



Seattle City Light Drafting & AutoCAD Requirements for Consultants

Reviewed and Approved by:

 4/8/2013
Mike Haynes, P.E., Power Production Director

 4/5/2013
David W. Holmes, Power Production Technical Resources Manager
Phone: (206) 615-0943

Introduction:

The purpose of Drafting and AutoCAD Requirements for Consultants is standardization of Seattle City Light (SCL) drawing information and consistency for all new drawing sets. Adherence to these title and format standards is required in order for Seattle City Light's Electronic Document Management System (EDM) to integrate new drawings into an archive of more than 100,000 design drawings.

Softwares:

Seattle City Light currently accepts consultant design drawings created by the following Autodesk applications.

AutoCAD
AutoCAD Map 3D
AutoCAD Civil 3D
AutoCAD Electrical
AutoCAD Utility Design (*)
Autodesk Revit (*)

- Actual software version required by SCL will change from time to time, therefore please refer to the specific project contract or contact the Project Manager and SCL Technical Resources for actual version and submission requirements.
- All new projects must use the latest version of the SCL drawing template, and supported blocks. Please coordinate with SCL Technical Resources for the current drawing template(s) and supporting files prior to beginning any SCL projects.
- Drawings submitted to SCL that are developed using software which has the (*) designation will be required additional standard requirements. Contact SCL Technical Resources for more details.

General Requirements:

- State of Washington professional engineer, architect, or land surveyor stamp(s) shall be placed in a block immediately to the left of the "Endorsements".

Drawings provided by the consultants shall be identified by the consultant's logo and address, (See **Figure 6** for placement of Consultant's logo and stamp). Electronic engineer's or architect's stamps shall not be included in the electronic file unless agreed to by SCL.

- "Xrefs" or External References drawings shall not be used unless approved by SCL. However, their use is permitted during design phases, but shall be bound as blocks to each individual drawing file prior to submitting final design AutoCAD files to SCL. The consultant shall submit only one layout for each drawing file.
- Three dimensional (3D) drawings shall not be used unless specifically authorized by SCL.
- All drawings become property of Seattle City Light when the work is completed, unless expressly agreed otherwise by SCL.
- SCL will provide the consultant with an AutoCAD drawing template file (GenPS.dwt) which contains SCL standard attributed title blocks (in paper space) for "A", "B", "C", and "D" sizes. SCL will also provide the drawing numbers, the subject headings, and location headings. Under NO circumstances shall the block for SCL title border be modified and/or exploded. For drawing title guidelines and examples, see **Figure 6**. Compliance with these SCL title block and format details are required for consultant's drawings to be accepted by SCL.
- Consultant shall avoid using background images (raster images) such as jpeg, tiff, pdf, png in drawings, if possible. If images are required, they shall be inserted into the drawings as embedded objects by using Insert OLE. If images cannot be inserted into the drawings as embedded objects, the consultant shall provide the image file(s) when submitting the final drawings to SCL.
- Electronic AutoCAD files shall match exactly with the printed submittal package delivered to SCL. There shall be no difference in contents between hard copies and electronic files.

SCL Drawing Classifications (Class Codes):

Class Code	Class Code Description
A	Architectural
C	Civil

E	Electrical
G	General (cover & index sheets)
M	Mechanical
L	Land Surveying (or Landscape)
S	Structural
R	Communications

- When there are multiple drawings in the same classification, the class\sheet number assigned to the title block shall be in consecutive numbers such as C-1, C-2, C-3, etc. See **Figure 1**. The class\sheet number shall be listed on the drawing index. See **Figure 2**. It shall also be used on the Section/Details callouts. See **Figure 3**.

use C-3 for next sheet if it is the same class. Do not use C-2.0, C-2.1, C-2.0a, etc.

 Seattle City Light Power Production & Substations APPROVED FOR SEATTLE CITY LIGHT	SUBJECT	OVERHEAD DISTRIBUTION	SHEET	2 OF 35
	LOCATION	SOUTH DISTRIBUTION	CLASS \ SHEET	C-2
DATE	TITLE	SR 99 RAMP @ E. MARGINAL WAY NEW GLULAM POLE PLAN AND PROFILE	DRAWING NO.	TD-11527
			SCALE	REV. NO.
			AS NOTED	0

Figure 1

SHEET INDEX			
SHEET #	CLASS #	SHEET TITLE	DRAWING #
1	C-1	SR 99 RAMP @ E. MARGINAL WAY – NEW GLULAM POLE LOCATION MAPS, GENERAL NOTES & DRAWING INDEX	TD-11526
2	C-2	SR 99 RAMP @ E. MARGINAL WAY – NEW GLULAM POLE PLAN AND PROFILE	TD-11527
3	C-3	SR 99 RAMP @ E. MARGINAL WAY – NEW GLULAM POLE ENLARGED PLAN, ELEVATION AND PARTS LIST	TD-11528
4	C-4	SR 99 RAMP @ E. MARGINAL WAY – NEW GLULAM POLE STRINGING CHARTS	TD-11529

Figure 2

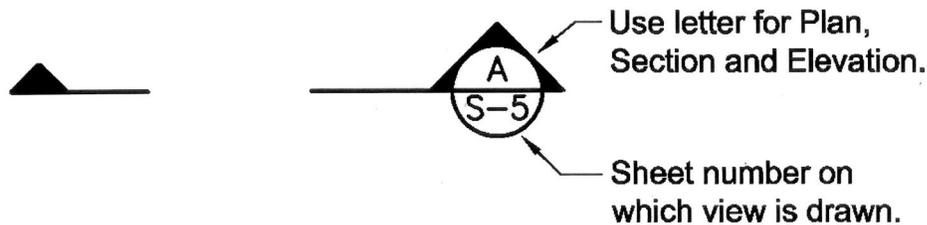


Figure 3

Drawings Submittal:

- **Design Phases 30%, 60%, and 90% drawings review (unless specified otherwise in the project's contract):**

The consultant shall submit the following to the Project Manager:

- Full size or reduced size of hard copy prints and number of hard copies sets specified on the contract.
 - One (1) set of drawings in PDF format.
 - A complete set of AutoCAD files for SCL Technical Resources to review and comment to confirm adherence to SCL Drafting Standards.
- SCL Technical Resources will provide comments on AutoCAD drawings. Consultant shall incorporate the comments into the next design phases.
 - If a significant number of corrections are required following the 90% submittal, the consultant may be required to submit an additional 95% plan for SCL review.

- **Final design phase 100% drawing review:**

The consultant shall submit the following to the Project Manager:

- One (1) set of full-size prints with wet ink signatures and seals applied to all sheets. Drawings shall be produced on standard bond paper with such quality that electronic scans or copies can be made without loss of details.
 - Consultant shall scan the final stamped drawings and provide (1) set in PDF format.
 - Each AutoCAD file will contain only one layout for each drawing sheet. All review corrections from 90% review (and 95% review) comments should be included in this submittal.
 - Civil 3D data from x-ref'ed design files shall be promoted into the design file to be included with the submittal package.
- All electronic files (AutoCAD, PDF, Microsoft documents, etc.) should be submitted to SCL using CDs, USB flash drive or through FTP site.

Datum:

- All drawings should be in the World UCS with the (0,0) point defined by Survey if project survey drawings are provided.
- Horizontal Datum should be Washington State Plane Coordinate System, NAD 83/91 North Zone, US Feet.
- Vertical Datum should be the North American Vertical Datum of 1988 (NAVD 88)

Drawing Numbers and File Naming:

- Consultant should contact the Project Manager or SCL Technical Resources for drawing numbers.
- File name of the AutoCAD file should be named according to drawing numbers. For example, if a drawing number is D-12345, the file name should be D-12345.dwg

Drawing Title Block and Borders:

- The SCL AutoCAD drawing template (GenPS.dwt) contains the following six standard layouts for drawing titles and borders.

<u>Layout</u>	<u>Description</u>	<u>Sheet size</u>
ANSI-A Por	A-size title and border Portrait	8 ½"x11"
ANSI-A-LS	A-size title and border Landscape	8 ½"x11"
ANSI-B	B-size title and border	11"x17"
ANSI-C	C-size title and border	17"x22"
ANSI-D	D-size title and border	22"x34"
ANSI-F	F-size title and border	28"x40"

- Consultant shall use the size of title block border specified on the contract and delete other unused layouts. **DO NOT under any circumstances shall the attributed title block be modified or exploded.**

Guideline for Drawing Titles:

- The standard SCL title block contains attributes for subject heading, location heading and three lines of title as shown in the illustration below.

SUBJECT HEADING
LOCATION HEADING
TITLE 1 – (First line of title)
TITLE 2 – (Second line of title)
TITLE 3 – (Third line of title)

- Subject Heading: Consultant should contact SCL Technical Resources or Project Manager to get project subject heading. Subject heading should be spelled out on the title block. If there is no subject heading that is applicable this line can be left blank.
- Location Heading: Consultant should contact SCL Technical Resources or Project Manager to get project location heading.
- Title 1 (First line of title): General description of the project.
Example:

LADDER CREEK GARDEN LIGHTING
ACCESS ROAD SLOPE STABILIZATION
GLULAM POLE REPLACEMENT
- Title 2 (Second line of title): Detailed description of the project.
Example:

NORTH AREA – TRAIL IMPROVEMENT
NORTH AREA
SR 99 AND E. MARGINAL WAY

- Title 3 (Third line of title): Drawing type.
Example:

COVER, SITE MAP & SHEET INDEX
PLAN AND PROFILE
SECTIONS AND DETAILS

SCL Drafting Standard:

All drawings shall conform to SCL drafting Standards as follows:

- Drawing Template: The consultant shall create drawings using the SCL GenPS.dwt template provided by SCL. This template contains the SCL standard layers, blocks for title borders, text styles, dimension variables, and AutoCAD line types. Coordinate with SCL Technical Resources for other SCL standard blocks as shown in **Figure 4** and supported files such as line types, color table and fonts.

SCL STANDARD BLOCKS

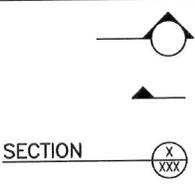
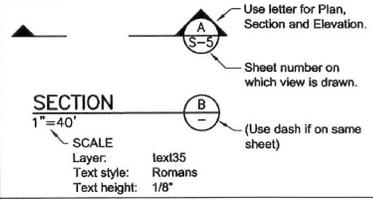
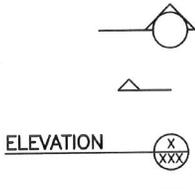
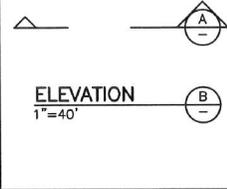
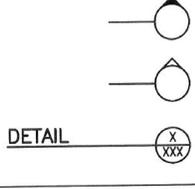
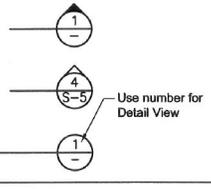
View Symbols	Block/File Name	Description	
	SECT-1 SECT-2 SECT-3	section cut, bubble end section cut, arrow end section notation	
	ELEV-1 ELEV-2 ELEV-3	elevation cut, bubble end elevation cut, arrow end elevation notation	
	VIEW-SEC VIEW-EL DET-3	detail section cut, bubble detail elevation cut, bubble detail notation	
	N-ARROW	North Arrow	<p>General Requirements</p> <ol style="list-style-type: none"> North arrow should be placed in the upper right of all plan views. Preferably, all north arrows should point to the top of the drawing. If this is not possible, it should point to the left or right. It is not recommended to point arrow down., except in some circumstances. Show north arrow proportional to size of plan, but never bigger than full size.

Figure 4

- **Dimensioning:** The consultant shall use the GENPSSTANDARD dimension style from SCL drawing template file. This may be modified, but the consultant is encouraged to use the GENPSSTANDARD settings and variables, and select “Override” to temporarily change settings only if necessary.
- **Scale and Units:** All design drawings, details, shall be drawn in model space in full scale using architectural units. Plans shall be drawn in either engineering or architectural unit.
- **Layers, Colors and Linetypes:** The GenPS.dwt template includes 33 standard predefined layers. Use these predefined standard layers without changing layer properties. Create new layers complying with the US National CAD standard when other line types and properties are needed, such as for property line and benchmark data, topographic features, water resources, vegetation, pavements and other features, or any other special features. All entities in the drawings shall be drawn with colors and layers set to “By Layer” only. See **Figure 5** for SCL standard layers.

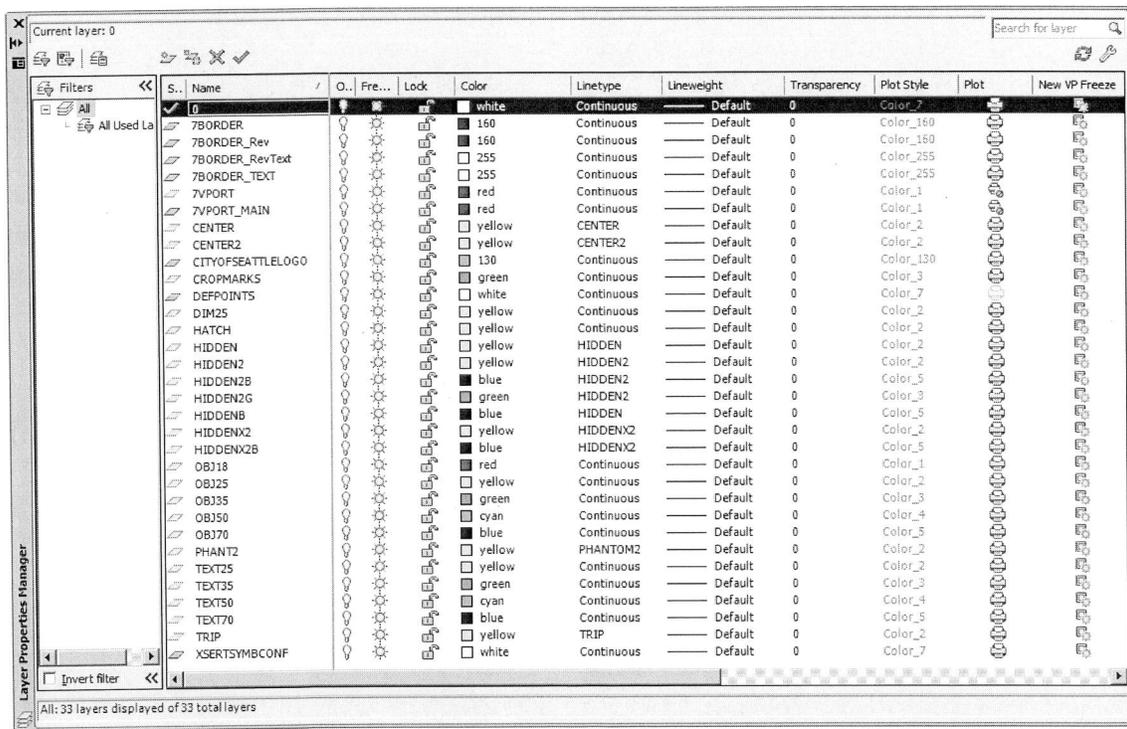


Figure 5

- **Note:** When starting a new drawing, layer 0 will be set as the current layer. However, no objects shall be drawn with layer 0. Use layer 0 to insert blocks. This make layer 0 as a Block Reference Layer when listing the block. The

object entities are still in the layer in which they were originally drawn. Do not freeze layer 0.

- Plot Style Table (ctb file): The plot style is intended to provide consistency through out the drawing package. The Consultant shall use GenPS Standard-Black.ctb file provided by SCL. If the Consultant believes the .ctb file requires modification, contact SCL Technical Resources for approval prior to implementing changes.
- Hatch: Consultant shall not use custom or non-standard hatch patterns. Only standard AutoCAD hatch patterns or SCL custom hatch patterns shall be used.
- Text Styles: SCL standard text styles are included in the GenPS drawing template. The text style called "standard" which is created by AutoCAD shall not be used. Consultant shall not use custom font type. The SCL standard text styles are listed in the **Table A-1**:

SCL STANDARD TEXT STYLES

Annotation Type	Text Style	Plotted Text Size Sheet Sizes A & B	Plotted Text Size Sheet Sizes C & D
Drawing Titles	HELV	0.1875"	0.25"
View Title	HELV	0.1875"	0.1875"
General Text, Call-outs	Romans	0.1"	0.125"
Dimension Text	Romans	0.1"	0.125"
All Other Notes	Romans	0.1"	0.125"
Revision Note Text	Romans	0.09375"	0.09375"

Table A-1

- Annotation callouts, dimensions, notes, and general texts within the body of the drawing must be upper case letters. Lower case letters are only allowed for unit measurements, symbols, and structural technical terms such as Fc', Fy.

Revision block and Public Works approval stamps:

- The revision note block for revision 0 is already inserted in each layout of SCL drawing template.
- See **Figure 6** for general arrangement of revision and Public Works Approval blocks.

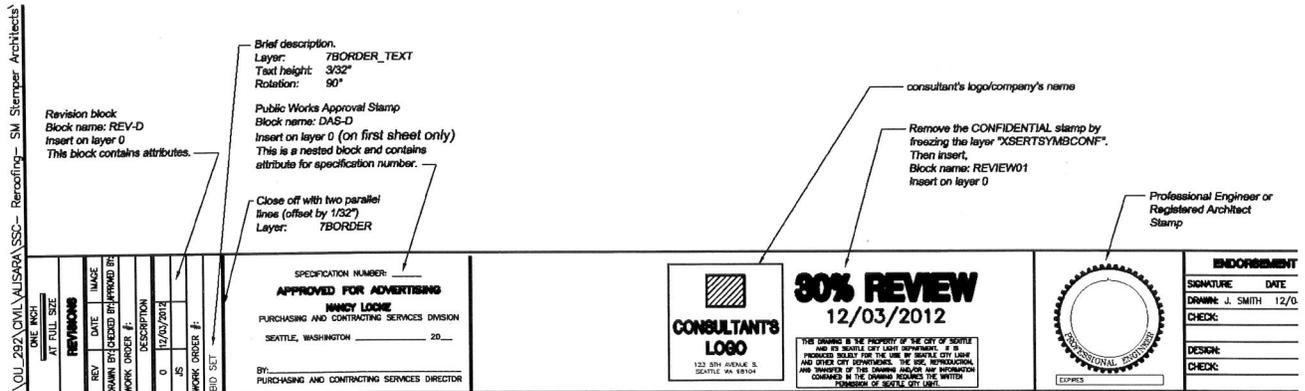


Figure 6

Requirements for Electrical Drawings:

Use IEEE C37.2 (latest active revision) Standard Electrical Power Device Function Numbers and Contact Designations to designate all relay and control equipment and devices on all electrical diagrams. Relays shall also indicate the specific relay manufacturer and model designation on connection diagrams. On elementary diagrams, provide the complete manufacturer's model number in the drawing legend, uniquely identified with an IEEE device number and device-specific identifier.

Use IEEE 100, The Authoritative Dictionary of IEEE Standards Terms for all electrical terms.

Connection Diagrams:

- **Connections:** Connection drawings shall show every point to point connection using the two (2) letter device designation described above, not the ANSI device function number, space shall also be provided for showing and listing external cables to be installed by others. All external cabling shall be terminated on the terminal blocks. Interconnections from or to another

drawing shall be referenced by drawing number and terminal block position, see **Figure 7**.

- **Elementary Drawings:** Elementary drawings shall conform to City Light's standards as follows:
 - Elementary drawings shall list devices by their ANSI device function number.
 - Terminal block connections, when practical, shall be shown.
 - A circle (O) on the schematic will designate a terminal block point.
 - The two (2) letter designation for the terminal block shall be to the right of the circle and the terminal point number for the block as on the left.
 - Circuit and cable designations should be shown, when practical as shown in **Figure 8**.

Detail drawings

- **Equipment layout:** The consultant shall provide SCL with equipment layout drawings showing the location, size and dimensions for all equipment, parts and components to be installed, built or constructed.
- **Wiring, Piping and Ducts:** Wiring, conduit, ducts and piping drawings shall include all pertinent information to show the route for wiring, conduit, piping, or duct work as appropriate.
- **Equipment Assembly drawing:** the consultant shall provide SCL drawings showing equipment assembly detail and detailed connections between components, equipment and their appurtenances so that when the construction or installation work is complete, the completed system will function as designed.
- **Other detailed Drawings:** Consultants shall provide SCL detailed drawings indicating all visible interference and obstruction to the new installation or construction. Consultants shall also provide drawings showing solutions to the interference or obstruction. Visible interference and obstruction is defined

as object, parts or materials that are exposed and can be seen without removing permanent structures or materials.

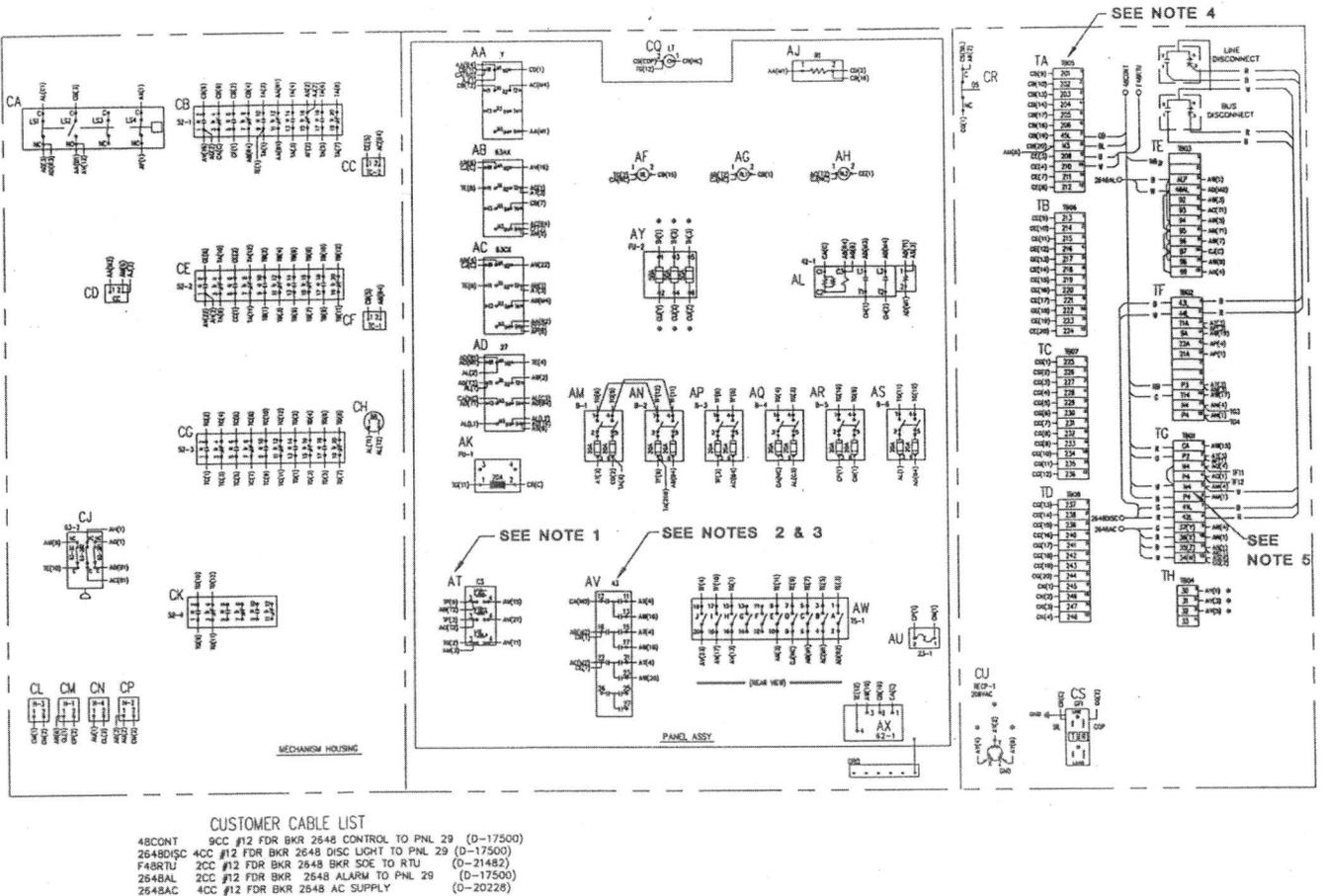


Figure 7 – Example of Connection Diagram

Notes:

1. Two character device designation.
2. Device definition.
3. Device model number or part number should be noted below (on important components only). Ex: 43 GE SG218
4. Provide terminal blocks for external customer connections.
5. Use terminal block labels as circuit designations on elementary diagram.

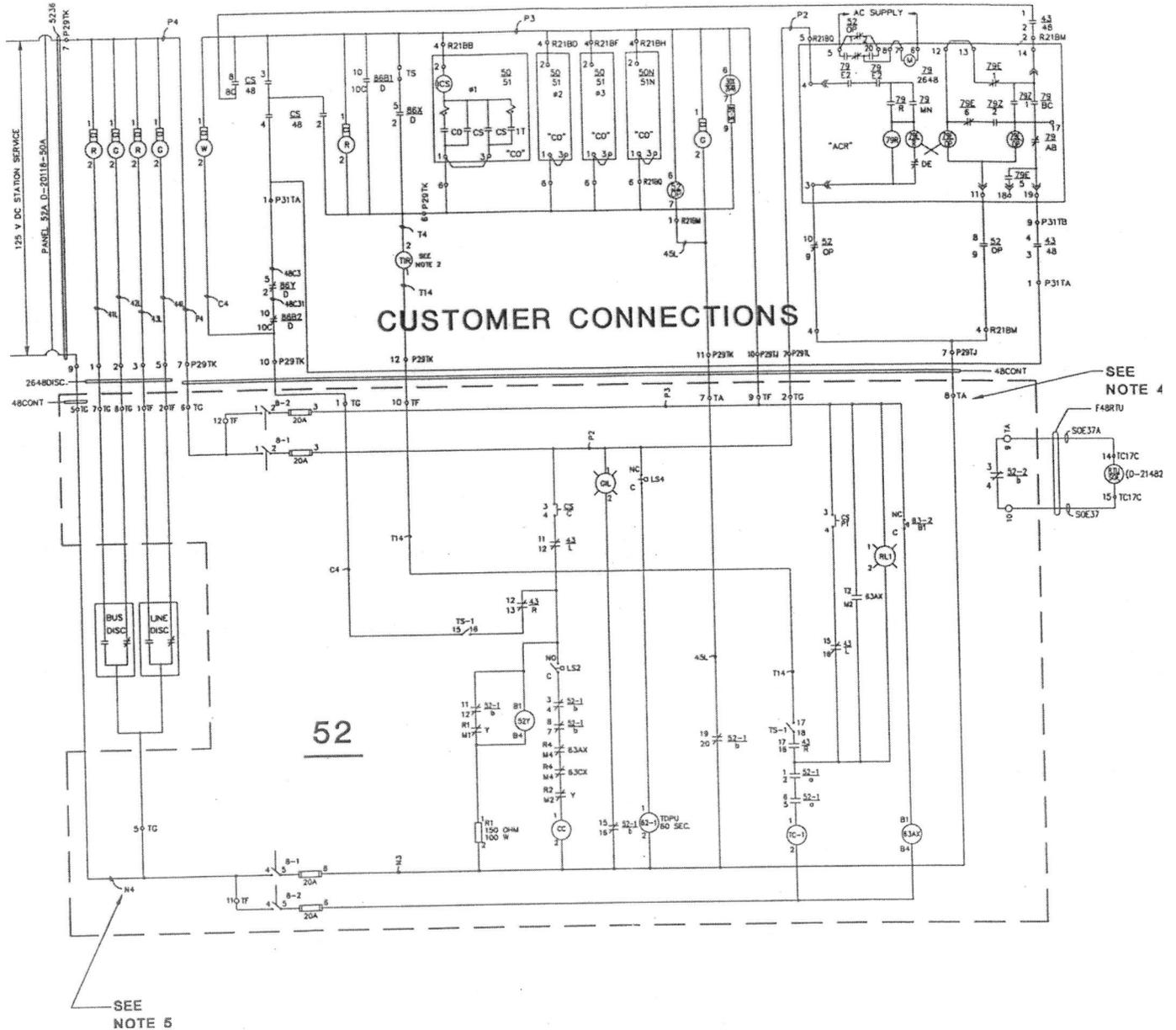


Figure 8 – Example of Elementary Diagram