

ELECTRICAL SERVICE REQUIREMENTS

GENERAL INFORMATION, GEN

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Load Calculations	GEN-DWG-101

Scope and Purpose

The Electrical Service Requirements presented herewith provide detailed amplifications of certain established rules of City of Glendale *Water & Power* (hereafter referred to as GWP) pertaining to electrical service connections, together with customers' installation of service wiring and service equipment. These requirements are issued for the guidance and assistance of electrical contractors, engineers, architects, and manufacturers engaged in the installation and design of electrical service wiring and service equipment. As an additional convenience, certain extracts from General Order 95, "Rules for Overhead Line Construction"; General Order 128, "Rules for Construction of Underground Electric Supply and Communication Systems", of the California Public Utilities Commission concerning service installations have been included for your reference.

The provisions of these Electric Service Requirements are intended to be in accordance with all applicable laws or ordinances, including but not limited to the "Rules for Overhead Line Construction" and the "Rules for Construction of Underground Electric Supply and Communication Systems," of the Public Utilities Commission of the State of California, Titles 8 and 24 of the State of California, **the California Electric Code**, and the National Electric Code.

Mailing Address and Telephone Numbers

All engineering inquiries shall be forwarded to:

City of Glendale *Water & Power*
Electrical Services
Customer Service Engineering
141 N. Glendale Ave., 4th Level
Glendale, CA 91206

Customer Service Engineering
Switchgear and Meter Panel Approval..... (818)548-3921
Fax (818)240-4754
GWP Construction Inspector (818)548-3920
Customer Service Applications..... (818)548-3300
Meter Shop (818)548-2122
Electric Service Removals (818)548-3995
Electric Emergencies.....(818) 548-2011
Street Lights (818) 548-4877
Solar Solutions/Photovoltaic Systems(818) 548-2750
Electric Vehicle Charging Stations.....(818) 548-3300

Available Short Circuit Current

City of Glendale, Public Works, Building Section requires that customers install service equipment with over-current protective devices which have a short circuit rating equal to or greater than available short circuit current.

The available short circuit currents at the point of connection of GWP's service conductors to the customer's facilities are as follows:

1. Residential (individually metered single family dwellings or duplexes):

Table 1

Service Entrance Ampacity	Available Short Circuit Current
100 amperes	10,000 amperes
200 amperes	10,000 amperes
400 amperes	22,000 amperes

2. Residential Units with Grouped Meters (three or more), Commercial and Industrial:

Table 2

Phase	Service Voltage	Service Entrance Ampacity	Available Short Circuit Current
1	120/240	600 amperes or less	Consult GWP
3	120/208 or 240	800 amperes or less	42,000 amperes
3	120/208 or 240	801-4000 amperes	Consult GWP
3	480	1200 amperes or less	30,000 amperes
3	277/480	1200 amperes or less	30,000 amperes
3	277/480	1201-2000 amperes	45,000 amperes
3	277/480	2001-4000 amperes	Consult GWP

Available fault currents for all services may be calculated on an individual basis per customer's request. Consult GWP's Service Planner.

Underground Service Alert (USA)

The State of California Government Code 4216 mandates that anyone doing excavation work shall call **USA** at least two (2) working days prior to commencement of any excavation. If you are performing this type of work in City of Glendale, please call Underground Service Alert at **811**.

Standard Distribution Service Voltages

GWP will supply the following standard service distribution Voltages, **if available**:

Single-Phase, 3-Wire, 120/240 volt
Three-Phase, 3-Wire, 240 volt*
Three-Phase, 4-Wire, 120/240 volt, **DELTA***
Three-Phase, 4-Wire, 12,470/7200 volt
Three-Phase, 3-Wire, 12,470 volt

* For load calculations, see GEN-DWG-101.

The following voltages will only be supplied if an on-site transformer facility is installed on customer's premises.

Three-Phase, 4-Wire, 120/208 volt
Three-Phase, 3-Wire, 240 volt
Three-Phase, 4-Wire, 277/480 volt
Three-Phase, 3-Wire, 480 volt

Customer Utilization Voltages

All customer-owned utilization equipment must be designed and rated in accordance with the following utilization voltages specified by the American National Standards Institute (ANSI) C84.1 if the customer equipment is to give fully satisfactory performance:

Table 3

Nominal Utilization Voltage	Minimum Utilization Voltage	Maximum Utilization Voltage
120	110	125
208	191	216
240	220	250
277	254	289
480	440	500

Minimum utilization voltages from ANSI C84.1 are shown for customer information only as GWP has no control over voltage drop in customer's wiring.

Temporary Authorization for Un-metered Electric Service

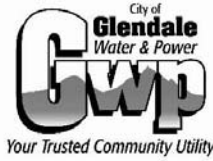
If any electrical work would result in the service being un-metered, prior authorization is required before removing the meter, **see GEN-100, Page 6 of 10**. Use of an un-metered service without prior authorization will result in penalties and the electric service will be disconnected.

Call (818) 548-2122 for a temporary un-metered service authorization.

Upon advance notification to GWP by the customer or customer's agent of upgrades or repairs to electrical equipment, GWP may temporarily authorize the electric service to be un-metered for a period not to exceed thirty (30) calendar days. When authorized un-metered services have exceeded thirty (30) days, a forty-eight (48) hour notification will be given and then the service will be disconnected until such time as improvements or repairs are completed and comply with all laws, ordinances, and regulations applicable thereto (Glendale Service Regulation, Section I, Article 11).

Unauthorized un-metered service will be disconnected and subject to the provisions and penalties for energy diversion as established in Glendale Municipal Code (Section 13.44.500-F & H). An estimated energy bill will be rendered for the period of time service is un-metered.

For periods longer than thirty (30) days or in cases where an un-metered service is not necessary, a temporary meter service must be used. Contact an Electric Service Planner for details at (818) 548-3921.



NOTICE OF METER TAMPERING AND UNMETERED SERVICE REQUIREMENTS

IMPORTANT INFORMATION AND REQUIREMENTS
ELECTRIC METER TAMPERING - WARNING

Glendale Water and Power's (GWP) electric meter(s) may not be altered or tampered with or removed by anyone, including a licensed electrician, other than authorized GWP employees.

If an emergency should require a seal, locking device, or meter removal without prior notification, GWP must be notified within 24 hours so that the service can be inspected and the seal replaced.

Non-emergency or unauthorized removal of the meter, locking device or meter seal will result in a charge of \$250 per meter and costs associated with the repair and/or replacement of any damaged equipment, loss of revenue, attorneys' fees, city personnel time, resources, and investigative costs.

It is the responsibility of the customer of record to ensure that removed meters and accessory equipment are accessible for return to GWP.

UNMETERED ELECTRIC SERVICE - WARNING

Making an unauthorized connection to obtain unmetered electric service is theft of service and in violation of California Penal Code, Section 498. Unauthorized unmetered service will be disconnected and will result in a charge of \$250 per meter and costs associated with the repair and/or replacement of any damaged equipment, loss of revenue, attorneys' fees, city personnel time, resources, and investigative costs.

If any electrical work will result in the service being unmetered, prior authorization from GWP is required. A GWP "Approved Unmetered Service" tag will be placed on your meter or service panel and must be displayed at all times.

For work requiring more that thirty (30) days or when an unmetered service is not necessary, a temporary meter service must be used.

For temporary service or to receive authorization for unmetered service call (818) 548-2011.

Form with fields for Electric Service Address, Name (please print), Signature, Check Box (Owner, Contractor, Authorized Agent), Mailing Address (please print), City, State, Zip Code, Date, and GWP Service Planner.

PSC-108 (rev. 12/13)

White: Original

Yellow: Electrical Engineering

Pink: Customer

Requirement for Encroachment upon City of Glendale Electric Easements (Written or Prescriptive) and Easement Acquisition

All applications for encroachment shall be made on an approved form filled out completely and accompanied with detailed plan showing the proposed construction, see **GEN-100, Pages 8, 9 and 10**. A fee of \$1,100.00 is required at the time of acceptance of each application. Applications shall be submitted to:

City of Glendale *Water & Power*
Electrical Services
141 N. Glendale Ave., 4th Level
Glendale, CA 91206 (818)548-3921

Final decisions will be based on an individual case by case basis. All decisions are based on pole access, protection, safety, wire and cable clearances, as well as underground infrastructure, conduits, and cabling. **For power pole clearance requirements see OH-DWG-14.**

Encroachment Policy

1. Permanent structures above ground will not be allowed under high voltage power lines, with the exception of fencing (i.e., wood, chain link or, perimeter wall). All fences shall meet GWP overhead line and pole clearances and require a Permission to Occupy (PTO) from GWP. A \$150 fee shall be paid to GWP for clearance verification. Fences meeting clearances will be granted PTO from GWP.
2. Permanent structures under secondary lines that serve more than one customer or not exclusive to the property applying for encroachment will be reviewed on a case by case basis. However, no structures that are habitable will be permitted.
3. GWP does not need an easement for secondary wires exclusive to the property it serves; therefore, encroachment permit is not necessary. Structure must be constructed to meet the required clearances for safety.
4. Extensions of existing uninhabitable structures under power lines are allowed, provided that the following conditions are met:
 - Safety standards have to be met.
 - GWP access for maintenance and service must be met.
 - If an easement does not exist, the property owner shall grant an easement to the City of Glendale for the overhead power lines.
 - A covenant for indemnification and waiver of damages shall be executed between the property owner and the City of Glendale.



ENGINEERING

<p><u>Checklist:</u></p> <p><input type="checkbox"/> Application</p> <p><input type="checkbox"/> Copy of Current Grant Deed</p> <p><input type="checkbox"/> As-Built/Arch. Plan</p> <p><input type="checkbox"/> Payment</p>
--

**Processing Fee: \$1,100.00
Non-Refundable**

APPLICATION FOR PERMIT TO ENCROACH

Disclaimer: *The non- refundable fee only covers the process of the application and does not entitle or guarantee favorable result(s) to the property owner.*

Date: _____ **Receipt of Non-Refundable Fee:** _____

Applicant: _____

Address: _____

Phone Number: _____ **Cell Phone:** _____

Name and Address of property benefited by the encroachment:

Specific description and justification for encroachment:

Upon grant of permit to encroach, application agrees to satisfy all conditions thereof and to remove said structure upon revocation of permission at no cost to the City of Glendale.

Applicant Signature

Date



ENGINEERING

Checklist:

- Application
- Copy of Current Grant Deed
- As-Built/Arch. Plan
- Payment

EASEMENT ACQUISITION FROM CUSTOMER TO GWP

In certain situations the customer will be required to provide GWP easement rights for their new electrical project. The customer is required to pay \$1100.00 to GWP, to process and record the new easement.

Disclaimer: *The non- refundable fee only covers the process of the application and does not entitle or guarantee favorable result(s) to the property owner.*

Date: _____ **Receipt of Non-Refundable Fee:** _____

Applicant: _____

Address: _____

Phone Number: _____ **Cell Phone:** _____

Name and Address of property:

Specific description and justification for Easement:

Applicant Signature

Date



ENGINEERING

APPLICATION FOR PERMIT TO OCCUPY

**CITY OF GLENDALE
GLENDALE WATER & POWER**

Disclaimer: *The non-refundable fee of \$150.00 only covers the process of the application and does not entitle or guarantee favorable result(s) to the property owner. Fee is subject to change without notice.*

Date: _____ Receipt of Non-Refundable Permit Fee: _____

Applicant: _____

Address: _____

Phone Number: _____

Specific description and justification for encroachment: _____

Upon grant of permission to encroach, applicant agrees to satisfy all conditions thereof and to remove said structure upon revocation of permission at no cost to the City of Glendale.

Applicant Signature

Date

Property Owner Signature

Date

GWP Approval Signature

Date

GWP Approval Printed Name

HOW TO APPLY FOR SECONDARY ELECTRIC SERVICE

GEN-101

Secondary electric service means that the service connection is made to GWP's secondary distribution system and in this case the distribution transformer is located on a distribution pole or in a distribution vault.

Where to apply

Application for secondary electric service is made at:

City of Glendale *Water & Power*
Electrical Services
Customer Service Engineering
141 N. Glendale Ave., 4th level
Glendale, California 91206
Telephone (818)548-3921
Fax (818)240-4754

The customer service counter is open:

Mondays through Thursdays 7:30AM to 4:45PM
Fridays 8:00AM to 12:00PM

The Procedure to Apply for Secondary Electric Service

You must apply for electric service as part of the building permit application process for a new building or a building addition. The process is as follows:

1. Go to GWP (location as noted above) and bring the following:
 - a. Properly completed buildings permit application form.
 - b. One set of plans, sections, elevations, and site survey plans.
 - c. Electrical load calculations and single line diagram for 400 ampere residential and all commercial services.

HOW TO APPLY FOR SECONDARY ELECTRIC SERVICE

GEN-101

2. At GWP Customer Service Engineering counter, special requirements may be imposed on the project before the building and electric service applications can be approved. Requirements may be any or all of the following:
 - a. Modification of the project to maintain necessary clearances and accessibility to overhead lines, poles or underground substructures.
 - b. Obtaining an Encroachment Permit in **the existing** City easements. The Encroachment policy and application process is outlined in **GEN-100 starting on page 7 of 10**.
 - c. Obtaining a service plan (service spot) from the GWP Service Planner.
 - d. Submittal of required drawings, calculations, and other information to GWP.
 - e. Satisfying Street Lighting requirements. Contact the Street Light Engineering Section at (818)548-4877.
3. Make an appointment with the GWP Service Planner to meet at the project site, if required.
4. When you meet the Service Planner at the project-site, you must bring one set of architectural plans. The Service Planner will provide you with an Electric Service Plan or Electric Service Spot which illustrates the electrical service equipment location and installation requirements. The information on the Electric Service Plan/Electric Service Spot must be transferred to the building section plan check sets for the project. GWP will look for this information on both plan check sets before the building permit application is approved.
5. Once all the special requirements are met, GWP will approve and sign your building permit application. At this point your Electrical permit application can also be signed by GWP. Customers who are applying for a new service shall pay to GWP the electric service fee any time after the permit is signed and before the customer is ready to sign up for service. Customers who are upgrading **and/or relocating** their electric service must pay to GWP the electric service fee before their electric permit or combo permit can be signed by GWP.

HOW TO APPLY FOR SECONDARY ELECTRIC SERVICE

GEN-101

Secondary Electric Service Connection Requirements

The electric secondary service connection, or “hook up”, will be done by GWP after the building construction is completed and the following conditions are satisfied:

1. All fees are paid.
2. All electric installations are inspected and accepted by GWP Construction Inspector (818) 548-3920, if applicable.
3. The customer has signed up for electric billing with GWP, Customer Service Applications (818) 548-3300, if applicable.
4. Any new easement or permit to encroach requirements by the City are granted to the City and duly recorded, if applicable.
5. The project has been issued a certificate of occupancy, if applicable, and City of Glendale, Public Works, Building Inspector has signed off the project and notified GWP that the electric service has been approved and is ready to be energized.
6. No holds have been placed on the project by any other City Department.

HOW TO APPLY FOR PRIMARY ELECTRIC SERVICE

GEN-102

Primary electric service means that the customer has a dedicated transformer facility or high voltage switchgear assembly located on the property and customer's electric service is directly connected to this facility.

Where to apply

Application for primary electric service is made at:

City of Glendale *Water & Power*
Electrical Services
Customer Service Engineering
141 N. Glendale Ave., 4th level
Glendale, California 91206
Telephone (818)548-3921
Fax (818)240-4754

The customer service counter is open:

Mondays through Thursdays 7:30AM to 4:45PM
Fridays 8:00AM to 12:00PM

The Procedure to Apply for Primary Electric Service

A construction project in the City of Glendale with an electric service main size of more than 400 amperes, single phase or three phase, will need a customer owned on-site transformer facility. The architect for the project must provide the required space for the on-site facility. GWP will design the facility.

To aid the architect in planning, see **Primary Services chapter (PRI), Sections PRI-100, PRI-101, PRI-102, and PRI-103** for acceptable types of on-site transformer facilities and size requirements for corresponding electric service main sizes.

The procedure for customer-owned on-site transformer facility design is as follows:

1. The project's architect and electrical engineer must meet with GWP's Customer Service Engineering Section (818) 548-3921 to finalize the type, size, location, and other requirements of the customer-owned transformer facility, electrical room and associated switchboards.
2. The following must be brought to the meeting for submittal to GWP:
 - a. Site survey plan.
 - b. Architectural plans, elevation plans and section through facility.
 - c. Foundation plan.
 - d. Electrical load calculations signed and stamped by either a licensed electrical engineer or licensed electrician.
 - e. Electrical single line diagram signed and stamped by either a licensed electrical engineer or licensed electrician.
 - f. Electrical room layout and switchboard elevations.
3. Other requirements (street lighting, distribution, etc.) or fees may be determined by GWP on the project and the customer will be notified of such requirements.
4. After the meeting, any changes agreed upon must be incorporated by the architect in the appropriate drawings and re-submitted to GWP.
5. Upon receipt of final drawings from the architect, GWP will prepare an electrical design of the customer-owned on-site transformer facility.

6. Completion of the customer-owned on-site transformer facility design may only be one of the requirements needed before the application for the building permit and the electrical permit can be approved and signed off. There may be other requirements such as:
 - a. Modification of the project to maintain necessary clearances from power poles and overhead lines.
 - b. Obtaining a Permit to Encroach or providing an easement to the City of Glendale. The application is outlined in **Section GEN-100 Page 8**.
 - c. Satisfying Street Lighting requirements. Contact the Street Light Engineering Section at (818) 548-4877.
7. Once all the requirements are met, GWP will approve and sign your building permit application. At this point your Electrical permit application can also be signed by GWP. Customers who are applying for a new electric service shall pay to GWP the electric service fee any time after permit is signed and before the project is completed and is ready for equipment installation.

Primary Electric Service Connection Requirements

Transformer installation and high voltage and low voltage cabling will start after the following has taken place:

1. The customer has paid all transformer and cabling charges, **see PRI-100**.
2. The construction of the on-site transformer facility and associated underground substructures has been completed to the satisfaction of the GWP Construction Inspector.

The electric service connection, or “hook up”, will be done by GWP after the following conditions are satisfied:

1. The customer has signed up for electric billing with GWP, Customer Service, (818)548-3300, if applicable.
2. Any new easements or encroachment requirements by the City are granted to the City and duly recorded, if applicable.

HOW TO APPLY FOR PRIMARY ELECTRIC SERVICE

GEN-102

3. The project has been issued a Certificate of Occupancy, if applicable, and City of Glendale, Public Works, Building Inspector has signed off the project and notified GWP that the electric service has been approved and is ready to be energized.
4. No holds have been placed on the project by any other City Department.

HOW TO APPLY FOR TEMPORARY ELECTRIC SERVICE

GEN-103

There are two types of temporary electric services, secondary and primary.

Secondary services are available when the temporary service needed is 400 ampere or less, single phase or three phase. There are two types of secondary temporary services, overhead and piggyback underground.

Temporary overhead services are available when the construction site is accessible to overhead lines. The charge for the overhead temporary service is similar to charge for permanent secondary service and is outlined in **Section GEN-104** and the application process is the same as the procedure outlined in **Section GEN-101**.

Piggyback underground services are available when the construction site is not accessible to the overhead lines. The service panel is installed where the permanent panel would be installed and all required underground substructure work must be constructed to have temporary service. The charge for the piggyback underground service is same as the charge for permanent underground secondary service and is outlined in **Section GEN-104**. However, the customer will not be charged for permanent installation. The application process is similar to permanent secondary services as outlined in **Section GEN-101**.

Primary temporary electric service is required when the requested electric service size exceeds 400 amperes, single phase or three phase. The application process is the same as the procedure outlined in **Section GEN-102**.

SECONDARY SERVICE FEES

GEN-104

Table 1

SERVICE SIZE	CLASS	TYPE	CABLE SIZE	BASIC FLAT FEE	FLAT CHARGE ADDER FOR EACH ADDITION AL RUN	CABLE COST ADDER PER FOOT	ACCT.	FUND	ORG	PROJECT
100-200A (R)	1Ph	OH	#2 AL TRI	\$633	N. A.	\$0.51/FT	38770	555	000	E14866
200A (C)	1Ph	OH	#1/0 AL TRI	\$892	N. A.	\$1.03/FT	38770	555	000	E14867
*400A (R)	1Ph	OH	#3/0 AL TRI	\$892	N. A.	\$1.91/FT	38770	555	000	E14868
400A (C)	1Ph	OH	PARALLEL #1/0 AL TRI	\$1,035	N. A.	\$2.07/FT	38770	555	000	E14869
100-200A	3Ph	OH	#1/0 QUAD	\$956	N. A.	\$1.17/FT	38770	555	000	E14871
400A	3Ph	OH	PARALLEL #1/0 QUAD	\$1,135	N. A.	\$2.35/FT	38770	555	000	E14872
100-150A	1Ph	UG	1/0-2-1/0	\$1,077	\$570	\$1.10/FT	38770	555	000	E14873
200A	1Ph	UG	4/0-2/0-4/0	\$1,410	\$570	\$1.52/FT	38770	555	000	E14874
*400A (R)	1Ph	UG	350-4/0-350	\$1,489	\$570	\$2.69/FT	38770	555	000	E14875
400A (C)	1Ph	UG	750-500-750	\$2,277	\$570	\$5.07/FT	38770	555	000	E14876
200A (C)	3Ph	UG	3-4/0, 2/0	\$2,324	\$897	\$2.07/FT	38770	555	000	E14877
400A (C)	3Ph	UG	3-750, 4/0	\$2,937	\$897	\$6.31/FT	38770	555	000	E14878
100-150A	1Ph	OH-UG	1/0-2-1/0	\$2,456	\$570	\$1.10/FT	38770	555	000	E14879
200A	1Ph	OH-UG	4/0-2/0-4/0	\$2,525	\$570	\$1.52/FT	38770	555	000	E14880
*400A (R)	1Ph	OH-UG	350-4/0-350	\$2,683	\$570	\$2.69/FT	38770	555	000	E14881
400A (C)	1Ph	OH-UG	750-500-750	\$3,640	\$570	\$5.07/FT	38770	555	000	E14882
200A (C)	3Ph	OH-UG	3-4/0, 2/0	\$2,979	\$1,140	\$2.07/FT	38770	555	000	E14883
400A (C)	3Ph	OH-UG	3-750, 4/0	\$4,205	\$1,140	\$6.36/FT	38770	555	000	E14884

All fees are subject to change without notice. The customer must pay the service fees in effect at the time of payment.

- Notes:**
- *1) In most cases this is a Class 320 ampere service panel.
 - 2) R = Residential, C = Commercial, OH = Overhead, UG = Underground, OH-UG = Overhead to Underground.
 - 3) The Basic Flat Fee includes:
 - a. The cost of the first 100 feet of service cable for OH and UG services.
 - b. The labor cost of one service run for UG services.
 - c. The cost of the first 200 feet of service cable and labor cost of two runs for OH-UG services.
 - 4) The customer must pay the service fees in effect at the time of payment.
 - 5) All fees are subject to change without notice.
 - 6) One Electric Service Spot drawing will be provided for each electric service at no charge. A \$68.00 fee shall be assessed for each revision to the Electric Service Spot drawing.
 - 7) A \$263.00 adder fee shall be assessed for all mid-span services.

Exception 1

If a residential customer is upgrading an existing overhead or underground service to 100A for safety reasons (room additions do not qualify), the service is installed at no charge.

Exception 2

If a customer is a fire victim and the electrical service needs to be reconstructed and no service upgrade is taking place, the service is installed at no charge.

Exception 3

If a customer is moving the electrical panel or the panel is updated and the service size stays the same, the following applies:

- 1) OH Services
 - a. If the existing service conductor is reused, there is a \$211.00 labor charge in lieu of flat fee.
 - b. If a new service conductor is required, all regular charges apply.
- 2) UG Services
 - a. If the existing service conductor is reused and our service crews must pull the service conductor back and re-install it, there is a \$633.00 labor charge in lieu of flat fee. If the service crews should re-connect the service cables only, there is a \$211.00 labor charge.
 - b. If a new service conductor is required, all regular charges apply.

SECONDARY SERVICE PLANNING GUIDELINES GEN-105

Table 1

ZONE	SERVICE AREA	SERVICE TYPE	CONDUIT REQUIREMENT	PANEL TYPE	SERV. SPOT	SEE NOTES
1. Single Family Residential						
	a. New	OH	OH	3" Stub-out to PL	OH/UG	Yes 1
	b. New	UG	UG	3" or 4" Service Conduit	UG	Yes 2,3
	c. Upgrade	OH	OH	None	OH or OH/UG	Yes 1
	d. Upgrade	UG	UG	3" or 4" Service Conduit	UG	Yes 2,3,4
2. Multi-family Residential, Commercial, Industrial/Commercial						
	a. New	OH	OH to UG	4" Service Conduit(s)	UG	Yes 3
	b. New	UG	UG	4" Service Conduit(s)	UG	Yes 2,3
	c. Upgrade	OH	OH	None	OH/UG	Yes 1
	d. Upgrade	UG	UG	4" Service Conduit(s)	UG	Yes 2,3
3. Traffic, Caltrans, L.A. County						
	a. New/upgrade	OH	OH to UG	2,3 or 4" Service Conduit	Pedestal	Yes 3,6,
	b. New/upgrade	UG	UG	2, 3 or 4" Service Conduit	Pedestal	Yes 2,3,6
4. Street Light						
	a. New/upgrade	OH	OH to UG	2,3 or 4" Service Conduit	Pedestal	Yes 3,5,6
	b. New/upgrade	UG	UG	2, 3 or 4" Service Conduit	Pedestal	Yes 2,3,5,6
5. Cell Site, Cable T.V.						
	a. New/upgrade	OH	OH to UG	2,3 or 4" Service Conduit	Pedestal	Yes 3,6
	b. New/upgrade	UG	UG	2, 3 or 4" Service Conduit	Pedestal	Yes 2,3,6

Notes:

- 1) There may be special requirements (span distance) for 400 ampere Overhead services.
- 2) See Underground Services Chapter (UG) **UG-100**.
- 3) A distribution pull box may be required and will be designated as such on the service spot by the Service Planner.
- 4) If the service is to be upgraded to 100A or 200A, and the existing service conduit is undersized (2" or 2 1/2"), special consideration must take place for the undersized service conduit to be utilized. A special letter must be signed to agree with conditions set forth by *Glendale Water & Power*, see **UG-100 Page 3 of 3**.
- 5) Street light pedestals may be metered, but at this time are not metered. If there are other loads, such as, tree lighting, maintenance receptacles, etc., then a meter is installed.
- 6) Use addresses with 1/4, example 155 1/4 S. Glendale Ave.
- 7) For all other types of services, consult *Glendale Water & Power*. For example, bus shelters, parking meters, etc.

THREE PHASE, THREE WIRE, WYE

CALCULATIONS OF LOADS ON THREE PHASE, THREE WIRE SYSTEMS GENERALLY INVOLVE THE ADDITION OF SINGLE PHASE AND BALANCED THREE PHASE LOADS. BALANCED THREE WIRE STAR OR WYE LOADS MAY BE CONSIDERED AS DELTA LOADS EQUAL KVA OR LINE CURRENT FOR THE PURPOSE OF THESE CALCULATIONS.

UNBALANCED STAR OR WYE LOADS ON THREE WIRE SYSTEMS ARE VERY RARE. SINCE ALL THREE CONDUCTORS OF A SERVICE, FEEDER OR BRANCH CIRCUIT ARE REQUIRED TO BE OF THE SAME CAPACITY, IT IS NECESSARY TO CALCULATE THE LOAD ONLY ON THE CONDUCTOR WHICH INVOLVES THE GREATEST CURRENT.

THE FOLLOWING PROCEDURE SIMPLIFIES CALCULATIONS:


- (A) ADD ALL BALANCED THREE-PHASE AMPERE LOADS DIRECTLY.
- (B) CONVERT THREE-PHASE LOAD INTO THREE EQUAL SINGLE-PHASE LOADS. (THE CURRENT OF EACH OF THESE EQUAL SINGLE-PHASE LOADS WILL BE EQUAL TO 58 PERCENT OF THE THREE-PHASE LINE CURRENT.)
- (C) ADD THE SINGLE-PHASE LOADS ON EACH PHASE SEPARATELY. TO EACH OF THESE ADD THE SINGLE-PHASE LOAD DERIVED FROM THE THREE-PHASE LOAD IN (B) ABOVE.
- (D) TAKE THE LARGER TWO TOTAL LOADS FROM (C), ADD THEM TOGETHER, AND IF THE UNBALANCE BETWEEN THEM IS NOT MORE THAN 2 TO 1, MULTIPLY BY 0.87. THIS WILL GIVE THE TOTAL LINE CURRENT. SEE BELOW FOR ALL MULTIPLIERS.

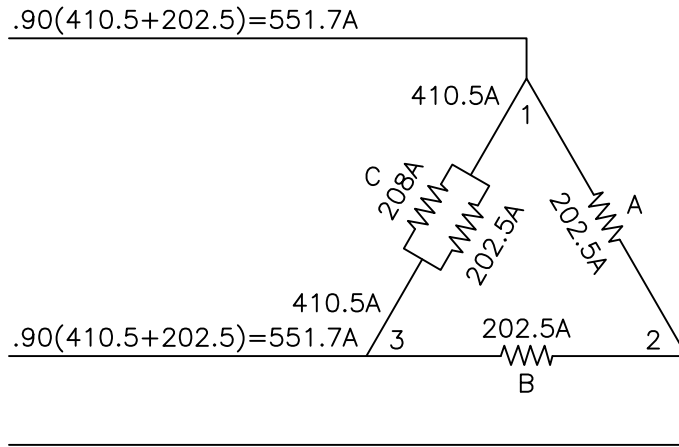
NOT MORE THAN	2 TO 1	-	0.87
NOT MORE THAN	3 TO 1	-	0.90
NOT MORE THAN	6 TO 1	-	0.94
NOT MORE THAN	10 TO 1	-	0.96
OVER	10 TO 1	-	1.00

EXAMPLE 1

EQUIPMENT:	3 ϕ AMPS PER TERMINAL	PHASE A (L1 TO L2)	PHASE B (L2 TO L3)	PHASE C (L3 TO L1)
THREE-PHASE				
10 HP	28			
5 HP	15.2			
20 HP	54			
15 HP	42			
30 HP	80			
50 HP	130			
TOTAL 3 PHASE	349.2 X .58 =	202.5	202.5	202.5
SINGLE-PHASE				
50kVA				208
		202.5	202.5	410.5
				<u>202.5</u>
SUM OF TWO LARGEST LOADS			=	613.0
MULTIPLIED BY			=	= 0.90
LINE CURRENT			=	<u>551.7 AMPS</u>

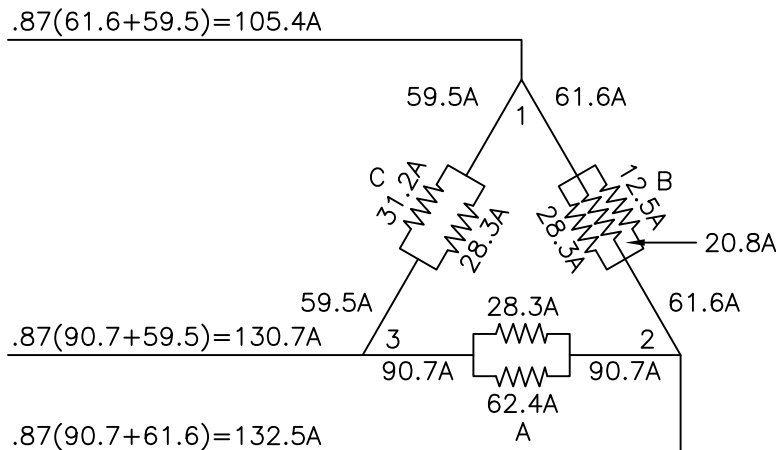
DATE	REV.	DESCRIPTION	BY	CHK'D	APP.

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EXAMPLE 2

EQUIPMENT:	3 ϕ AMPS PER TERMINAL	PHASE A (L1 TO L2)	PHASE B (L2 TO L3)	PHASE C (L3 TO L1)
THREE-PHASE				
5 HP	15.2			
3 HP	9.6			
10 kW	24.1			
TOTAL 3 PHASE	48.9 X 0.58 =	28.3	28.3	28.3
SINGLE-PHASE				
5 kW		20.8		
15 kVA			62.4	
7.5 kVA				31.2
3 kVA		12.5		
		61.6	90.7	59.5
SUM OF TWO LARGEST LOADS	=	=	<u>61.6</u>	
MULTIPLIED BY	=	=	152.3	
LINE CURRENT	=	=	<u>0.87</u>	
			132.5 AMPS	



DATE	REV.	DESCRIPTION	BY	CHK'D	APP.
1/8/14	1	CORRECTED WYE FORMULA	CC	VMP	VA

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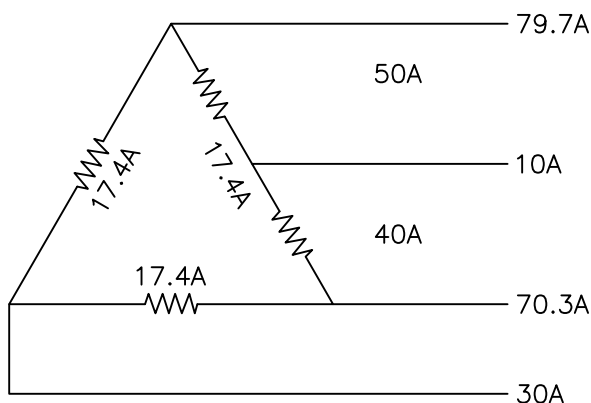
THREE PHASE, FOUR WIRE DELTA

LOADS ON FOUR WIRE SYSTEMS USUALLY CONSIST OF SINGLE PHASE LOADS BETWEEN LINE AND NEUTRAL AND BALANCED THREE WIRE THREE PHASE LOADS. THE LINE CURRENT IS EQUAL TO THE HIGHEST SINGLE-PHASE LINE NEUTRAL LOADS PLUS THE THREE PHASE LINE LOAD.

IF SINGLE PHASE LINE-TO-LINE LOADS ARE ENCOUNTERED THEY MAY BE CONVERTED TO THREE PHASE LOADS AND THEN ADDED DIRECTLY TO THE LINE CURRENT.

EXAMPLE 3

WHERE A FEEDER SUPPLIES 3 PHASE, 240 VOLT AND 1 PHASE 120/240 VOLT LOADS THE FOLLOWING CALCULATIONS MAY BE APPLIED WITH A FEEDER SUPPLYING 30 AMPS OF 3 PHASE LOAD AND 90 AMPS OF 120 VOLT LOAD DISTRIBUTED AS SHOWN. LARGEST LINE LOAD TO THE NEUTRAL IS 50 AMPERES.



STEP 1 – CONVERT 3 PHASE LINE CURRENT TO PHASE CURRENT.
 $30 \times .58 = 17.4$ AMPS PER PHASE

STEP 2 – ADD LARGEST LINE TO NEUTRAL LOAD TO PHASE CURRENT.

PHASE 1	17.4
L-N	<u>50</u>
	67.4


STEP 3 – ADD TWO LARGEST LOADS.
 $67.4 + 17.4 = 84.8$

STEP 4 – CHECK RATIO BETWEEN THE TWO LARGEST PHASE CURRENTS TO DETERMINE THE MULTIPLIER.
 (NOTE: SEE PAGE 1.)
 $67.4 : 17.4$ LESS THAN $6:1 = .94$

STEP 5 – TO FIND THE LINE CURRENT, MULTIPLY THE SUM OF THE TWO LARGEST PHASE CURRENT BY THE CONSTANT.
 $84.8 \times .94$ AMPS LINE CURRENT = 79.7

WIRE SIZE SHALL BE CAPABLE OF CARRYING 79.7 AMPS CAPACITY, IT IS USUALLY NECESSARY TO CALCULATE THE LOAD ONLY ON THE CONDUCTOR WHICH INVOLVES THE GREATEST CURRENT.

DATE	REV.	DESCRIPTION	BY	CHK'D	APP.

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