Indianapolis Power & Light Company

Electric Service and Meter Manual

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ELECTRICAL INSPECTION AUTHORITIES COVERING TERRITORY SERVED BY INDIANAPOLIS POWER & LIGHT COMPANY

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If a correction is needed,
please send an e-mail with the correction to charlie.eldridge@aes.com to have it corrected

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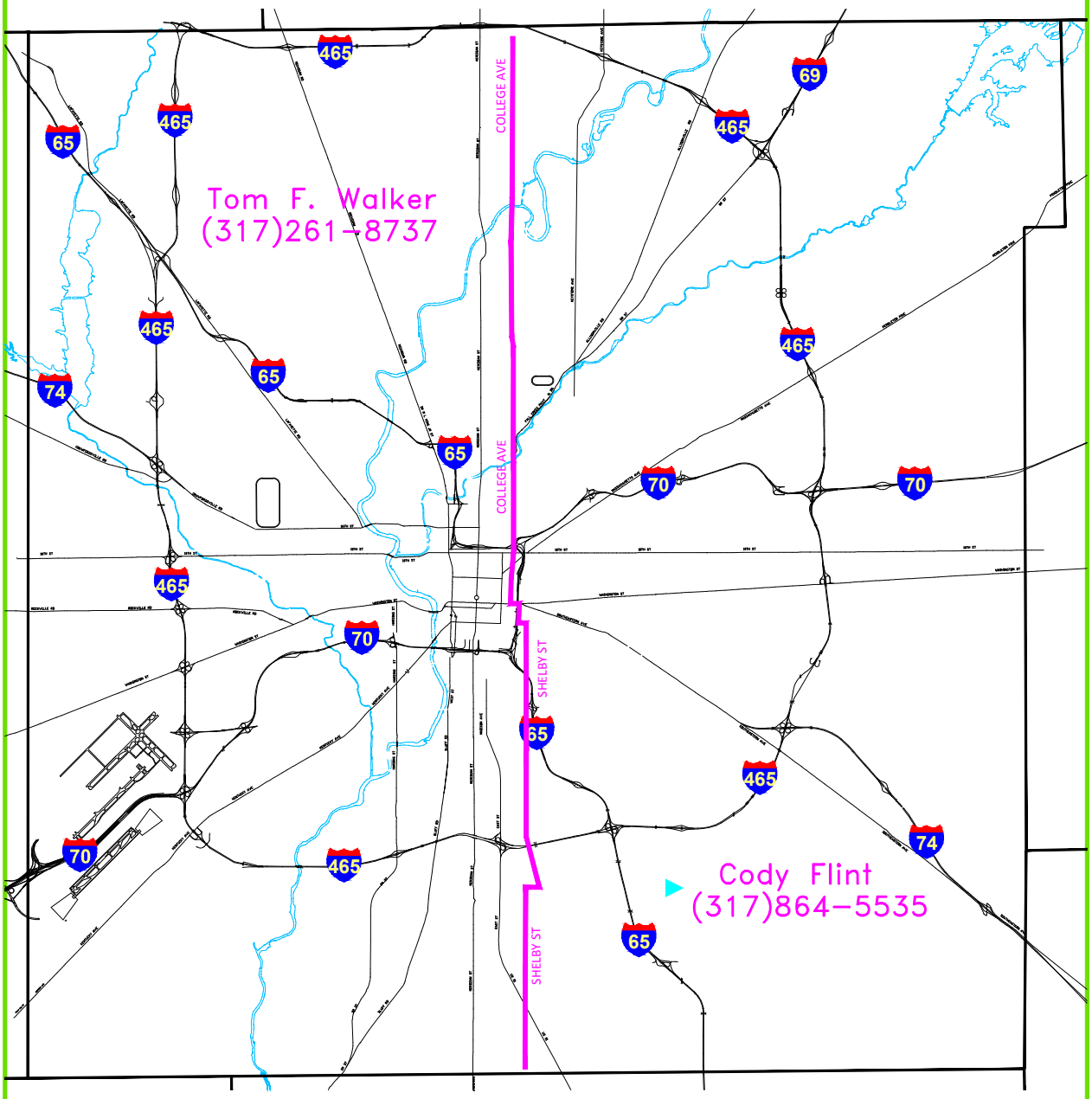


Tree Trimming
Team Leader
Daniel Perry
(317)261-8124

TREE TRIMMING COORDINATORS

REV 11-21-16

GB0-180

PART I: GENERAL

100 APPLICATION FOR SERVICE

It is important that the customer or their representative notify Indianapolis Power & Light Company (the Company) well in advance of the date a new temporary or permanent electric service will be required, especially when it is evident that construction work will be necessary.

All new customers should be notified that it is necessary for them to make application to have the service energized.

Application for service to a single family residence or a single family apartment may be made by telephoning the Customer Contact Department - (317) 261-8222 or by visiting the Customer Service Center at 2102 North Illinois Street.

The applicant shall give the correct street address and include detailed information as to his connected load, other service requirements and pertinent information regarding the responsible individual or corporation.

All new underground services require an underground application and agreement, except secondary network service area.

Application for a service to a commercial/industrial building should be made by calling the appropriate Engineering Division (see maps in front of book for jurisdiction). A completed copy of the Commercial/Industrial Information Sheet GB0-030 is to be submitted at initial meeting.

102 INSPECTION FOR ELECTRIC SERVICE

The company will furnish electric service only after an authority having jurisdiction (normally an electrical or building inspector) has approved an installation for electrical service. A self-certification certificate is acceptable in areas where permitted by the authority having jurisdiction. Where a self-certification certificate is permitted and used, it shall have the current date and it is considered no longer valid after 30 days from that date.

Temporary services may or may not require an electrical inspection, check with the authority having jurisdiction.

State of Indiana buildings, Federal buildings, and services on railroad property do not require an inspection; however, the engineer in charge of the customer's construction shall take responsibility for the correctness of the electrical service by filling out and signing the "Letter in Lieu of Electrical Inspection" provided by the Company.

The City of Indianapolis - Department of Business and Neighborhood Services does not include Speedway, Southport, Lawrence, Beech Grove or any areas outside Marion County.

115 TERMINATION OF SERVICE ON BUILDING

The Service Installation team will locate all single and two family residential services 400 amperes and below. Services over 400 amperes will be located by the Engineering Department.

The point of termination for either an overhead service drop or an underground service lateral shall be located on the side of the building at the closest point to the Company's facilities. (See Drawing GB5-010 for U.G. Residential Services.)

Exception: See section 220A2j.

Structures deemed as temporary by the Engineering Department (normally structures without a permanent foundation) shall be served as shown on Drawings GB4-060, GB5-080, and GB5-090.

The service drop or lateral shall not cross adjacent property.

117 CONVERTING FROM RESIDENTIAL OVERHEAD TO UNDERGROUND SERVICE

400 ampere services or less that are being converted from overhead to underground are the responsibility of Service Connections. Services over 400 amperes are the responsibility of the Engineering Department.

The customer will be charged for converting from an overhead to an underground service. Additionally, the customer will always be responsible for the replacement of the meter fitting, trenching, backfill, furnishing and installing any required conduit, and repair of the landscape.

118 RELOCATING THE RESIDENTIAL SERVICE POINT OR CABLE

400 ampere services or less that need to be relocated or replaced are the responsibility of Service Connections. Services over 400 amperes are the responsibility of the Engineering Department.

For underground services, the customer will be charged for any modifications to their service laterals. Additionally, the customer will always be responsible for the replacement of the meter fitting, trenching, backfill, furnishing and installing any required conduit, and repair of the landscape.

119 UPGRADING A RESIDENTIAL UNDERGROUND SERVICE LATERAL

Where a customer is upgrading their service and the existing cable size is inadequate for the new service, there will be no charge if the 30 month revenue equals or exceeds the Indianapolis Power & Light Company cost of the project. The customer will be responsible for the replacement of the meter fitting, trenching, backfill, furnishing and installing any required conduit and repair of all landscape.

120 OVERHEAD SERVICE

An overhead service drop must clear trees and other obstructions and be a minimum of three feet from windows, porches, fire escapes and similar structures. Also, it shall be located so it will not be necessary to climb on roofs to make a connection or disconnection. A suitable support of sufficient strength for the attachment of the service wires shall be provided by the customer.

J. All temporary construction services shall be approved and located by the Major Underground Distribution Projects Engineering Division prior to installation by the electrical contractor.

K. Meter enclosures and fittings shall be grounded in accordance with Article 250 of the Indiana Electrical Code.

Metering enclosure grounding: Where Indiana Electrical Code Section 250.142(B) Exception 2 is not permitted or used, a grounding conductor shall be run from the service grounding electrode conductor and grounded service conductor at the service equipment to the meter fitting or meter cabinet. This grounding conductor shall be copper and sized and installed in accordance with the Indiana Electrical Code requirements for grounding electrode conductors.

L. The customer shall install conduit seals that will limit the flow of hazardous gases and vapors from outside and inside the service lateral conduits in accordance with the Indiana Electrical Code Sections 230.8 and 300.5(G).

520 COMMERCIAL AND INDUSTRIAL METERING UNDER 600 VOLTS

In all cases, the meter location and the type of facilities to be installed are subject to approval by the Meter Department prior to starting construction.

The metering equipment shall be located in a safe area and at heights indicated on the typical installation drawings. Section 110.26 of the Indiana Electrical Code shall be followed and a clear level working space of at least 4 feet shall be maintained in front of the meter. Safe and ready access to this area shall be provided.

If the metering facilities are located inside, a 3/4" conduit sleeve shall be provided from the meter location to the outside of the building for the installation of an outside antenna for remote metering. This conduit sleeve shall be sealed against the weather by the customer.

The location:

- If inside must be clean, dry, illuminated, and readily accessible.
- If outside must be readily accessible, level, away from obstructions such as dumpsters and grease pits, etc.

A. 100 - 225 AMPERE SERVICES

Self-contained meters may be utilized for installations either underground or overhead in this range of capacities, where demand metering will not be required. Self-contained meters shall be installed ahead of the service disconnecting means in all cases.

Exception 1: Where a group of more than six disconnect switches are to be connected to a single set of service entrance conductors.

Exception 2: Installations in the networked areas where a main disconnect ahead of each meter is always required.

Exception 3: 480 volt installations.

A two gang 120/240 or 120/208 volt, three phase, four wire meter fitting is permitted to be provided by the customer upon approval by the Company for 200 ampere or smaller services.

PART VI: POWER QUALITY AND ELECTRIC SERVICE RELIABILITY

600 SERVICE RELIABILITY

Reliability of service is of prime importance to both the Company and the Customer. The Company's record of excellent service reliability is the result of sound engineering, system design and carefully implemented maintenance programs.

In spite of these efforts, power system disturbances do occur. Generally, the majority of Customer equipment can tolerate short-term voltage variations. But in today's electronic world, the inability of microprocessors and electronic controls to tolerate power system disturbances can result in equipment problems and downtime.

The Company encourages care in the design of the electrical system, and in the installation of power conditioning equipment. This will promote satisfactory operation of customer equipment and prevent electrical problems to the Company's and other Customers' equipment. The Customer should consider the following items as a guide for electrical system design where power quality is an important factor:

(a.) Wiring and grounding practices that comply with the current edition of the Indiana Electrical Code.

(b.) Dedicated circuits for electronic systems.

(c.) Multistage transient voltage surge protection (TVSS).

(d.) Single phasing protection for motors.

(e.) Derated or "K" rated transformers for load with high harmonic content.

(f.) Line reactors for protection of adjustable speed-drive motors.

(g.) Uninterruptible power supply (battery or rotary).

(h.) Back-up or emergency generation for some applications.

Should there be any questions to the application of these concepts, please call the Company's Power Quality Consultant on (317) 261-8382. The consultant will be most happy to assist you in obtaining the electric service to meet your needs.

610 POWER QUALITY ISSUES

Further explanation of issues that affect both the Company and the Customer are denoted below.

A. Harmonic Distortion

IEEE Standard 519 - 2014, contains the goals for the design of electrical systems that include both linear and nonlinear loads. The use of this standard for system design will assure compatible performance and safety of customer systems and minimize problems for neighboring Customers. Examples of nonlinear loads include adjustable speed drives, inverters, computers, lighting, high efficiency HVAC, etc. Previous experience by the Company has shown that the design requirements of IEEE Std. 519 - 2014 should be specified by the Customer at the Point of Common Coupling with other loads such as a Customer's main switchgear bus. Please contact the Company for assistance at specific locations.

B. Transformer Derating

The capacity of transformers provided by the Company may be inadequate due to a change in Customer load from a linear type to a nonlinear type. This action may result in premature failure and/or loss of life expectancy of the transformer that directly serves Customer load. Therefore, the rating of the step-down transformer provided by the Company will be reviewed using ANSI/IEEE C57.110 - 2008. This review is based upon the Customers' specified system design results per IEEE Std. 519 - 2014 and/or actual testing. The excess facility charges of a Standard Contract Rider Number 4 may apply to the Customer, if a larger than normal transformer is required to serve a load because of nonlinear characteristics. The excess facilities of a Standard Contract Rider Number 4 do not apply to the Customer with a design that meets the harmonic distortion goals described above.

C. Low Frequency Oscillatory Transient

Transients caused by capacitor-bank switching may occur at Customer locations. This transient can be caused by switching either the Company or Customer capacitor banks. The transient oscillates on the normal 60 Hz. sine wave and decays in a very short period of time. Typical magnitudes of the transient, including the normal 60 Hz. sine wave, are 1.1-2.0 per unit of nominal system voltage. The time duration of the transient alone is about 0.5-2 cycles. Specifications for the design of Customer systems should include appropriate protection for these transients.

D. Impulsive Transient

Lightning is a prime example of an impulsive transient and can cause damaging over voltages to appear on both Company and Customer electrical facilities. Multistage transient voltage surge suppression (TVSS) protection is necessary to avoid catastrophic equipment failure. IEEE/ANSI C62.41.1 - 2002 and C62.41.2-2002 provide information to properly coordinate equipment withstand capability and environmental characteristics to ensure proper protection. Customer specifications for the design and operation of electrical systems should include multistage TVSS protection.

E. Voltage Unbalance and/or Single Phasing

Voltage unbalance results from a load that is not balanced between phases. Voltage unbalance can occur by various means, including a phase loaded significantly heavier than another and loss of one or two phases of a three phase power system. Loss of one or two phases of a three phase power system that serves motor load at Customer locations is often called "single phasing". Voltage unbalance may result in motor damage due to heating. Appropriate protection for these conditions cannot be economically provided by the Company. Therefore, it is the Customers' responsibility to provide and maintain protection for multi-phase equipment that may be adversely affected by these conditions. The Company assumes no liability for equipment damaged by a loss of phase condition.

F. Voltage Sag

A voltage sag is a short duration voltage decrease. Voltage sags are usually associated with power system faults but can also be caused by switching heavy loads, starting of motors, etc.

Voltage sags caused by power system faults often have a different voltage on each phase, generally have durations of a second or less, and are more likely to occur during adverse weather conditions. Smaller voltage changes occur more often than large voltage changes. Thus equipment with greater sensitivity is more likely to experience problems. Customer equipment that cannot tolerate a voltage sag due to power system faults should be specified with the capability to ride through this condition.

Voltage sags caused by switching heavy loads, starting motors are best controlled by the Customer. Customer systems should include electrical and/or mechanical devices to limit the sag at the point of delivery to 2% below the impressed voltage at the point of delivery. Please contact the Company for assistance at specific locations.

G. Voltage Fluctuations

Loads that exhibit continuous rapid variation in their current magnitude can result in voltage fluctuations. These voltage fluctuations can cause corresponding fluctuations in lighting equipment output. The magnitude and frequency of the fluctuating light output can become very irritating to people.

Examples of loads that can cause voltage fluctuation and may result in flicker are welding machines, arc furnaces, X-ray machines, etc. Customers installing equipment that may exhibit these characteristics should specify, install and operate equipment that will limit the fluctuations to the limits specified by the Company. Typically, these limits will range in magnitude from 0.3% of the impressed RMS voltage, at the metering point for modulation frequencies in the 5-10 Hz. range to a maximum of 2% for other modulation frequencies. Please contact the Company for the limits at specific Customer locations.

Surface Crossed by Service Drop	Required Clearance
Subject to pedestrians or restricted traffic only. Includes lawn areas, decks, platforms, sidewalks and similar areas. (See Notes 1 through 4)	12 Feet
Residential driveways and parking areas	12 Feet
Roads, streets, and other areas subject to truck traffic, commercial driveways, parking lots, and alleys. Other areas traversed by vehicles, such as cultivated, grazing, forest, and orchard lands, industrial sites, commercial sites, etc.	16 Feet
Main streets and thoroughfares	18 Feet
Swimming pools and decks around pools, railroad tracks and for services larger than 400 amperes	(See Note 5)

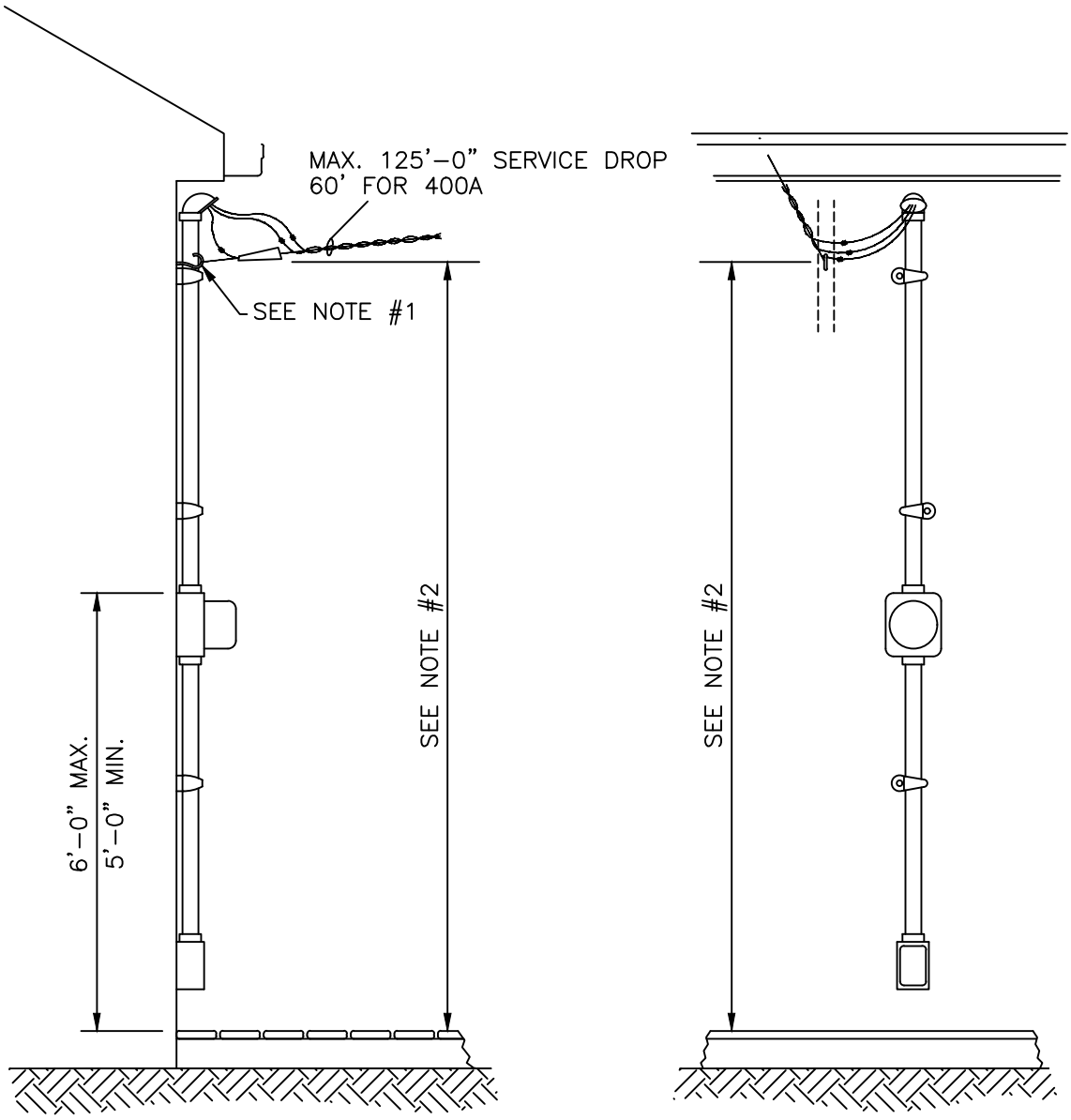
Notes:

1. All clearances are based on the requirements for standard triplex and quadruplex cables.
2. Where communications conductors (Telephone, Cable TV, etc.) are located, mid-span clearance of 18" shall be maintained to the service drop conductors.
3. Only power service-drop conductors shall be permitted to be attached to a service mast. See the Indiana Electrical Code, Section 230.28
4. Where the height of a residential building does not permit its service drop or drip loop to meet 12 feet, the clearance may be reduced to 10 feet.
5. Crossing this area requires the assistance of a project designer. See the Customer Projects Engineering District Map, GB0-100 for the name and contact information.
6. See Sections 115, 120 and 125 for additional information.
7. These required clearances meet or exceed the National Electrical Safety Code requirements.

OVERHEAD SERVICE DROP CLEARANCE UP TO 400 AMPERES

REV 12/6/16

GB4-005



SIDE VIEW **FRONT VIEW**

NOTES:

1. CONTRACTOR TO FURNISH AND INSTALL A MINIMUM SIZE 3/8" GALVANIZED LAG SCREW EYE OR EYE BOLT FOR ATTACHMENT OF SERVICE DROP.

2. 13'–6" MINIMUM ABOVE DECK, PATIO, GRADE, OR OTHER AREAS OF PEDESTRIAN TRAFFIC TO THE ATTACHMENT POINT.

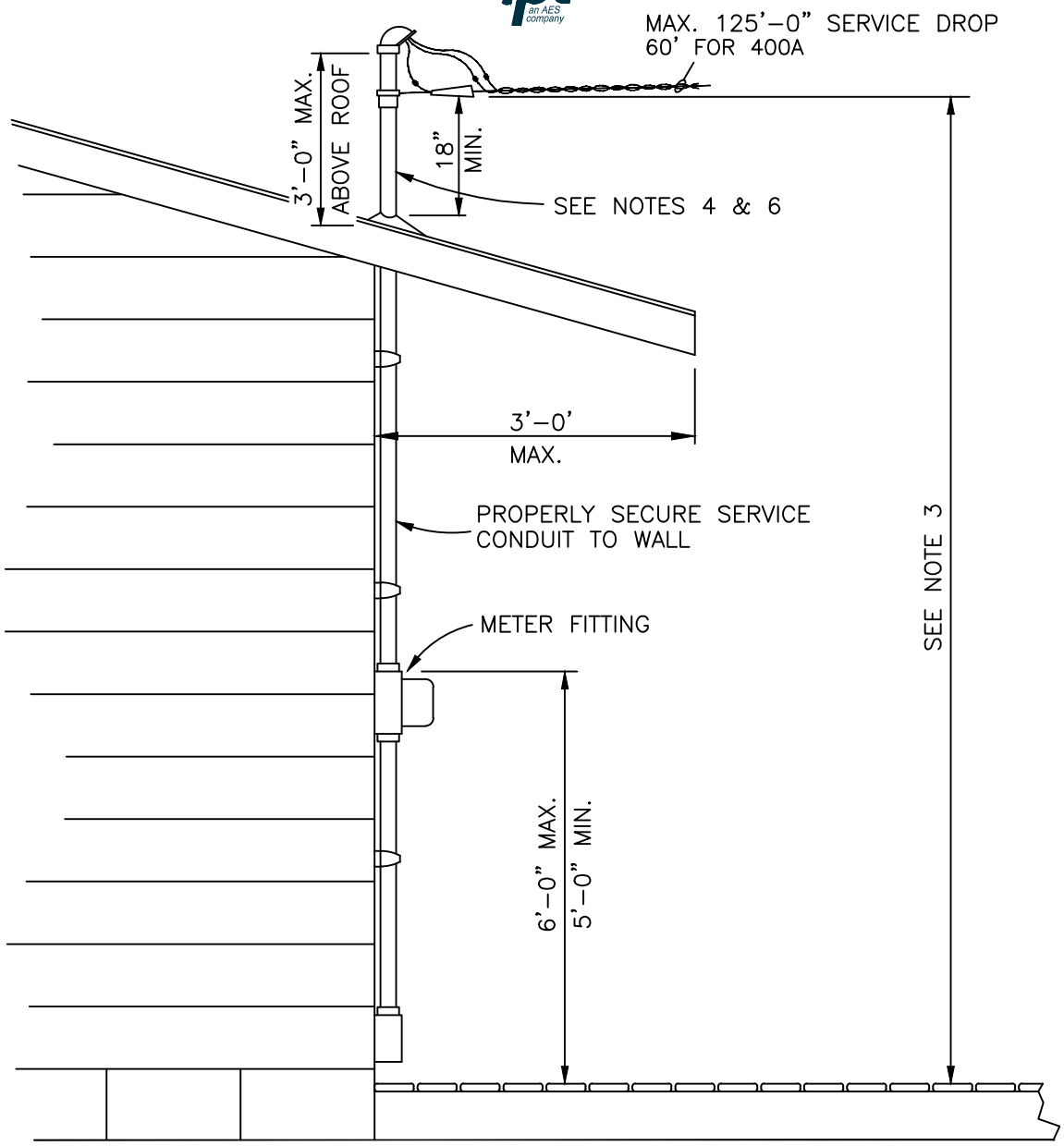
3. THE SERVICE DROP SHALL NOT MAKE A SMALLER ANGLE THAN 30° WITH THE SIDE OF THE BUILDING.

▶ 4. FOR VERTICAL CLEARANCES, SEE DRAWING GB4–005.

SERVICE CONNECTION BELOW ROOF 400 A MAXIMUM SERVICE

REV 11–28–16

GB4-010



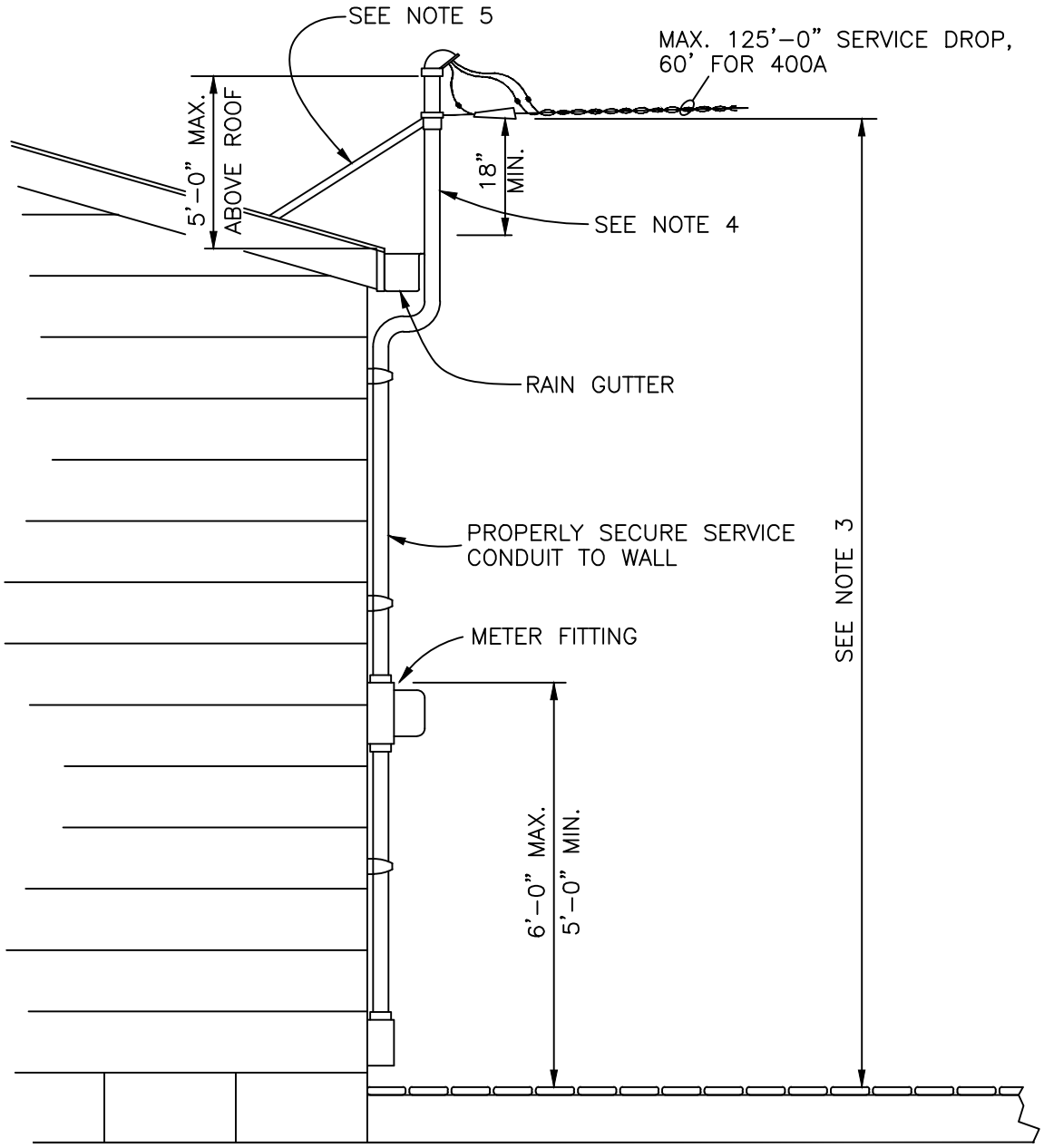
NOTES:

1. SERVICE HEAD SHALL BE LOCATED SO CONNECTION CAN BE MADE FROM A LADDER WITHOUT CLIMBING ON ROOF.
2. NO COUPLINGS OR FITTINGS SHALL BE INSTALLED WITHIN 6'–0" OF SERVICE HEAD.
3. 13'–6" MINIMUM ABOVE DECK, PATIO, GRADE, OR OTHER AREAS OF PEDESTRIAN TRAFFIC TO THE ATTACHMENT POINT.
4. CUSTOMERS SERVICE RISER EXTENDING THROUGH ROOF FOR SUPPORT OF SERVICE DROP SHALL BE A MINIMUM OF 2" RIGID GALVANIZED OR INTERMEDIATE METAL CONDUIT.
5. THE SERVICE DROP SHALL NOT MAKE A SMALLER ANGLE THAN 30° WITH THE SIDE OF THE BUILDING.
6. NOT APPROVED FOR 480V. SERVICES.
7. ▶ FOR VERTICAL CLEARANCES, SEE DRAWING GB4–005.

SERVICE RISER EXTENDING THROUGH ROOF 400 A MAXIMUM SERVICE

REV 11–28–16

GB4-020



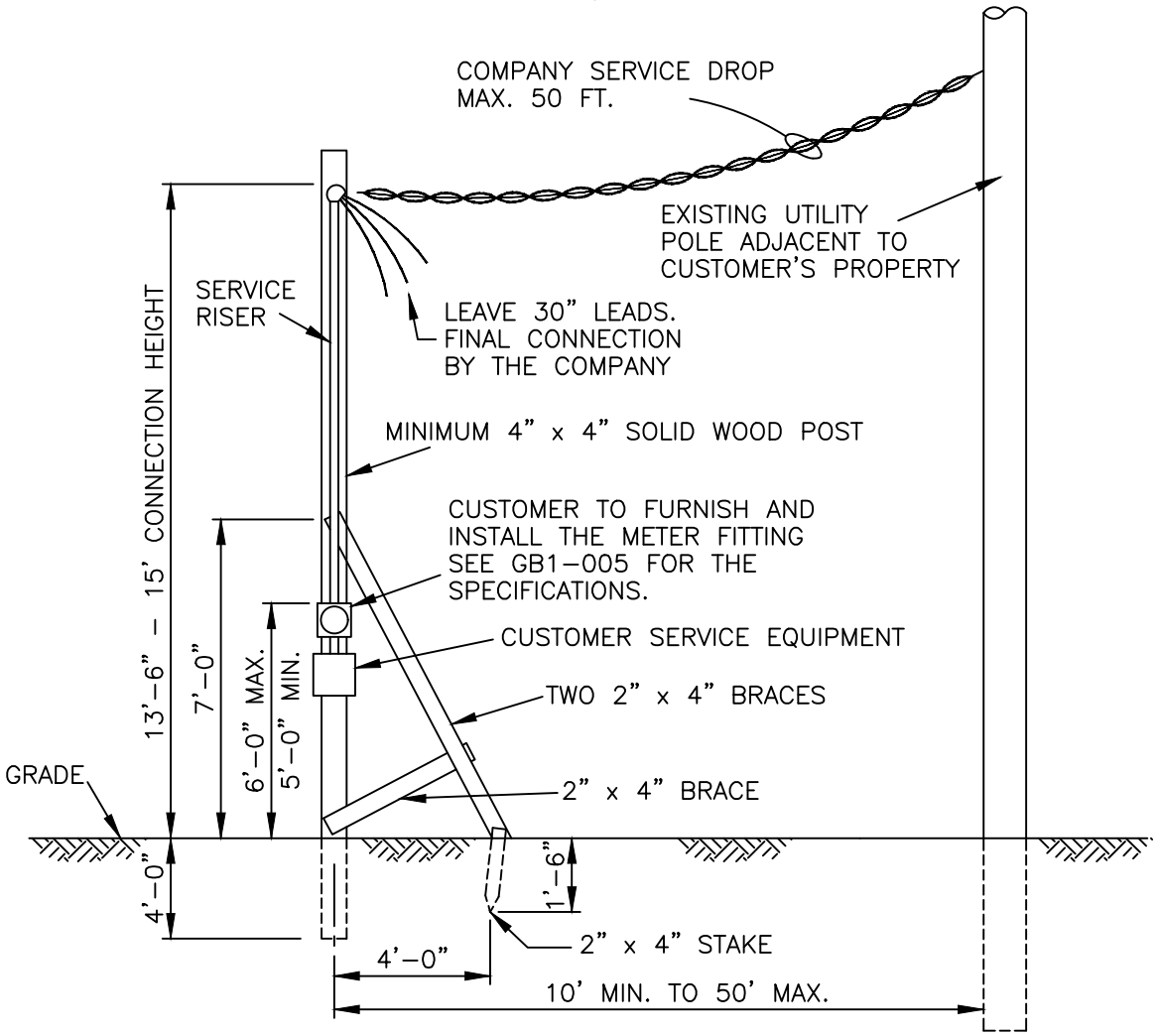
NOTES:

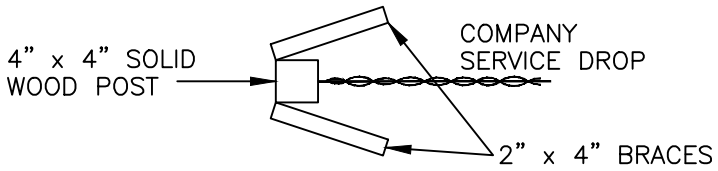
1. SERVICE HEAD SHALL BE LOCATED SO CONNECTION CAN BE MADE FROM A LADDER WITHOUT CLIMBING ON ROOF.
2. NO COUPLINGS OR FITTINGS SHALL BE INSTALLED WITHIN 6'–0" OF SERVICE HEAD.
3. 13'–6" MINIMUM ABOVE DECK, PATIO, GRADE, OR OTHER AREAS OF PEDESTRIAN TRAFFIC TO THE ATTACHMENT POINT.
4. CUSTOMERS SERVICE RISER SHALL BE A MINIMUM OF 2" RIGID GALVANIZED, INTERMEDIATE METAL, OR ALUMINUM CONDUIT (3" FOR 400A).
5. 2–RIGID SUPPORTS SECURED TO TWO SEPARATE RAFTERS.
6. THE SERVICE DROP SHALL NOT MAKE A SMALLER ANGLE THAN 30° WITH THE SIDE OF THE BUILDING.
7. NOT APPROVED FOR 480V. SERVICES.
8. ▶ FOR VERTICAL CLEARANCES, SEE DRAWING GB4–005.

SERVICE RISER EXTENDING ABOVE ROOF 400 A MAXIMUM SERVICE

REV 11–28–16

GB4-030





TOP VIEW

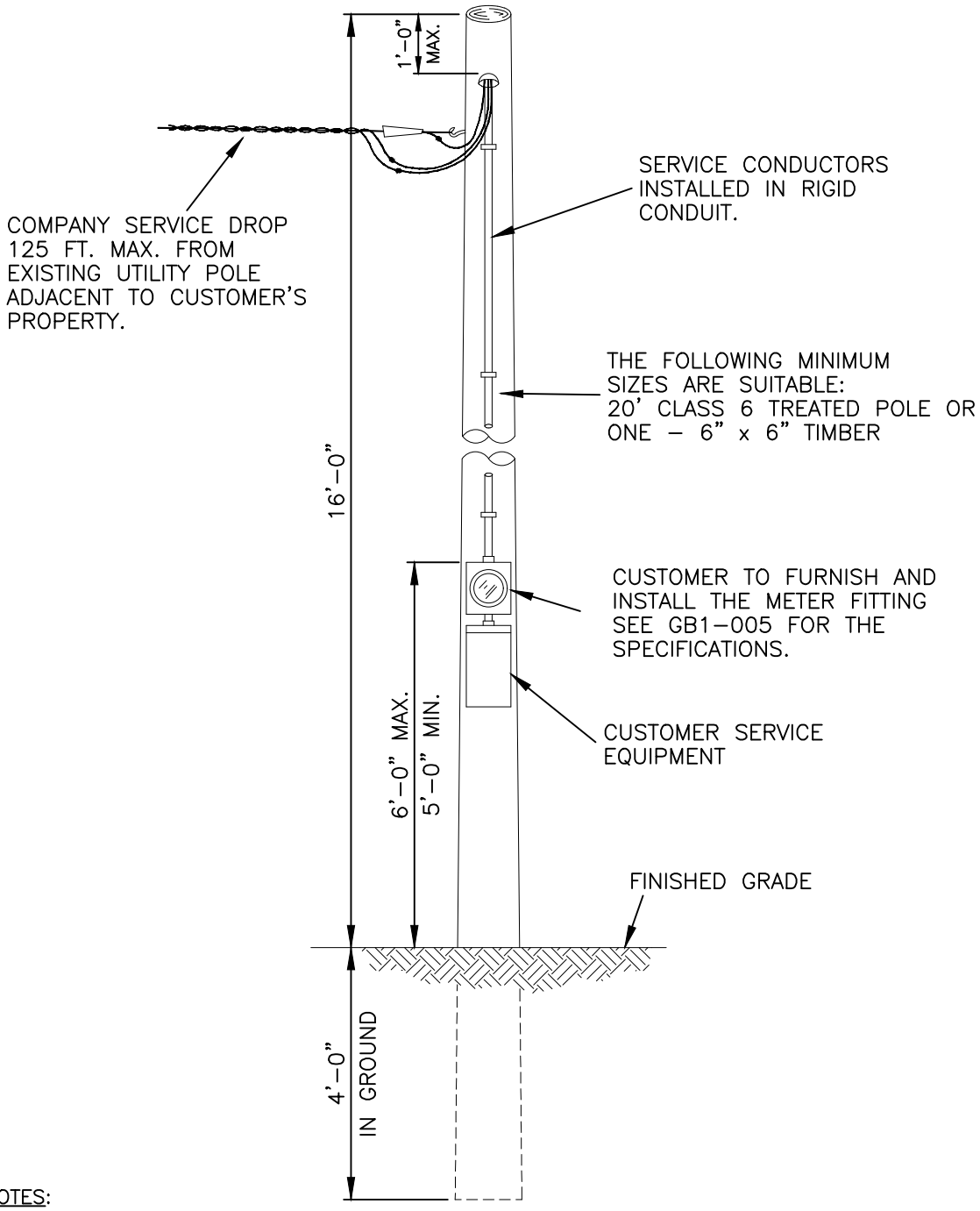
NOTES:

1. ENTIRE STRUCTURE TO BE CONSTRUCTED AND INSTALLED BY THE CONTRACTOR.
2. THE USE OF THIS STRUCTURE IS NOT PERMITTED IF SERVICE WIRES PASS OVER PUBLIC STREETS, ALLEYS, ROADS, AND DRIVEWAYS.
3. TEMPORARY CONSTRUCTION SERVICE POLE MUST BE A MINIMUM OF 10 FT. FROM THE COMPANY'S POLE AND MUST BE POSITIONED TO ALLOW THE SERVICE DROP TO CLEAR THE COMMUNICATION CABLES BY AT LEAST 40 INCHES.
4. ALTERNATE METHODS MAY BE USED WITH PERMISSION OF SERVICE CONNECTION.
5. FOR DEFINITION OF "TEMPORARY", SEE SECTION 107.
6. ▶ FOR VERTICAL CLEARANCES, SEE DRAWING GB4-005.

TEMPORARY OVERHEAD CONSTRUCTION SERVICE 120/240 VOLT, 1 PHASE, 3 WIRE 225 A MAXIMUM SERVICE

REV 11-28-16

GB4-040



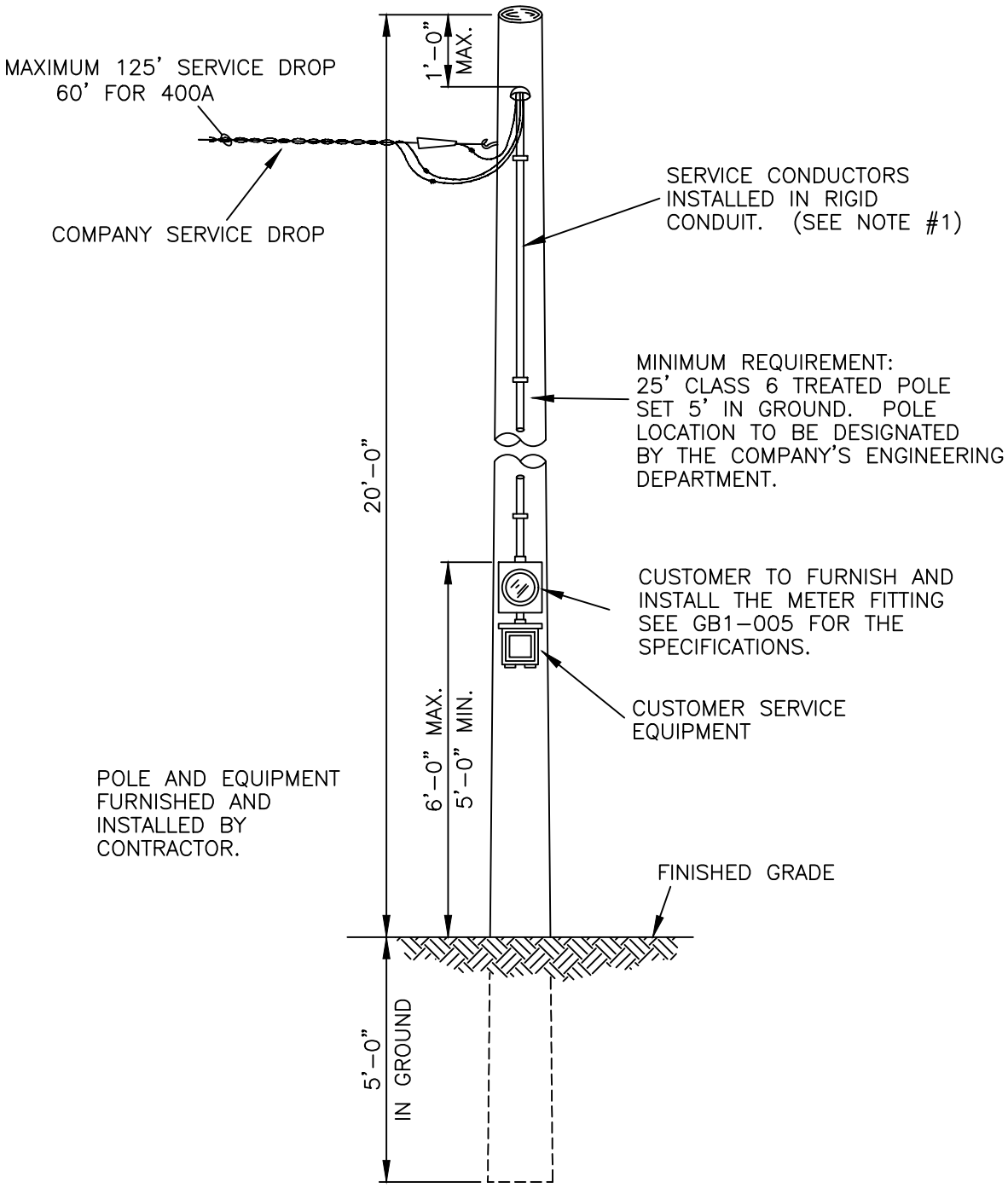
NOTES:

1. POLE AND EQUIPMENT FURNISHED AND INSTALLED BY CONTRACTOR.
2. TEMPORARY CONSTRUCTION SERVICE POLE MUST BE A MINIMUM OF 10 FT. FROM THE COMPANY POLE AND MUST BE POSITIONED TO ALLOW THE SERVICE DROP TO CLEAR THE COMMUNICATION CABLES BY AT LEAST 40 INCHES.
3. FOR DEFINITION OF "TEMPORARY", SEE SECTION 107.
4. SEE SECTION 220A2d FOR THE DEFINITION OF RIGID CONDUIT.
5. ▶ FOR VERTICAL CLEARANCES, SEE DRAWING GB4–005.

TEMPORARY POLE METER INSTALLATION FOR CONSTRUCTION 120/240 VOLT, 1 PHASE 3 WIRE 225 A MAXIMUM SERVICE

REV 11–28–16

GB4-050



NOTES:

1. SEE SECTION 220A2d FOR THE DEFINITION OF RIGID CONDUIT.
2. ▶ FOR VERTICAL CLEARANCES, SEE DRAWING GB4-005.

PERMANENT POLE METER INSTALLATION FOR ONE SERVICE 120/240 VOLT, 1 PHASE, 3 WIRE 400 A MAXIMUM SERVICE

REV 11-28-16

GB4-060