrams
- Fault Studies, Relay Coordination, Relay Settings
- SCADA/RTU Points List
- Integration/Communications System Single Line
- Drafting
- 3D/ACADE
- Transmission/Distribution


Foundation Design Checklist

> "Quality is never an accident. It is always the result of intelligent effort."

TIER 1™
UTILITY DESIGN, INC.

As a diverse firm, all business spend with Tier 1 will be 100% diverse. We are committed to working and collaborating with other local & diverse contractors.

100%
Diverse Content

Third-Party certified by Women's Business Enterprise National Council (WBENC)

- Certification as a Women's Business Enterprise (WBE)
- Women-Owned Small Business (WOSB) Certification
- Certified WBE by Supplier Clearinghouse

WOMEN OWNED™ CERTIFIED BY WOMEN'S BUSINESS ENTERPRISE NATIONAL COUNCIL

SBA WOSB Woman Owned Small Business

Supplier Clearinghouse • Pursuant to CPUC General Order 156 • Est. 1989



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