



STANDARD OPERATING PROCEDURE FOR ROUTING OF ELECTRICAL LINES OVER AND AROUND FLOODWALLS, LEVEES AND PUMP STATIONS

18 December 2014

This Standard Operating Procedure provides guidance for the clearances and routing of both Utility and Sponsor Owned electrical power lines over and around federal levees, floodwalls, and pump stations. For illustrative purposes, reference details 1 through 3 of this SOP.

Where it is impractical to route electrical lines over levee embankments, the Standard Operating Procedure titled “Utility Penetrations in Levees and Floodwalls – Fiber Optic, Electrical, and Other Non-Pressure Lines Up and Over Existing Earthen Levees” shall be utilized.

CASE 1: Utility Owned Power Lines

Electrical lines owned by local utility shall be governed by the latest version of NSI/IEEE C2 (2012) – National Electrical Safety Code. Clearance requirements (both vertical and horizontal) are separated per voltage levels and levee system component as outlined in Pages 2 through 8 of this SOP.

CASE 2: Sponsor Owned Power Lines

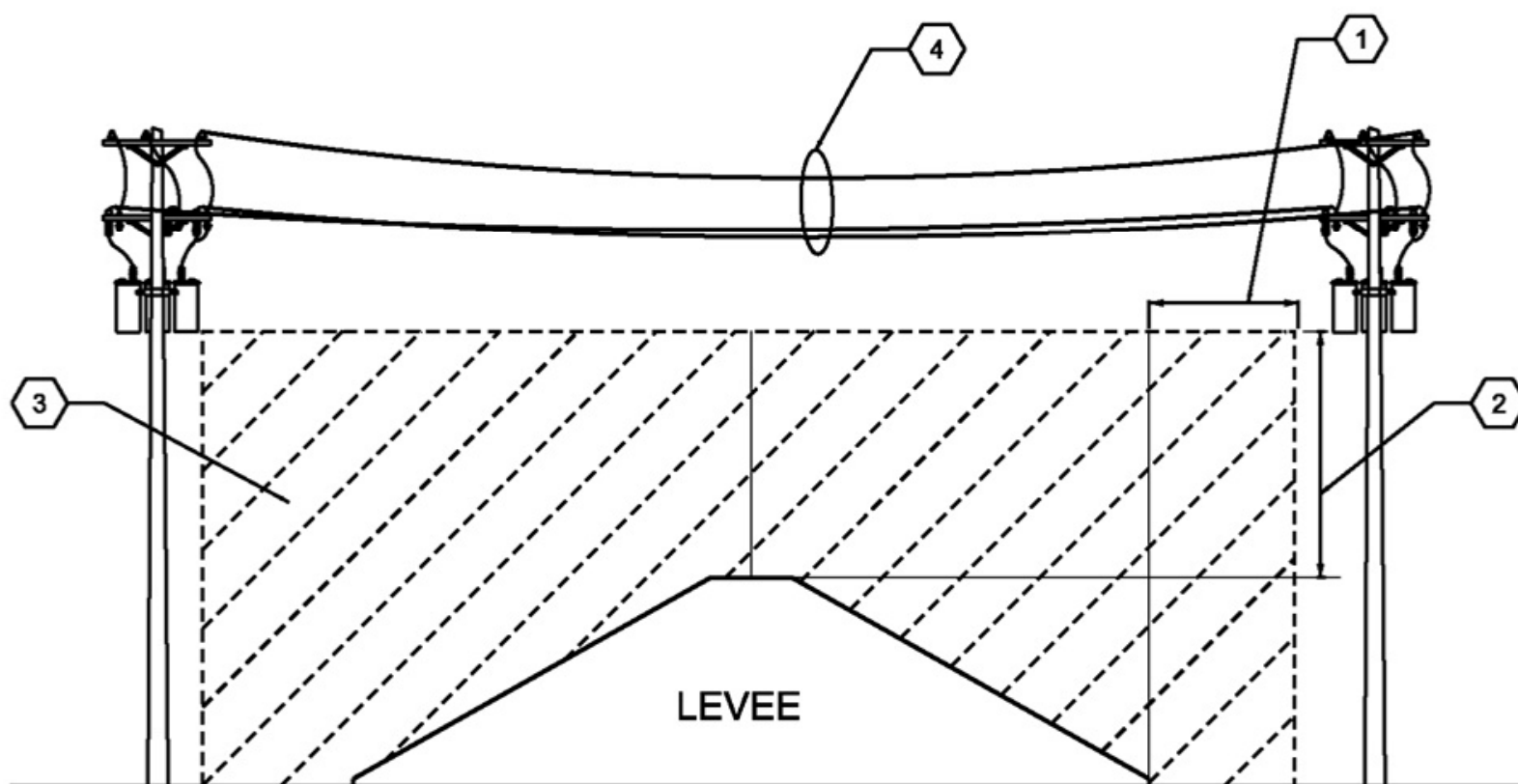
Electrical lines owned by local sponsor shall be governed by latest version of NFPA 70 (2014) – National Electrical Code. Clearance requirements (both vertical and horizontal) are separated per voltage levels and levee system components as outlined in Pages 9 and 10 of this SOP.

GENERAL NOTES

1. FOR CLEARANCE VALUES, SEE IEEE C2 TABLE 232-1 FOR UTILITY OWNED LINES, AND NFPA 70 TABLE 225.60 FOR SPONSOR OWNED LINES.
2. HORIZONTAL CLEARANCES AROUND LEVEE DETERMINED BY ELECTRIC POLE BASE REQUIREMENTS AND 15' TOE CLEARANCE REQUIREMENTS.

SHEET KEYNOTES

- 1 HORIZONTAL CLEARANCE REQUIREMENTS
- 2 VERTICAL CLEARANCE REQUIREMENTS
- 3 AREA OF CLEARANCE FOR ELECTRICAL LINES
- 4 ELECTRICAL LINES IN QUESTION



DETAIL #1 FOR ELECTRICAL LINE CLEARANCE

NOT TO SCALE



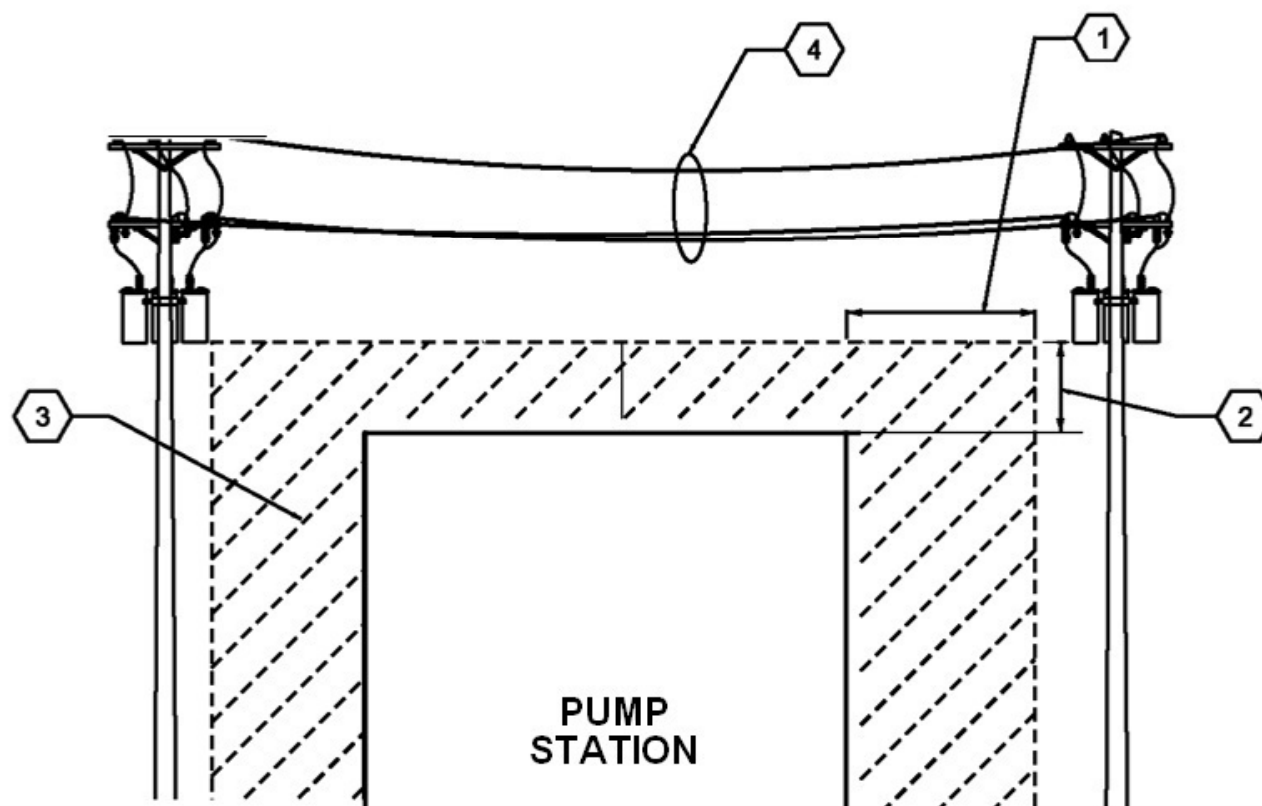
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GENERAL NOTES

1. FOR CLEARANCE VALUES, SEE IEEE C2 TABLE 234-1 FOR UTILITY OWNED LINES, AND NFPA 70 TABLE 225.61 FOR SPONSOR OWNED LINES.
2. HORIZONTAL CLEARANCES AROUND LEVEE DETERMINED BY ELECTRIC POLE BASE REQUIREMENTS AND 15' TOE CLEARANCE REQUIREMENTS.

SHEET KEYNOTES

- 1 HORIZONTAL CLEARANCE REQUIREMENTS
- 2 VERTICAL CLEARANCE REQUIREMENTS
- 3 AREA OF CLEARANCE FOR ELECTRICAL LINES
- 4 ELECTRICAL LINES IN QUESTION



DETAIL #2 FOR ELECTRICAL LINE CLEARANCE AT PUMP STATION

NOT TO SCALE

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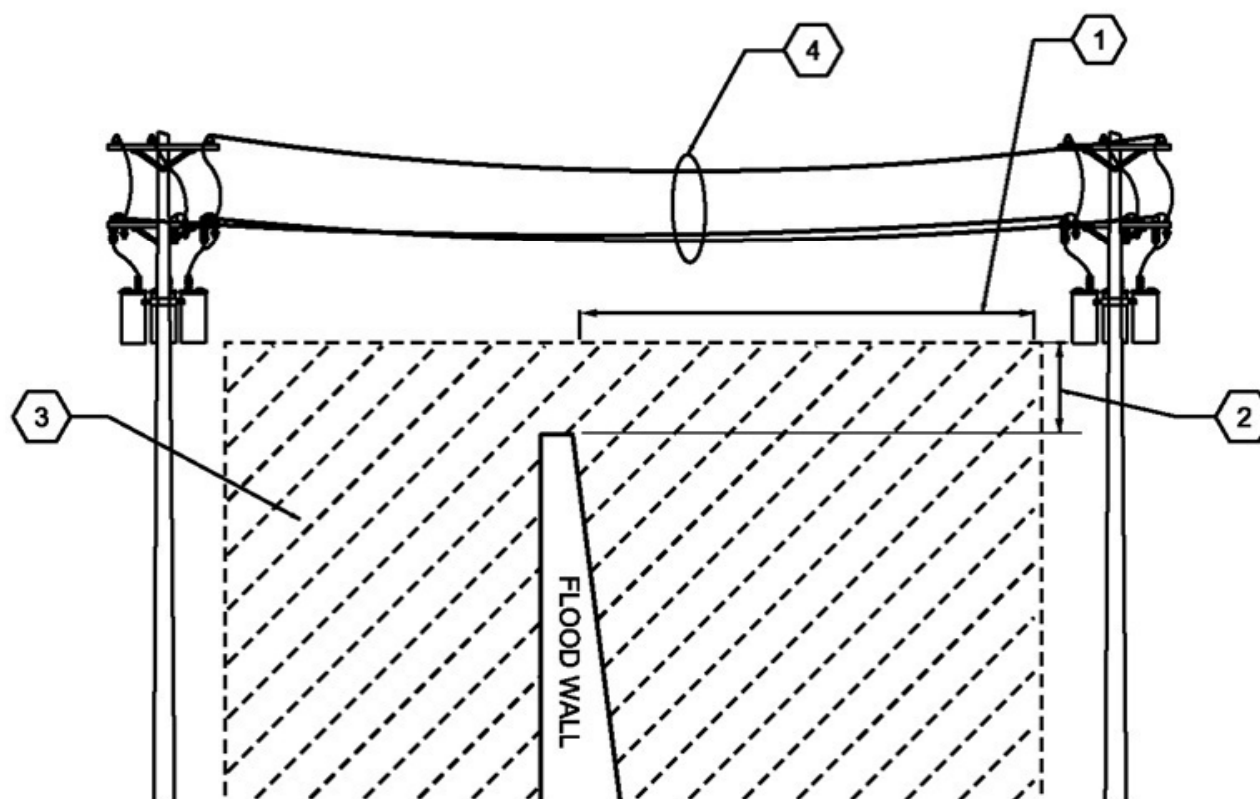


GENERAL NOTES

1. FOR CLEARANCE VALUES, SEE IEEE C2 TABLE 234-1 FOR UTILITY OWNED LINES, AND NFPA 70 TABLE 225.61 FOR SPONSOR OWNED LINES.
2. HORIZONTAL CLEARANCES AROUND LEVEE DETERMINED BY ELECTRIC POLE BASE REQUIREMENTS AND 15' TOE CLEARANCE REQUIREMENTS.

SHEET KEYNOTES

- 1 HORIZONTAL CLEARANCE REQUIREMENTS
- 2 VERTICAL CLEARANCE REQUIREMENTS
- 3 AREA OF CLEARANCE FOR ELECTRICAL LINES
- 4 ELECTRICAL LINES IN QUESTION



DETAIL #3 FOR ELECTRICAL LINE CLEARANCE AT FLOOD WALL

NOT TO SCALE



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CASE 1: Utility Owned Power Lines

Electrical lines owned by local utility shall be governed by the latest version of NSI/IEEE C2 (2012) – National Electrical Safety Code. Clearance requirements (both horizontal and vertical) are separated per voltage levels and levee system component as indicated below:

0 – 22kV Voltage Range: Levee Clearance Requirements

Levee clearances shall be determined by ANSI/IEEE C2 Table 232-1 (Modified 11/15/11) – Vertical Clearances of Wires, Conductors, and Cables Above Ground, Roadway, Rail or Water Surfaces (Reference Attached Table 232-1).

0 – 22kV Voltage Range: Pump Station and Floodwall Clearance Requirements

Pump station and floodwall clearances shall be determined by ANSI/IEEE C2 Table 234-1 – Clearance of Wires, Conductors, Cables, and Unguarded Rigid Lives Parts Adjacent but not attached to Buildings and Other Installations Except Bridges, shown below.

> 22kV Voltage Range

For routing of electrical lines with voltages exceeding 22kV, the following sections in ANSI/IEEE C2 – National Electrical Safety Code have calculation methods for required clearances:

- Levees – 232.C – Additional clearances for wires, conductors, cables, and unguarded rigid live parts of equipment – Part 1 – Voltages exceeding 22kV
- Floodwalls and pump stations – 234.G – Additional clearances for voltages exceeding 22kV for wires, cables, and unguarded rigid live parts.

**Table 232-1-
Vertical clearance of wires, conductors, and cables above ground,
roadway, rail, or water surfaces**

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definitions section for voltages of other systems.

See Rules 232A, 232B1, 232C1a, and 232D4.)

IEEE C2 (2012) – National Electrical Safety Code

Nature of surface underneath wires, conductors, or cables	Insulated communication conductors and cable; messengers; overhead shield/surge-protection wires; grounded guys; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to 0 to 300 V ^{(6), (11), (15)} ; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Noninsulated communication conductors; supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V ⁽³⁾ ; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to over 300 V to 750 V ^{(6), (14), (15)} (ft)	Open supply conductors, over 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to 750 V to 22 kV ^{(6), (14), (15)} (ft)	Trolley and electrified railroad contact conductors and associated span or messenger wires ⁽¹⁾	
					0 to 750 V to ground (ft)	Over 750 V to 22 kV to ground (ft)
Where wires, conductors, or cables cross over or overhang						
1. Railroad on levee† (except electrified railroads using overhead trolley conductors) ^{(2), (16), (22)}	23.5	24.0	24.5	26.5	22.0 ⁽⁴⁾	22.0 ⁽⁴⁾
2. Roads, streets, and other areas on levee crown subject to truck traffic † ⁽²³⁾	15.5	16.0	16.5	18.5	18.0 ⁽⁵⁾	20.0 ⁽⁵⁾
3. Driveways, parking lots, and alleys ⁽²³⁾	15.5 ^{(7), (13)}	16.0 ^{(7), (13)}	16.5 ⁽⁷⁾	18.5	18.0 ⁽⁵⁾	20.0 ⁽⁵⁾
4. Other areas traversed by vehicles, such as cultivated, grazing, forest, and orchard lands, industrial sites, commercial sites, etc. ⁽²⁵⁾	15.5	16.0	16.5	18.5	—	—
5. Spaces and ways subject to pedestrians or restricted traffic only ⁽⁹⁾	9.5	12.0 ⁽⁸⁾	12.5 ⁽⁸⁾	14.5	16.0	18.0
6. Water areas not suitable for sailboating or where sailboating is prohibited ⁽²¹⁾	14.0	14.5	15.0	17.0	—	—
7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams, and canals with an unobstructed surface area of ^{(17), (18), (19), (20) (21)}						
a. Less than 20 acres	17.5	18.0	18.5	20.5	—	—

Nature of surface underneath wires, conductors, or cables	Insulated communication conductors and cable; messengers; overhead shield/surge-protection wires; grounded guys; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to 0 to 300 V ^{(6), (11), (15)} ; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Noninsulation conductors; supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V ⁽³⁾ ; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to over 300 V to 750 V ^{(6), (14), (15)} (ft)	Open supply conductors, over 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to 750 V to 22 kV ^{(6), (14), (15)} (ft)	Trolley and electrified railroad contact conductors and associated span or messenger wires ⁽¹⁾	
					0 to 750 V to ground (ft)	Over 750 V to 22 kV to ground (ft)
b. Over 20 to 200 acres	25.5	26.0	26.5	28.5	—	—
c. Over 200 to 2000 acres	31.5	32.0	32.5	34.5	—	—
d. Over 2000 acres	37.5	38.0	38.5	40.5	—	—
8. Established boat ramps and associated rigging areas; areas posted with sign(s) for rigging or launching sail boats	Clearance aboveground shall be 5 ft greater than in 7 above, for the type of water areas served by the launching site					
Where wires, conductors, or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway						
9. Roads, streets, or alleys	15.5 ⁽²⁴⁾	16.0	16.5	18.5	18.0 ⁽⁵⁾	20.0 ⁽⁵⁾
10. Roads where it is unlikely that vehicles will be crossing under the line	13.5 ^{(10), (12)}	14.0 ⁽¹⁰⁾	14.5 ⁽¹⁰⁾	16.5	18.0 ⁽⁵⁾	20.0 ⁽⁵⁾

NOTE: The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M & E) value of Table A-1 to the applicable Reference Component of Table A-2a of Appendix A.

† - Original text from IEEE C2 Table changed for clarification of application to levee systems.

- (1) Where subways, tunnels, or bridges require it, less clearance above ground or rails than required by Table 232-1 may be used locally. The trolley and electrified railroad contact conductor should be graded very gradually from the regular construction down to the reduced elevation.
- (2) For wires, conductors, or cables crossing over mine, logging, and similar railways that handle only cars lower than standard freight cars, the clearance may be reduced by an amount equal to the difference in height between the highest loaded car handled and 20 ft, but the clearance shall not be reduced below that required for street crossings.
- (3) Does not include neutral conductors meeting Rule 230E1.
- (4) In communities where 21 ft has been established, this clearance may be continued if carefully maintained. The elevation of the contact conductor should be the same in the crossing and next adjacent spans. (See Rule 225D2 for conditions that must be met where uniform height above rail is impractical.)
- (5) In communities where 16 ft has been established for trolley and electrified railroad contact conductors 0 to 750 V to ground, or 18 ft for trolley and electrified railroad contact conductors exceeding 750 V, or where local conditions make it impractical to obtain the clearance given in the table, these reduced clearances may be used if carefully maintained.
- (6) These clearance values also apply to guy insulators.
- (7) Where the height of a residential building does not permit its service drop(s) to meet these values, the clearances over residential driveways only may be reduced to the following:

- | | |
|------|---|
| (ft) | |
| 12.5 | (a) Insulated supply service drops limited to 300 V to ground |
| 10.5 | (b) Insulated drip loops of supply service drops limited to 300 V to ground |
| 12.0 | (c) Supply service drops limited to 150 V to ground and meeting Rule 230C1 or 230C3 |
| 10.0 | (d) Drip loops only of service drops limited to 150 V to ground and meeting Rule 230C1 or 230C3 |
| 11.5 | (e) Insulated communication service drops |

- (8) Where the height of a residential building does not permit its service drop(s) to meet these values, the clearances may be reduced to the following:

(ft)

- | | |
|---|------|
| (a) Insulated supply service drops limited to 300 V to ground | 10.5 |
| (b) Insulated drip loops of supply service drops limited to 300 V to ground | 10.5 |
| (c) Supply service drops limited to 150 V to ground and meeting Rule 230C3 | 10.0 |
| (d) Drip loops only of supply service drops limited to 150 V to ground and meeting Rule 230C3 | 10.0 |
- (9) Spaces and ways subject to pedestrians or restricted traffic only are those areas where riders on horses or other large animals, vehicles, or other mobile units exceeding a total height of 8 ft are prohibited by regulation or permanent terrain configurations, or are otherwise not normally encountered nor reasonably anticipated.
- (10) Where a supply or communication line along a road is located relative to fences, ditches, embankments, etc., so that the ground under the line would not be expected to be traveled except by pedestrians, the clearances may be reduced to the following values: (ft)
- | | |
|---|------|
| (a) Insulated communication conductor and communication cables. | 9.5 |
| (b) Conductors of other communication circuits | 9.5 |
| (c) Supply cables of any voltage meeting Rule 230C1 and neutral conductors meeting Rule 230E1 | 9.5 |
| (d) Insulated supply conductors limited to 300 V to ground | 12.5 |
| (a) Insulated supply cables limited to 150 V to ground meeting Rule 230C2 or 230C3 | 10.0 |
| (a) Grounded guys, guys meeting Rules 279A1 and 215C5 exposed to 0 to 300 V | 9.5 |
- (11) No clearance from ground is required for anchor guys not crossing tracks, rails, streets, driveways, roads, or pathways.
- (12) This clearance may be reduced to 13 ft for communication conductors and guys.
- (13) Where this construction crosses over or runs along alleys, driveways, or parking lots not subject to truck traffic this clearance may be reduced to 15 ft.
- (14) The portion(s) of span guys between guy insulators and the portion(s) of anchor guys above guy insulators that are not grounded shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
- (15) The portion of anchor guys below the lowest insulator meeting Rules 279A1 and 215C5 may have the same clearance as grounded guys.
- (16) Adjacent to tunnels and overhead bridges that restrict the height of loaded rail cars to less than 20 ft, these clearances may be reduced by the difference between the highest loaded rail car handled and 20 ft, if mutually agreed to by the parties at interest.
- (17) For controlled impoundments, the surface area and corresponding clearances shall be based upon the design high- water level.
- (18) For uncontrolled water flow areas, the surface area shall be that enclosed by its annual high-water mark. Clearances shall be based on the normal flood level; if available, the 10-year flood level may be assumed as the normal flood level.
- (19) The clearance over rivers, streams, and canals shall be based upon the largest surface area of any 1 mi long segment that includes the crossing. The clearance over a canal, river, or stream normally used to provide access for sailboats to a larger body of water shall be the same as that required for the larger body of water.
- (20) Where an overwater obstruction restricts vessel height to less than the applicable reference height given in Table 232-3, the required clearance may be reduced by the difference between the reference height and the overwater obstruction height, except that the reduced clearance shall be not less than that required for the surface area on the line-crossing side of the obstruction.
- (21) Where the U.S. Army Corps of Engineers, or the state, or surrogate thereof has issued a crossing permit, clearances of that permit shall govern.
- (22) See Rule 234I for the required horizontal and diagonal clearances to rail cars.
- (23) For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft in height. Areas not subject to truck traffic are areas where truck traffic is not normally encountered nor reasonably anticipated.
- (24) Communication cables and conductors may have a clearance of 15 ft where poles are back of curbs or other deterrents to vehicular traffic.
- (25) When designing a line to accommodate oversized vehicles, these clearance values shall be increased by the difference between the known height of the oversized vehicle and 14 ft.

Levees shall be considered “roads, streets, and other areas subject to truck traffic”, due to maintenance accessibility and other access requirements. Clearance distances shall be selected per voltage levels and the type of cable, conductor, or wire.

**Table 234-1—
Clearance of wires, conductors, cables, and unguarded rigid live parts adjacent but not attached to
buildings and other installations except bridges**

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definitions section for voltages of other systems. Clearances are with no wind displacement except where stated in the footnotes below.

See Rules 234A, 234C1a, 234C2, and 234H4.)

IEEE C2 (2012) – National Electrical Safety Code

Clearance of	Insulated communication conductors and cables; messengers; overhead shield/surge- protection wires; grounded guys; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to 0 to 300 V ^{(11), (14)} neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Unguarded rigid live parts, 0 to 750 V; noninsulated communication conductors; ungrounded equipment cases, 0 to 750 V; and ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to open supply conductors of over 300 V to 750 V ^{(5), (14)} (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V ⁽¹³⁾ (ft)	Unguarded rigid live parts, over 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to over 750 V to 22 kV ^{(5), (14)} (ft)	Open supply conductors, over 750 V to 22 kV (ft)
1. Buildings – Pump Station†						
a. Horizontal						
(1) To walls, projections, and guarded windows	4.5 ^{(1), (2), (7)}	5.0 ^{(1), (2)}	5.0 ^{(1), (2)}	5.5 ^{(1), (2), (9)}	7.0 ^{(1), (2)}	7.5 ^{(1), (2), (10)}
(2) To unguarded windows ⁽⁸⁾	4.5	5.0	5.0	5.5 ⁽⁹⁾	7.0	7.5 ⁽¹⁰⁾
(3) To balconies and areas readily accessible to pedestrians ⁽³⁾	4.5	5.0	5.0	5.5 ⁽⁹⁾	7.0	7.5 ⁽¹⁰⁾
b. Vertical⁽¹²⁾						
(1) Over or under roofs or projections not readily accessible to pedestrians ⁽³⁾	3.0	3.5	10.0	10.5	12.0	12.5
(2) Over or under balconies, porches, decks, and roofs readily accessible to pedestrians ⁽³⁾	10.5	11.0	11.0	11.5	13.0	13.5
(3) Over roofs, ramps, decks, and loading docks accessible to vehicles but not subject to truck traffic ⁽⁶⁾	10.5	11.0	11.0	11.5	13.0	13.5
(4) Over roofs, ramps, decks, and loading docks accessible to truck traffic ^{(6), (16)}	15.5	16.0	16.0	16.5	18.0	18.5

Clearance of	Insulated communication conductors and cables; messengers; overhead shield/surge- protection wires; grounded guys; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to 0 to 300 V ^{(11), (14)} neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Unguarded rigid live parts, 0 to 750 V; noninsulated communication conductors; ungrounded equipment cases, 0 to 750 V; and ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to open supply conductors of over 300 V to 750 V ^{(5), (14)} (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V ⁽¹³⁾ (ft)	Unguarded rigid live parts, over 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C4, 215C5, and 279A1 exposed to over 750 V to 22 kV ^{(5), (14)} (ft)	Open supply conductors, over 750 V to 22 kV (ft)
2. Floodwalls† and other installations not classified as buildings or bridges ⁽¹⁵⁾						
a. Horizontal ⁽⁴⁾						
(1) To portions that are readily accessible to pedestrians ⁽³⁾	4.5	5.0	5.0 ^{(1), (2)}	5.5 ⁽⁹⁾	7.0 ^{(1), (2)}	7.5 ⁽¹⁰⁾
(2) To portions that are not readily accessible to pedestrians ⁽³⁾	3.0	3.5	5.0 ^{(1), (2)}	5.5 ^{(1), (2), (9)}	7.0 ^{(1), (2)}	7.5 ^{(1), (2), (10)}
b. Vertical						
(1) Over or under cat-walks and other surfaces upon which personnel walk	10.5	11.0	11.0	11.5	13.0	13.5
(2) Over or under other portions of such installations ⁽⁴⁾	3.0	3.5	5.5	6.0 ⁽¹⁾	7.5	8.0

NOTE: The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M & E) value of Table A-1 to the applicable Reference Component of Table A-2b of Appendix A.

† - Original text from IEEE C2 Table changed for clarification of application to levee systems.

- (1) Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operations that would require persons to work or pass between wires, conductors, cables or unguarded rigid live parts and structure, the clearance may be reduced by 2 ft.
- (2) Where available space will not permit this value, the clearance may be reduced by 2 ft provided the wires, conductors, or cables, including splices and taps, and unguarded rigid live parts have a covering that provides sufficient dielectric strength to limit the likelihood of a short circuit in case of momentary contact with a structure or building.
- (3) A roof, balcony, or area is considered readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor employs tools or devices to gain entry. A permanently mounted ladder is not considered a means of access if its bottom rung is 8 ft or more from the ground or other permanently installed accessible surface.
- (4) The required clearances shall be to the closest approach of motorized signs or moving portions of installations covered by Rule 234C.
- (5) The portion(s) of span guys between guy insulators and the portion(s) of anchor guys above guy insulators that are not grounded shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
- (6) For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft in height.
- (7) This clearance may be reduced to 3 in for the grounded portions of guys.
- (8) Windows not designed to open may have the clearances permitted for walls and projections.
- (9) The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 3.5 ft; see Rule 234C1b.
- (10) The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 4.5 ft; see Rule 234C1b.

- (11) The portion of anchor guys below the lowest insulator meeting Rules 279A1 and 215C5 may have the same clearance as grounded guys.
- (12) For clearances above railings, walls, or parapets around balconies, decks, or roofs, use the clearances required for row 1b(1). For such clearances where an outside stairway exists to provide access to such balconies, decks, or roofs, use the clearances required for row 2b(2).
- (13) Does not include neutral conductors meeting Rule 230E1.
- (14) These clearance values also apply to guy insulators.
- (15) It is presumed that a flag or banner is fully extended but that there is no deflection or displacement of the flagpole or other supporting structure due to wind and that the conductors, cables, or rigid live parts are not displaced by the wind. The specified clearance is measured to the point of maximum displacement of the banner or flag towards the overhead utility facility.
- (16) When designing a line to accommodate oversized vehicles, these clearance values shall be increased by the difference between the known height of the oversized vehicle and 14 ft.

CASE 2: Sponsor Owned Power Lines

Electrical lines owned by local sponsor shall be governed by latest version of NFPA 70 (2014) – National Electrical Code. Clearance requirements are separated per voltage levels and levee system components. Both horizontal and vertical clearances are required and have been provided below.

0 - 22kV Voltage Range: Levee Clearance Requirements

Levee clearances shall be determined by NFPA 70 Table 225.60 – Clearances over Roadways, Walkways, Rail, Water, and Open Land, shown below:

NFPA 70 – Table 225.60

Location	Clearance	
	m	ft
Open land subject to vehicles, cultivation, or grazing	5.6	18.5
Roadways, driveways, parking lots, and alleys – Levee with Road on Crown †	5.6	18.5
Walkways	4.1	13.5
Rails – Rail on Levee	8.1	26.5
Spaces and ways for pedestrians and restricted traffic	4.4	14.5
Water areas not suitable for boating	5.2	17.0

† - Original text from IEEE C2 Table changed for clarification of application to levee systems.

The top of levees shall be considered as access roadways (utilized for maintenance personnel) when determining clearance distances for electrical lines. Clearances for “roadways, driveways, parking lots, and alleys” have a vertical clearance of 18.5 feet. If there is any other applicable criteria that would place the levee in question into another category, those clearances shall be utilized.

0 - 22kV Voltage Range: Pump Station and Floodwall Clearance Requirements

Pump station and floodwall clearances shall be determined by NFPA 70 Table 225.61

– Clearances over buildings and structures, shown below:

NFPA 70 – Table 225.61

Clearance from Conductors or Live Parts from:	Horizontal		Vertical	
	m	ft	m	ft
Building walls, projections, and windows	2.3	7.5	-	-
Balconies, catwalks, and similar areas	2.3	7.5	4.1	13.5
Over or under roofs or projections not readily accessible to people	-	-	3.8	12.5
Over roofs accessible to vehicles but not trucks	-	-	4.1	13.5
Over roofs accessible to trucks	-	-	5.6	18.5
Other structures	2.3	7.5	-	-

Floodwalls shall be considered a “projection not readily accessible to people”. A clearance distance of 7.5 feet, as shown in category “Buildings walls, projections, and windows” is shown for horizontal distances of pump stations and floodwalls.

Vertical distances shall be 12.5 ft, as shown in category “Over or under roofs or projections not readily accessible to people”. If there is any other applicable criteria that would place the pump station or floodwall into question into another category, those clearances shall be utilized.

> 22kV Voltage Range

Clearances for the categories mentioned above shall be increased by 10mm (0.4 inches) per kV above 22,000 volts, in accordance with sections 225.60(B) of NFPA 70 – National Electrical Code.

Additional Notes

- Cables, conductors, and wires shall not be supported with vegetation, per NFPA 70 Section 225.26.

Note to Local Sponsor

NFPA 70 sections 225.60 and 225.61, and their associated tables provide clearance requirements and specific distances over buildings and structures that correlate with requirements in ANSI/IEEE C2 – National Electrical Safety Code. This indicates requirements are similar for both utility and sponsor owned equipment.