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NOTES:
1. ADEQUATE PASSAGEWAYS TO ACCOMMODATE CRANES, LINE TRUCKS, OR OTHER NECESSARY LIFTING AND HAULING EQUIPMENT SHALL BE PROVIDED TO ALLOW FOR MAINTENANCE, OPERATION, OR REPLACEMENT.
2. DISTANCES ARE FROM THE PAD OR TRANSFORMER CASING, WHICHER IS CLOSER TO THE BUILDING OR OPENING.
3. IF THE BUILDING HAS AN OVERHANG, THE DISTANCE IS MEASURED FROM THE OUTSIDE EDGE OF THE OVERHANG.
4. OUTSIDE WALKWAYS OR STAIRS ATTACHED TO THE BUILDING SHALL BE CONSIDERED AS PART OF THE BUILDING.
5. IF A BUILDING IS CONSTRUCTED OF BOTH COMBUSTIBLE AND NON-COMBUSTIBLE MATERIALS, NO PART OF THE PAD-MOUNTED TRANSFORMER CAN BE WITHIN THE ALLOWABLE DISTANCE FOR THE COMBUSTIBLE MATERIALS IN ANY DIRECTION.
6. DISTANCES LESS THAN THOSE SPECIFIED MAY BE ALLOWED IF APPROVED BY THE APPROPRIATE CODE ENFORCEMENT AUTHORITY, BUT IN NO CASE SHALL DISTANCES TO A BUILDING BE LESS THAN 3 FT. THIS MAY REQUIRE ALTERNATE MEANS OF FIRE PROTECTION INCLUDING FIRE BARRIERS, FIRE RATED WALLS, OIL CONTAINMENT MEANS, OR OTHER APPROVED MEASURES.
7. FIRE-RATED WALLS AROUND TRANSFORMERS MUST BE A MINIMUM OF 1'-0" ABOVE THE ANTICIPATED HEIGHT OF THE INSTALLED TRANSFORMER. NO WALL, WHETHER FOR FIRE PROTECTION OR AESTHETIC PURPOSES, CAN BE HIGH ENOUGH TO PREVENT DUKE ENERGY'S INSTALLATION AND FUTURE MAINTENANCE OF THE TRANSFORMER WITH STANDARD EQUIPMENT AND LIFTING DEVICES AS DETERMINE BY DUKE ENERGY.
8. FINAL GRADE AT THE LOCATION OF THE PAD-MOUNTED TRANSFORMER SHALL PROVIDE FOR MINERAL OIL TO DRAIN FROM THE BUILDING. OTHERWISE, AN OIL CONTAINMENT MEANS IS REQUIRED.
9. CLEARANCES LISTED ARE DUKE ENERGY MINIMUM REQUIREMENTS. THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) MAY HAVE REQUIREMENTS THAT ARE MORE STRINGENT. IT SHALL BE THE CUSTOMER'S RESPONSIBILITY TO CONFORM TO ALL LOCAL BUILDING CODES, INSURANCE REGULATIONS, OR ORDINANCES AFFECTING THE TRANSFORMER LOCATION.
NOTES:

1. ADEQUATE PASSAGEWAYS TO ACCOMMODATE CRANES, LINE TRUCKS, OR OTHER NECESSARY LIFTING AND HAULING EQUIPMENT SHALL BE PROVIDED TO ALLOW FOR MAINTENANCE, OPERATION, OR REPLACEMENT.

2. DISTANCES ARE FROM THE PAD OR SURFACE MOUNTED EQUIPMENT, WHICHEVER IS CLOSER TO THE OBJECT IN QUESTION.

3. A MINIMUM CLEAR WORKING SPACE OF 5 FT MUST BE MAINTAINED FROM EACH NON-DOOR SIDE OF THE EQUIPMENT (TO ACCOMMODATE CONTROL CABINETS, ETC.).

4. WHERE A METER IS MOUNTED TO A TRANSFORMER, A CLEAR SPACE AROUND THE METER OF AT LEAST 3 FT WIDE, 4 FT DEEP, AND 8 FT HIGH MUST BE PROVIDED AND ALWAYS AVAILABLE FOR READING, INSPECTING, TESTING, AND MAINTENANCE OPERATIONS.

5. DISTANCES LESS THAN THOSE SPECIFIED MAY BE ALLOWED IF APPROVED BY THE APPROPRIATE CODE ENFORCEMENT AUTHORITY. THIS MAY REQUIRE ALTERNATE MEANS OF FIRE PROTECTION INCLUDING FIRE BARRIERS, FIRE RATED WALLS, SPRINKLER SYSTEMS, OIL CONTAINMENT MEANS, OR OTHER APPROVED MEASURES.

6. IT SHALL BE THE CUSTOMER'S RESPONSIBILITY TO CONFORM TO ALL LOCAL BUILDING CODES, INSURANCE REGULATIONS, OR ORDINANCES AFFECTING THE EQUIPMENT LOCATION.

7. FOR INSTALLATIONS SUBJECT TO REGULAR VEHICLE TRAFFIC, SEE DWG. 36.01-105.

8. 7.5 FT. IN FLORIDA, 4 FT. ELSEWHERE. MAY BE REDUCED TO 3 FT BY AGREEMENT WITH LOCAL FIRE AUTHORITY.
1. Protective poles can be installed on all sides of pad-mounted equipment that are subject to regular vehicle traffic. Their use is at the discretion of local engineering and will be the customer's responsibility to provide and install after all reasonable efforts to locate the pad-mounted equipment elsewhere have been exhausted.

2. Poles should be evenly spaced along the sides of the pad-mounted equipment, no wider than half the dimension of the side they are protecting. Exceptions to this along sides with doors are allowed in order to accommodate note 3.

3. On any side of pad-mounted equipment with doors, this pole should be centrally located between the doors and must accommodate the door swing of the equipment. It shall be either removable by hand or collapsible. Removable or collapsible designs other than what are shown must be approved by local engineering.

4. Poles located on any side of pad-mounted equipment shall not interfere with the safe operation and expected maintenance or replacement of that equipment.

5. Poles shall be painted yellow or outfitted with a yellow bollard cover or post sleeve.

6. All poles shall have a 2" reflective tape applied either around the top of the bollard or extending vertically down the length of the bollard for 24". Vertical applications must be on the side facing any anticipated traffic.
### UNDERGROUND CLEARANCES FROM OTHER UTILITIES

### NOT IN A JOINT TRENCH CONFIGURATION

#### PRIMARY OR SECONDARY CABLES - DIRECT BURIED OR IN CONDUIT

<table>
<thead>
<tr>
<th>Paralleling</th>
<th>Horizontal Separation (IN)</th>
<th>Crossings</th>
<th>Vertical Separation (IN)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Preferred</td>
<td>NESC Minimum</td>
<td>Preferred</td>
</tr>
<tr>
<td>Communication Lines</td>
<td>12</td>
<td>SEE NOTE 4</td>
<td>Communication Lines</td>
</tr>
<tr>
<td>Water Lines</td>
<td>36</td>
<td>SEE NOTE 2</td>
<td>Water Lines</td>
</tr>
<tr>
<td>Sewer Lines</td>
<td>36</td>
<td>SEE NOTE 2</td>
<td>Sewer Lines</td>
</tr>
<tr>
<td>Fuel Lines</td>
<td>36 (SEE NOTE 5)</td>
<td>Fuel Lines</td>
<td>12 (SEE NOTE 5)</td>
</tr>
<tr>
<td>Steam Lines</td>
<td>60 (SEE NOTE 5)</td>
<td>Steam Lines</td>
<td>36 (SEE NOTE 5)</td>
</tr>
<tr>
<td>Customer Owned Cables</td>
<td>36</td>
<td>SEE NOTE 2</td>
<td>Customer Owned Cables</td>
</tr>
</tbody>
</table>

#### PRIMARY OR SECONDARY CABLES - IN A CONDUIT (DUCTBANK) SYSTEM

<table>
<thead>
<tr>
<th>Paralleling</th>
<th>Horizontal Separation (IN)</th>
<th>Crossings</th>
<th>Vertical Separation (IN)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preferred</td>
<td>NESC Minimum</td>
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</tr>
<tr>
<td>Communication Lines</td>
<td>12 (SEE NOTE 2)</td>
<td>3 - CONCRETE 4 - MASONRY</td>
<td>Communication Lines</td>
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<tr>
<td>Water Lines</td>
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<td>SEE NOTE 2</td>
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<td>Fuel Lines</td>
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<td>Steam Lines</td>
<td>60 (SEE NOTE 6)</td>
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<tr>
<td>Customer Owned Cables</td>
<td>36 (SEE NOTE 2)</td>
<td>SEE NOTE 2</td>
<td>Customer Owned Cables</td>
</tr>
</tbody>
</table>

#### NOTES:

1. The minimum separations in this drawing refer only to separate trench lines and do not apply to joint trench installations.

2. The NESC does not specify actual distances from most utilities, but instead states that the radial separation should be adequate to permit access to and maintenance of either facility to limit damage to the other (Rule 320.B.1 and Rule 353.A.2). The distances shown in the above table have been found to meet these criteria. Lesser distances may be allowed with agreement by all of the involved parties.

3. Vertical separation must be sufficient to limit the likelihood of detrimental load being transferred to either of the utilities or structures involved. The distances shown in the above table have been found to meet these criteria. Lesser distances may be allowed with agreement by all of the involved parties.

4. Direct buried applications with less than 12” of radial separation between communication and supply conductors are considered ‘random lay’ and require agreement between the affected parties. Random lay installations must also meet more stringent NESC guidelines and should be avoided unless part of a joint trench agreement.

5. Direct buried primary and secondary cables shall be installed with a minimum radial separation of not less than 12” from steam lines, gas, and other lines that transport flammable material.

6. Encased conduit or ductbank systems should be installed so as to limit the likelihood of detrimental heat transfer between the steam and ductbank systems.

7. Installations under railroad tracks must be a minimum of 60” below the top of rails. This is the NESC minimum only. Consult with the Duke Energy Permit Coordinator for actual requirements dictated by individual railroads.
NOTES:

1. WHERE PRACTICAL, CONFINE ALL CABLE INSTALLATION ACTIVITIES TO AREAS OUTSIDE THE DRIPLINE OF DESIRABLE TREES OR THOSE IDENTIFIED AS NEEDING TO BE SAVED.

2. IF CABLE INSTALLATION IS WITHIN THE DRIPLINE, REFER TO TABLE 1 FOR MINIMUM DISTANCES. ANOTHER RULE OF THUMB IS TO TRENCH 1' AWAY FOR EVERY 1" OF TRUNK DIAMETER AT BREAST HEIGHT (DBH).

3. IF THE MINIMUM DISTANCES IN TABLE 1 CANNOT BE OBTAINED, BORING MAY BE CONSIDERED AS AN ALTERNATE MEANS OF INSTALLATION. BORING AT A DEPTH OF 2 TO 3 FT SHOULD AVOID THE MAJORITY OF THE ROOT SYSTEM. IF DONE SOLELY AS A RESULT OF THE CUSTOMER'S INABILITY TO PROVIDE AN ADEQUATE ROUTE FOR THE INSTALLATION, CHARGES MAY APPLY.

4. BORING PITS SHOULD NOT BE DUG WITHIN THE DISTANCES SPECIFIED IN TABLE 1.

### TABLE 1

<table>
<thead>
<tr>
<th>TREE DIAMETER</th>
<th>MINIMUM DISTANCE FROM TRUNK BEYOND DRIPLINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0&quot; - 5&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>6&quot; - 9&quot;</td>
<td>10'</td>
</tr>
<tr>
<td>10&quot; - 14&quot;</td>
<td>12'</td>
</tr>
<tr>
<td>15&quot; - 19&quot;</td>
<td>15'</td>
</tr>
<tr>
<td>OVER 19&quot;</td>
<td></td>
</tr>
</tbody>
</table>
UNDERGROUND PRIMARY AND SECONDARY CABLE SHOULD MAINTAIN 5' MINIMUM SEPARATION FROM POOLS AND THEIR AUXILIARY EQUIPMENT. IF 5' IS NOT ATTAINABLE, LESSER DISTANCES ARE PERMITTED PER NESC RULE 351c. WITH CONSIDERATION FOR FUTURE OPERATIONAL NEEDS, THE DESIGNER SHOULD STILL MAINTAIN AS MUCH CLEARANCE AS POSSIBLE. ALL INSTALLATIONS WITHIN 5' MUST BE IN CONDUIT.

NOTES:

1. WHEN INSTALLING UNDERGROUND CABLE PARALLEL TO EXISTING STRUCTURES, OR THOSE THAT ARE UNDER CONSTRUCTION, IT IS NECESSARY TO MAINTAIN ADEQUATE CLEARANCE FROM THOSE STRUCTURES. THIS CLEARANCE IS NECESSARY TO MAINTAIN THE INTEGRITY OF THE SOIL, AND THE SUPPORT PROVIDED BY THE SOIL, UNDER THE FOUNDATION OF THE STRUCTURE.

2. UNDERGROUND FACILITIES INSTALLED PARALLEL TO A STRUCTURE SHOULD BE LOCATED AT LEAST TWICE AS FAR AWAY FROM THE STRUCTURE AS THE DEPTH OF THE TRENCH THAT IS DUG. FOR EXAMPLE, IF A TRENCH IS TO BE TWO (2) FEET DEEP, THEN THE TRENCH MUST BE LOCATED AT LEAST FOUR FEET AWAY FROM THE STRUCTURE.

3. THIS REQUIREMENT DOES NOT APPLY TO CABLE THAT IS NOT INSTALLED PARALLEL TO A STRUCTURE. IT ALSO DOES NOT APPLY TO CABLE THAT IS INSTALLED BY DIRECTIONAL BORING TECHNIQUES.

4. ON INSTALLATIONS WHERE THE CABLE CANNOT BE INSTALLED TWICE AS FAR FROM THE FOUNDATION AS THE CABLE IS DEEP, THE SOIL MUST BE COMPACTED THROUGHOUT THE ENTIRE TRENCH DEPTH TO 100% OF THE ORIGINAL SOIL DENSITY IN ALL AREAS WHERE ADEQUATE SEPARATION CANNOT BE OBTAINED FROM THE FOUNDATION.
NOTES:

1. THE SCOPE OF THIS GUIDELINE APPLIES ONLY TO DISTRIBUTION POWER POLES (VOLTAGES UP TO 35KV). CONTACT DUKE ENERGY TO DETERMINE LINE VOLTAGE. IF TRANSMISSION VOLTAGES (> 35KV) ARE PRESENT ON THE POLE OR WITHIN THE WORK AREA, DUKE ENERGY TRANSMISSION DEPARTMENT WILL ADVISE REQUIREMENTS FOR EXCAVATION AND MINIMUM WORKING CLEARANCES.

2. CONTACT DUKE ENERGY TO EVALUATE POLE SUPPORT IF PLANNED EXCAVATION ENCROACHES THE 'UNDISTURBED SOIL AREA' SHOWN IN FIG. 1, AND/OR IF ANCHORS WITH DOWN GUYS OR PUSH BRACE POLES ARE PRESENT ON THE SIDE OF THE POLE THAT FACES THE PLANNED EXCAVATION.

3. MINIMUM CLEARANCES SHOWN ARE FOR 3RD PARTY EXCAVATIONS BESIDE DISTRIBUTION POWER POLES. CONSULT DUKE ENERGY IF TRENCHING FOR FACILITIES TO BE LOCATED ON POLE, I.E. CONDUIT.

4. EXCAVATION EQUIPMENT MUST MAINTAIN AT MINIMUM A 10 FT. CLEARANCE TO OVERHEAD DISTRIBUTION LINES.

5. EXCAVATOR IS RESPONSIBLE FOR HAVING UTILITY LOCATES COMPLETED.

6. IF UNEXPECTED FIELD CONDITIONS ARE ENCOUNTERED THAT COULD AFFECT THE STABILITY OF THE SOIL IN THE 'UNDISTURBED SOIL AREA' SHOWN IN FIG. 1, I.E. WATER, CAVITIES, ETC., STOP WORK AND CONTACT DUKE ENERGY IMMEDIATELY.

7. THE 'UNDISTURBED SOIL AREA' SHOWN IN FIG. 1 IS BASED ON TYPE 'C' SOIL AS DEFINED IN OSHA 1926, SUBPART P. THIS GUIDELINE DOES NOT PREVENT THE EXCAVATOR FROM HIRING A LICENSED PROFESSIONAL ENGINEER TO PREPARE AN EXCAVATION PLAN BASED ON ACTUAL FIELD SOIL CONDITIONS. IN SUCH CASES, THE ENGINEERED EXCAVATION PLAN MUST BE SUBMITTED TO DUKE ENERGY FOR REVIEW PRIOR TO ANY EXCAVATION WORK BEING PERFORMED.
NOTES:

1. THE CLEARANCES STATED IN THIS SPECIFICATION ARE GENERAL GUIDELINES THAT SHOULD BE FOLLOWED IN ANY JOINT TRENCH ARRANGEMENT. ACTUAL CLEARANCES AND THE UTILITIES INVOLVED ARE UNIQUE TO THE JOINT USE AGREEMENT IN PLACE FOR THAT INSTALLATION AND SHOULD BE APPLIED ONLY TO THE INSTALLATIONS THEY GOVERN.

2. THIS SPECIFICATION DOES NOT INCLUDE THE CURRENT JOINT TRENCH PRACTICES IN PLACE IN DUKE ENERGY MIDWEST.

3. SUPPLY LINES OF ANY VOLTAGE SHALL HAVE A RADIAL SEPARATION OF NOT LESS THAN 12" FROM GAS LINES OR OTHER LINES THAT TRANSPORT FLAMMABLE MATERIAL AND ALLOW FOR PROPER MAINTENANCE OF EITHER.

4. SUPPLY LINES OF ANY VOLTAGE SHOULD HAVE A RADIAL SEPARATION OF NOT LESS THAN 12" FROM COMMUNICATIONS OR CATV LINES AND ALLOW FOR PROPER MAINTENANCE OF EITHER.

5. COMMUNICATIONS AND CATV LINES ARE PERMITTED WITHIN 12" OF EACH OTHER WITH AGREEMENT OF THE PARTIES INVOLVED.

6. RADIAL SEPARATIONS ARE MEASURED FROM SURFACE TO SURFACE, NOT CENTER TO CENTER.

7. SEPARATIONS BETWEEN PRIMARY AND SECONDARY LINES SHOULD MAINTAIN THOSE CLEARANCES AND BURIAL DEPTHS SET FORTH IN DWG. 22.01-101.
NOTES:

1. THIS SPECIFICATION DOES NOT INCLUDE THE CURRENT JOINT TRENCH PRACTICES IN PLACE IN DUKE ENERGY MIDWEST.


3. JOINT USE LINES OF OTHER UTILITIES SHALL NOT BE INSTALLED UNDER DUKE ENERGY SURFACE OR SUB-SURFACE EQUIPMENT.

4. PEDESTAL LOCATIONS MUST FOLLOW THE GUIDELINES SET FORTH IN FIGURE 1.

5. TRANSFORMERS, REGARDLESS OF ORIENTATION, MUST BE PLACED TO ALLOW FOR PROPER OPERATION AND MAINTENANCE AS SET FORTH IN DWG. 36.01-103.

6. TRANSFORMER ID'S MUST BE AFFIXED SO AS TO BE VISIBLE FROM THE ROAD.

7. ALL ABOVE-GROUND METALLIC POWER AND COMMUNICATION APPARATUS SEPARATED BY A DISTANCE OF 6’ OR LESS SHALL BE BONDED TOGETHER, PER THE TERMS OF THE APPLICABLE JOINT USE AGREEMENT WITH THAT UTILITY.

8. FOR INSTALLATIONS IN CLOSE PROXIMITY TO DUKE ENERGY POLES, JOINT USE COMPANIES SHALL NOT BE ALLOWED TO BOND TO DUKE ENERGY’S POLE GROUND UNLESS IT IS EXPRESSLY ALLOWED BY THAT COMPANY’S INDIVIDUAL JOINT USE AGREEMENT. BONDING TO THE POLE GROUND CAN CREATE HAZARDOUS CONDITIONS AND SHOULD NOT BE CONFUSED WITH THE ABOVE REQUIREMENT OF BONDBING METALLIC EQUIPMENT.