Exhibit C Instructions

A separate Exhibit C should be prepared for each type of construction.

A type of construction is defined as a series of structures with (i) the same number of circuits and (ii) the same distribution underbuild; all of which (iii) use similar materials (iv) arranged in a similar configuration and (v) were constructed at a similar point in time.

A separate Exhibit C is not required for unique structures.

Line 1: Enter the name of the company that is requesting the franchise. This should match the name entered on the petition form.

Line 2: Enter the name or circuit number used to identify the transmission line.

Line 3: Enter the length of the line segment. Do not enter the number of "circuit miles" if the segment is multi-circuited.

Line 4: Enter the section numbers, including township and range, in which the segment is located.

Line 5, 1st field: Select the phrase that applies. "Rebuilt" refers to a major rebuild in which the applicable edition of the NESC changes. *(See "Line 6, 2nd field" for additional information.)* {Choices from the drop-down box include: "will be constructed," "will be rebuilt," "was constructed," "was rebuilt."}

Line 5, 2nd field: Enter the year in which construction is anticipated to take place. If the segment has been rebuilt *(see above)*, enter the year in which the segment was rebuilt. Otherwise, enter the year in which the segment was constructed.

Line 6: Select the applicable edition of the NESC to which the line segment will be maintained. Most line segments are maintained to the current code, but older code editions may be used as long as they are not older than the code which was in effect when the line segment was constructed or reconstructed. Dates in which Iowa adopted the various editions of the NESC are listed in the table below. {Choices from the drop-down box include: "2023," "2017," "2012," "2007," "2002," "1997," "1993," "1990," "1981," "1977," "1973," "6th."}

Iowa's Adoption of the National Electrical Safety Code

Edition	6th*	1973	1977	1981	199	1993	1997	2002	2007	2012	2017	2023
Adopted	10/24/65	2/27/76	6/6/79	1/12/83	9/9/92	12/14/94	12/24/97	5/22/02	6/27/07	4/9/14	5/3/17	4/23/25

* The oldest edition that can apply to overhead or underground lines is the 6th Edition.

Line 7, 1st field: Select the maximum "capable of operating" voltage based on the construction of the line. "*Capable of operating*" shall mean the standard voltage rating at which the line, wire or cable can be operated consistent with the level of the insulators and the conductors used in construction of the line, wire, or cable based on manufacturer's specifications, industry practice, and applicable industry standards. 199 IAC 11.1(4) {Choices from the drop-down box include: "72.5 kVAC," "121 kVAC," "145 kVAC," "169 kVAC," "242 kVAC," "362 kVAC," "550 kVAC," "800 kVAC," "±400 kVDC," "±500 kVDC," "±600 kVDC," "±800 kVDC."}

Line 7, 2nd field: Select the nominal operating voltage based on the actual operation of the line. {Choices from the drop-down box include: "34.5 kVAC," "69 kVAC," "115 kVAC," "161 kVAC," "230 kVAC," "345 kVAC," "500 kVAC," "765 kVAC," "±400 kVDC," "±500 kVDC," "±600 kVDC," "±800 kVDC."}

Line 8, 1st field: Select the grade of construction for the line. (See Section 24 of the National Electrical Safety Code for additional details.) Individual structures built to a higher grade of construction do not require a separate Exhibit C. {Choices from the drop-down box include: "B," "C," "N."}

Line 8, 2nd field: Enter the typical span length, in feet, for this segment. If the typical span would be better represented by a range, then a range may be entered. The range does not need to include every span length in the segment.

Line 8, 3rd field: Enter the longest span length, in feet, for this segment.

Lines 9-12: Various information regarding vertical clearances should be entered in lines 9 through 12.

If the line segment does not cross over track rails of a railroad, in the *Surface* column, change "*Railroads*" to "*(no RR crossings).*" {Choices from the drop-down box include: "Railroads," "(no RR crossings)."}

If the line segment does not cross over water areas, in the *Surface* column, change "*Water*" to "*(no water surfaces)*." Drainage ditches that are normally dry are not considered water areas even though the ditches may be noted on some county maps.

If the line segment crosses over water areas that are suitable for a sailing boat, in the *Surface* column, change "*Water*" to "*Water* ___" where ___ corresponds to the applicable row in Table 232-1 of the 2007 Edition of the NESC. If the line segment crosses over multiple types of water surfaces, choose the applicable water surface that has the greatest clearance requirement. {Choices from the drop-down box include: "Water," "(no water surfaces)," "Water (<20 acres)," "Water (<200 acres)," "Water (<2000 acres)," "Water (>2000 acres)."}

In the *Basic Clearance* column, enter the basic clearance value – typically the value shown in Table 232-1 from the applicable version of the NESC.

- NOTE: 199 IAC 25.2(2)b2 requires the current code be used for clearances over water regardless of date of construction.

- NOTE: 199 IAC 42.6(2)a requires the reference height of a rail car to be 23' (3' higher than the NESC Table 232.1, Note 16) when calculating clearances. (2002 and later)

Commonly used basic clearance values for lines 9-12 are shown in the table below.

Basic Clearances, Transmission Open Supply Conductors, (ft)

NESC Edition	***Surface***							
	Open Ground	*Roads*	*Railroads*	*Water*	*Water* <20 acres	*Water* 20 to 200 acres	*Water* 200 to 2000 acres	*Water* >2000 acres
6th, 1973, 1977, 1981	22	22	30	-	-	-	-	-
1990, 1993, 1997	18.5	18.5	26.5	-	-	-	-	-
2002, 2007, 2012, 2017, 2023	18.5	18.5	29.5	17	20.5	28.5	34.5	40.5

In the *Voltage Adder* column, enter the voltage adder as determined by maximum *capable of operating* voltage and the applicable edition of the NESC. Commonly used voltage adder values are shown in the table below. Note that the voltage adder for the water surface row, ***Line 12***, may be different from the voltage adders for the other rows.

Voltage Adders, (ft)

NESC Edition	***Maximum Capable of Operating Voltage, (kV)***						
	72.5	*121*	*145*	*169*	*242*	*362*	*550*
6th, 1973, 1977, 1981	-	0.7	1.2	1.6	3.0	5.4	9.0
1990, 1993, 1997, 2002, 2007, 2012, 2017, 2023	0.7	1.6	2.1	2.6	4.0	6.3	9.9

Any additional adders should be accounted for in the *Additional Adders* column. Typically, the only additional adder will be the long span adder for lines subject to the 1981 or prior editions of the NESC. The long span adder amounts to 0.1 feet for each 10 feet of span in excess of 175 feet. When figuring this value, use the typical span value from ***Line 8***. If a range was used to represent the typical span, use the upper bound of the range values. If there are any other additional adders, or if the long span adder is different from what is described above, documentation showing how the value was calculated should be attached to the exhibit.

High Temperature Adder: If you list the line segment as being maintained to the 1977 NESC or 1981 NESC, you will be asked to provide information relative to the high-temperature adder. Using the high-temperature adder often results in clearance requirements that are in excess of the requirements found in the 1990 or later code editions.

In the *Clearance* column, add the values from the other three columns to obtain the minimum vertical overhead clearance.

Line 13, 1st field: Enter the code word of the phase conductor wire. EXAMPLE: “Drake” or “T2-Raven”

Line 13, 2nd field: Enter the size (overall size for T2 conductors) of the phase conductors. EXAMPLE: “795.0 MCM” or “4/0 AWG”

Line 13, 3rd field: Enter the stranding (Aluminum/Steel) of the phase conductors. EXAMPLE: “26/7” or “2-6/1”

Line 13, 4th field: Enter the material of the phase conductors. EXAMPLE: ACSR

Line 14, 1st field: Enter the size of the shield wire(s). Enter “N/A” if there is no shield wire. EXAMPLE: 3/8”

Line 14, 2nd field: Enter the stranding (number of wires) of the shield wire(s). Enter “N/A” if there is no shield wire. EXAMPLE: 7

Line 14, 3rd field: Enter the material of the shield wire(s). Enter “N/A” if there is no shield wire. EXAMPLE: EHS Steel

Line 15: Enter the frequency at which the shield wire is grounded. EXAMPLE: “At each structure”

Line 16, 1st field: If the typical structures do not use post-type insulators, change “Post Type” to “N/A” and leave the rest of the column blank. {Choices from the drop-down box include: “Post Type,” “N/A.”}

Line 16, 2nd & 3rd field: Select the typical type of suspension insulator used for the two types of construction. If suspension insulators are not used, select “N/A” and leave the rest of the column(s) blank. If the insulators are single-piece units, such as a polymer insulator, select “Single-Piece Unit.” If the insulators consists of a series of bells, select “String of ____ Bells” where ____ is the number of individual bells used to make up the insulator. If N/A is selected, complete the corresponding lines 16-22 as N/A as well. {Choices from the drop-down box include: “N/A,” “Single-Piece Unit,” “String of 4 Bells,” “String of 5 Bells,” “String of 6 Bells,” “String of

7 Bells," "String of 8 Bells," "String of 9 Bells," "String of 10 Bells," "String of 11 Bells," "String of 12 Bells," "String of 13 Bells," "String of 14 Bells," "String of 15 Bells," "String of 16 Bells," "String of 17 Bells," "String of 18 Bells," "String of 19 Bells," "String of 20 Bells."}

Line 17: Enter the manufacturer of the insulators.

Line 18: Enter the catalog number for the insulators.

Lines 19-22: Enter the electrical specifications for the insulators. Catalog sheets detailing the insulators' electrical specifications may be attached to the exhibit to aid in review. Values should be for the entire insulator, not the individual components.

Line 23: Select the phrase that best describes the typical structures. {Choices from the drop-down box include: "Wood Poles," "Laminated Wood Poles," "Steel Poles on Concrete Foundations," "Direct Embedded Steel Poles," "Lattice Towers," "Wood H-Frames," "Steel H-Frames," "Guyed A-Frames."}

Line 24: Enter the typical structure height (after installation), in feet, for this segment. If the typical height would be better represented by a range, then a range may be entered. The range does not need to include every structure height in the segment.

Line 25, 1st field: Enter the species of wood poles used. Enter "N/A" if wood poles are not used. EXAMPLE: "Western Red Cedar" or "Southern Yellow Pine."

Line 25, 2nd field: Enter the type of treatment used on the wood pole. EXAMPLE: "ACQ Preserve," "Chemonite ACZA," "Penta," "Copper Naphthenate," or "Clean Creosote."

Line 25, 3rd field: Enter the class of the typical wood pole. If the typical wood pole would be better represented by more than one class, multiple classes may be entered. Not every class that is used needs to be entered.

Line 25, 4th field: Enter the length, before installation, of the typical wood pole. If the typical length would be better represented by a range, then a range may be entered. The range does not need to include every pole length used in the segment.

Line 26: If steel structures are used, enter the type of steel structure material. If steel structures are not used, enter "N/A." EXAMPLE: "Weathering Steel," "Galvanized Steel," or "Painted Steel."

Line 27, 1st field: If H-frames are used, enter the type of brace. Enter "None" if braces are not used. Enter "N/A" if H-frames are not used. EXAMPLE: X-Brace Assembly

Line 27, 2nd field: Enter the spacing between the two H-fame poles. Enter "N/A" if H-frames are not used. Spacing is measured centerline to centerline.

Line 28, 1st field: Enter the typical type of support arm. Enter "N/A" if support arms are not used. EXAMPLE: "Crossarm" or "Davit Arm"

Line 28, 2nd field: Enter the type of material of the typical support arm. EXAMPLE: "Douglas Fir" or "Steel"

Line 28, 3rd field: Enter the dimensions of the typical support arm.

Line 29, 1st field: Select whether the guys are insulated, grounded, or insulated and grounded. Select "N/A" if guys are not used. {Choices from the drop-down box include: "Insulated," "Grounded," "Insulated and Grounded," "N/A."}

Line 29, 2nd field: Select the color of guy markers. Select "N/A" if guys are not used. NOTE: Guy markers must be of conspicuous color. 199 IAC 25.2(2)c {Choices from the drop-down box include: "Red," "Orange," "Yellow," "N/A."}

Line 30: Enter the name of the company that owns the second transmission circuit. If there is not a second transmission circuit, enter "N/A" and then skip to ***Line 47***.

Line 31: Enter the name or circuit number used to identify the second transmission circuit.

Line 32: If the second transmission circuit is franchised by another docket, enter that docket number. If the second transmission circuit is to be franchised as part of this petition, enter "(this docket)."

Line 33, 1st field: Select the maximum capable of operating voltage of the second transmission circuit based on the construction of the line. (See ***Line 7, 1st field*** above.) {Choices from the drop-down box include: "72.5 kVAC," "121 kVAC," "145 kVAC," "169 kVAC," "242 kVAC," "362 kVAC," "550 kVAC," "800 kVAC," "±400 kVDC," "±500 kVDC," "±600 kVDC," "±800 kVDC."}

Line 33, 2nd field: Select the nominal operating voltage of the second transmission circuit based on the actual operation of the line. {Choices from the drop-down box include: "34.5 kVAC," "69 kVAC," "115 kVAC," "161 kVAC," "230 kVAC," "345 kVAC," "500 kVAC," "765 kVAC," "±400 kVDC," "±500 kVDC," "±600 kVDC," "±800 kVDC."}

Lines 34-37: Enter vertical clearance information for the second transmission circuit. (See ***Lines 9-12*** above.)

Line 38, 1st field: Enter the code word of the phase conductor wire. EXAMPLE: "Drake" or "T2-Raven"

Line 38, 2nd field: Enter the size (overall size for T2 conductors) of the phase conductors. EXAMPLE: "795.0 MCM" or "4/0 AWG"

Line 38, 3rd field: Enter the stranding (Aluminum/Steel) of the phase conductors. EXAMPLE: "26/7" or "2-6/1"

Line 38, 4th field: Enter the material of the phase conductors. EXAMPLE: ACSR

Line 39-45: Enter information regarding the typical insulators for the second transmission circuit. (See ***Line 16, 1st field*** through ***Lines 19-22*** above.)

Line 46: Enter information regarding the second transmission circuit support arm. (See ***Line 28, 1st field*** through ***Line 28, 3rd field*** above.)

Line 47: Enter the name of the company or companies that own the distribution underbuild. If there is not distribution underbuild, enter "N/A" and then skip to ***Line 60***.

Line 48: Enter the nominal voltage of each distribution underbuild circuit. Table 1 of ANSI C84.1-2006 contains a list of standard nominal system voltages. The appropriate unit of measure (i.e. "V" or "kV") should be listed along with the numeric voltage value.

Line 49: Enter the total number of distribution phase conductors. For example, if there are two three-phase distribution underbuild circuits, "6" should be entered.

Line 50, 1st field: Select if the distribution neutral is multi-grounded or single-grounded. If there is no distribution neutral, select "N/A." {Choices from the drop-down box include: "Multi-grounded," "Single-grounded," "N/A."}

Line 50, 2nd field: Enter the frequency of grounding for the neutral conductor. Enter "N/A" for delta circuits or single grounded circuits. EXAMPLE: "At Least 4 Times per Mile" or "At Each Structure."

Lines 51-54: Enter vertical clearance information for the distribution phase conductors. (See ***Lines 9-12*** above.) Commonly used basic clearance values for lines 51-54 are shown in the table below.

Basic Clearances, Distribution Open Supply Conductors, (ft)

NESC Edition	Surface							
	Open Ground	Roads	Railroads	Water	Water <20 acres	Water 20 to 200 acres	Water 200 to 2000 acres	Water >2000 acres
6th, 1973, 1977, 1981	20	20	28	-	-	-	-	-
1990, 1993, 1997	18.5	18.5	26.5	-	-	-	-	-
2002, 2007, 2012, 2017, 2023	18.5	18.5	29.5	17	20.5	28.5	34.5	40.5

Lines 55-58: Enter vertical clearance information for the distribution neutral conductor(s), if applicable. (See ***Lines 9-12*** above.) Commonly used basic clearance values for lines 55-58 are shown in the table below.

Basic Clearances, Distribution Neutral Conductors, (ft)

NESC Edition	Surface							
	Open Ground	Roads	Railroads	Water	Water <20 acres	Water 20 to 200 acres	Water 200 to 2000 acres	Water >2000 acres
6th, 1973, 1977, 1981	18	18	27	-	-	-	-	-
1990, 1993, 1997	15.5	15.5	23.5	-	-	-	-	-
2002, 2007, 2012, 2017, 2023	15.5	15.5	26.5	14	17.5	25.5	31.5	37.5

Line 59, 1st field: Enter the typical type of support arm. Enter "N/A" if support arms are not used. EXAMPLE: "Crossarm" or "Davit Arm"

Line 59, 2nd field: Enter the type of material of the typical support arm. EXAMPLE: "Douglas Fir" or "Steel"

Line 59, 3rd field: Enter the dimensions of the typical support arm.

Line 60: Attach a typical structure drawing (see below) and select "has." {Choice from the drop-down box is "has."}

Additional Drawings Required for New Construction

Line 61: If angle structures will be used in this segment of line, attach a drawing (see below) of a typical angle structure and select "will" and "has" in the two fields. If angle structures will not be used in this segment of line, select "will not" and "has not" in the two fields. If new construction is not being proposed, the two fields can be left blank. {Choices from the drop-down box in the first field include: "will," "will not." Choices from the drop-own box in the second field include: "has," "has not."}

Line 62: If dead-end structures will be used in this segment of line, attach a drawing (see below) of a typical dead-end structure and select "will" and "has" in the two fields. If dead-end structures will not be used in this

segment of line, select “will not” and “has not” in the two fields. If new construction is not being proposed, the two fields can be left blank. {Choices from the drop-down box in the first field include: “will,” “will not.” Choices from the drop-down box in the second field include: “has,” “has not.”}

Typical Structure Drawings: Typical structure drawings should include the following:

- Ground wire along pole (consistent with Exhibit C)
- Dimension consistent with Exhibit C
- Vertical and horizontal lengths between phase conductors
- Vertical and horizontal lengths between conductors of different circuits
- Vertical and horizontal lengths between top phase conductor and shield wire
- Length of insulators
- Underbuild circuit if one exists

Additional Drawings Required for All Dockets

All drawings should include a description of the location (quarter, section, township, range, streets, or road intersection, etc.) of the items included in the drawing.

Line 63: Select the appropriate phrase for both fields. If there are grain bins along this segment of line, a drawing should be prepared showing the clearance envelope (see NESC 234F) for each grain bin in relation to the line. {Choices from the drop-down box in the first field include: “are no grain bins,” “is a grain bin,” “are grain bins.” Choices from the drop-down box in the second field include: “are not required,” “have been attached,” “to be filed prior to construction” (new line).}

Line 64: Select the appropriate phrase for both fields. If there is a conductor crossing along this segment of line, a drawing should be prepared showing the clearances (see NESC 233) for the conductors, both the conductor(s) subject of the petition and the conductor(s) crossing it. {Choices from the drop-down box in the first field include: “are no conductor crossings,” “is a conductor crossing,” “are conductor crossings.” Choices from the drop-down box in the second field include: “are not required,” “have been attached,” “will be filed prior to construction” (new line).}

Line 65: Select the appropriate phrase for both fields. If there is a structure adjacent to the line along this segment of line, a drawing should be prepared showing the clearances (see NESC 234) for the conductors,. {Choices from the drop-down box in the first field include: “are no structures,” “is a structure,” “are structures.” Choices from the drop-down box in the second field include: “are not required,” “have been attached,” “to be filed prior to construction” (new line).}

Note: If a utility elects to provide a robust description, including identification of the location by quarter, section, township, range, streets, or road intersection, in place of a structure drawing (Line 65 only), this description should be included in Exhibit D under (4) “Any other information or explanations in support of the petition.” This exception should only be used for those structures that are sufficiently far from the clearance envelope to provide clarity that the subject line does not come near the clearance envelope in any condition. Use of the option to provide a description instead of a clearance drawing will be allowed at the discretion of the IUC.

Note: Additional drawings for conductor crossings and/or other structure drawings may be required by the IUC for verification to ensure a clearance violation does not exist.

Questions?
Call (515) 725-7300 or email iuc@iuc.iowa.gov.