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VIRGINIA POWER

May 16, 1996

Secretary
Federal Communications Commission
1919 M Street, N. W.
Room No. 222
Washington, D. C. 20544

DOCKET FILE COPY ORIGINAL

Re: FCC Docket No. 96-98, NPRM on Facility Access Obligations

Dear Sir;

In the NPRM, the FCC is seeking comment on issues which directly affect the ultimate cost to the rate payers of Virginia Power for electrical service in its service area. In the interest of providing competition in telecommunication ventures, the FCC is indicating a willingness to force these rate payers to subsidize the business expenses of parties not willing to participate in the installation of the poles, conduits, and other facilities needed by electric utilities and themselves.

Obviously by the above wording Virginia Power's Distribution Engineering & Operations Department is concerned about how intrusive the FCC's rules will be to the electric utility industry. Perhaps not as obvious is how easily the FCC could unknowingly enact regulations which grossly favor one set of customers over another.

We hope that the following listing of concerns and questions will prompt the FCC to consider how much it wants to intrude into restricting electric utilities from using their plant as intended - to distribute electric energy to its customers in a manner which is mutually beneficial to its rate payers and its stockholders. Our initial reaction to both the Act and the NPRM is that, in the name of competition, both shift numerous cost responsibilities from the telecommunication providers to the electric utilities.

Virginia Power is a pole owner because it needs these facilities to distribute electricity. Years ago it became obvious that sharing these facilities with the local telephone company would benefit both companies and the local communities by reducing business costs, reducing the

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number of roadside hazards, as well as create a more pleasing aesthetic environment. This joint use has become a mandate by the NESC, the FHWA, the state DOTs, and usually by local governments.

In support of this mandate, our contracts with the local TELCOs have included the agreement that both parties would set and own a certain number of poles, that each party would maintain its poles as well as the other party's poles if necessary (for a fee). Each party agreed to a minimum size of pole and cost responsibility if one party's needs created a larger than needed pole. Over the years, the balance of pole ownership has shifted to Virginia Power due to the need for larger electric poles and the expensive nature of the equipment necessary to set and maintain these poles.

From an electric utility perspective, we were disappointed when our CATV joint use parties refused to become pole owners and decided to lease the space they need. This did not alleviate the need for capital investment in poles by our company, and it created the need to conduct business with a lessee which obviously had different legal obligations and no proprietary interest as an owner would. In addition, unless the pole owners allowed them to encroach into the reserve space many many poles would require replacement because they were a few feet too short for the additional attachment. Since this was not in anyone's best interest, a new joint use venture was initiated by allowing this temporary encroachment into our reserve space.

Unfortunately, Virginia Power discovered that these new parties were lacking in the ability or desire to engineer and install cable in a safe and professional manner. We continually address numerous incidents where ground clearances are too low, where poles are bent so that electric lines are pulled into each other, and where basic guying, anchoring, and grounding practices are not performed. We believe that this situation is the result of ignorance of NESC and standard utility practices, and probably was unintentionally initiated by these parties because not being pole owners they are unconcerned with the legal, structural or business ramifications that pole owners must face.

If these parties created these situations out of ignorance, they obviously did not recognize their financial responsibility to fix them. Thus an already hostile situation was made more so by our demands that these situations be corrected now. Add to this scenario the friction between the local TELCO and CATV, and the inability or unwillingness to pay market rates for their space needs; and it is easy to see why everything became so negative so fast. (We would like to note that even today our poles are still being damaged by the lack of guying and our lines are being brought together by inappropriate actions by CATV construction crews),

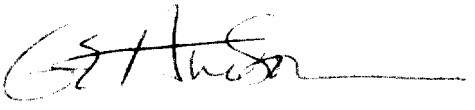
From an electric utility perspective the Telecommunications Act of 1996 has not improved the above situation at all. The subsidy of the rates for all telecommunications ventures except LECs if applied to our existing joint use contracts will reduce revenue.

Virginia Power's Distribution E&O Department believes that the use of plant paid for by Virginia Power rate payers is not being protected by either the language in the Act or by the FCC's language in its NPRM. Neither document imposes the same requirements of

safety, reliability, and notification on the non-pole owner. Neither document appears to recognize that owners of pole, conduits, ducts, and ROW have a greater responsibility to public safety, a greater risk of liability, and a substantial capital investment than non-owners.

Our comments on the individual concerns expressed in the FCC NPRM follow, and we would be happy to meet with the FCC to discuss our concerns or electric utility distribution construction/operation practices. If anyone has any questions, please call me at (804) 775-5323.

Sincerely,



G. E. Hudson
Director Distribution Engineering & Operations

rfd/

Attachment

cc: Mr. J. T. Earwood, Jr.
Mr. W. D. Keck

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VIRGINIA POWER
DISTRIBUTION ENGINEERING & OPERATIONS DEPARTMENT
COMMENTS ON FCC DOCKET NO. 96-98

What is meant by nondiscriminatory access? Must terms be the same for the pole owner as for non-pole owners? Are there legitimate bases for distinguishing conditions of access? Should there be specific standards when a utility has "insufficient capacity" to permit access? Should the burden of proof be imposed on the utility? Should there be regulations to ensure that a utility allocates capacity fairly?

Virginia Power installs plant to meet its current and expected future needs. It is required by DOTs to install spare conduits and ducts in certain situations, and likewise Virginia Power requires certain customers to install spare conduits or ducts at their expense to satisfy our reliability concerns.

To the extent that Virginia Power does not object to sharing this as yet unneeded capacity we agree that access should be on a non-discriminatory basis and should be based on market rates. There should be no physical hindrances or federal mandated burdens placed on Virginia Power's use of its reserved space or spare conduits/ducts whatsoever.

The rights of ownership impose responsibilities of public stewardship and a liability if, by their actions or indirectly through that of others, that stewardship is felt to be lacking. As such those parties not restricted by this responsibility and not investing in this ownership have no right to the benefits, if any, of owning this plant.

Any use of non-reserved space by any party should be done in a manner that is fair and reasonable. Contrary to the language of the NPRM, this should apply to non-owners as well as owners outside their reserve space. The party requiring the change should bear the burden of proof that a lack of access is not correct. How can a non-owner <u>not</u> be excluded? What recourse would an owner (and thus the rate payers) have from a party using this burden of proof unfairly?

When Virginia Power installed plant (poles, conduit, duct) or acquired ROW, it did so with some future capacity in mind. This plant acquisition and installation was paid for by the rate payers for the benefit of Virginia Power customers. The future capacity for electrical facilities should not be taken away from utilities since such a taking would be done at the expense of the rate payers, they would in effect be further subsidizing the operations of a separate business.

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Should the FCC require a utility to certify a minimum or quantifiable threat to reliability before denying access? Should the burden of proof be on utilities that such denial is justified?

Owners have already addressed safety and reliability issues when they selected and installed the plant, and determined what space requirements were needed for current and expected future needs. The FCC should not impede any electric utility in its ability to utilize the plant it installed to meet the current and expected future needs of its customers.

As long as non-reserved space is treated the same for every party (owners when outside their reserve space and non-owners in non-reserved space) there should be no unfair competitive situations. It is certainly reasonable to require that the party requesting a particular physical space or location that is not included in their reserved space should be responsible for showing that access for their facilities is fair, and that they can be designed and installed in manner which is safe and will not damage the plant, or affect the operation of any existing party. If this responsibility falls solely on the owners, then other parties will not have any incentive to install and maintain facilities as expected by the general public who are exposed to injury if facilities are mistreated.

If this philosophy is not taken by the FCC and assuming that the FCC chooses to utilize the existing national safety standard (the NESC), how will they define "minimum". Who will be the referee in NESC disputes?

For example, Virginia Power recognizes that a CATV installation of a single ½" coax installed with 12 inches of sag for a 200 foot span on 1/4" EHS messenger is acceptable according to NESC requirements. An over lash of a second 3/4" coax is also acceptable. A third over lash of a 3/4" coax is acceptable in Norfolk, Virginia but is not acceptable in Alexandria, Virginia because the heavier ice loading causes the strand to approach within 70 pounds of its NESC mandated limit of 60% of its rated breaking strength. Does the FCC truly desire to rule on a public safety issue such as this? (Data from a CATV cable supplier's PC program is attached. This program is free from CommScope and calculates sag and tension data for CATV coax and fiber optic cables.)

(Please note that this is an example of why we are concerned about knowing what facilities are over lashed, as well as why we feel that we and the CATV installers should have sag and tension data prior to the cable installation. This safety problem can easily and economically be resolved up front by a looser installation sag if clearances will allow. or by a taller pole if necessary.)

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Should requirements be established concerning notification of modifications (manner of notification and timing)? How will the cost of this notification be proportioned?

Virginia Power rate payers should not bear the burden of cost for notifying non-owners of upcoming modifications to plant. This would be an unfair burden because the non-owner's attachment was not requested by the utility, serves the utility no electrical or financial purpose, and is of no significant benefit to the rate payer. Costs such as these would more than negate any future revenue increases suggested by the FCC.

The manner and timing of the notice should be left up to the parties involved. Some localities may be able to afford a computerized real-time system, while others may not. Is the mail service in that particular area efficient enough that all parties have confidence in it? If one party insists on a more expensive but efficient carrier, should that cost be passed on to the other parties? This issue is not relevant to the Act, and therefore the FCC should wait to see if problems are severe enough to warrant their attention.

It is interesting to note that there is no mention of the non-owners responsibility to notify the owners of a change or modification in its facilities. Obviously there are now many parties on poles, and not every party can be allowed to load its supporting hardware up to its maximum limit. Agreements to allow third party attachments were not intended to allow unlimited cables to be attached, as well as unlimited modifications. The requests were simply to attach a specific number of cables at that time. Permission was not requested for anything else. If the owners had taken the approach that maximum load would be required of all hardware, then all of the poles would have had to be replaced.

By monitoring the attachments the pole's structural capacity can be utilized fully without creating a safety hazard to the public and without affecting the life of the pole by stressing it inappropriately. This also assures the owners that proper guying, grounding and anchoring techniques are being followed. These practices differ around the country and even within the State due to their dependence on soil characteristics. Virginia Power is required as an owner to ensure that attachments are conducted properly. Obviously this safety concern is difficult to address without notification.

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Should the FCC impose limits on an owner's right to modify a facility and then collect a proportionate share of the costs? Should the FCC limit owners from making unnecessary modification or specifications?

It is difficult to imagine the scenarios that would prompt the FCC to limit an owner's right to modify its plant as it needs to serve its customers because a non-owner also has customers to serve. This might be feasible in TELCO facilities, however plant installed by electric utilities should not be included in these regulations.

By attempting to establish these regulations, the FCC will ultimately arbitrate situations such as when an electric utility needs to add a second primary circuit and its facilities are adequate structurally or physically without the non-owner facilities but not with them. Will this utility be required to replace or add facilities at its cost because the FCC is concerned about telecommunication rate payers but not electric rate payers?

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DISTRIBUTION ENGINEERING & OPERATIONS DEPARTMENT
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ATTACHMENT

Supporting documentation for the CATV coax installation used in the comments:

a) CommScope data on messengers

b) Copy of 1993 NESC Rule 261K

c) Example 1 (2 pages)

d) Example 2 (2 pages)

e) Explanation of generic output of CommScope Spanmaster program

Note: The sag and tension calculations shown in the two examples were calculated using CommScope's "Spanmaster" PC based program. This program is free from CommScope and calculates NESC sag and tension requirements for CATV coax and fiber optic cables. An explanation of the program's output is also attached.

CommScope Data

PHYSICAL DATA FOR COMMON EXTRA HIGH STRENGTH STEEL MESSENGERS

PRODUCT DESCR.	X-SECT. AREA (sq.in)	EFF. MODULUS (psi)	NOMINAL DIAMETER (in)	EFF.EXP. COEFF. (1/F)	CABLE WEIGHT (lb/ft)	E*A, LOAD BEARING CAPACITY (lbs)	MAX. RATED LOAD (lbs)	
0.109"HTL	0.0093	2.82E+07	0.109	5.60E-06	0.032	263134	1800	
0.134"HTL	0.0141	2.82E+07	0.134	5.60E-06	0.048	397620	2680	
3/16" EHS	0.0211	2.60E+07	0.188	5.60E-06	0.073	549458	3990	
1/4" EHS	0.0352	2.60E+07	0.250	5.60E-06	0.121	914940	6650	3,990
5/16" EHS	0.0595	2.60E+07	0.313	5.60E-06	0.205	1545960	11200	6,720
3/8" EHS	0.0792	2.60E+07	0.375	5.60E-06	0.273	2058420	15400	
7/16" EHS	0.1156	2.60E+07	0.438	5.60E-06	0.399	3005600	20800	
1/2" EHS	0.1498	2.60E+07	0.500	5.60E-06	0.517	3894800	26900	

Comm/Scope

MAX. LOAD IS 60%. NESC 260K (251 Loads)

I. Supply Cable Messengers

1. Messengers shall be stranded and shall not be stressed beyond 60% of their rated breaking strength under the loadings specified in Rule 251.

NOTE 1: There are no strength requirements for cables supported by messengers.

NOTE 2: Bonding and grounding requirements for Type 1 supply cables are in Section 21.

NOTE 3: The factor in Rule 261I1 applies for the loading conditions of Rule 251, except when the extreme wind loading conditions, Rule 260C, apply.

J. Open-Wire Communication Conductors

Open-wire communication conductors in Grade B or C construction shall have the sizes and sags given in Rules 261H1 and 261H2 for supply conductors of the same grade.

EXCEPTION: When open-wire communication conductors in spans of 150 ft (45 m) or less are above supply circuits of 5 kV or less between conductors, Grade C sizes and sags may be replaced by Grade D sizes and sags, except that where the supply conductors are trolley-contact conductors of 0 to 750 V to ground, Stl WG No. 12 may be used for spans of 0 to 100 ft (0 to 30 m), and Stl WG No. 9 may be used for spans of 125 to 150 ft (38 to 45 m).

K. Communication Cables

1. Communication Cables

There are no strength requirements for such cables supported by messengers.

2. Messenger

The messenger shall not be stressed beyond 60% of its rated breaking strength under the loadings specified in Rule 251.

L. Paired Communication Conductors

1. Paired Conductors Supported on Messenger

a. Use of Messenger

A messenger may be used for supporting paired conductors in any location, but is only required for paired conductors crossing over trolley-contact conductors of more than 7.5 kV to ground.

b. Sag of Messenger

Messenger used for supporting paired conductors required to meet Grade B construction because of crossing over trolley-contact conductors shall meet the sag requirements for Grade D messengers.

c. Size and Sag of Conductors

There are no requirements for paired conductors when supported on messenger.

2. Paired Conductors Not Supported on Messenger

a. Above Supply Lines

Grade B: Sizes and sags shall be not less than those required by Rules 261H1 and 261H2 for supply conductors of similar grade.

Grade C: Sizes and sags shall be not less than the following:

Spans 0 to 100 ft (0 to 30 m)—No sag requirements.

Each conductor shall have a rated breaking strength of not less than 170 lb (0.75 kN).

Spans 100 to 150 ft (30 to 45 m)—Sizes and sags shall be not less than required for Grade D communication conductors.

Spans exceeding 150 ft (45 m)—sizes and sags shall be not less than required for Grade C supply conductors. (See Rule 261H2.)

b. Above Trolley-Contact Conductors

Grade B: Sizes and sags shall be not less than the following:

Spans 0 to 100 ft (0 to 30 m)—No size requirements. Sags shall be not less than for AWG No. 8 hard-drawn copper. (See Rule 261H2.)

NAME: DATE: SPAN ID:

NOTES: 200' Span @ 2' Sag on 1/4" EHS strand

Meets Rule 260K all Loading Zones Comm/Scope

Strand Input

DESCRIPTION	AREA (sq.in)	MODULUS (psi)	DIA. (in)	EXP. COEFF. (1/F)	WEIGHT (lb/ft)	CREEP (in/in)
1/4" EHS	0.0352	2.60E+07	0.250	5.60E-06	0.121	0.0000

Cable Input (Up to 4 cables on the same strand)

	DESCRIPTION	AREA (sq.in)	EFF.MOD. (psi)	DIA. (in)	EFF.EXP (1/F)	WEIGHT (lb/ft)	FIGURE 8 CABLE?
CABLE 1	P3-500JCA	0.2463	2.01E+06	0.560	1.46E-05	0.095	N
CABLE 2	P3-750JCA	0.5281	2.05E+06	0.820	1.44E-05	0.199	N/A
CABLE 3	P3-750JCA	0.5281	2.05E+06	0.820	1.44E-05	0.199	N/A
CABLE 4							N/A

Span Input Data

INSTALL. TEMP.(F)	SPAN (ft)	SAG (ft)	SAG (%)	MIN. SERV. TEMP.(F)	MAX. SERV. TEMP.(F)	Optional Clearance (ft)
60	200	2	1.0	-40	140	0.00

Span Output Data

DISTRIBUTED LOAD	0.614	lb/ft
SPAN TENSION	1535	lb
SPAN CATENARY LENGTH	200.053	ft
STRESS FREE LENGTH @ INST. TEMPERATURE	199.718	ft

UNLOADED STRAND SAG
0.46 ft
0.23 %

UNLOADED STRAND TENSION
1304 lb

Effect of Temperature Change from Span Input Conditions

TEMP (F)	MIDSPAN SAG (ft)	TENSION (lbs)	% LENGTH CHANGE FROM SPAN INPUT CONDITIONS	CLEARANCE (ft)
-40	1.57	1955	-0.01	Not Applicable
-30	1.61	1910	-0.01	Not Applicable
-20	1.64	1867	-0.01	Not Applicable
-10	1.68	1823	-0.01	Not Applicable
0	1.72	1780	-0.01	Not Applicable
10	1.77	1738	-0.01	Not Applicable
20	1.81	1696	-0.00	Not Applicable
30	1.86	1655	-0.00	Not Applicable
40	1.90	1614	-0.00	Not Applicable
50	1.95	1574	-0.00	Not Applicable
60	2.00	1535	0.00	Not Applicable
70	2.05	1496	0.00	Not Applicable
80	2.10	1459	0.00	Not Applicable
90	2.16	1422	0.00	Not Applicable
100	2.22	1385	0.01	Not Applicable
110	2.27	1350	0.01	Not Applicable
120	2.33	1315	0.01	Not Applicable
130	2.39	1282	0.01	Not Applicable
140	2.46	1249	0.01	N/A

Ex. 1 Page 1

NAME: DATE: SPAN ID:
NOTES:

Comm/Scope

NESC ICE AND WIND LOADING -RULE 251

LOADING DIST.	TEMP (F)	ICE LOADING (lbs/ft)	HORIZONTA WIND LOADING (lb/ft^2)	RESULTANT LOADING + CONSTAN (lbs/ft)	SAG (ft)	TENSION (lbs)	% LEN. CHG.FROM INPUT CONDIT'NS
HEAVY	0	1.361	4	2.468	4.42	2792	0.10
MEDIUM	15	0.603	4	1.617	3.54	2286	0.06
LIGHT	30	0	9	1.453	3.39	2145	0.05

NESC Clearance Rule 232A W/Creep =0.0000 in/in 0.00%

LOADING CONDITION	TEMP (F)	ICE LOADING (lbs/ft)	HORIZONTA WIND LOADING (lb/ft^2)	RESULTANT LOADING (lbs/ft)	SAG (ft)	TENSION (lbs)	% LEN. CHG.FROM INPUT CONDIT'NS
232A1	120	0.000	0	0.614	2.33	1315	0.01
232A2	120	0.000	0	0.614	2.33	1315	0.01
232A3							
HEAVY	32	1.361	0	1.975	4.05	2437	0.08
MEDIUM	32	0.603	0	1.217	3.04	2000	0.04
LIGHT	32	0	0	0.614	1.86	1647	-0.00

Cable bundle dia. used in ice calculations (in): 1.682
Cable bundle hgt. used in wind calculations (in): 1.682 page 2

Ex. 1 Page 2

NAME: DATE: SPAN ID:

NOTES: 200' Span @ 1' Sag on 1/4" EHS strand
Heavy Loading Zone is 3,923# (3,990 is max. Allowed)
Medium " " is 3,551#

Comm/Scope

Strand Input

DESCRIPTION	AREA (sq.in)	MODULUS (psi)	DIA. (in)	EXP. COEFF. (1/F)	WEIGHT (lb/ft)	CREEP (in/in)
1/4" EHS	0.0352	2.60E+07	0.250	5.60E-06	0.121	0.0000

Cable Input (Up to 4 cables on the same strand)

	DESCRIPTION	AREA (sq.in)	EFF.MOD. (psi)	DIA. (in)	EFF.EXP (1/F)	WEIGHT (lb/ft)	FIGURE 8 CABLE?
CABLE 1	P3-500JCA	0.2463	2.01E+06	0.560	1.46E-05	0.095	N
CABLE 2	P3-750JCA	0.5281	2.05E+06	0.820	1.44E-05	0.199	N/A
CABLE 3	P3-750JCA	0.5281	2.05E+06	0.820	1.44E-05	0.199	N/A
CABLE 4							N/A

Span Input Data

INSTALL. TEMP.(F)	SPAN (ft)	SAG (ft)	SAG (%)	MIN. SERV. TEMP.(F)	MAX. SERV. TEMP.(F)	Optional Clearance (ft)
60	200	1	0.5	-40	140	0.00

Span Output Data

DISTRIBUTED LOAD	0.614	lb/ft	UNLOADED STRAND SAG	
SPAN TENSION	3070	lb	0.20	ft
SPAN CATENARY LENGTH	200.013	ft	0.10	%
STRESS FREE LENGTH @ INST. TEMPERATURE	199.344	ft	UNLOADED STRAND TENSION	
			3011	lb

Effect of Temperature Change from Span Input Conditions

TEMP (F)	MIDSPAN SAG (ft)	TENSION (lbs)	% LENGTH CHANGE FROM SPAN INPUT CONDITIONS	CLEARANCE (ft)
-40	0.86	3568	-0.00	Not Applicable
-30	0.87	3518	-0.00	Not Applicable
-20	0.89	3468	-0.00	Not Applicable
-10	0.90	3418	-0.00	Not Applicable
0	0.91	3368	-0.00	Not Applicable
10	0.93	3318	-0.00	Not Applicable
20	0.94	3268	-0.00	Not Applicable
30	0.95	3219	-0.00	Not Applicable
40	0.97	3169	-0.00	Not Applicable
50	0.98	3119	-0.00	Not Applicable
60	1.00	3070	0.00	Not Applicable
70	1.02	3021	0.00	Not Applicable
80	1.03	2971	0.00	Not Applicable
90	1.05	2922	0.00	Not Applicable
100	1.07	2873	0.00	Not Applicable
110	1.09	2824	0.00	Not Applicable
120	1.11	2775	0.00	Not Applicable
130	1.13	2727	0.00	Not Applicable
140	1.15	2678	0.00	N/A

NAME: DATE: SPAN ID:
NOTES:

Comm/Scope

NESC ICE AND WIND LOADING -RULE 251

LOADING DIST.	TEMP (F)	ICE LOADING (lbs/ft)	HORIZONTA WIND LOADING (lb/ft^2)	RESULTANT LOADING + CONSTAN (lbs/ft)	SAG (ft)	TENSION (lbs)	% LEN. CHG.FROM INPUT CONDIT'NS
HEAVY	0	1.361	4	2.468	3.15	3923	0.06
MEDIUM	15	0.603	4	1.617	2.27	3557	0.03
LIGHT	30	0	9	1.453	2.11	3437	0.02

NESC Clearance Rule 232A W/Creep =0.0000 in/in 0.00%

LOADING CONDITION	TEMP (F)	ICE LOADING (lbs/ft)	HORIZONTA WIND LOADING (lb/ft^2)	RESULTANT LOADING (lbs/ft)	SAG (ft)	TENSION (lbs)	% LEN. CHG.FROM INPUT CONDIT'NS
232A1	120	0.000	0	0.614	1.11	2775	0.00
232A2	120	0.000	0	0.614	1.11	2775	0.00
232A3							
HEAVY	32	1.361	0	1.975	2.74	3611	0.04
MEDIUM	32	0.603	0	1.217	1.81	3354	0.02
LIGHT	32	0	0	0.614	0.96	3209	-0.00

Cable bundle dia. used in ice calculations (in): 1.682
Cable bundle hgt. used in wind calculations (in): 1.682 page 2

Ex 2 Page 2

SpanMaster Release 2

NAME: DATE: SPAN ID
NOTES:

Comm/Scope

Strand Input

DESCRIPTION	AREA (sq.in)	MODULUS (psi)	DIA. (in)	EXP. COEFF (1/F)	WEIGHT (lb/ft)	CREEP (in/in)
1/4" EHS	0.0352	2.60E+07	0.250	5.60E-06	0.121	0.0000

← Strand Info

Cable Input (Up to 4 cables on the same strand)

	DESCRIPTION	AREA (sq.in)	EFF.MOD. (psi)	DIA. (in)	EFF.EXP (1/F)	WEIGHT (lb/ft)	FIGURE 8 CABLE?
CABLE 1	P3-500JCA	0.2463	2.01E+06	0.560	1.46E-05	0.095	N
CABLE 2							N/A
CABLE 3							N/A
CABLE 4							N/A

← Cable Info

Span Input Data

INSTALL. TEMP.(F)	SPAN (ft)	SAG (ft)	SAG (%)	MIN. SERV. TEMP.(F)	MAX. SERV. TEMP.(F)	Optional Clearance (ft)
60	250	2.5	1.0	-40	140	0.00

← Desired Sag, Reference Sag, Actual Sag

Span Output Data

DISTRIBUTED LOAD	0.216	lb/ft
SPAN TENSION	675	lb
SPAN CATENARY LENGTH	250.067	ft
STRESS FREE LENGTH @ INST. TEMPERATURE	249.882	ft

UNLOADED STRAND SAG
1.73 ft
0.69 %
UNLOADED STRAND TENSION
547 lb

Effect of Temperature Change from Span Input Conditions

TEMP (F)	MIDSPAN SAG (ft)	TENSION (lbs)	% LENGTH CHANGE FROM SPAN INPUT CONDITIONS	CLEARANCE (ft)
-40	1.61	1046	-0.02	Not Applicable
-30	1.68	1003	-0.01	Not Applicable
-20	1.76	962	-0.01	Not Applicable
-10	1.83	921	-0.01	Not Applicable
0	1.91	882	-0.01	Not Applicable
10	2.00	844	-0.01	Not Applicable
20	2.09	807	-0.01	Not Applicable
30	2.19	772	-0.01	Not Applicable
40	2.29	738	-0.00	Not Applicable
50	2.39	706	-0.00	Not Applicable
60	2.50	675	0.00	Not Applicable
70	2.61	646	0.00	Not Applicable
80	2.73	619	0.01	Not Applicable
90	2.84	593	0.01	Not Applicable
100	2.96	569	0.01	Not Applicable
110	3.09	547	0.01	Not Applicable
** 120	3.21	526	0.02	Not Applicable
130	3.33	506	0.02	Not Applicable
140	3.46	488	0.02	N/A

← Sag Data (w/o Ice Load)

** Worst Case Sag Is At Either 120°F or 32°F w/Ice (Heavy is ½" Ice, Medium is ¼" Ice)

NAME: DATE: SPAN ID:
NOTES:

Comm/Scope

NESC ICE AND WIND LOADING -RULE 251

LOADING DIST.	TEMP (F)	ICE LOADING (lbs/ft)	HORIZONTA WIND LOADING (lb/ft^2)	RESULTANT LOADING + CONSTAN (lbs/ft)	SAG (ft)	* TENSION (lbs)	% LEN. CHG. FROM INPUT CONDIT'NS
HEAVY	0	0.817	4	1.497	5.75	2032	0.11
MEDIUM	15	0.331	4	0.900	4.66	1509	0.07
LIGHT	30	0	9	0.695	4.23	1283	0.05

{ Worst Case Tension *Cannot Exceed 60% of Strand's Max. Rated Load

NESC Clearance Rule 232A W/Creep =0.0000 in/in 0.00%

Strand	60% of Max Load
1/4" E.H.S.	3,990
5/16" E.H.S.	6,720

LOADING CONDITION	TEMP (F)	ICE LOADING (lbs/ft)	HORIZONTA WIND LOADING (lb/ft^2)	RESULTANT LOADING (lbs/ft)	SAG (ft)	TENSION (lbs)	% LEN. CHG. FROM INPUT CONDIT'NS
232A1	120	0.000	0	0.216	3.21	526	0.02
232A2	120	0.000	0	0.216	3.21	526	0.02
232A3							
HEAVY**	32	0.817	0	1.033	5.09	1586	0.08
MEDIUM**	32	0.331	0	0.547	3.78	1131	0.03
LIGHT	32	0	0	0.216	2.21	765	-0.01

{ Worst Case Sag Data[1] (Also see 120°F

[1] Includes Ice

Cable bundle dia. used in ice calculations (in): 0.810
Cable bundle hgt. used in wind calculations (in): 0.810 page 2

** Worst Case Sag Is At Either 120°F or 32°F w/Ice (Heavy is 1/2" Ice, Medium is 1/4" Ice)