REMEDIAL DESIGN PLANS

Former Shell Service Station
1230 14th Street
Oakland, California

DUAL PHASE EXTRACTION AND AIR SPARGE SYSTEM

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REMEDIAL DESIGN PLANS

Former Shell Service Station
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Introduction

The enclosed drawings contain information for the installation of a Dual Phase Extraction and Air Sparge System. The following drawings are presented for construction and installation purposes.

Figure No.	Title
-	Title Page
A	Dual Phase Extraction and Air Sparge System Specifications
1	Site Map
2	Remedation System Piping Layout
3	DPE and AS Piping Details
4	DPE and AS System Manifold Details
5	Sanitary Sewer Connection Details
6	Compound Detail
7	Equipment Anchoring Details
8	Electrical Single Line Diagram
9	Process and Instrumentation Diagram

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INTRODUCTION

The enclosed specifications contain information for the construction and installation of a Dual Phase Extraction and Air Sparging (DPE/AS) system (the "System"). The following drawings depicting the System are presented for construction and installation:

Figure No.	Title
-	Title Page
A	Dual Phase Extraction and Air Sparge System Specifications
1	Site Map
2	Remediation System Piping Layout
3	DPE/AS Trench Details
4	DPE/AS System Manifold Details
5	Sanitary Sewer Connection Details
6	Compound Detail
7	Equipment Anchoring Details
8	Electrical Single Line Diagram
9	Process and Instrumentation Diagram

This package also contains the following specifications required for construction and installation:

General
Excavation/Trenching
Piping
Electrical
Equipment
Equipment Enclosure

SPECIFICATIONS

General

1. The selected Contractor shall verify all dimensions and site conditions before starting work. The Consultant's Project Manager shall be notified of any discrepancy.

2. All materials used for construction of the system shall be new unless otherwise noted.

3. Unless otherwise specified, all necessary construction permits and inspections, including permits for electrical, mechanical and civil construction, shall be obtained by the Contractor. Consultant to obtain any required air or process water discharge permits to construct/operate the System.

4. The Contractor shall restore all excavated surface areas to match existing.

5. All construction shall be clearly marked with barricades, cones, plates, or other approved safety markers to restrict access and provide a safe work environment for the Contractor and the site occupants.

6. A pre-construction meeting between the Contractor and the Consultant will be required before any work begins. The meeting will be held at the site.

7. The Contractor shall provide an electrician for one day during start-up of the equipment.

8. The Contractor shall warranty all Contractor-provided materials and construction for a period of not less than one year. All defects shall be corrected at the Contractor's expense.

Excavation/Trenching

1. If applicable, all excavated soil shall be monitored by the Consultant in accordance with local regulations for contaminated soil. If hydrocarbon-impacted soil is detected, the soil shall be stockpiled in an area designated by the Consultant and covered with plastic sheets if necessary. The Consultant will sample the excavated soil for hydrocarbons. Disposal/treatment of hydrocarbon-impacted soils will be the responsibility of the Consultant, or performed as extra scope by the Contractor, if authorized. The Contractor shall dispose of all hydrocarbon-free soil and construction debris off-site including any pavement removed during trenching.

2. Where piping is installed below ground, the pipe shall be buried in a trench or excavation at a minimum depth of 18 inches to the top of the pipe, unless otherwise stated. If exacavation must remain open after normal work hours, it shall be cordoned off with barricades and caution tape. Contractor shall minimize disruptions to vehicular traffic and access to the buildings on site and shall provide trench plates to cover the excavation/trenches as necessary to facilitate safe vehicular movement and building access.

3. Process piping trenches and excavations shall be backfilled with clean sand from 2-inches below the piping to 2-inches above the piping. Native material shall be used as backfill material from 2-inches above the piping to the bottom of the class II roadbase fill. Thickness of the class II roadbase fill to match existing.

4. The Contractor shall take all necessary precautions to prevent damage to underground utilities, piping and adjoining structures. Contractors shall provide utility line locator prior to start of contruction. Contractor shall be responsible for notifying Underground Service Alert prior to conduting any subsurface work.

5. Trenching and excavation is expected through concrete and asphalt surfaces.

-Excavation shall be saw cut to provide a square vertical joint for repaving.
-Contractor shall make every effort to utilize existing edges of pavement when saw cutting to reduce unnecessary saw cuts.
-Pavement removed from trenches or other excavations shall be replaced with new material to match existing.
-When resurfacing with concrete, 3,000 psi reinforced concrete shall be used to match existing thickness. Reinforcing shall be No. 4 rebar tied into the existing slab staggered on each side of the trench on 24-inch centers placed at mid-height.
-Contractor shall use Aqua Crete or equivalent sealent to seal the concrete joints.
-Contractor shall return to the site after one week and apply asphalt joint sealer to all areas that were trenched and replaced.

Piping

1. All underground process piping shall be schedule 40 PVC (unless otherwise indicated) and all aboveground piping shall be schedule 80 PVC (unless otherwise indicated). Contractor to use low volatile organic compound emitting primers and solvents when installing glued slip fittings.

2. When connecting to or bypassing existing underground piping the Contractor shall verify the existing piping path.

3. Where piping is routed above ground, the piping shall be supported by uni-strut pipe supports and clamps. The uni-strut support shall be fastened to the wall/fence posts or mounted on a base that is secured to the ground surface.

4. All process lines and conduits shall be free of dirt and debris after installation. Any secondary containment lines shall be cleared as necessary prior to the installation of the primary line. Contractor shall install pull lines in all secondary containment lines. Pull lines shall consist of 1/4" braided nylon rope.

5. All DPE lines shall be pressure tested to 5 psi and installation approved by the Project Engineer prior to backfill. There shall be no noticeable change in pressure after 1 hour or any visible leak indications. Pressure testing shall be witnessed by a Consultant's representative. No testing will be conducted through instruments or eqiupment.

6. When installing lateral subsurface DPE piping, lateral piping shall be sloped towards manifold at a ratio of 1/32" per 1' of piping whenever possible.

7. Underground piping can be layered on top of each other as necessary with appropriate spacing between layers.

8. Contractor shall install 18-gauge tracer wire in all trenches to assist in locating subsurface piping in the future.

Electrical

1. The Contractor shall furnish and install all necessary equipment to connect to the local electrical service and route the appropriate electric service to the system control panel(s). The Contractor shall also furnish and install all necessary equipment to connect the system control panel(s) to each unit of process equipment requiring electric power. The Contractor shall verify operation of all electrical equipment upon completion of the work. Contractor may reuse existing panel and equipment if deemed of sound condition.

2. The electrical service shall be equipped with a power meter and weather tight main panel with lockable shut-off switch.

3. All electrical work shall be completed in accordance with the most recent edition of the National Electrical Code (N.E.C.), and the local building and fire department requirements. Any drawings required for permits other than those presented herein will be responsibility of the Contractor and shall be reviewed by the Consultant prior to use.

4. If necessary, the installation within the equipment enclosure shall comply with a Class 1, Division II environment as per NEC and local codes. All wiring connectors, conduit, and Contractor supplied equipment shall comply with Class 1, Division II requirements, if required by the NEC and local codes.

5. Electrical wiring shall be contained in rigid conduit and routed along the enclosure floor and walls or buried as allowed by local code.

Equipment

1.Equipment listed below will be supplied by the Consultant or Consultant's suppliers. All other required equipment and parts shall be the responsibility of the Contractor.

-Trailer-mounted Thermal/Catalytic oxidizer and vacuum blower
-Two 1,000 pound Carbon Vessels
-5 Horsepower Air Compressor

Equipment Enclosure

1. Contractor to install the following signage on all sides of the enclosure(s):

a. No Smoking
b. Proposition 65
c. Others as per local code

2. Contractor to supply and install a fire extinguisher in accordance with local fire codes.

Construction Schedule

1. The Contractor shall confirm a construction schedule with the Consultant's Project Manager at least 72 hours prior to any work at the site.

2. The proposed construction schedule shall be presented in a time line format showing estimated start date, duration and completion times for each activity. Any deviation from the originally proposed schedule must be communicated to the Consultant's Project Manager within 24 hours.

As-Built Drawings

1. Upon completion of system installation, the Contractor shall provide As-Built drawings (Red Lines) showing actual installation, details, dimensions and other pertinent features that vary from the original design.

Safety/Clean-up

1. The Contractor (including workers and subcontracotrs) shall read, sign and abide by the Consultant's Site-Specific Health and Safety Plan piror to beginning any work each day.

2. Prior to departure from the site, the Contractor shall make sure that the work area is clean and orderly.

3. The Contractor shall contain loose debris and store construction material on a daily basis prior to departure from the site to provide a clean and orderly work area.

4. If necessary, Contractor shall make available the necessary equipment and materials to prevent run-off of sediments from trenching activities in to the storm drains.

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Figure

A

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1230 14th Street
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Dual Phase Extraction and Air Sparge System Specifications

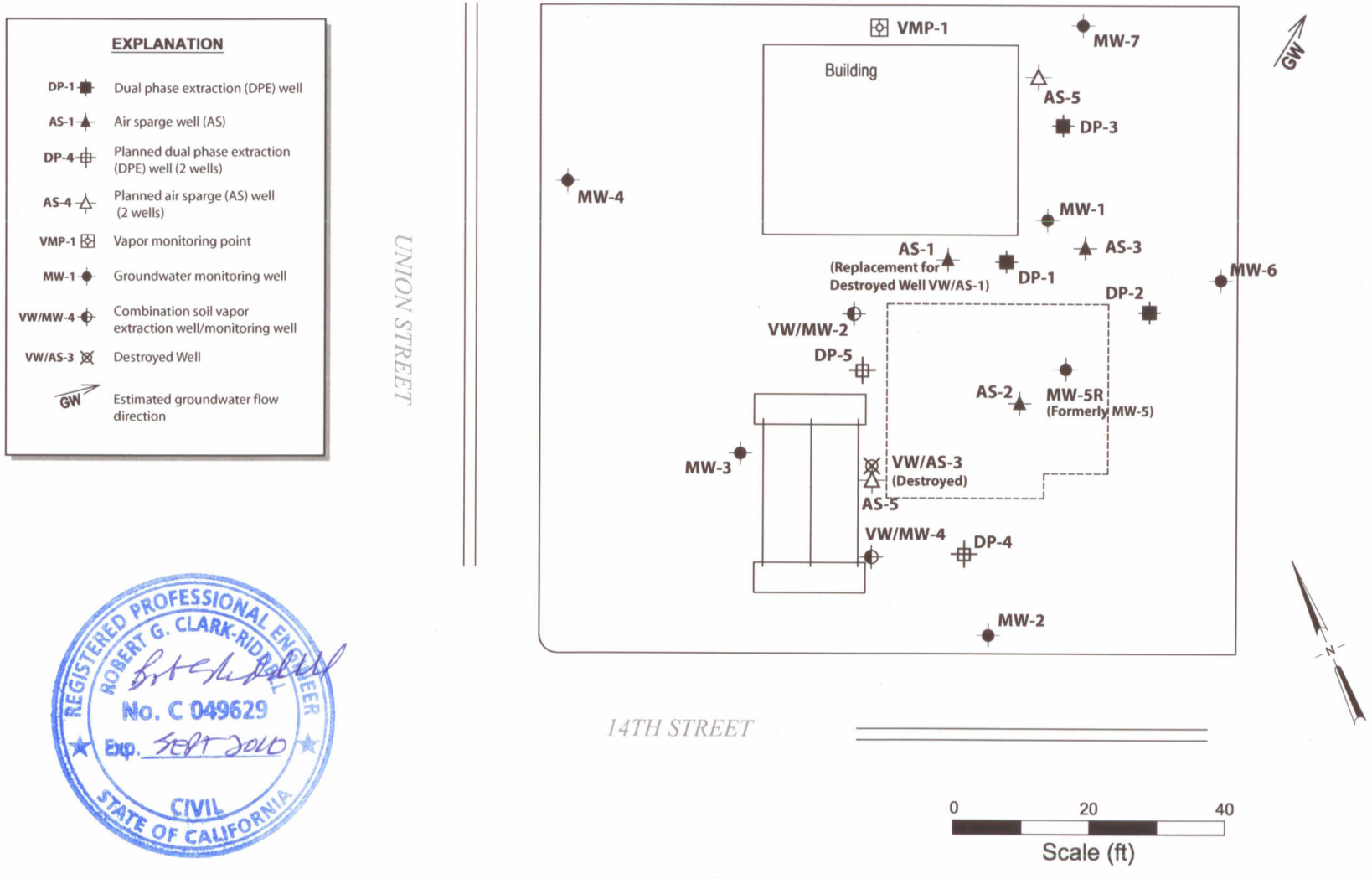

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FIGURE
1

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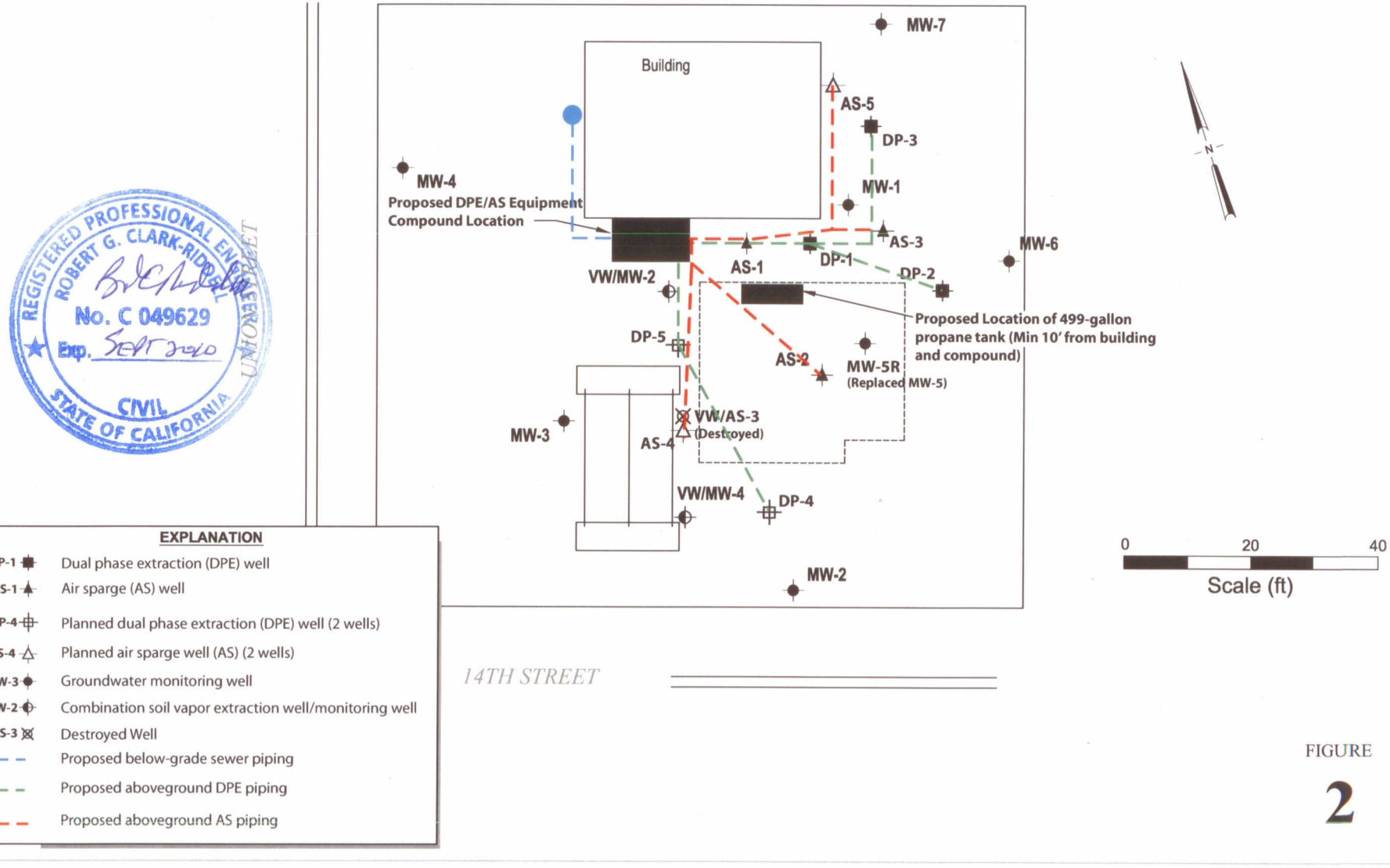
Site Map



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UNOFFICIAL SHEET

FIGURE

2

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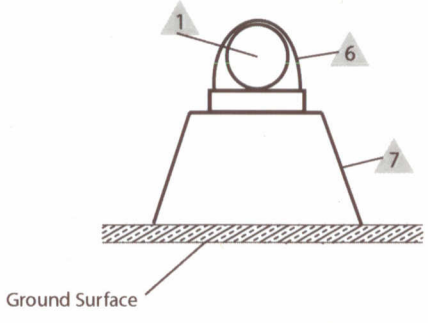
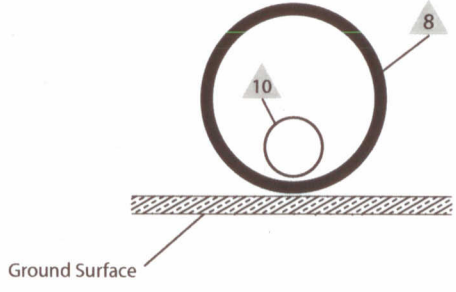
Remediation System Piping Layout

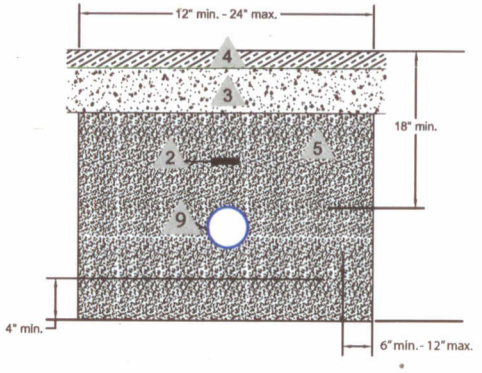
3/A **Aboveground DPE Piping from Equipment Location Wells DP-1 through DP-5** (Not to scale)



3/B **Aboveground AS Piping from Equipment Location to Wells AS-1 through AS-5** (Not to scale)



3/C **Piping from Equipment Location to to Sanitary Sewer Cleanout** (Not to scale)



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EXPLANATION

1	2" Dia. SCH 40 PVC pipe, painted white	6	Anchoring strap, attached to pier block
2	18 Gauge Tracer Wire	7	Concrete pier block, placed every 5'
3	Class 2 aggregate base	8	3" Corrugated drain pipe
4	Asphalt/Concrete to match existing	9	3" SDR 35 PVC sewer pipe
5	Backfill material - sand from 2" above piping to 2" below piping	10	1/2" OD High-pressure polyethylene tubing

FIGURE
3

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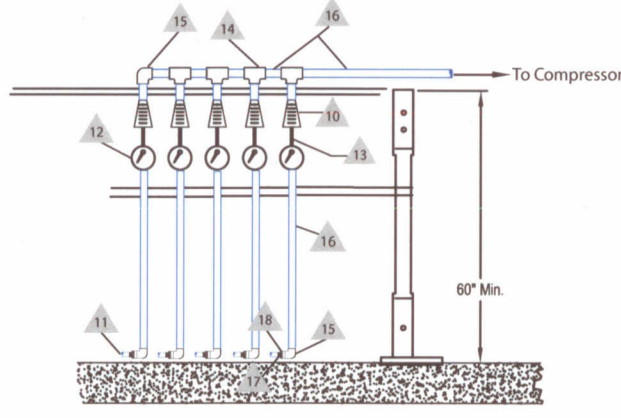
DPE and AS Piping Details

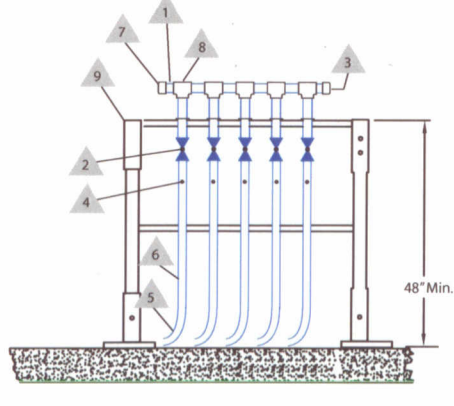
4/A **AS Manifold**

Not to Scale



4/B **DPE MANIFOLD**

Not to Scale



NOTES:

1. 4" Dia. SCH. 80 PVC vapor extraction piping
2. 2" Dia. SCH. 80 PVC ball valve, typical of 5
3. 4" Dia. SCH. 80 PVC slip cap
4. 1/4" NPT Male x Hose PVC labcock sample port, typical of 5
5. 2" Wide radius 90° PVC elbow
6. 2" Dia. SCH 80 PVC pipe
7. 4" Dia. SCH 80 female adaptor
8. 4" x 4" x 2" SCH. 80 PVC tee
9. Unistrut with mounting clamps for piping
10. 0-10 CFM Flow meter - Grainger Item #4UM97
11. 1/2 OD High pressure polyethylene tubing
12. 0-30 PSI Pressure gauge - Grainger Item #2C515
13. 3/4" X 3/4" X 1/4" Galvanized Reducing Tee
14. 3/4" Galvanized Tee
15. 3/4" Galvanized Elbow
16. 3/4" Galvanized Pipe
17. Brass Compression Tube Fitting (1/2" OD tube X 1/2" NPT)
18. 3/4" X 1/2" Galvanized Reducing Bushing

FIGURE
4

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DPE and AS System Manifold Details

5/A Sanitary Sewer Connection

No Scale

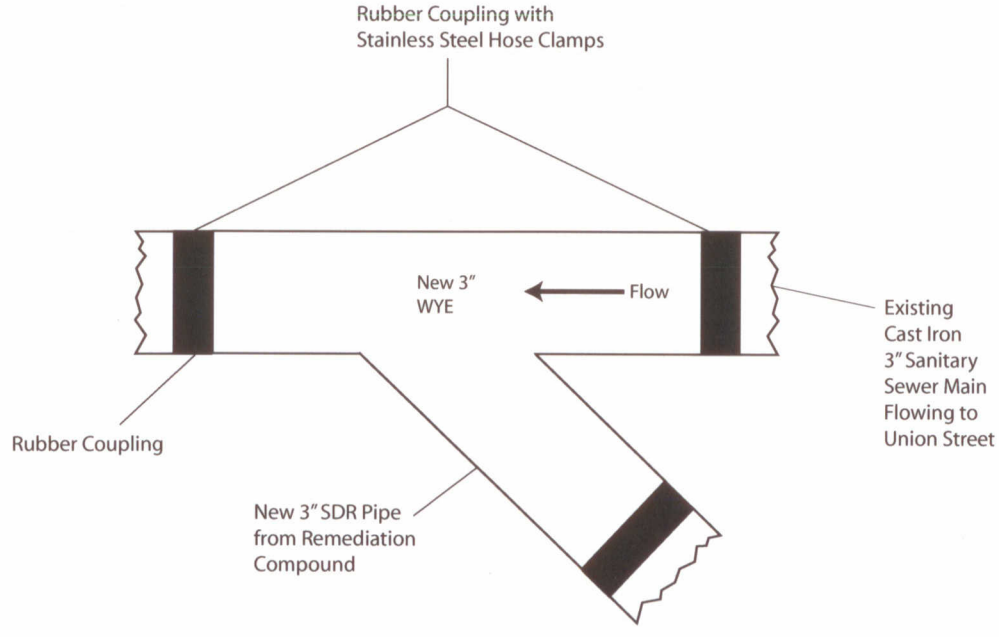

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Figure

5

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Sanitary Sewer Connection Details

Explanation:

1. Solleco 400 TCAT Thermal Catalytic Oxidizer trailer
2. DPE Manifold 5 pipes - 2" dia. w/4" spacing between pipes
3. Conduit stub-up, connected to panel via liquid-tight flexible conduit
4. Filter bag housing for trade size 2 filter bag
5. 1,000 lbs. granular activated carbon
6. 2" Electrical conduit from service panel (above ground)
7. Propane gas line
8. Propane connection at oxidizer
9. 4" Spiralite 115 hose from manifold to fitting on KO tank
10. 3" SDR 35 sewer line (underground)
11. 2" Spiralite 115 discharge hose
12. Water totalizer meter
13. Location of 120v GFI receptacle

Notes: All electrical installed per NEC standards. All plumbing installed per UPC standards.

Compound dimension approximate 13' x 26'

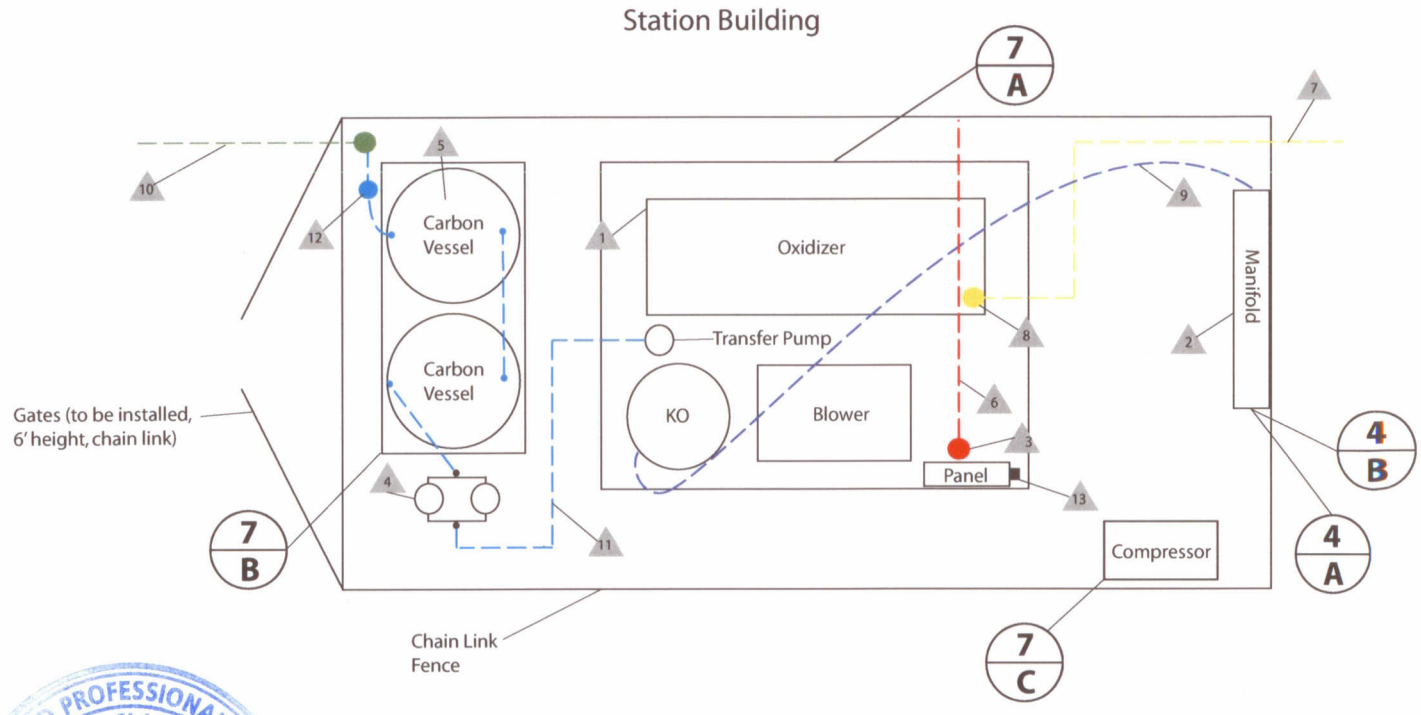

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Figure

6

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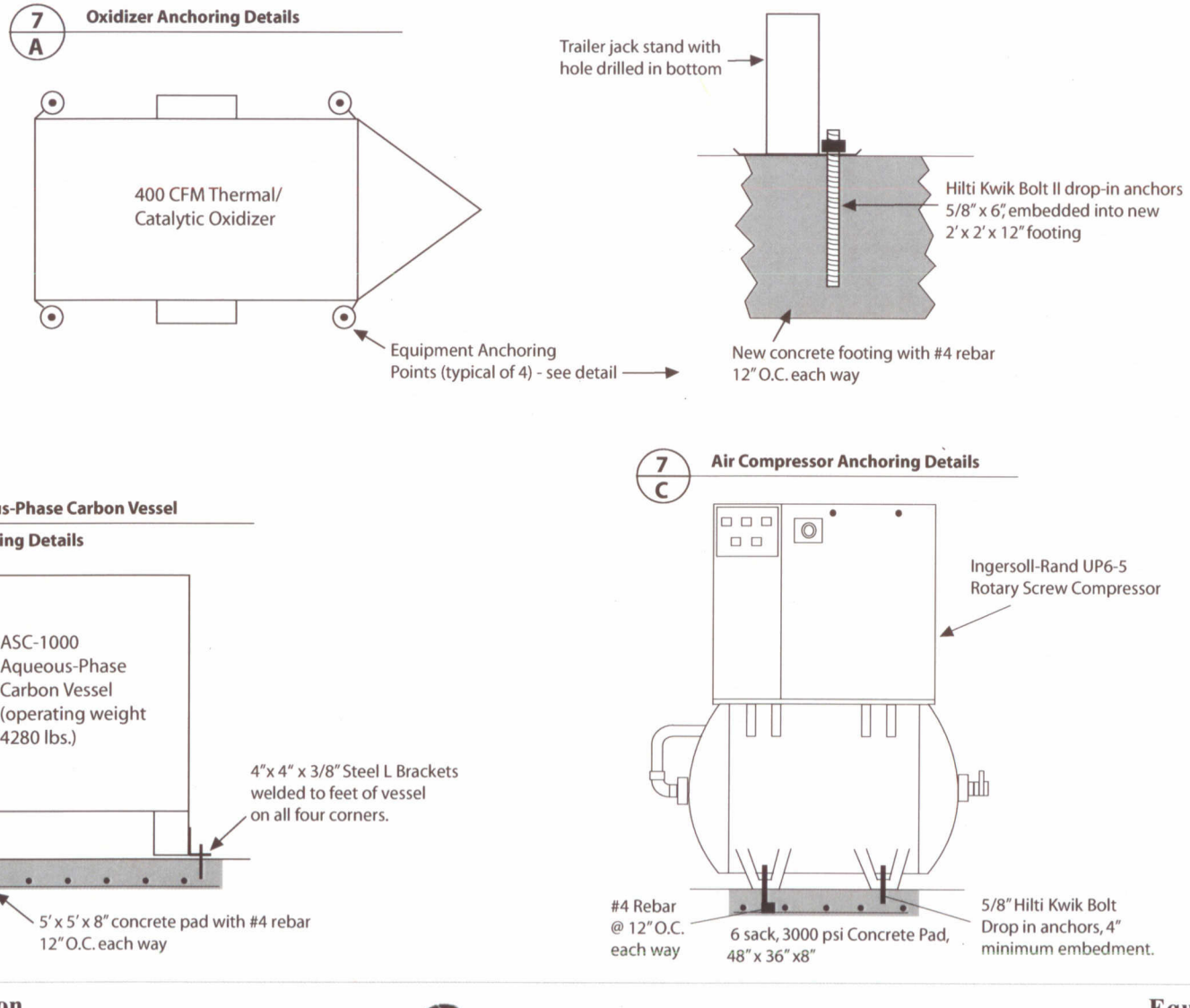
Compound Detail



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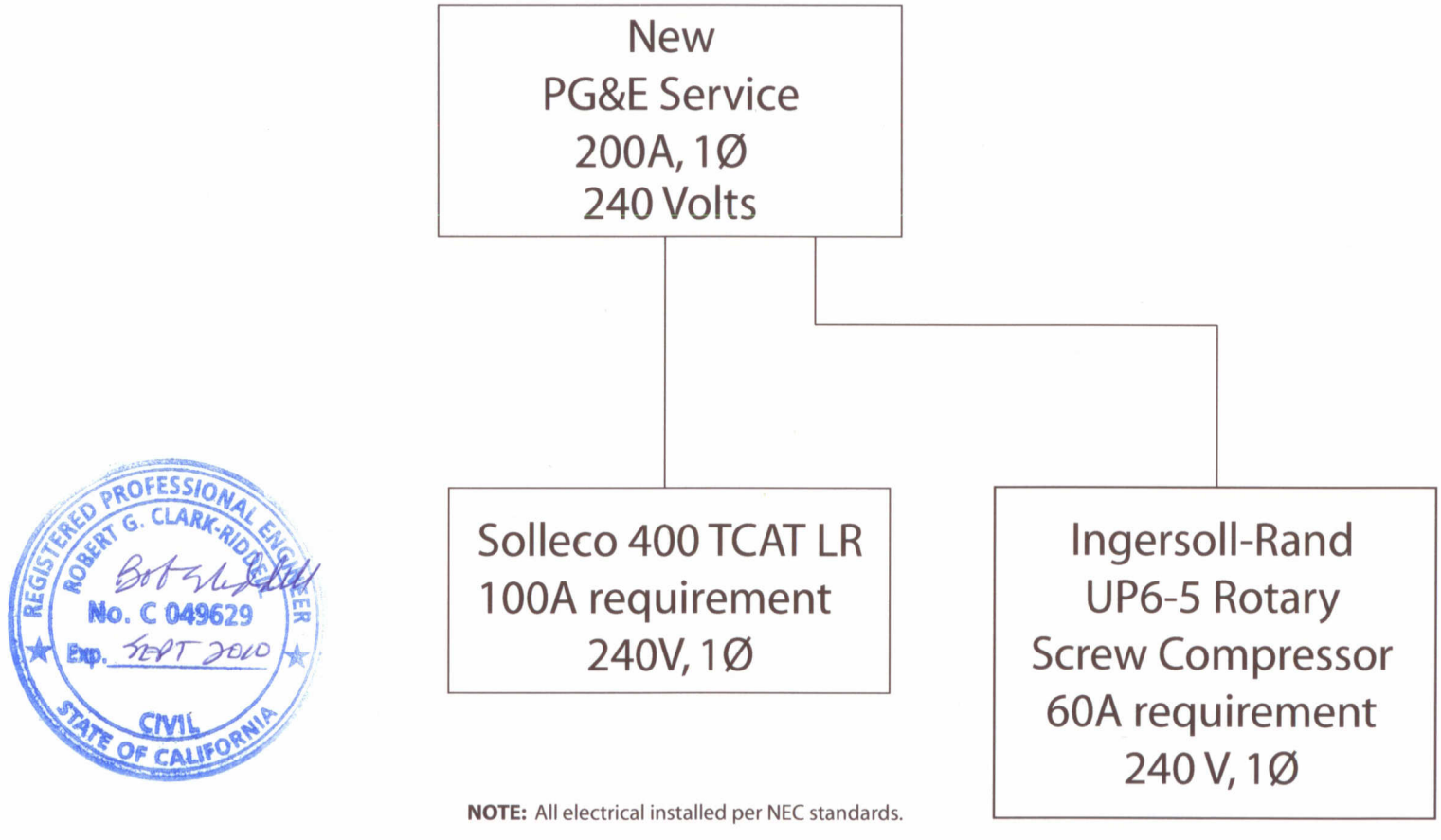
Equipment Anchoring Details



NOTE: All electrical installed per NEC standards.

FIGURE

8

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Electrical Single Line Diagram

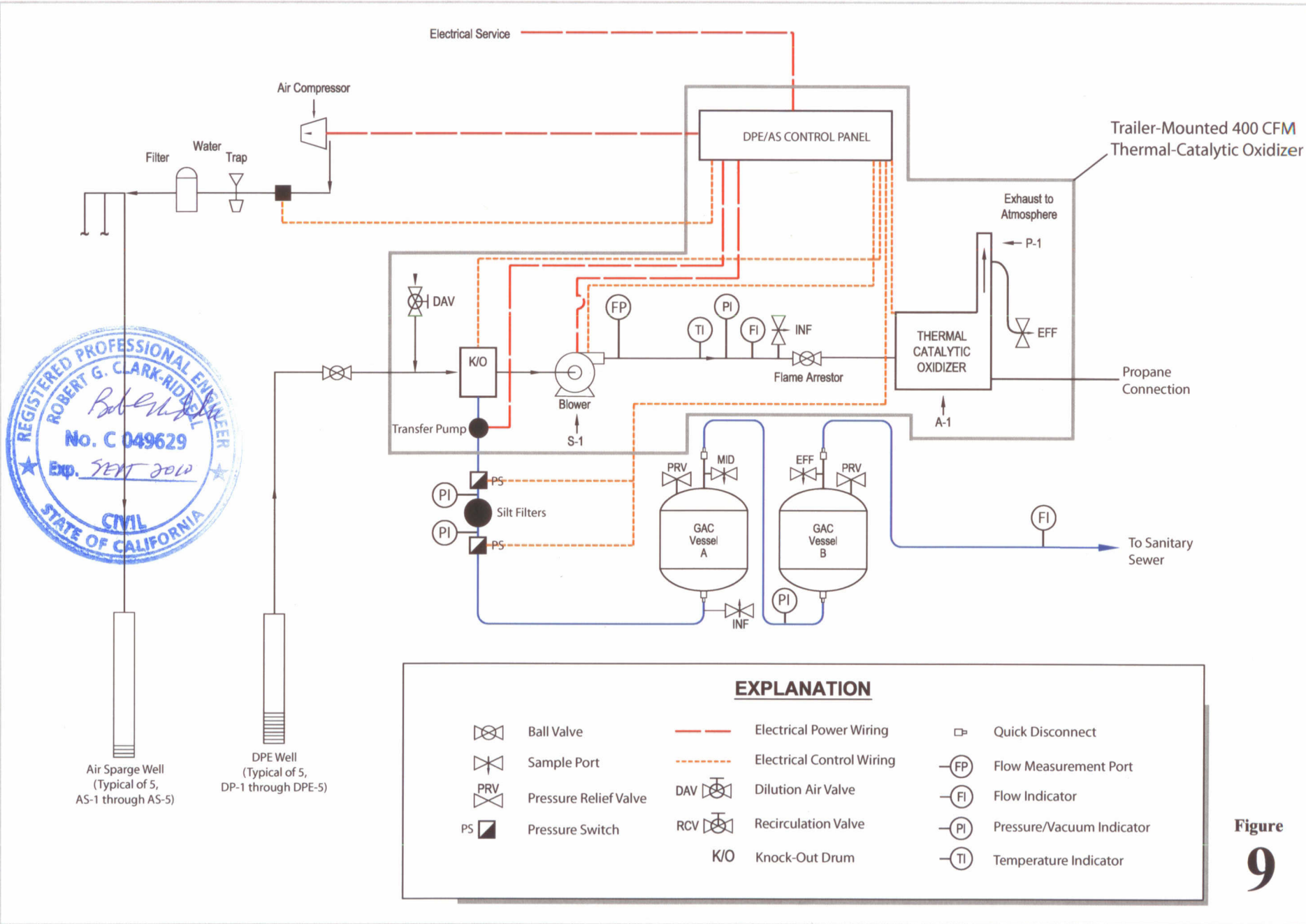

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Figure 9

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DPE/AS System Process and Instrumentation Diagram