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August 16, 2011

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street
PO Box 2319, 27th Floor
Toronto, ON
M4P 1E4

Dear Ms. Walli:

RE: Application by Canadian Distributed Antenna Systems Coalition ("CANDAS");
Board File No.: EB-2011-0120

We represent CANDAS in connection with its application to the Board regarding access to the power poles of licensed electricity distributors for the purpose of attaching wireless telecommunications equipment ("**Application**").

In accordance with Procedural Order No. 1, CANDAS is filing the Responses to Interrogatories of Toronto Hydro-Electric System Limited.

CANDAS will file two paper copies of the above-noted evidence tomorrow.

Yours very truly,

(signed) H.T. Newland

HTN/ko

cc: Mr. George Vinyard
ExteNet Systems, Inc.
Mr. Mark Rodger
Borden Ladner Gervais
All Intervenors

EB-2011-0120

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15, (Schedule B);

AND IN THE MATTER OF an Application by the **Canadian Distributed Antenna Systems Coalition** for certain orders under the *Ontario Energy Board Act*, 1998.

RESPONSES TO INTERROGATORIES OF

TORONTO HYDRO-ELECTRIC SYSTEM LIMITED

(on the evidence of the Applicant, CANDAS)

August 16, 2011

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I. Application[1]

Questions:

1. *Reference: p. 4 and 21, paras. 2.8, 2.9 and 7.10*

At p. 2.8, CANDAS states that: "Moreover, Canadian carriers who require access to power poles to enable their wireless networks are now effectively precluded from entering the market. This is either because they are unable to obtain pole access at all, or because the terms and conditions of such access are completely indeterminate or subject to such uncertainties as to prelude the requisite capital investments. If left unchecked, the ability of electricity distributors to use their monopoly power to unduly discriminate among Canadian carriers by unilaterally deciding who may have access to regulated assets and who may not, will materially and adversely affect the development of a competitive wireless industry in Ontario." (emphasis added)

Later, paragraph 7.10, CANDAS states that "As a result of the continuing delays in permit processing and the uncertainty as to when the Toronto DAS Network would be 100 percent completed, Public Mobile decided to launch its new Toronto service using "temporary" Macro Cell Sites. Accordingly, Public Mobile, ExteNet and DAScom agreed to terminate arrangements for the committed use of the Toronto DAS Network by Public Mobile. Although Public Mobile is still interested in utilizing DAS technology for portions of its network in Toronto, it will not commit to do so unless and until it receives credible assurances, including assurances that THESL will grant timely and long-term pole access for node and fibre attachments."

(a) Please describe in greater detail all of the other alternatives available to Canadian carriers - such as Public Mobile - to the Toronto DAS Network solution proposed by ExteNet and DAScom.

(b) From the evidence of CANDAS, it appears that Public Mobile is currently using a "Macro Cell Site" alternative to the Toronto DAS Network. Please provide particulars on how a Macro Cell Site approach can be used to provide service to Canadian carriers.

(c) Who are the vendors from whom Canadian carriers - such as Public Mobile - that can purchase "Macro Cell Site" service? Rogers? Bell? Telus? American Tower? Crown Castle? Please identify any others.

[1] As filed April 21, 2011.

(d) What is the total cost being paid by Public Mobile for use of the Macro Cell Site alternative for coverage in the exact service area that is proposed to be covered by the Toronto DAS Network?

(e) What is the difference in total cost between Public Mobile's "Macro Cell Site" alternative currently being used by Public Mobile and the forecasted costs of the Toronto DAS Network proposed by ExteNet and DAScom?

(f) Please specify and provide the relevant particulars regarding Public Mobile's likely use of a DAS network, how many nodes it would require within its current business planning period, where those nodes would be located, and what proportion of its traffic volumes would be handled through such a network.

Responses:

(a) The Application and the written evidence in the record contain sufficient detail as to the limited alternatives available to wireless carriers and demonstrate that such alternatives are not the equivalent of a DAS network solution. To the extent that this Interrogatory seeks greater detail about a specific network project or a particular carrier network, the information requested is not relevant to the issues raised by the Application. Moreover, production of this information would be unduly onerous relative to its probative value, if any.

(b) See response to THESL 1(a).

(c) See response to THESL 1(a).

(d) The information requested is not relevant to the issues raised by the Application.

(e) The information requested is not relevant to the issues raised by the Application.

(f) The information requested is not relevant to the issues raised by the Application.

Questions:

2. *Reference: p. 9, para. 3.11*

CANDAS states "That the parties' settlement on this issue was reached after "considerable discussion" and resulted in universal access by all Canadian carriers (with only the Bell Canada carve out) is significant. As appears from the THESL Letter, THESL now takes the position that the CCTA Order does not apply to wireless attachments because there was no discussion about such attachments during the CCTA Proceeding and the Board never "turned its mind" to this issue. To suggest that wireless attachments are not within the scope of the CCTA Order because the issue was not debated in the CCTA Proceeding ignores the fact that the parties in that proceeding had already agreed, as part of the settlement, that access should be given to all Canadian carriers and not just to wireline carriers. Accordingly, there was no need for further discussion of this issue during the CCTA Proceeding. Moreover, to now suggest that the Board never turned its mind to the issue is to suggest that the Board and Board counsel did not apprehend that the definition of "Canadian carrier" included wireless carriers. Such a suggestion would be quite remarkable."

(a) Are wireless attachments explicitly discussed anywhere in the CCTA Decision?

(b) In the CCTA Decision, the Board was focused specifically on attachments made within the 2ft communications space on distribution poles. Please confirm whether all of the proposed Toronto DAS Network distribution pole attachments fit strictly within the 2ft communications space. Alternatively, please identify those components associated with the Toronto DAS Network that require attachment to the utility pole outside of the 2ft communications space.

(c) In the CCTA Decision, the Board determined that 2.5 attachments per pole was reasonable in the context of its Decision. In respect of the Toronto DAS Network, could 2.5 wireless distribution pole attachments be made to each distribution pole within the 2ft communications space? Please provide the relevant particulars regarding the response.

(d) At paragraph 3.15, CANDAS notes that "The Board ultimately decided the pole charge issue in a way that did not distinguish among various types of attachments." Are there any notable differences between wireline and wireless attachments? Did the Board explore these differences in the CCTA Decision? If so, please provide the relevant particulars, including specific references to the CCTA Decision.

Responses:

(a) See response to CCC 1.

(b) CANDAS does not understand the communications space on a pole to invariably be 2 feet. Rather, the communications space is the standard clearance between the power and neutral zones above, and the required clearance above grade for cable spans below. Components of the Toronto DAS Network that attach outside (below) the allocated communications space on node site poles include remote radio units, power supplies and related elements such as cables, connectors and switches, as described in the Written Evidence of Tormod Larsen (Exhibit D, sheets 3 and 4 of 4).

(c) In the CCTA Order, the Board adopted an assumption regarding the number of attachers, not the number of separate attachments, in respect of its determination of rates. CANDAS does not understand the Board to have made a determination regarding a reasonable number of attachments to a node site pole or the location thereof.

Depending on the nature and arrangement of the components attached to the pole and the size of the communications space on the pole, CANDAS believes that more than 2.5 attachments can appropriately be affixed to the communications space.

CANDAS has never suggested that a particular number of wireless attachments should be made “to each distribution pole” and, in fact, has noted that the numbers of poles to which wireless equipment may be attached are small in relation to the total number of distribution poles.

Wireline and wireless attachments include components that are not designed to, and do not need to fit within the communication space.

(d) CANDAS does not believe there are any differences between wireline and wireless attachments that are of significance for purposes of this proceeding.

Questions:

3. *Reference: p. 12 and 14, paras. 4.1 and 5.9*

CANDAS states at paragraph 4.1 that "CANDAS was formed for the purpose of promoting the ongoing improvement of wireless communications services in Canada, by creating an environment conducive to the rapid deployment of DAS networks in those areas where DAS technology offers technical, economic and environmental advantages that cannot be realized through traditional macro cell site infrastructure."

CANDAS states at paragraph 5.9 that "In the United States, DAS networks have been successfully deployed in most major cities. Such networks typically utilize hydro and telephone poles." (emphasis added)

(a) Has ExteNet, Public Mobile, or DAScom considered, either together or individually, any other alternatives to siting, and deployed its proposed Toronto DAS Network other than using distribution utility poles?

(b) If the answer to (a) is yes, please describe each of the other alternatives that have been considered and please provide all attachment agreements in the possession of any of the CANDAS group of companies relating to each of these alternatives.

(c) If the answer to (a) is no - why hasn't CANDAS explored other alternatives? Please provide the relevant particulars.

(d) Is CANDAS aware of outdoor DAS networks in the United States that have been deployed using assets other than distribution utility poles? Please elaborate on the specific examples of which CANDAS is aware, including providing details on what asset the wireless antenna is attached to.

Responses:

(a) Yes.

(b) ExteNet and DAScom have considered the following alternatives to electric distribution utility poles:

1. Streetlight poles owned by THESI.
2. Bell Canada poles.
3. Various methods of installing fibre optic cabling in new underground conduits (as an alternative to new aerial fibre deployments by Cogeco).

4. Traffic light standards and other municipal “street furniture”.
5. Installation of new node poles in the public rights of way.

Except for the pole access agreement with THESI, there are no attachment agreements with respect to any of the foregoing alternatives because with the exception of the THESI streetlight poles none of the foregoing alternatives was deemed to be a viable alternative means of providing effective DAS network services to meet the needs of Public Mobile and possibly other wireless carriers in Toronto.

(c) Not applicable.

(d) CANDAS is aware of a limited number of instances in which DAS networks have been deployed in the United States using assets other than electric distribution poles. These instances generally fall into two categories:

1. Areas in which all electric distribution lines have been placed underground so that there are no distribution poles. These are primarily city centers, but also include some (usually newer) residential areas and institutional campuses. For example, in Las Vegas, fibre optic cabling was deployed in underground and newly installed conduits owned by the local electric utility. New poles were constructed in the public rights of way for mounting communications nodes. In Chicago, fibre optic cabling was deployed in existing conduits. Nodes were mounted on streetlight poles pursuant to a City Ordinance dealing specifically with attachments to city-owned structures.

2. Areas in which other utility poles or similar structures (e.g., telephone company poles that are not also used for electric distribution under a joint use agreement or municipal streetlight poles) are available and better located for the purposes of DAS network deployment.

Questions:

4. *Reference: p. 12 and 14, paras. 4.1, 4.2, 6.1 and 6.2*

CANDAS states that it is a coalition of Canadian companies engaged in the telecommunications industry sector. Specifically, CANDAS explains at paragraph 4.1 that: "The members of CANDAS – Public Mobile Inc. ("Public Mobile"), ExteNet Systems (Canada), Inc. ("ExteNet") and DAScom Inc. ("DAScom") – collaborated, with others, in a project to establish a new wireless network in the City of Toronto using DAS technology."

Toronto Hydro understands that Public Mobile is registered with the CRTC as a Canadian carrier. It appears to Toronto Hydro that ExteNet is the principal proponent of the Toronto DAS Network, that DAScom and Cogeco are underlying suppliers, and that Public Mobile is a potential user of the Toronto DAS Network. Specifically, CANDAS states at p. 6.2: "ExteNet, working with two underlying suppliers, DAScom and Cogeco Data Services Inc. ("Cogeco"), undertook to design, develop and implement the Toronto DAS Network, initially for use by Public Mobile in launching its new wireless services. ExteNet is a Canadian corporation that is registered with the CRTC as a reseller of telecommunications services. ExteNet and its parent company have significant experience in the design and construction of DAS networks."

(a) Is ExteNet a Canadian carrier within the meaning of the CCTA Decision? Please explain and provide the relevant particulars.

(b) Is DAScom a Canadian carrier within the meaning of the CCTA Decision? Please explain and provide the relevant particulars.

(c) On what legal basis does ExteNet and DAScom seek to rely on the CCTA Decision?

(d) Please identify the parties that are the "others" referred to at para. 4.2, and what their respective roles were in the collaboration with the members of CANDAS.

(e) Regarding paragraph 4.2, were any of the "others" involved in site procurement for wireless facilities? If so, please indicate their respective roles and which sites were procured through them.

(f) Please provide the relevant particulars of all entities which were considered as possible participants in the process for the acquisition of sites for wireless facilities in the Toronto DAS Network project. For those entities that did not participate in the project, please explain the reason(s) why.

Responses:

(a) ExteNet is a Canadian corporation that is registered with the Canadian Radio-television and Telecommunications Commission (CRTC) as a reseller of telecommunications services. ExteNet is not a Canadian carrier as defined in the *Telecommunications Act* and within the meaning of the CCTA Order.

(b) DAScom is registered as a non-dominant carrier with the CRTC. DAScom is a Canadian carrier as defined in the *Telecommunications Act* and within the meaning of the CCTA Order.

(c) Each of the members of CANDAS is registered to provide telecommunications services in Canada under the statutory authority of the CRTC. Furthermore, as set forth in the Application and in the previously submitted Written Evidence of CANDAS, each has an interest in developing DAS networks in Ontario. As such, each of the members of CANDAS has an interest in having the CCTA Order interpreted or clarified as necessary to permit the development of DAS networks in Ontario.

(d) The "others" included Cogeco, various contractors selected to provide engineering and construction services, and various equipment suppliers.

(e) The information requested is not relevant to the issues raised by the Application.

(f) The information requested is not relevant to the issues raised by the Application.

Questions:

5. *Reference: p. 12, para. 5.1 (also, Larsen Written Evidence, p. 5-6)*

CANDAS states that a DAS network comprises three main elements, including "multiple telecommunications "nodes", incorporating small, low elevations antennas and low-power radio units".

(a) Please provide the manufacturer's name and model number for each antenna in use, or planned for use, by CANDAS, whether in Toronto, Montreal, New York, San Francisco, Las Vegas, Boston, Providence or elsewhere.

(b) Regarding the response to (a), please provide the relevant particulars, including full descriptions of the propagation characteristics of each installation and supporting documents, including, but not limited to, requirements for placement density.

(c) Please provide the manufacturer's name and model number of each radio unit currently used, or planned for use, by CANDAS, whether in Toronto, Montreal, New York, San Francisco, Las Vegas, Boston, Providence or elsewhere.

(d) Regarding the response to (c), please the relevant provide particulars, including full descriptions of the propagation characteristics of each installation and supporting documents, including, but not limited to, requirements for placement density.

Responses:

(a) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(b) See response to THESL 5(a).

(c) See response to THESL 5(a).

(d) See response to THESL 5(a).

Question:

6. *Reference: p. 12, para. 5.1*

CANDAS states that a DAS network comprises three main elements, including "one or more central hub facilities housing the wireless carriers' equipment that propagates and receives communication signals to and from the nodes utilizing the wireless carriers' licensed radio frequency spectrum."

(a) Please identify (including manufacturer and model) and describe, with the relevant particulars, all "central hub facilities housing the wireless carriers' equipment that propagates and receives communication signals" which are currently used, or planned for use, by CANDAS, whether in Toronto, Montreal, New York, San Francisco, Las Vegas, Boston, Providence or elsewhere.

Response:

(a) The information requested is not relevant to the issues raised by the Application.

Questions:

7. *Reference, p. 12, para. 5.2*

CANDAS states that "The wireless and wireline components of a DAS network are equally essential to the operation of the network. One cannot function without the other. The antennas and radio units must be proximate to and interconnected with the fibre optic cabling which, as with other wireline systems, is most effectively deployed by aerial suspension from support structures in public rights-of-way or established utility easements. Therefore, it makes sense - economically, environmentally and operationally - to attach wireless equipment on the same support structures from which the fibre optic cabling is suspended."

(a) Please identify, and provide the relevant particulars regarding, within CANDAS' targeted geographic market in Toronto, the location of fibre optic facilities (placed by any party including CANDAS) that could be used to support wireless antenna systems, whether DAS or traditional macro site based systems.

(b) Please provide the relevant particulars in support of the statement that "it makes sense - economically, environmentally and operationally - to attach wireless equipment on the same support structures from which the fibre optic cabling is suspended", including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(c) Please provide particulars in support of the statement that "antennas and radio units must be proximate to and interconnected with the fibre optic cabling", including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents that demonstrate fibre optic cable is required to support DAS and that copper, coaxial or wireless applications are insufficient or inferior.

(d) Regarding the response to (c), please also provide the minimum, average and maximum bandwidth requirements for each of the last 12 months for each node which is currently deployed for use by CANDAS, whether in Toronto, Montreal, New York, San Francisco, Las Vegas, Boston, providence or elsewhere.

Responses:

(a) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(b) CANDAS believes the quoted statement is adequately supported by the Application, including the context from which it is taken, and the Written Evidence filed in this proceeding. However, further support for the statement can be found in the observation that locating the remote radio components on the same poles that support the fibre optic cabling used to connect these units back to the central hub facilities of the DAS network is sensible from an economic, environmental and operational perspective because doing so reduces the cost, environmental disruption and signal loss that would result from having to extend the fibre from the pole line to which it is attached, over or under the public ways, to appoint of interconnection with other infrastructure located at a distance from the pole line.

(c) CANDAS provides the following additional support for the quoted statement. In a typical DAS network, the distance from the central hub to the several node sites connected to it can range from 1 km up to 20 km. The desirability of fibre optic cable for connecting the central hub with each of the node sites is evidenced by the fact that DAS network equipment is virtually all made to interconnect the hub facilities with the nodes using optical fibre and not other types of cabling which lack the signal transport capacities, capabilities and characteristics needed to effectively support a DAS network over the foregoing distances. All DAS network equipment is based on fibre transport. More particularly, the reasons that fibre is required for DAS network applications include (i) its long distance capabilities/low loss characteristics (ii) support for high bandwidth communications and (iii) isolation from/ resistance to interference from other wireless or RF sources.

The following table illustrates why copper wires, coaxial cables and wireless applications are not suitable for the interconnection of nodes with hub facilities in DAS network applications:

	Network Requirement	Fiber Specification	Copper Specification CAT7a (high performing cable)	Coax Specification (LMR 1700) Dia. 42.42mm (large cable)	Wireless (over the air = RF or MW/mmW)
Distance & Loss	20km	0.4dB/km 25 km	0.1 km	49dB/km 0.2 km	< 3km
Frequency band support	700-2200MHz	**n/a**	0-1000MHz	**DC - 6GHz**	**700-2200MHz if off-air**
Bandwith support	Dedicated fiber or 1.228Gbits up to 3.3Gbit/s ADC & OBSAI/CPRI	**>10Gbit/s**	**<10Gbit/s**	<100Mbit/s	1.228Gbit/s if mmw in 70-80GHz range not approved yet in Canada.
RF Isolation	Required	**Comply**	**Comply**	**Comply**	Partly comply. Extremely carefull planning specifically in dense metropolitan areas to avoid interference.

*) ***Cat 7A Cable*** *– Supports 10G Base-T standard for bandwidths up to 10 Gbps over a maximum distance of 100 meters. In addition to this, they can also support 40 Gbps bandwidth for around*

50 meters and 100 Gbps bandwidth for around 15 meters. They support frequencies in the range of 0-1000 Mhz. http://www.excitingip.com/847/know-your-cat-5-6-7-unshielded-twisted-pair-utp-network-cables/

***) LMR 1700 cable: http://timesmicrowave.com/products/lmr/downloads/40-43.pdf*

In sum, (i) copper would not be able to support the distances nor the bandwidth requirements for outdoor DAS; (ii) coaxial cable would not support the distance nor the bandwidth requirements for outdoor DAS; and (iii) wireless would not be able to support the distances, the bandwidth requirements or RF isolation requirements for outdoor DAS.

(d) The bandwidth requirements for the nodes of the Montreal DAS Network being utilized by Public Mobile and for the Toronto DAS Network as designed are: 1.228 to 3.3Gbit/s/node (CPRI).

CANDAS notes that no nodes are deployed by or for the use of any of the members of CANDAS in any locations other than Toronto and Montreal. Any additional information on this matter is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

Questions:

8. *Reference: p. 13, para 5.3 (also, Larsen Written Evidence, p. 5)*

CANDAS states that "optimal and effective design and deployment of DAS networks require that node antennas be attached at elevations that correspond roughly to the heights of utilities and street light poles (9-14 meters), as opposed to higher elevations of towers and the roof tops of multi-story buildings (greater than 15 meters). Ideally, cabling and equipment should also be located at the street intersections and along traffic corridors to enable unimpeded transmission of wireless signals in the areas traversed by mobile users and into the most heavily traveled areas of surrounding buildings."

(a) Please provide the particulars in support of this statement that "optimal and effective design and deployment of DAS networks require that node antennas be attached at elevations that correspond roughly to the heights of utility and street poles (9-14 meters)", including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(b) Please identify each circumstance in which CANDAS and/or one of its member companies has mounted, attached, deployed, leased or otherwise utilizes a node antenna of the type discussed, whether in Toronto, Montreal, New York, San Francisco, Las Vegas, Boston, Providence or elsewhere:

(i) on utility or streetlight poles; and

(ii) at locations other than utility or street light poles.

(c) For each such circumstance identified in response to (b), please provide the relevant particulars, including the following, as applicable:

(i) physical location;

(ii) antenna manufacturer, make and model number;

(iii) antenna manufacturer's mounting requirements and installation guides;

(iv) description of structure to which antenna is attached;

(v) height at which antenna is mounted;

(vi) engineering diagram, schematic and/or technical drawing describing the antenna's installation;

(vii) description of all other equipment installed at that location to support or connect to the antenna including, but not limited to, radio units, power or back-up power equipment, fibre optical cable, or other wireline cable related equipment;

(viii) indication as to whether the location is owned or leased by CANDAS or one of its member companies;

(ix) CANDAS and/or member company installation costs;

(x) make ready fees and other non recurring installation charges assessed by leasing entity, if any;

(xi) monthly lease costs, if any; and,

(xii) a copy of the applicable lease agreement, if any.

Responses:

(a) The statement "optimal and effective design and deployment of DAS networks require that node antennas be attached at elevations that correspond roughly to the heights of utility and street poles (9-14 meters)" is based on the RF propagation characteristics at cellular/PCS frequencies combined with the intended/desired capacity.

If the RF signal radiation center (antenna) is at a high elevation – the signal will propagate for several kilometres through free space. This is not an issue in sparsely populated areas where the number of mobile wireless users per square km is fairly low or if the wireless carrier is licensed to use a large amount of RF spectrum, as discussed below. However, in densely populated areas like Toronto and Montreal the signal propagation characteristics with radiation centres at

higher elevations can present significant challenges especially for wireless carriers with limited frequency spectrum. In contrast, if the radiation center is low the signal will be attenuated due to clutter and the range will be fairly short.

The two biggest challenges in modern wireless networks are managing capacity and interference. A major objective in cellular network design is therefore to achieve a very well-defined coverage "footprint" for each antenna site. Without this, the site may cover an area that is too large and hence too many subscribers will be competing for use of limited network capacity. In addition a poorly defined, overlarge "footprint" may overlap and interfere with signals from surrounding antenna sites. The result in both cases would be that customers will experience extensive blocking (fast busy signal) or very low data rates. The maximum number of subscribers that can be supported by an antenna site depends on the amount of spectrum the wireless carrier is licensed to use in a particular market. For a wireless carrier having less spectrum, fewer users can be served per antenna site, and as a result a very well designed network is even more important so that the limited spectrum can be used to the greatest effect. DAS network architecture provides a better defined and more contained footprint due to the lower elevation radiation center compared to traditional macro sites as could be seen from the calculations below. In fact, in metropolitan areas, DAS networks benefit from the RF "clutter" caused by surrounding buildings. The RF signals propagate along the urban "canyons" created by the buildings lining the streets the DAS node is located on, and they are attenuated by the building walls which helps to create a very clearly defined coverage "footprint". The elevation of the DAS node antennas is therefore a critical factor. If the antenna is too high, it will potentially overshoot and cover too much area creating both capacity and interferences issues. If the antenna is too low, the coverage "footprint" will be too small with the result that the coverage area of each Node will not encompass the desired number of users and more nodes will be required to cover the same area so that radio resources are used less efficiently.

Using Toronto as an example, the following calculation could be made:

	Area	Population	Canadian Mobile Market Penetration *	Market Share	Tot Subscribers	Simultanous users (50%)	Number of users/sector (node) **	Number of Nodes	Coverage area/node [km²]	Coverage radius [km]
City of Toronto	630 km²	2,480,000	74%	7%	128,464	64,232	90	714	0.883	0.530
*	CWTA 24.7M subs 03'11									
	Population of Canada 33.4M									
**	CDMA - 30 users/ch									
	5Mhz = max 3 ch = 90 sim. users									

This implies that the average coverage radius/link distance per node should not exceed 530m. Utilizing The COST-Hata-Model 231 which is formulated as follows:

Where,

L = Median path loss. Unit: Decibel (dB)

f = Frequency of Transmission. Unit: Megahertz (MHz)

h_B = Base Station Antenna effective height. Unit: Meter (m)

d = Link distance. Unit: Kilometer (km)

h_R = Mobile Station Antenna effective height. Unit: Meter (m)

$a(h_R)$ = Mobile station Antenna height correction factor as described in the Hata Model for Urban Areas.

Assuming the following:

L = Median path loss. < 135dB

f = Frequency of Transmission. 1900MHz

h_B = Node Antenna effective height. 9m to 14m

d = Link distance. 0.53km

h_R = Mobile Station Antenna effective height. 1.8 m

The following table shows the results of the above calculation for radiation centres at various elevations, illustrating how the 9 to 14 meter range of elevation produces the most desirable Link Distances:

Height [m]	Loss [dB]	Link Distance @ 135dB
6	137.8	0.450km
9	135.7	0.510km
14	133.4	0.585km
25	130.3	0.720km
50	126.75	0.940km
80	124.3	1.140km
100	123.1	1.250km

(b)

(i) None of the members of CANDAS has mounted, attached, deployed, or utilized any outdoor DAS nodes in locations other than Toronto and

Montreal. All outdoor DAS nodes in Toronto and Montreal are mounted on power or streetlight poles**.**

(ii) No outdoor DAS nodes deployed or used by any of the members of CANDAS are mounted at a location other than a power poles or traffic signal standard. To the extent that detailed information beyond the forgoing is requested, it is not relevant to the issues raised by the Application; moreover, production of such detailed information would be unduly onerous relative to its probative value, if any. However, for purposes of comparison and context, ExteNet Systems, Inc. ("ExteNet Systems") and its operating subsidiaries have attached outdoor nodes in the United States as follows:

Structures Used for ExteNet Systems
Node Attachment in United States

Utility Poles	90.08%
Street Lamps, Traffic Signal Poles and Street Lamp Stealth Poles	9.92% (includes new Las Vegas Poles)
Building Rooftop (*This was done in response to customer request)	1 Node

Only one node was placed on a building, which was a DAS BTS Hub location. No other traditional/macro site structures have been used.

(c) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

Question:

9. *Reference: p. 14, para. 5.9*

CANDAS states that DAS networks have been deployed in most major cities in the United States and that such networks typically utilize hydro or telephone poles.

(a) Please provide the relevant particulars in support of this statement, including reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Response:

(a) The following Table reflects the current state of CANDAS' knowledge of the information reflected in the quoted statement from the Application:

Major US Metro Areas	Estimated Number of Outdoor DAS Nodes in Operation
Baltimore	200
Boston/Providence	1400
Chicago	880
Detroit	400
Las Vegas	100
Major Cities in California	2900
Major Cities in Florida	350
Major Cities in Texas	370
New York City Metro Area	1200
Philadelphia	600
Washington DC	300

Questions:

10. *Reference: p. 14, para. 5.10*

CANDAS states that "DAS technology facilitates a more competitive market because it is particularly attractive to new entrants who wish to launch new services quickly."

(a) In what way does DAS technology do this?

(i) is it the case that new entrants can effectively "piggyback" on a DAS system once it is in place?

(ii) what is the capacity of a DAS system? If the answer to part i. is yes, please also explain capacity in terms of how many new entrants can effectively "piggyback" on a DAS system once it is in place?

(b) Please provide any other particulars in support of this statement, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Responses:

(a) DAS technology is attractive to new market entrants because it offers the potential for rapid deployment in the targeted market areas and immediate and longer term flexibility and scalability that allow for efficient utilization of limited radio frequency spectrum and radio equipment resources. Rapid deployment is possible because DAS networks are designed for installation on existing utility infrastructure, located in the public rights of way, which allows for easy access to the work sites and enables the use of efficient and uniform construction methods.

(i) Any wireless carrier can potentially benefit from using a DAS network that is already in place, from new entrants to established wireless carriers.

(ii) DAS Networks are typically constructed with sufficient fibre capacity to accommodate a total of at least four wireless carriers. Node sites are generally designed to accommodate more than one wireless carrier, but the actual capacity of each specific node site will vary depending upon:

(1) the specific equipment configurations;

(2) numbers of RF frequency bands and technologies being deployed;

(3) limitations on the design of the node site that may be imposed by local authorities; and

(4) the physical configurations of the poles involved.

(b) See the written evidence of Mr. Larsen, Mr. O' Shaughnessy and Ms. Lemay. To the extent the request seeks more detailed information, the production of this information would be unduly onerous relative to its probative value, if any.

Questions:

11. *Reference: p. 15 and 21, paras. 6.1, 6.2 and 7.10*

CANDAS states at paragraph 6.2 that ExteNet is "working with two underlying suppliers" (DAScom and Cogeco) to "design, develop and implement the Toronto DAS Network, initially for use by Public Mobile in launching its new wireless services."

(a) If successful in developing the Toronto DAS Network, who would own the wireless attachments that are proposed to be affixed to the distribution utility poles? ExteNet? DAScom? Cogeco?

(b) Could the owner of the Toronto DAS Network sell use of the Network to other Canadian carrier customers? How many others?

(c) Is Public Mobile a customer that would pay to use the Toronto DAS Network?

(d) If Public Mobile is a customer that would pay to use the Toronto DAS Network, how much would Public Mobile pay for use of the Toronto DAS Network? How much of this fee is associated with the regulated access charge under the CCTA Decision?

Responses:

(a) If completed as planned, the title ownership of the components of the Toronto DAS Network attached to or supported by electric distribution poles would be as follows**:**

(i) Cogeco would own the fibre optic cabling and the means by which it is affixed to the poles, subject to an indefeasible right of use (IRU) with respect to a portion of the capacity thereof granted to ExteNet.

(ii) Public Mobile would own the remote radio units and back-up power supplies.

(iii) Public Mobile would own the antennas, subject to an IRU with respect to a portion of the capacity thereof granted to ExteNet.

(iv) DAScom would own all of the other items affixed to the poles for purposes of attaching, supporting and interconnecting the foregoing elements (power and coaxial cables, support brackets, fasteners, etc.) subject to an IRU with respect to a portion of the capacity thereof granted to ExteNet.

(b) Pursuant to its IRU rights, ExteNet could make those components of the Toronto DAS Network that are not exclusively owned by or dedicated to the exclusive use of Public Mobile, available for others.

(c) Yes.

(d) The information requested is not relevant to the issues raised by the Application.

Questions:

12. *Reference: p. 15, para. 6.3*

CANDAS states that the plan for the Toronto DAS Network involved constructing approximately 790 node sites.

(a) Please identify the planned location for each of the 790 node sites.

(b) Please provide a map or other information detailing the total coverage area supported by the 790 node sites included in the Toronto DAS Network. Please state the total square kilometres intended to be covered by the 790 node sites included in the Toronto DAS Network as well as the average number of nodes per square kilometre.

(c) Please provide a map or other information detailing the total coverage area of each of the 790 node sites included in the Toronto DAS Network.

(d) Has CANDAS determined that an alternative to each of the 790 node sites is either technically or economically infeasible?

(e) If CANDAS' position is that it has determined that an alternative to each of the 790 node sites is either technically or economically infeasible, please provide the particulars of such determination for each site, including all reports, analyses, studies, letters, email, other correspondence and documents upon which such determination was made.

Responses:

(a) See the map attached as Schedule 12(a)-1.

(b) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

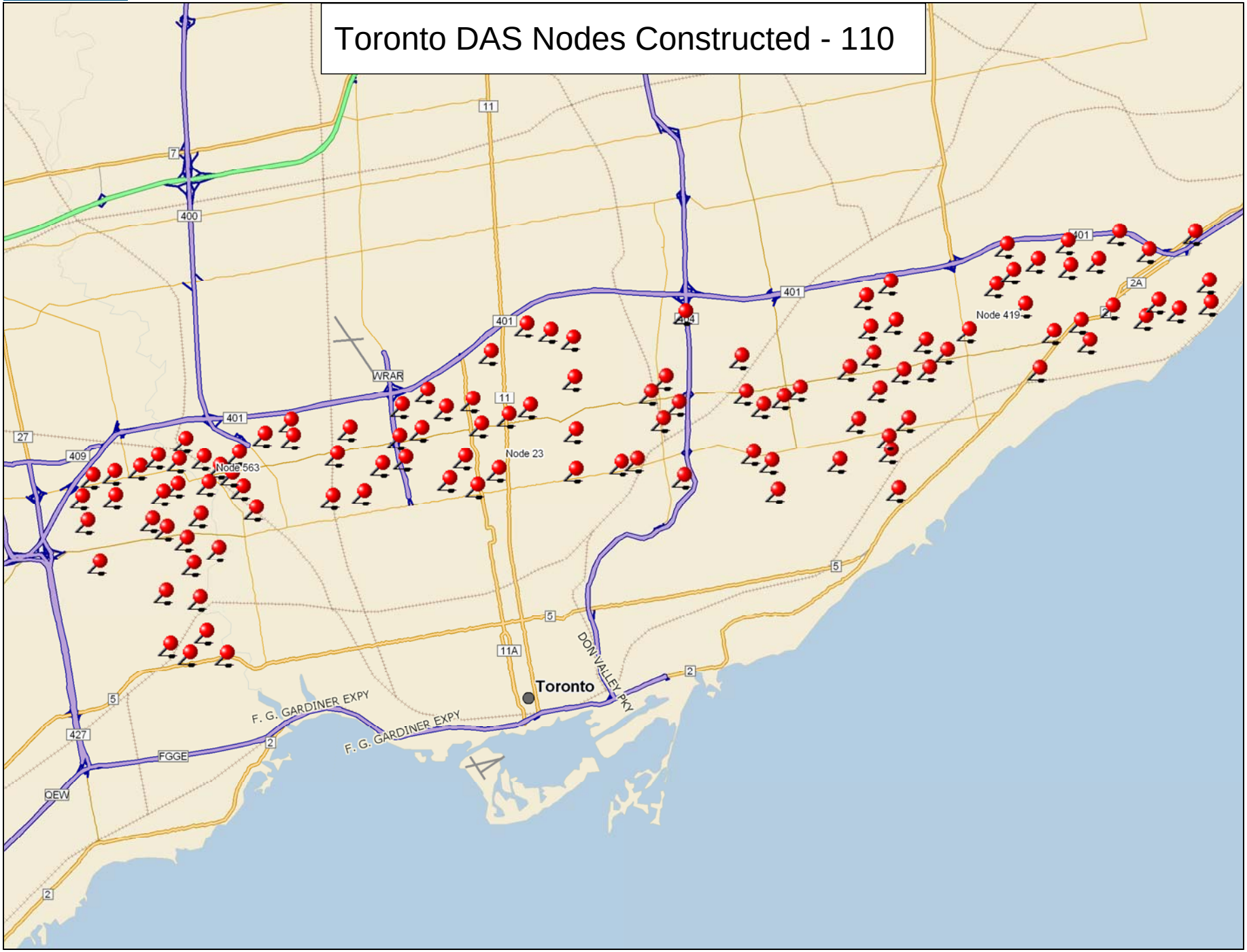
(c) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(d) No.

(e) Not applicable.

DeLORME **XMap® 6**

Toronto DAS Nodes Constructed - 110



TN
MN (10.5°W)

Scale 1 : 162,500
1" = 2.56 mi
Data Zoom 10-3

Questions:

13. *Reference: p. 16, para. 6.6*

CANDAS states that without access to existing power and lighting poles upon commercially reasonable terms and conditions, neither the Toronto DAS Network, nor any other DAS network deployment in Toronto, would be economically or technically feasible.

(a) Please provide coverage characteristics, broadband capabilities monthly/annual costs, and/or per subscriber costs of DAS to traditional wireless macro site based systems.

(b) Please provide any other particulars in support of this statement, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Responses:

(a) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(b) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

Question:

14. *Reference: p. 18, para. 6.10*

CANDAS states that "On July 20, 2009, ExteNet and Public Mobile met with David O'Brien… to discuss the Toronto DAS Network project, including Public Mobile's new wireless network. Mr. O'Brien expressed his support for the new wireless network."

(a) Please provide anything in writing that CANDAS has to support this statement.

Response:

(a) Attached as Schedule 14(a)-1, please find a copy of the letter sent by Mr. O'Shaughnessy to Mr. O'Brien immediately following the meeting.

July 29, 2009

David O'Brien
President and CEO
Toronto Hydro Corporation

Dear David,

Let me start by thanking you for meeting with Alek Krstajic on July 21 and for your support of Public Mobile and our launch plans.

We have already seen positive progress as a result of that meeting with the Structural Services Agreement (SSA) terms with Toronto Hydro being agreed to and an expectation that the agreement will be signed within 1 week. Further, Girma Tewold of your team is currently exploring how to add additional resources to the approval process for our build.

We are also working with the Toronto Hydro Energy Systems to complete a similar SSA for installations on street and traffic light poles prior to Sept 4, 2009. We will work with them to see if an earlier approval date is possible.

The main outstanding issue for discussion with your team is to explore how we could streamline the process to allow for faster and approval of installations. It is worth noting that the City of Montreal and Hydro Quebec have adopted such a process to simplify the load on their resources while maintaining their high quality standards for all installations by DASCom and Public Mobile. We would be happy to share their practices with your team and explore what would meet your needs.

As we progress through the various activities above and work to streamline the Toronto Hydro approval process, it would be helpful to have a senior level contact within your organization to have regular check point discussions. Could you please let me know who you would like us to work with going forward?

Thank you very much for your support, and please call me if you have any questions.

Brian O'Shaughnessy
CTO
Public Mobile Inc.
416-605-2442 (cell)
130 Merton St, suite 600
Toronto, Ontario

Question:

15. *Reference: p. 2, para. 1(e)*

Part of the Relief sought by CANDAS is an Order amending the licenses of all distributors requiring them to include, in their Conditions of Service, the terms and conditions of access to power poles by Canadian carriers, including the terms and conditions of access for the purpose of deploying the wireless and wireline components of DAS etc, etc. CANDAS has filed no evidence on the terms and conditions it believes should be imposed by the OEB.

(a) Please confirm that CANDAS is no longer pursuing this relief contained in paragraph (e), page 2 of the Application, given that it has provided no evidence in support of this relief.

Responses:

(a) Not confirmed. Refer to Written Evidence of George Vinyard (Q. 6-11).

Question:

16. *Reference: page 28, para 10.9*

Question:

17. *Reference: page 28, para 10.9*

The Application indicates that in 2005, the Board made the CCTA Order and that "The CCTA Order does not distinguish between Canadian carriers that seek to attach wireline equipment and those that seek to attach wireless equipment". CANDAS acknowledges that the Board's Decision (attached at Tab 6 of the Application) resulted from the CCTA hearing, and the issues and scope for that hearing resulted from the October 19, 2004 Settlement Agreement between the parties (attached at Tab 5 of the Application). The Settlement Agreement included a definition of an "Attachment", which was accepted by the Board.

(a) Please confirm that in section 1.5 of Appendix B at page 10 of the Settlement Agreement, " Attachment" is defined as follows:

> "Attachment means any material, apparatus, equipment or facility owned by the Licensee which the Owner has Approved for Affixing to poles or other equipment of the Owner or In-span, including, but without limiting the generality of the foregoing:
>
> -Licensee-owned cable not directly attached to a pole, but Over Lashed to a cable or Support Strand not owned by the Licensee;
>
> - Service Drops Affixed directly to the Owner's poles;
>
> - Service Drops Affixed In-span to a Support Strand supported by poles of the Owner; and
>
> - Attachments owned by the Licensee but emanating from a cable not owned by the Licensee.
>
> [Attachment excludes wireless transmitters and power line carriers.]
>
> NOT AGREED. "

Response:

(a) CANDAS disagrees that the Board accepted any definition of "Attachment" in the CCTA Order. This was a contentious issue related to the application of rates (Issue 3(6)). The Board did not approve a standard form of contract or a

definition of "Attachment" therein (see CCTA Order, p. 120 of 1378 of the Application). However, the Board did rule that all "Canadian Carriers" (and cable companies) should have pole access.

See also the answer to CCC Interrogatory 1.

II. Written Evidence of George Vinyard[2]

Questions:

18. *ExteNet* Reference: p. 4, Q. 5

Mr. Vinyard states that "ExteNet Systems has entered into approximately 80 attachment agreements with over 35 utilities, most of which involve attachment to power poles."

(a) Please provide a copy of each such attachment agreement.

(b) Please provide the highest, lowest and average monthly pole rental rates. Please separately provide the upfront charges, make ready fees and any other non-recurring charges associated with each sites covered by the 80 attachment agreements.

(c) Please also identify the number of agreements that ExteNet Systems, or any other member of CANDAS, has entered into which allow for the attachment of DAS antennas and other equipment to facilities other than power poles or lampposts.

Responses:

(a) Attached as Schedule 18(a)-1 and Schedule 18(a)-2 are two redacted copies of representative attachment agreements between ExteNet Systems and utility companies. Set forth in the table below is information regarding all the attachment agreements between ExteNet Systems and utility companies.

[2] As filed July 26, 2011.

Summary of ExteNet Systems Attachment Agreements

Type of Utility	Total # of Attachment Agreements	# of Attachment Agreements Allowing Antenna on Pole Top	# of Attachment Agreements in States Governed by FCC Pole Attachment Regulations
ELECTRIC UTILITIES			
Wireline Only	16	N/A	7
Wireless Only	15	6	6
Combined Wireline and Wireless	9	6	3
Conduit Only	3	N/A	1
Subtotal Electric Utilities	43	12	17
TELEPHONE COMPANIES			
Wireline Only	9	N/A	0
Wireless Only	6	1	0
Combined Wireline and Wireless	11	2	8
Conduit Only	7	N/A	3
Subtotal Telephone Companies	33	3	11
JOINT POLE ASSOCIATIONS			
Combined Wireline and Wireless	2	2	0
Grand Total:	78	17	28

(b) The information requested is not relevant to the issues raised in the Application. No party has requested the Board to review and vary the regulated pole access rate. Moreover, the production of information that has no probative value would be unduly onerous.

(c) ExteNet Systems is not a member of CANDAS. ExteNet Systems, directly and through its operating subsidiaries, designs, builds, owns, operates, monitors and maintains both outdoor and indoor DAS networks throughout the United States. In connection with its outdoor DAS network business, ExteNet Systems has not entered into any agreements for the attachment of a meaningful number of DAS antennas or other DAS-related equipment (excluding conduit agreements for DAS-related fibre optic cabling) to facilities other than power poles, streetlight poles (including lampposts) or traffic signal standards. In connection with its indoor DAS business, ExteNet Systems typically enters into agreements with the

owners or operators of the facilities (or with wireless carriers who have themselves entered into agreements with the facility owners or operators) for the attachment or installation of DAS antennas and other DAS-related equipment within the structure in which the DAS network is to be used to provide wireless services.

ExteNet has not entered into any agreements which allow for the attachment of DAS antennas and other DAS-related equipment to facilities other than power poles, streetlight poles (including lampposts) or traffic signal standards for purposes of any outdoor DAS network deployment.

DAScom has not entered into any agreements which allow for the attachment of DAS antennas and other DAS-related equipment to facilities other than power poles, streetlight poles (including lampposts) or traffic signal standards for purposes of any outdoor DAS network deployment.

Public Mobile has not entered into any agreements which allow for the attachment of DAS antennas and other DAS-related equipment to facilities other than power poles, streetlight poles (including lampposts) or traffic signal standards for purposes of any outdoor DAS network deployment.

CONFIDENTIAL

POLE, CONDUIT AND TRENCH USE AGREEMENT

BETWEEN

CLEARLINX NETWORK CORPORATION

AND

[redacted]

TABLE OF CONTENTS

ATTACHMENT 4 PROCESS AND CHARGES FOR JOINT USE "WORK AS A CONTRACTOR"

POLE, CONDUIT AND TRENCH USE AGREEMENT

This Pole, Conduit and Trench Use Agreement, hereinafter referred to as "AGREEMENT" made this 4th day of ~~May~~ September 2003, by and between [redacted] EDISON, and ClearLinx Network Corporation, hereinafter referred to as "JOINT USER," organized and existing under the laws of [redacted]

WITNESSETH:

WHEREFORE, JOINT USER proposes to attach cables and, where necessary, repeater equipment and antennas and associated equipment to poles or install cables in ducts, conduits, and manholes (collectively "conduit system") or trenches of EDISON (collectively the "Project"), for a wireless telecommunications network in one or more [redacted] municipalities as EDISON and JOINT USER may mutually agree from time to time and EDISON is willing to grant a revocable permit to the extent that it may lawfully so do, for the installation of the Project, where, in EDISON's sole judgment, such attachment or installation will not interfere with its own service requirements, including considerations of reliability, operability, and safety.

NOW, THEREFORE, in consideration of the premises and mutual covenants herein contained, the parties hereto do agree as follows:

ARTICLES I - SCOPE OF AGREEMENT

A. EDISON grants to JOINT USER a revocable permit to attach repeater equipment, cable, antennas and associated equipment (collectively the "Equipment"), as EDISON may approve, to such poles as EDISON may designate (and no others). EDISON further grants to JOINT USER a revocable permit to install cables in EDISON's conduit systems or trenches as EDISON may designate (and no others). EDISON must first approve the method and location of installation on poles or in conduit systems and trenches.

B. EDISON grants JOINT USER non-exclusive rights for its attachments on poles, or in conduit system and trenches. EDISON does not imply or guarantee that JOINT USER will have sole occupancy of a pole, conduit systems, or trench.

C. Prior to attaching or installing equipment on poles or in the conduit system or trenches, JOINT USER shall obtain all necessary permits, franchises, consents, or approvals, either public or private, which may be necessary to enable JOINT USER to attach or install such cable or to carry on its business. Should JOINT USER fail to obtain such authorizations or should such authorizations be revoked, JOINT USER shall immediately cease attaching or installing its equipment and shall remove its existing equipment. JOINT USER, where possible and where required, shall provide EDISON copies of such authorizations, or any written consent from any private property owner, or owners, stating that JOINT USER has permission for ingress or egress and also to construct and operate its equipment over, under, and upon the EDISON-owned poles or conduit system located on said private property.

D. EDISON may, in its reasonable judgment, remove any poles or conduit system not needed for its electric service requirements. JOINT USER shall, upon sixty (60) days written notification from EDISON, remove, at its own expense, its equipment from such poles or conduits system. EDISON will use its best efforts to provide as much advance notice as possible when EDISON is abandoning a pole or its conduits to which JOINT USER has attachments.

ARTICLE II - ADMINISTRATIVE PRACTICES

A. Specifications, drawings, forms and any practice or procedure essential to the detailed administration and operation of this AGREEMENT are contained in the Administrative Practices - Attachment 1, which is incorporated in and made part of this AGREEMENT. EDISON shall have the right, acting reasonably and with written notice to JOINT USER, to unilaterally amend or change the Administrative Practices. Such amendments and/or changes shall become a part of this AGREEMENT to the same extent a though originally part of the Administrative Practices. All Administrative Practices shall be applied in a non-discriminatory manner among JOINT USER and other entities on EDISON poles and in EDISON conduit system or trenches.

ARTICLE III - SPECIFICATIONS

A. The attachment or installation of JOINT USER's equipment shall conform with the then current edition of the National Electrical Safety Code, including modifications by authority of the State of [redacted] or any other authority having jurisdiction, any applicable work practices including, but not limited to, the Department of Labor Occupational Safety and Health Act (OSHA), [redacted] Occupational Safety and Health Act ([redacted]OSHA), [redacted] Department of Transportation Regulations (DOT), and the requirements contained in the Administrative Practices - Attachment 1. Included within JOINT USER'S duty to conform with the National Electric Safety Code, JOINT USER is required to inspect its system and confirm to EDISON, in writing, that its installations comply with the National Electric Safety Code, subject to EDISON's verification. JOINT USER agrees to provide this confirmation at least every three (3) years and to include in its report the following information: The GLN number and associated digital photographs of each pole JOINT USER is attached to.

B. Where JOINT USER's facilities will be installed in EDISON's conduit system, JOINT USER may use any reasonably available innerduct, as determined by EDISON. If there is no inner duct available in the duct selected, JOINT USER will have EDISON install three (3) innerducts in such duct at JOINT USER's expense. If the duct will not support three (3) innerducts, JOINT USER will have EDISON install as many innerducts as feasible. All innerducts installed in EDISON's conduit system shall become the property of EDISON, and EDISON shall be free to use such innerducts for any purposes it deems appropriate. JOINT USER's facilities will be installed by EDISON in one of those innerducts at JOINT USER's expense. As used in this paragraph, innerduct shall mean high-density, polyethylene ducts, of the smooth type, 1 inch to 1¼-inch in diameter, installed within EDISON's conduit system.

C. JOINT USER is to provide a RF Certification Form for pole mounted repeater system for each antenna consistent with the form attached as Exhibit 42.

The RF Certification form for pole mounted repeater system certifies that the installation complies with FCC Rule Section 1.1307, et seq., and related OET Bulletin No. 65 governing radio-frequency ("RF") emissions. In particular, based on an engineering analysis of the pole mounted repeater, RF emissions are within the Maximum Permissible Exposure ("MPE") limits for an uncontrolled environment at more than six inches from the transmitting

antenna. Any changes of the pole mount repeater installation that would affect the MPE calculations must be agreed to by EDISON and JOINT USER.

ARTICLE IV
ESTABLISHING AND IDENTIFYING POLE AND CONDUIT USE

A. No new attachment, placement, or installation of JOINT USER's equipment shall be made by JOINT USER on any pole, trenches, or conduit system of EDISON before written permission (in the form of Exhibits 2 or 4 of the Administrative Practices - Attachment 1) is received from EDISON, which permission shall not be unreasonably withheld, delayed or constrained. Such permission shall be denied only for reasons of lack of excess capacity, safety, reliability, or generally applicable engineering reasons including, but not limited to, electrical system, security, and operability, or to facilitate service to electric customers. The procedures and forms to be used in making application and receiving permission for attachment, placements, or installations shall be as provided for in the Administrative Practices - Attachment 1. JOINT USER shall attach or install its Equipment on poles or in conduit system of EDISON at its own expense. Only EDISON or an EDISON contractor will be allowed to install JOINT USER's repeater equipment and antennas on poles. All maintenance and repair work on associated equipment will be performed by EDISON or an EDISON contractor. JOINT USER will pay EDISON for the repeater equipment and antenna installation, maintenance and repair work on associated equipment a rate mutually agreed to and set forth in a separate Installation and Maintenance Agreement where EDISON shall undertake and JOINT USER shall retain EDISON to perform such work under EDISON's "Work as a Contractor" program.

B. All Make Ready Work shall conform to all requirements as outlined in Article III, Paragraph A. JOINT USER shall be responsible for all costs associated with the Make Ready Work on EDISON's poles or conduit system as described on Attachment 2. Only EDISON or an approved EDISON contractor will be permitted to perform such work. As used in this paragraph, Make Ready Work shall mean any alterations or modifications to EDISON's poles or conduit system necessary to permit JOINT USER to attach or install its Equipment.

C. JOINT USER shall arrange for EDISON field representative(s) to be present any time JOINT USER is performing work, including, without limitation,

maintenance work in EDISON's conduit system. Depending on the scope of the work, EDISON, acting reasonably and in its sole discretion, may assign more than one field representative to monitor JOINT USER's work. JOINT USER shall not perform any work in conduit system without the field representative(s) being at the work location. The field representative(s) shall have the authority to terminate any work being performed by JOINT USER should the field representative(s) reasonably believe JOINT USER, in performing such work, is not complying with the terms of this AGREEMENT. JOINT USER shall reimburse charges for EDISON to be present.

D. The costs for any rearrangement, relocation, or removal of JOINT USER's cables or equipment shall be allocated to EDISON or other entities on the following basis:

1. If the rearrangement, relocation or removal of JOINT USER's cable or equipment is the result of an additional attachment or the modification of an existing attachment sought by an entity other than EDISON or JOINT USER, the entity requesting the additional or modified attachment shall bear the entire cost of rearrangement, relocation and removal of JOINT USER's cables or equipment.

2. If the rearrangement, relocation or removal of JOINT USER's cables is the result of an additional non-internal communication (excluding electric) attachment or the modification of an existing non internal communication (excluding electric) attachment sought by EDISON, EDISON shall bear the entire cost of rearrangement, relocation and removal of the JOINT USER's cables.

3. If EDISON modifies or alters a pole, or conduit system, to which JOINT USER has made an attachment, EDISON shall provide written notification on a monthly basis of the work performed. JOINT USER will be invoiced for "Work as a Contractor" as noted in Attachment 4, as amended.

4. If the rearrangement, addition or modification is requested by JOINT USER, JOINT USER shall bear the entire cost of such rearrangement, addition or modification. JOINT USER is free to make agreements with other entities to receive reimbursement of proportionate costs where the

other entities are benefiting from the rearrangement, addition or modification.

E. At each pole or manhole location, and at JOINT USER's expense, cables shall be identified with a durable, legible weatherproof cable identification tag showing JOINT USER's name and a twenty-four (24) hour toll-free telephone number. A sample of such cable identification must be submitted to EDISON for approval prior to installation, and must be color-coded pursuant to the requirements set forth in Attachment 1, Exhibit 7. All power supplies must be identified with a label identifying JOINT USER's company name and 24-hour toll-free telephone number.

ARTICLE V - MAINTENANCE OF FACILITIES

A. EDISON may, in its sole judgment, replace or relocate any poles or conduit system used by JOINT USER hereunder to maintain the reliability, operability, and security of its electric and internal communication system or to facilitate service to its electric customers. Notwithstanding Article IV, Paragraph D above, EDISON shall be responsible for all costs associated with such replacement or relocation, except JOINT USER shall be responsible for the reasonable cost of transferring, relocating or moving its cable.

B. Each party shall be responsible for maintaining its own cables. EDISON shall continue to perform the type of tree trimming it typically would perform had JOINT USER cable not been present on its poles. Any additional tree trimming required for the attachment, installation or maintenance of JOINT USER's cable shall be performed by JOINT USER.

C. In the event JOINT USER experiences an emergency with its cable in the conduit system, it is necessary that an EDISON representative be at the site before JOINT USER, or its contractor, enters an EDISON manhole. EDISON will respond to an emergency as arranged between JOINT USER and EDISON. JOINT USER shall pay EDISON's costs for such work.

D. In the event of an emergency on its poles or its conduit system EDISON, may take whatever action it deems reasonably necessary and appropriate under the circumstances, including, but without limitation, the removal of JOINT USER's cable from its poles or conduit system. JOINT USER shall pay EDISON's costs for such work. EDISON will make reasonable efforts to notify JOINT USER prior to taking such action. The failure to provide such notice shall not subject EDISON to liability for any loss of or damage to JOINT USER.

E. EDISON reserves to itself, its successors and assigns, the right to maintain its poles and conduit system and to operate its facilities thereon in such manner as will best enable it to fulfill its own service requirements and responsibilities.

F. In joint use trenches, with energized electrical facilities, JOINT USER shall hand expose (no power tools) its facilities to work and/or repair JOINT USER facilities. Further, when any work is necessary to install, maintain or repair its underground facilities, JOINT USER shall follow the provision as detailed in [redacted] 22.190(1), et seq. All personnel involved in hand exposing facilities shall be trained in possible dangers and have knowledge of the approved methods and safety precautions. Normally, EDISON will not deenergize its facilities during the JOINT USER hand exposing work. However, digging in any manner shall not be performed around faulted electric power cables until EDISON has verified that it is deenergized and tested. It shall be incumbent upon JOINT USER to determine through inquiry and field observation any potential for damage to power facilities before digging and to avoid such damage.

ARTICLE VI
TERMINATION OF POLE, CONDUIT, OR TRENCH USE

A. JOINT USER may, at any time, remove its facilities from any EDISON pole, conduit system, or trench, and shall immediately give EDISON notice of such removal (in the form of the Administrative Practices - Attachment 1, Exhibits 3 or 5).

B. Upon notice from EDISON to JOINT USER that the use of any pole, conduit or trench is forbidden by governmental authorities or property owners, permission for attachments shall immediately be deemed terminated and JOINT USER must begin to vacate within seventy-two (72) hours of such notice. JOINT USER shall remove all of its Equipment from the pole, conduit or trench involved. If JOINT USER does not take the necessary action within seventy-two (72) hours, EDISON may remove the cables and hold JOINT USER liable for all costs and expense involved.

C. If JOINT USER shall fail to comply with any of the terms or provisions of this AGREEMENT, EDISON may, at its option, terminate this AGREEMENT or

terminate permission for use of any pole or conduit system in accordance with Article IX, Paragraph A.

ARTICLE VII - CHARGES

A. [redacted]

B. JOINT USER will provide written notice, at a minimum annually or whenever right-of-way agreements are approved, to EDISON of the dates on which JOINT USER begins to offer telecommunication services over each of its systems and the type of service offered. JOINT USER will provide EDISON with copies of its right-of-way agreements for each community where it provides services to its customers within EDISON's service territory in [redacted]

ARTICLE VIII - INSPECTIONS

A. EDISON reserves the right to inspect each new installation of JOINT USER and to make periodic inspections of any or all installations of JOINT USER. Attachment 3 explains the process and Charges for Conducting Periodic Inspections and Construction Violation Audits. Such inspection costs or periodic inspection or attachment audits are to be paid by JOINT USER. Failure to make such inspections shall not operate to relieve JOINT USER of any responsibility or obligation or liability assumed under this AGREEMENT. The term "inspection" used in this AGREEMENT includes, but is not limited to, a Field Visual Inspection, an Attachment Audit, a Safety Audit, and a Post-Inspection Audit.

ARTICLE IX - DEFAULT, WAIVER, AND REVIEW

A. If JOINT USER shall fail to comply with any of the terms or provisions of this AGREEMENT, or default in any of its obligations under this AGREEMENT and shall fail within thirty (30) days after written notice from EDISON to correct such default or non-compliance, or, in cases where complete correction within thirty (30) days is impracticable, shall fail within such thirty (30) days to commence such correction and thereafter continue in good faith to pursue a

plan reasonably designed to effect such correction, EDISON, may, at its option,

~~EDISON, may, at its option,~~ terminate this AGREEMENT or terminate permission for use of any pole or conduit system involved in the default or non-compliance. Such termination in no way exempts payment for any pole or conduit system rental prior to the actual removal of all attachments.

B. Failure of EDISON to enforce or insist upon compliance with any of the terms or provisions of this AGREEMENT shall not constitute a general waiver or relinquishment of any such terms or provisions.

ARTICLE X - PROTECTION AND INDEMNITY

A. EDISON reserves to itself, its successors and assigns, the right to maintain its poles, conduit system and trenches and to operate its cables thereon in such manner as will best enable it to fulfill its own service requirements. EDISON shall exercise reasonable precaution to prevent damage to, or interference with the operation of the equipment of JOINT USER, EDISON shall not be liable for, and JOINT USER waives all claims for, any such damage or interference which may arise out of the use of EDISON's poles or conduit system or trenches hereunder or operation of its cables thereon.

B. JOINT USER shall exercise precautions to avoid damage to cables of EDISON or of other authorized users of said poles, conduit system, or trenches, and JOINT USER hereby assumes all responsibility for any and all damage to cables of EDISON, or other authorized users arising out of, or caused by the erection, maintenance, installation, presence, use or removal of JOINT USER's cables or equipment. JOINT USER shall make an immediate report to the particular owner of the cables affected by the occurrence of any damage and hereby agrees to reimburse such owner for the expenses incurred in making the necessary repairs and replacement.

C. To the extent provided by law, JOINT USER covenants and agrees that it shall indemnify and hold EDISON, and all of its officers, agents, employees, and affiliates, harmless from any claim, loss, damage, cost, charge, expense, lien, settlement or judgment, including interest thereon, whether to any person or property or both, arising directly or indirectly out of, or in connection with JOINT USER's, or any of its contractors' or subcontractors', use of EDISON facilities, including poles, conduit systems, and trenches to which EDISON, or

any of its officers, agents, employees and affiliates may be subject, or put by reason of any act, action, neglect or omission on the part of EDISON or JOINT USER, or any of its contractors or subcontractors, or any of their respective officers, agents, employees, and affiliates; said obligation to indemnify and hold EDISON harmless includes, but is not limited to, injuries which occur to employees of JOINT USER, or its contractors or subcontractors, or injuries to members of the public, or injuries to employees of EDISON, or injuries to employees of attaching parties. If this AGREEMENT is one subject to the provisions of [redacted], as amended, then JOINT USER will not be liable under this section for damages arising out of injury or damage to persons or property directly caused or resulting from the sole negligence of EDISON, or any of its officers, agents, employees, or affiliates.

D. In the event any suit or other proceedings, for any claim, loss, damage, cost, charge, or expense covered by JOINT USER's foregoing indemnity should be brought against EDISON, or any of its officers, agents, employees, or affiliates, JOINT USER hereby covenants and agrees to assume the defense thereof and defend the same at JOINT USER's own expense and to pay any and all costs, charges, attorney's fees, and other expenses, and any and all judgments that may be incurred by, or obtained against EDISON, or any of its officers, agents, employees, or affiliates in such suits or other proceedings. EDISON reserves the right to approve of counsel selected by JOINT USER to represent the interests of EDISON in any such suit or other proceeding. In the event of any judgment or other lien being placed upon the property of EDISON in such suits or other proceedings, JOINT USER shall at once cause the same to be dissolved and discharged by giving bond or otherwise.

E. Notwithstanding JOINT USER'S obligation to indemnify and hold EDISON and its officers, agents, employees, and affiliates harmless, as provided in Article X, paragraph C above, or JOINT USER's obligation to defend EDISON and its officers, agents, employees, and affiliates as provided in Article X, paragraph D above, JOINT USER shall not be obligated to indemnify, hold harmless or defend EDISON or its officers, agents, employees, or affiliates, in the event of any claim, loss, damage, cost, charge, expense, lien, settlement or judgment, including interest thereon, as well as any costs of defense, including attorneys' fees, court costs, or expenses, arising from the installations performed by EDISON for JOINT USER.

ARTICLE XI – INSURANCE

A. JOINT USER shall, at their own expense, procure, maintain and keep in effect during the term of this AGREEMENT, and any extensions or renewals thereof, a policy of Commercial General Liability Insurance, including contractual liability coverage for the liability assumed herein, in the amount not less than $10,000,000 in the aggregate annually consisting of primary and excess insurance with respect to each project or contract undertaken with EDISON. Each Insurance Policy is to include EDISON as an additional insured.

B. JOINT USER shall maintain at its own expense Workers' Compensation Coverage as required by applicable statute. Such Workers' Compensation Coverage shall also include Employer's Liability coverage (Coverage B) up to a limit of not less than $1,000,000 for each accident, $1,000,000 for each employee from disease, and $1,000,000 in the aggregate for each employee from disease.

C. JOINT USER shall maintain at its expense Automobile Liability Coverage up to a limit of not less than $1,000,000 combined single limit with respect to bodily injury and property damage arising from the ownership, operation or use of an automobile.

D. In the event JOINT USER expands the Project to a geographic area beyond the initially designated municipality, the amount of insurance coverage required under this AGREEMENT will be reviewed and the amount of coverage may be required to be increased as determined by EDISON. The amount of coverage required shall be comparable to the overall requirements by EDISON of similar attaching parties at the time of the imposition of such revised requirements.

E. EDISON and JOINT USER shall cause each insurance policy obtained by them to provide that their respective carrier waives all right of recovery by way of subrogation against the other party in connection with any damage covered by any policy.

F. JOINT USER shall at the time of the acceptance of this AGREEMENT submit to EDISON's Joint Use Facilitator or EDISON's legal counsel, copies of all insurance policies which constitute coverage which satisfies the requirements of this AGREEMENT or, at EDISON's sole option, Certificates of Insurance

describing with specificity and evidencing such insurance coverage and endorsement of EDISON as an additional insured as provided for herein and evidence of renewals thereof. Such certificates shall state that no cancellation can be effected without thirty (30) days prior written notice to EDISON. Certificates evidencing renewals of these coverages shall be delivered to EDISON no later than thirty (30) days prior to the effective date of such renewal. EDISON may secure additional copies of such insurance policies once every three (3) years upon written request. Notwithstanding the foregoing, EDISON shall have the right to secure copies of substitute insurance policies each time JOINT USER changes carriers. EDISON and its legal counsel agree that they will not disclose the amount, contents, or provisions or any other information concerning insurance polices issued to JOINT USER to anyone other than necessary interested representatives of EDISON for the purpose of satisfying EDISON's insurance requirements in its proposed contract with JOINT USER. The policies of insurance to be procured are to be maintained in satisfaction of these requirements, and EDISON's acceptance of any Certificate of Insurance, policy language, or endorsement shall not constitute a waiver of these requirements.

G. It is expressly understood that the obtaining of the insurance as is herein provided shall in no way limit or release JOINT USER's liability arising under any other provision of this AGREEMENT.

H. The insurance provided by JOINT USER and its contractors and subcontractors shall be primary to, and not contributing with, any applicable insurance or self insurance maintained by EDISON.

I. It is understood that the requirements set forth in this article are subject to revision by EDISON every three years after the execution of this AGREEMENT, with effect from the anniversary of such execution. Such revisions, however, will not require insurance coverage in excess of $30,000,000 in the aggregate annually with respect to each project or contract undertaken with EDISON.

J. EDISON does not in any way represent that the insurance specified herein, whether with respect to scope or coverage or limits, is adequate or sufficient to protect the interests of JOINT USER.

K. JOINT USER shall not do any act, or suffer or permit any act to be done, whereby any insurance required by this AGREEMENT would or might be suspended or impaired.

ARTICLE XII - RIGHTS

A. Nothing herein contained shall be construed as affecting the rights or privileges previously conferred by EDISON, by contract or otherwise, to others not parties to this AGREEMENT, to use any pole, conduit system, or trenches covered by this AGREEMENT and EDISON shall have the right to continue and extend such rights or privileges. The privileges herein granted shall at all times be subject to such prior contracts and arrangements.

B. EDISON waives any lien rights it may have concerning the Equipment which are deemed JOINT USER'S personal property and not fixtures, and Lessee has the right to remove the same at any time without EDISON's consent.

C. EDISON acknowledges that JOINT USER has entered into a financing arrangement including promissory notes and financial and security agreements for the financing of the Equipment (the "Collateral") with a third party financing entity (and may in the future enter into additional financing arrangements with other financing entities). In connection therewith, EDISON: (i) consents to the installation of the Collateral; (ii) disclaims any interest in the Collateral, as fixtures or otherwise; and (iii) agrees that the Collateral shall be exempt from execution, foreclosure, sale, levy, attachment, or distress for any rent due or to become due and that such Collateral may be removed at any time without recourse to legal proceedings.

D. JOINT USER shall not assign, sublease or otherwise transfer, in whole or in part, the privileges granted herein without the prior consent in writing of EDISON, provided, however, that JOINT USER may assign its interest to its parent company, any subsidiary or affiliate of it or its parent company or to any successor-in-interest or entity acquiring fifty-one percent (51%) or more of its stock or assets subject to any financing entity's interest, if any, in this AGREEMENT as set forth in Article XII, paragraphs B and C above, as long as JOINT USER provides prior written notification of such assignment, and as long as the assignee agrees to assume the debt of JOINT USER and agree with the terms and conditions of this AGREEMENT.

JOINT USER may further assign, mortgage, pledge, hypothecate, or otherwise transfer without consent its interest in this AGREEMENT to any

financing entity, or agent on behalf of any financing entity to whom lessee: (i) has obligations for borrowed money or in respect of guarantees thereof; (ii) has obligations evidenced by bonds, debentures, notes or similar instruments; or (iii) has obligations under or with respect to letters of credit, bankers acceptances, and similar facilities or in respect of guarantees thereof.

E. JOINT USER shall not permit any other entity's cables, facilities or equipment on EDISON's poles, conduit system, trenches, or permit use of JOINT USER's cables, without EDISON's consent in writing.

F. Subject to the provisions of Paragraph B hereof, this AGREEMENT shall extend to and bind the successors and assigns of the parties hereto.

ARTICLE XIII - PAYMENT OF BILLS

A. Bills for pole reconstruction, alterations, inspections, expenses, rental and other charges under this AGREEMENT shall be paid within thirty (30) days after presentation. Any amounts that are billed and remain unpaid five (5) business days following Joint User's receipt of notice of delinquency will be subject to a [redacted] per month late fee for each month the amount of the invoice remains unpaid. Nonpayment of bills after thirty (30) days following such notice shall constitute default of this AGREEMENT.

B. [redacted]

ARTICLE XIV - TERMS OF AGREEMENT

A. This AGREEMENT shall become effective on the day and year first above written; and if not terminated in accordance with the provisions of this agreement, shall continue in effect for a term of Ten (10) years, which may be renewed on an annual basis, upon mutual consent. Either party may terminate this Agreement upon ninety (90) day written notification.

B. Upon termination of the AGREEMENT in accordance with any of its terms, JOINT USER, after receiving notice of intent to terminate, shall remove its cables and equipment from all poles, conduit system or trenches of EDISON. If not so removed, EDISON shall have the right to remove them at the cost and expense of JOINT USER, and without any liability therefore and JOINT USER agrees to pay the reasonable costs thereof within ten days after it has received an invoice from EDISON.

ARTICLE XV - FORCE MAJEURE

A. Neither party will be held liable for any delay or failure or performance of any provision of this AGREEMENT, other than any delay or failure to pay any sum of money due hereunder, and no party shall be in default under this AGREEMENT, if such delay or failure results from a Force Majeure event. A Force Majeure event means an event caused by strike or other labor problem; act of a third party; embargo; epidemic; accident, act of God; fire, flood, adverse weather conditions, or other major environmental disturbance; material shortage or unavailability; lack of transportation; act of military authority; government ordinance, law, rule, regulation, or restrictions; inability to obtain necessary license, permit, or right; war or civil disorder, or other event of similar or dissimilar nature, provided that such causes are beyond the reasonable control and without the willful act, fault, failure, or negligence of the party whose performance is affected by the Force Majeure event continues to make reasonable efforts to perform.

ARTICLE XVI
RECEIVERSHIP, FORECLOSURE, OR ACT OF BANKRUPTCY

A. This AGREEMENT herein granted shall, at the option of EDISON, cease and terminate one hundred twenty (120) days after the appointment of a receiver or receivers or trustee or trustees to take over and conduct the business of JOINT USER whether in a receivership, reorganization, bankruptcy, or other action proceeding unless such receivership or trusteeship shall have been vacated prior to the expiration of said one hundred twenty (120) days, or unless:

1. Such receivers or trustees shall have, within one hundred twenty (120) days after their election or appointment, fully complied with all the terms and provisions of this AGREEMENT granted pursuant hereto, and the receivers or trustees within said one hundred twenty (120) days shall have remedied all defaults under this AGREEMENT; and

2. Such receivers or trustees shall within said one hundred twenty (120) days, execute an agreement duly approved by EDISON having jurisdiction in the premises, whereby such receivers or trustees assume and agree to be bound by each and every term, provision and limitation of the franchise herein granted.

B. In the case of a foreclosure or other judicial sale of the plant, property and equipment of JOINT USER, or any part thereof, including or excluding this AGREEMENT, EDISON may serve notice of termination upon JOINT USER and the successful bidder at such sale, in which event this AGREEMENT herein granted and all rights and privileges of this AGREEMENT hereunder shall cease and terminate thirty (30) days after service of such notice, unless:

1. EDISON shall have approved the transfer of this AGREEMENT, as, and in the manner provided in this AGREEMENT; and

2. Unless such successful bidder shall have covenanted and agreed with EDISON to assume and be bound by all the terms and conditions to this AGREEMENT.

XVII - ENTIRE AGREEMENT

A. This AGREEMENT, along with any exhibits or attachments thereto, constitutes the entire AGREEMENT between the parties and may not be modified except in writing.

XVIII - TITLES

A. The article headings in this AGREEMENT are for convenience only and shall not be considered a part of or used in the interpretation of this AGREEMENT.

XIX - SEVERABILITY

A. Should any provision(s) of this AGREEMENT be declared or be determined by any court to be illegal or invalid, the validity of the remaining parts, terms or provisions shall not be affected thereby, and the illegal or invalid provision(s) shall be deemed not to be part of this AGREEMENT.

XX - GOVERNING LAW

A. This AGREEMENT shall be governed by and construed in accordance with the laws of the [redacted]

XXI - CONFIDENTIALITY AND NON-DISCLOSURE

The terms and conditions of this AGREEMENT, including but not limited to all terms and conditions stated in the Attachments and Exhibits forming part of this AGREEMENT, are considered confidential in nature and shall not be disclosed to any third party except professional advisors, consultants and financing sources who agree to be bound by confidentiality. JOINT USER and EDISON acknowledge each others' desire to retain the confidential nature of the terms and conditions of this AGREEMENT, and JOINT USER and EDISON and their employees, attorneys and representatives agree not to reproduce or disseminate any of the confidential terms

and conditions of this AGREEMENT without the prior consent of the non-disclosing party.

JOINT USER and EDISON and their employees, attorneys and representatives agree that it will treat the terms and conditions in this AGREEMENT, the Attachments and Exhibits, as each treats like information of its own, but in all events, each shall exercise at least a reasonable degree of care for preventing unauthorized disclosures of these confidential terms and conditions. Except as provided in this article, JOINT USER and EDISON will not make any copies of the Confidential Information received from the disclosing party that is in documented form, except for use by employees or consultants with a need to know. JOINT USER and EDISON further agree not to distribute, disclose, or disseminate the Confidential Information to anyone, except to its employees or consultants who have a need to know. JOINT USER and EDISON agree that any disclosure of Confidential Information to their employees or consultants who have a need to know shall be limited to only so much of such Confidential Information as is necessary for such employee or consultant to perform his/her function. JOINT USER and EDISON shall cause their employees, attorneys, representatives and consultants to comply with this confidentiality and non-disclosure provision, and shall obtain such employee's, attorneys', representatives' and consultant's agreement to be bound by the terms of this confidentiality and non-disclosure provision.

(Signature Page follows this page.)

POLE, CONDUIT AND TRENCH USE AGREEMENT

BETWEEN

[redacted]

AND

[redacted]

[redacted]

CLEARLINX NETWORK CORPORATION

By: _____

Its: CHIEF EXECUTIVE OFFICER

Dated: 8/12/03

Attachment 1

ADMINISTRATIVE PRACTICES
CLEARLINX NETWORK CORPORATION

Table of Contents

Section A Attaching or Installing Cable

JOINT USER must receive written approval from EDISON prior to attaching, installing, replacing, reconfiguring or overlashing a cable (including power supply) on an EDISON pole or conduit system. JOINT USER initiates approval by preparing the following:

- Attachment Permit with all required information (Exhibit 2 - Overhead, and Exhibit 4 - Underground);
- Outside Sales Product Map (obtained for a fee from EDISON's Inter Graphic Services) with the pole or conduit system to be attached to marked in red; and
- Payment of the pole or conduit system Application Fee (Attachment 2 - Charges/Terms of Payment).

JOINT USER shall either send or bring in three copies of the completed Attachment Permit and marked up Outside Sales Product Map, along with the Application Fee, to [redacted] EDISON determines the cost of Make Ready Work. JOINT USER pays the cost of Make Ready Work and related charges as set forth in Attachment 2 prior to EDISON scheduling Make Ready Work. EDISON or an approved contractor completes Make Ready Work prior to allowing JOINT USER to work on an EDISON pole or conduit system.

EDISON is responsible for installing JOINT USER cable and innerduct in the EDISON conduit system. JOINT USER pays the cost for EDISON to install JOINT USER cable and innerduct in the EDISON conduit system prior to EDISON scheduling the work. JOINT USER is responsible for splicing and testing JOINT USER cable in the EDISON conduit system. JOINT USER pays the cost of EDISON to be present whenever JOINT USER is working in the EDISON conduit system prior to EDISON scheduling work, unless there is an emergency (defined as JOINT USER is unable to schedule work in advance). EDISON costs will include overheads and premiums.

An approved Attachment Permit and Outside Sales Product Map is returned to JOINT USER for filing and proof of EDISON approval. JOINT USER is obligated to produce a copy of each Permit for every attachment at EDISON's request. EDISON has the right to immediately terminate JOINT USER work on an EDISON pole or conduit system if EDISON approval has not been received. JOINT USER is not required to have an Attachment Permit and Outside Sales Product Map when performing maintenance work on an EDISON pole or conduit system (defined as repairing a piece of damaged cable, connecting a service cable or testing a cable).

A maximum of one Outside Sales Product Map is allowed per Attachment Permit. A maximum of one power supply is allowed per Attachment Permit. Early and frequent communication with EDISON by JOINT USER is a must to ensure Attachment Permits are approved on schedule. EDISON's Joint Use Department will use the approved Attachment Permits to prepare and update the records used for Pole and Conduit Rental billing.

EDISON's Joint Use Department will use the approved Attachment Permits to prepare and update the records used for the billing of power supplies.

Once JOINT USER has been given authorization to attach to EDISON's poles, JOINT USER shall provide written notification to EDISON on a monthly basis of the poles it has attached to by GLN number with associated digital photographs. JOINT USER must attach to the poles within six months of notification from EDISON that Make Ready Work is completed. Permits are valid for six months after EDISON's completion of the Make Ready Work. If JOINT USER's pole attachments are not completed within six months, a new Application for Attachment Permits must be submitted with a new Application Fee.

JOINT USER's use of a J-hook is not an acceptable permanent construction method (defined as left on pole overnight) to attach a cable to an EDISON pole. The use of a 3-bolt clamp, with a longer bolt during rebuilds, is the preferred construction method. The longer bolt must not protrude from the pole any more than 2" from the pole when the rebuild is completed. EDISON's Joint Use Department must approve a non 3-bolt clamp construction method prior to its use.

Section B Removing Cable

JOINT USER shall give immediate written notification of a cable (including power supply) removal from an EDISON pole or conduit system by preparing a Termination Notice (Exhibit 3 - Overhead, and Exhibit 5 - Underground) and Outside Sales Product Map with the poles or conduit system marked in red, and the appropriate fees. A maximum of one power supply is allowed per Termination Notice. JOINT USER shall either send or bring in three copies of the completed Attachment Permit and marked up Outside Sales Product Map, along with the Application /Fee, to EDISON'S Joint Use Department, [redacted] EDISON will verify that the cable is removed and an approved Termination Notice and Outside Sales Product Map will be returned to JOINT USER for filing. EDISON's Joint Use Department will use the approved Termination Notice to prepare and update the records used for the Pole and Conduit Rental billing. EDISON's Joint Use Department will use the approved Termination Notice to prepare and update the records used for the billing of power supplies.

Section C Identification of Cable

JOINT USER shall identify (See Exhibit 7) at every EDISON pole or manhole location, their cable (including any power supply and all guy wires) with a durable, legible, weatherproof GREEN cable identification tag showing the JOINT USER name and twenty-four-hour (24) hour toll-free telephone number. EDISON must approve the cable identification tag prior to its use.

Attachment 1

Section D - Exhibits

The Exhibits applicable to this AGREEMENT are listed in Exhibit 1 and attached.

Additional Exhibits for the installation of JOINT USER cable may be required. JOINT USER will reimburse EDISON for costs incurred in preparing additional Exhibits.

EXHIBIT 1

LINE CONSTRUCTION STANDARDS **1-4**

4 - JOINT USE

EXHIBIT 1

4 – JOINT USE

Exhibit 2-1

Permit #_____

Service Center _____

Date Rec'd _____

Application/Notification for Attachment Permit (PL 175) (Overhead)

Customer Information

New Construction ☐ Rebuild or Overlash ☐

Att. Party/Joint User _____

Address _____ City/State/Zip _____

Contact Person: _____ / Company _____ Phone _____

Application Fee $_____ Check #_____ Check Date_____

Date Permit Submitted_____

Cable/Equipment Information

Cable Information: Strand Size_____ Cable O.D._____ Cable Weight_____ No. Poles _____

Tension at 60 F Ambient Temp_____ Tension under NESC Heavy Loaded Conditions _____

Total # of Cables _____ City/Twp. _____ Map-Sect. _____

Make_____ Model Type_____ Input Watts_____

Address/City_____ X/Y Coordinate _____

Transformer Number (If Underground)_____ Date Energized _____

The following items must be included to this Attachment request:

1. [redacted] outside sales product maps (3) with requested pole attachments and GLN numbers circled in red and numbered sequentially.
2. Payment of application fee as described in Rate Schedule of our Agreement.

The granting of this permit does not in any way grant possessory interest to use public or private property. The Grantee is solely responsible for obtaining all necessary rights of ways, easements, permits, consents or approvals, either public or private.

Permission is hereby granted to make a single attachment on _____ number o[redacted] poles as specified on Exhibit 2-2 by XY coordinate. The installation of all pole attachments must conform to all[redacted] construction standards and NESC rules and regulations. This permit must be on site during construction. Grantee's failure to produce a permit when requested from a[redacted] employee or it's representative will result in an immediate job shut down until an approved permit can be produced. Grantee must send written notification to[redacted] that pole attachments have been made within ten days of completion of construction. Grantee will be required to correct any violations of construction standards within thirty days. Grantee is required to maintain the approved permit on file and must produce upon request by[redacted]

Permit to attach issued to Grantee: By_____ (Signature)

_____ (Print Name)

Date _____

Post Inspection Completed By: _____ (Signature)

_____ (Print Name)

Date: _____

Permit Issued: _____ (Date) _____

[redacted]

Exhibit 2-2

Permit #________________

Service Center ________________

Date Rec'd ________________

Pole Attachment Information (fill out information for every pole location circled in red)

X-Coordinate	Y-Coordinate	Ht. Of Attach	X-Coordinate	Y-Coordinate	Ht. Of Attach	X-Coordinate	Y-Coordinate	Ht. Of Attach

[redacted]

EXHIBIT 3

Termination No. _____

Region _____

Service Center _____

Date _____

Termination Notice [redacted]

Termination of Foreign Attachments on [redacted] Poles

All attachments of _____

have been removed from certain poles, as indicated herein or in sketch attached, and joint use of these poles is hereby terminated.

Effective Date		Sign[redacted]	
No. of Poles	No. of Power Supplies	Exact Pole Location	
	Pole Loc. No.	Municipality	
Checked By	Date	Map Section No.	[redacted] Dept. Order No.

Poles Circled in Red

Approved By _____

Title _____

Date _____

[redacted]

EXHIBIT 4

Attachment Permit- Underground

Permit No. _____

Region _____

Ser. Ctr. _____

Date _____

Permit for Attachment In [redacted] Manholes & Conduit

The granting of this permit does not grant possessory interest to use public or private property. The Grantee is solely responsible for obtaining all necessary rights of way, easements, permits, consents, or approvals, either public or private, which may be necessary prior to making the pole attachments.

Permission is hereby granted to _____ to make attachments in certain manhole(s) & conduit(s), as indicated on attached conduit map(s), with the understanding that all such attachment(s) shall be subject to the provisions of our Agreement with you.

Contact Person's Signature	Telephone No.	Date

Underground

Description of cable to be installed: a.) type of cable; b.) number of strands; c.) diameter of cable; d.) pulling tension; and e.) weight per foot. Provide specifications, if requested.

Manholes #'s	City/Township	Map Section No.	Total Footage	No. Splices	No. Knockouts	Application Fee (Total for Project)

The following items must be included with this Attachment Permit request:

1. [redacted] conduit maps (3) with requested attachment permit and Manhole numbers circled in red.
2. Payment of application fee as described in Rate Schedule.

Power Supply Section (One power supply per Attachment Permit)

Address or Exact Pole Location

Make	Model No.			Pole or Pad Location No.

Inspection Section

Pre-install Field Verified by	Date

Result of Verification

Post-install Field Verified by	Date

Results of Verification

Signature [redacted]	Effective Date

☐ **Check box if any comments or remarks are on the back**

[redacted]

EXHIBIT 5

JOINT USE TERMINATION
UNDERGROUND LINES
[redacted]

[redacted]

_____
(Date)

NOTICE OF TERMINATION **TERMINATION NUMBER** _____

Notification is hereby given to _____

That joint use of certain underground conduit or manholes, as indicated on attached sketch, is terminated.

TOTAL DUCT LENGTH: _____ FEET TOTAL NUMBER OF MANHOLES: _____

MAP SECTION(S) NUMBER(S): _____ _____

_____ BY: _____

REFERENCE _____ _____

ACKNOWLEDGEMENT

EFFECTIVE DATE: _____ _____

BY: _____

_____

[redacted]

Joint Use Record

Joint Buried Facilities - Main Trench

EXHIBIT 6

Electric ☐ Communication ☐ Gas ☐ Other ☐

Contract Awarded By:

Contractor:

Starting Date:

Completion Date:

Payment No.:

Unit No.	Item	Surface	Joint Trench Footage	Separate				For Office Use Only						(R) (S) (T)	Remarks
				Electric	Comm.	Gas	Other	Cost Per Ft.	Electric	Comm.	Gas	Other	Total		

Job Status (Check One) ☐ (A) Not Completed ☐ (B) Not Final Billing

NOTE: (R) For Random Method Placing
(S) For 2 Stage Backfill Method
(T) Third Stage Backfill

Signed/_____ Co. _____

Signed/ Gas Co. _____

Signed/Comm. Co. _____

Signed/Electric Co. _____

Cost To Be Paid By _____ Co.

Cost To Be Paid By _____ Gas Co.

Cost To Be Paid By _____ Comm. Co.

Cost To Be Paid By _____ Electric Co.

EXHIBIT 7

CABLE IDENTIFICATION FOR JOINT USE AND ATTACHING PARTY CUSTOMERS

To identify cable accurately, it will be necessary that the Attaching Party or Joint User install a approved Cable Identification Tag along with the name and 24-hour toll free phone number on each tag on each cable at each pole that the Attaching Party or Joint Users has been granted permission to attach to.

A color-coding system for cable identification is required. The following criteria must be used to determine the color of the Cable Identification Tag that is applicable to your company.

Green	Telecommunication Providers
Red	Municipalities and Government Agencies
Yellow	Cable Service Providers
Grey & White	Small Businesses
Blue	Schools

If your cable is already installed and tagged incorrectly or not tagged at all, it is necessary to retag your entire system. Also, when there is a need for you to visit a pole for maintenance, emergencies, over lashing, etc., the new tagging policy must be adhered to. In addition, you must supply a sufficient quantity of cable tags for [redacted] use in the event we must move your attachment.

If you entire system or a significant portion of you system is tagged incorrectly or not tagged at all, then a proposed re-tagging schedule must be submitted in writing within thirty (30) days of receipt of this exhibit. All power supplies must be identified with a label identifying Attaching Party or Joint User's company name and 24-hour toll free telephone number.

Please notify all appropriate personnel in your organization and your contractors of this new policy.

4-JOINT USE

GENERAL

The intent of this section is to provide the construction details to be followed by all third party, [redacted], and [redacted] contract crews when making attachments to [redacted] utility poles within the communication zone or elsewhere as shown. To assure worker safety, only qualified electrical workers[1] (as defined in the footnote below) are permitted to install communication equipment (including vertical runs and electrical taps) if the equipment is to be installed above the communication zone on a pole. Installation or upgrading of third party cables and/or equipment in [redacted] manholes is also covered in this section. The details within this section cover the clearances, mounting separation, guying, grounding, bonding, power supply mounting, climbing space, and the hardware to be used when making these attachments, installations, and/or upgrades.

Before any new installation, attachment, or upgrade is made to communication facilities; a Permit and Contract must be obtained from [redacted] defining the scope of the work and to obtain permission to perform the work as proposed.

As part of the permitting process, any modifications to existing facilities or new installations require an engineering evaluation be made to determine the impact of the proposed construction on the existing pole. The engineering study will also determine the size of pole required, the guying requirements, conductor/cable sags, and the associated wire clearances under the worst case conditions as described in the NESC.

[1] Per the 2002 Edition of National Electrical Safety Code; "Qualified is having been trained in and having demonstrated adequate knowledge of installation, construction, or operation of lines and equipment and the hazards involved, including identification of and exposure to electrical supply and communication lines and equipment in or near the workplace.

EXHIBIT 42

ClearLinx RF Certification Form

For pole mounted repeater system

This form certifies that a ClearLinx Certified engineer has evaluated a certain digital transmitter site and has determined that it complies with FCC Rule Section 1.1307 et. Seq. and related OET Bulletin No. 65 governing radio-frequency ("RF") emissions. In particular, based on an engineering evaluation of the pole mount repeater, the RF emissions are within the Maximum Permissible Exposure ("MPE") limits for an uncontrolled environment at more than 6 inches from the transmitting antenna.

The original of this form should be kept with the market station files.

[redacted]

Any changes of the pole mount repeater installation that would affect the MPE calculations must be agreed to by [redacted] and ClearLinx.

Site Number: _____ Site Name: _____
Site Address: _____
City and State: _____

Site Compliance Procedure

The site complies with the FCC's Maximum Permissible Exposure ("MPE") standards, taking into account any nearby significant transmitting sources, based on OET Bulletin 65 calculational methods.

Additional Information for Categorical Exclusion

The sum of all ERPs of all operating frequencies does not exceed 1000 watts ERP.

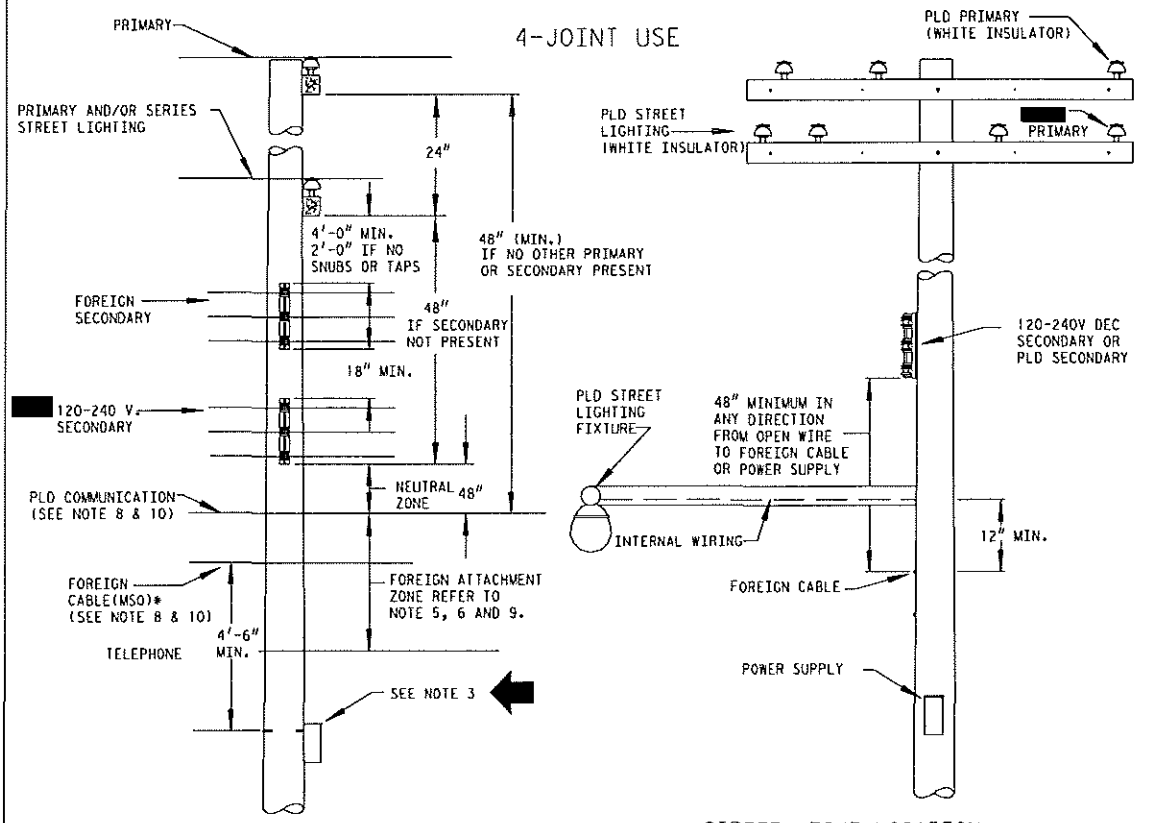
Additional Information for Categorical Exclusion

_____
Signature

_____
Printed Name

_____
Date of Evaluation

EXHIBIT 9



NEUTRAL ZONE
DETAIL 402

STREET LIGHT LOCATION
DETAIL 402A

NOTES:

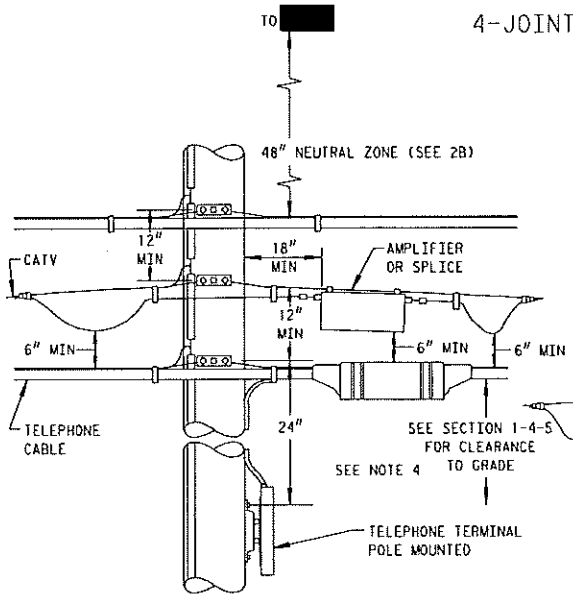
1. A NEUTRAL ZONE IS REQUIRED BETWEEN POWER AND FOREIGN CABLES TO PROVIDE A SAFETY SEPARATION BY SPACE FOR THE LINEMAN WORKING ON EITHER SYSTEM. THIS ZONE SHALL MEASURE 48" OR 72" (SEE NOTE 4) BETWEEN THE POWER CONDUCTORS OR NON-CURRENT CARRYING METAL PARTS OF EQUIPMENT CLOSELY ASSOCIATED THEREWITH, SUCH AS TRANSFORMER CASES, METAL PINS OR RACKS, ETC., TO THE FOREIGN CABLE. (SEE DETAIL 402).
2. SEE 1-4-8 AND 9 FOR LOCATION OF AMPLIFIER UNIT ON POLE, AND 120V SERVICE TO AMPLIFIER.
3. SEPARATIONS BETWEEN FOREIGN ATTACHMENTS ARE USUALLY 24" PREFERRED OR 12" MINIMUM.
4. WHERE THE PREFERRED NEUTRAL ZONE CANNOT BE OBTAINED ON EXISTING POLES, THE FOLLOWING CAN BE SUBSTITUTED TO AVOID POLE REPLACEMENTS: 40" FOR 48", 60" FOR 72". (DETAIL 402)
5. THE [redacted] SYSTEM NEUTRAL AND [redacted] FIBER OPTIC CABLE SUPPLY CABLES MAY HAVE A REDUCED CLEARANCE OF 30 INCHES TO COMMUNICATION CABLES (INCLUDING FOC CABLES) WHEN THE NEUTRAL AND THE CABLE MESSENGERS ARE BONDED TOGETHER. EXCEPTION: SYSTEM NEUTRAL CLEARANCE MAY BE REDUCED TO 12 INCHES IN THE SPAN WHEN BONDED TO THE MESSENGER OF THE COMMUNICATION CABLE AND HAVE A 30 INCH MINIMUM CLEARANCE AT THE POLE.
6. ALL FOREIGN CABLES, MESSENGERS AND GUY WIRES SHALL BE BONDED AS SPECIFIED BY [redacted] AND THE OWNER OF THE OTHER COMMUNICATION FACILITY. REFER TO 1-4-7.
7. AERIAL CROSSING CLEARANCE REQUIRED BETWEEN FOREIGN CABLE AND SECONDARY SUPPLY CONDUCTORS IS 48" MINIMUM WITHIN 6' OF POLE AND 24" MINIMUM BEYOND 6' FROM POLE.
8. REFER TO 1-4-4 FOR MINIMUM VERTICAL CLEARANCES TO BE PROVIDED OUT IN THE SPAN.
9. WHEREVER PRACTICABLE, ALL CABLES SHALL BE INSTALLED ON THE SAME SIDE (NON-CLIMBING) OF THE POLE. THIS IS GENERALLY ON THE SAME SIDE AS THE POWER SECONDARY NEUTRAL.

[redacted]

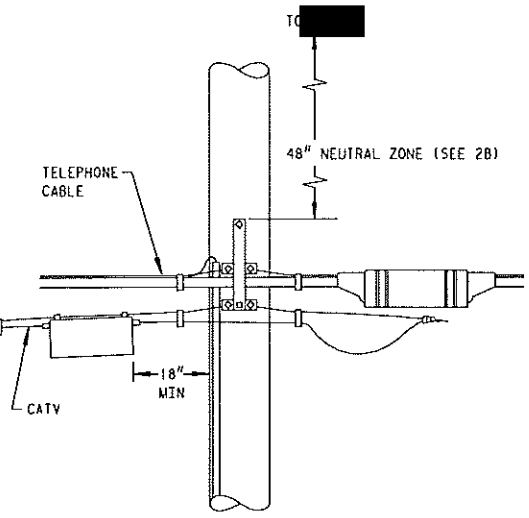
N:\DGN-DHV\42DGN
DEC-06-2002 LLS/RUSSELL

JOINT USE SPECIFICATION
FOR FOREIGN, COMMUNICATION
(NEUTRAL ZONE, STREET LIGHT LOCATION)

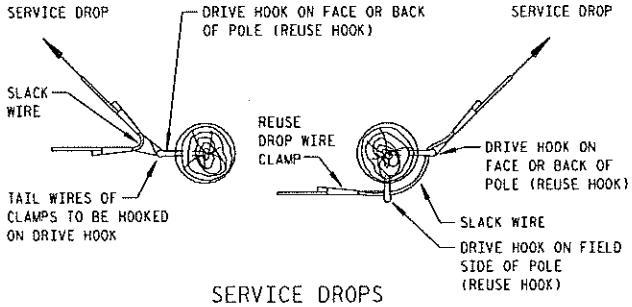
EXHIBIT 10



VERTICAL SEPARATION BETWEEN CABLES
DETAIL 403



VERTICAL SEPARATION BETWEEN CABLES WITH "L" BRACKET
DETAIL 403A



SERVICE DROPS
DETAIL 403B

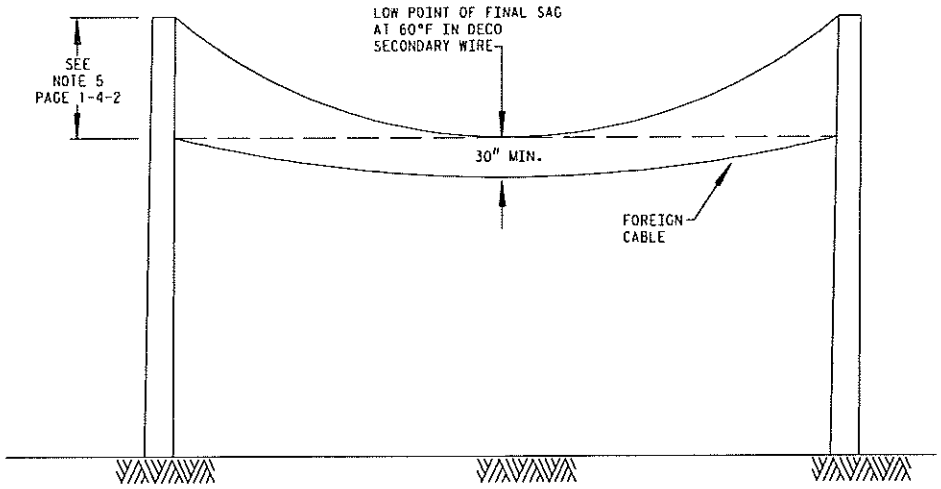
1. CONSTRUCTION LIMITED TO TANGENT, MINOR ANGLE WITH ASSOCIATED GUYS, SERVICE DROPS, TELEPHONE, OR CABLE TV, OR COMMUNICATION CABLES.
2. CLEARANCE BETWEEN FOREIGN CABLES AND [redacted] CONSTRUCTION:
   A. VERTICAL SEPARATION BETWEEN FOREIGN CABLES 12" MIN. BUT MAY BE REDUCED TO 4" MIN. FOR CROSSING.
   B. 48" PREFERRED. 40" MIN. NEUTRAL ZONE MUST BE MAINTAINED FROM DECO ATTACHMENT TO FOREIGN ATTACHMENTS. (REFER TO PAGE 1-4-2-NOTE 5 FOR CLEARANCES).
3. METHODS OF BONDING AND GROUNDING:
   A. ALL CABLE SUPPORTING STRANDS AND ASSOCIATED GUYS SHALL BE BONDED AND COMMON GROUNDED ON EVERY POLE WHERE GROUNDS EXIST. REFER TO PAGE 1-4-7 FOR CONSTRUCTION DETAILS.
4. DO NOT INSTALL POLE ADJACENT TO A FOREIGN CABLE STRAND MOUNTED TERMINAL OR A CABLE TV AMPLIFIER.
5. THERE IS NO SPECIFIED ORDER FOR FOREIGN CABLES.
6. CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-2-39.

[redacted]

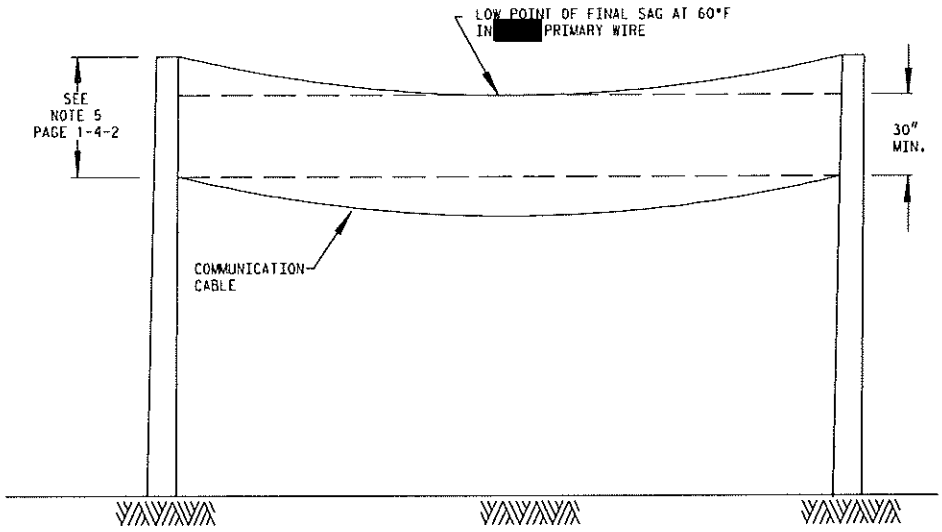
VERTICAL SEPARATION AND SERVICE DROPS

EXHIBIT 11

4-JOINT USE



CLEARANCE TO SECONDARY
DETAIL 404



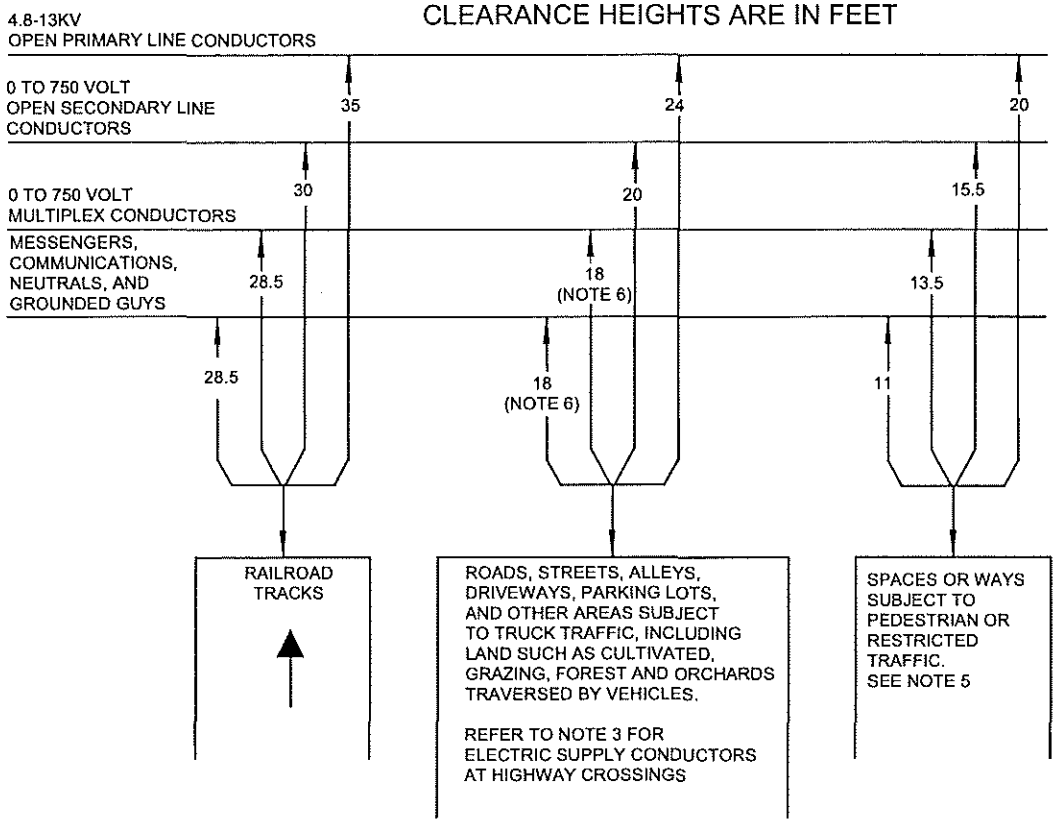
CLEARANCE TO PRIMARY
DETAIL 404A

[redacted]

VERTICAL CLEARANCES

4-JOINT USE

CLEARANCE HEIGHTS ARE IN FEET



→ CHART 405

Notes:

1. **Clearances shall be calculated at maximum final sag** at the maximum operating temperature of the conductor. Clearances in the chart **include the 1.5- to 5-ft sag adders** shown on page 1-11-1 in the Lines Construction Maunal. Refer to Section 18 in the Lines Construction Manual for sags.
2. Where the height of attachment to a building or other installation does not permit service drops to meet these values, clearances in the Alternate Chart for Service Drops on page 1-11-9 in the Lines Construction Manual may be used.
3. [redacted] statutes require a minimum clearance of 22 feet for electric supply conductors at highway crossings. Highways include major streets or roads which are direct traffic routes. Clearances apply at the center or edge of the highway.
4. Trucks are defined as any vehicle exceeding 8 feet in height; clearances for trucks are based on a vehicle height of 14 feet.
5. Pedestrian and restricted traffic areas are those where vehicles exceeding 8 feet in height are prohibited or not normally encountered nor anticipated.
6. Clearance may be reduced to 17 feet in road rights-of-way where the wires, conductors, or cables **do not overhang** the traveled way of the roadway. 17 feet of clearance also applies at crossings over, or running along, alleys, driveways or parking lots.
7. No clearance from ground is required for anchor guys not crossing tracks, rails, roads, streets, driveways, or pathways.
8. Changes other than detail numbers made to this page must be reflected on reference page 1-11-8 in the Lines Construction Manual.

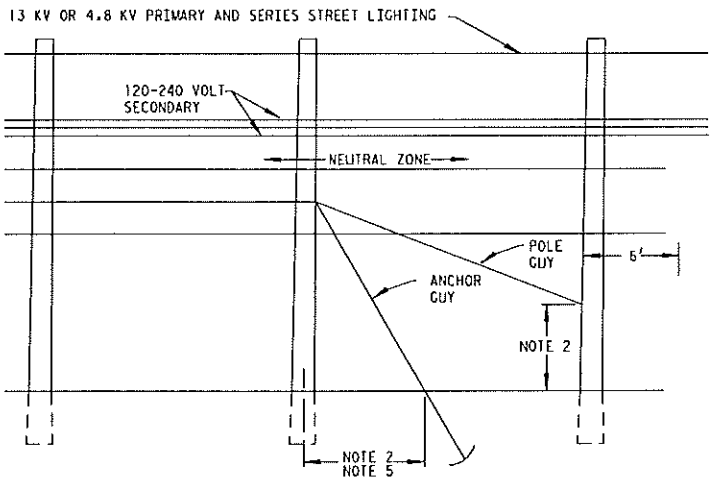
VERTICAL CLEARANCE OF DISTRIBUTION WIRES, CONDUCTORS, OR CABLE ABOVE GROUND, ROADWAY, OR RAILS

[redacted]

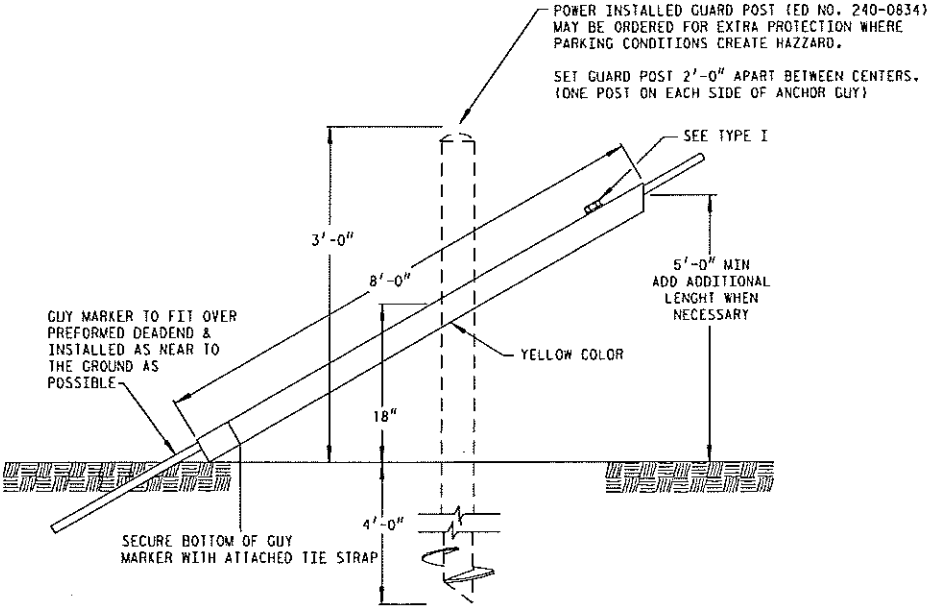
EXHIBIT 13

1-4-6	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-6

4-JOINT USE



GUYING
DETAIL 406



INSTALLATION OF PLASTIC GUY MARKER
DETAIL 406A

NOTES:

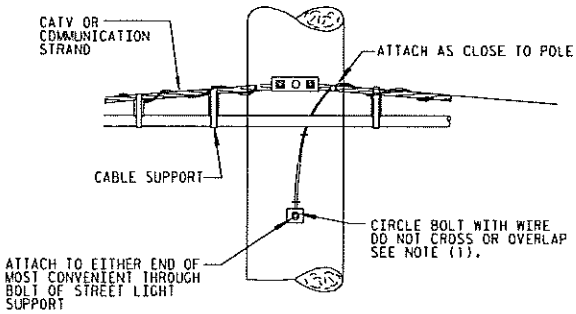
1. STRINGING SAGS FOR FOREIGN CABLES ARE TO BE ADJUSTED SO THAT THE REQUIRED STRENGTH LIMITS OF 60% OF ULTIMATE UNDER HEAVY LOADED CONDITIONS ARE NOT EXCEEDED.
2. ALL CONDUCTOR DEADENDS SHALL BE ANCHOR OR POLE GUYED (ANCHOR GUY PREFERRED). POLE GUY ATTACHMENT HEIGHTS ARE TO BE AT THE LOAD AND AT A MINIMUM 8'-0" ABOVE GROUND.
3. GUYS ARE TO BE BONDED TO MESSENGER WIRES TO EFFECTIVELY GROUND THE GUY WIRES. A MINIMUM OF 4 GROUNDS PER MILE ON THE MESSENGER IS REQUIRED.
4. AERIAL CROSSING CLEARANCE REQUIRED BETWEEN FOREIGN CABLE AND SECONDARY SUPPLY CONDUCTORS IS 48" MINIMUM WITHIN 6' OF POLE AND 24" MINIMUM BEYOND 6' FROM POLE.
5. ANCHORS SHALL BE INSTALLED WITH A MINIMUM OF 4' HORIZONTAL CLEARANCE FROM ADJACENT ANCHORS.

GUYING REQUIREMENTS

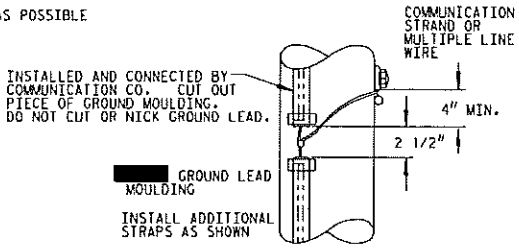
[redacted]

EXHIBIT 14

4-JOINT USE



FOREIGN CABLE STRAND TO [redacted] STREET LIGHT BRACKET
DETAIL 407



FOREIGN CABLE STRAND TO [redacted] GROUNDING CONDUCTOR
DETAIL 407A

NOTES:

1. FOREIGN STRAND MUST BE BONDED TO A [redacted] STREET LIGHT BRACKET OR STREET LIGHT SUSPENSION STRAND WHEN THE VERTICAL CLEARANCES CANNOT BE OBTAINED.

   THE [redacted] WILL INSTALL THE BOND:
   WHEN A [redacted] STREET LIGHT IS TO BE INSTALLED ON A POLE HAVING EXISTING COMMUNICATION STRAND.
   THE COMMUNICATION CO. WILL INSTALL THE BOND: (SEE NOTE 4)
   WHEN THE STRAND IS TO BE INSTALLED ON A POLE HAVING AN EXISTING [redacted] STREET LIGHT.

2. BOND WIRE SHALL BE NO. 6 OR LARGER, BARE OR COVERED.

3. IF BOND WIRE IS MORE THAN 12" LONG, STAPLE TO POLE.

4. THE FOREIGN CO. MAY ATTACH THE BOND WIRE TO THE STRAND AND LEAVE SUFFICIENT WIRE TO REACH THE FIXTURE, BUT IT SHALL NOT BE ATTACHED UNTIL IT IS DETERMINED THAT THE INSULATING TRANSFORMER IS A STANDARD APPROVED TYPE. THE COMMUNICATION CO. SHALL REFER EACH CASE TO THE [redacted] SERVICE PLANNER WHO WILL DETERMINE THE TYPE OF TRANSFORMER. IF THE TRANSFORMER IS SATISFACTORY, THE COMMUNICATION CO. SHALL COMPLETE THE BOND. IF IT IS NECESSARY TO REPLACE THE TRANSFORMER, THE COMMUNICATION CO. SHALL REQUEST SUCH REPLACEMENT BY JOINT USE MEMO. THE [redacted] SHALL COMPLETE THE BOND AT THE TIME OF TRANSFORMER REPLACEMENT.

5. INTERSECTING CABLE RUNS- BOND AT EVERY JOINT USE POLE AT INTERSECTING LEADS.

   PARALLELING CABLE RUNS- BOND AT THE FIRST AND LAST POLE, AND ON INTERMIDIATE POLES AT APPROXIMATELY EQUAL INTERVALS OR NOT MORE THAN 750 FEET.

6. BONDING IS REQUIRED WHEN A POLE GROUND EXISTS.

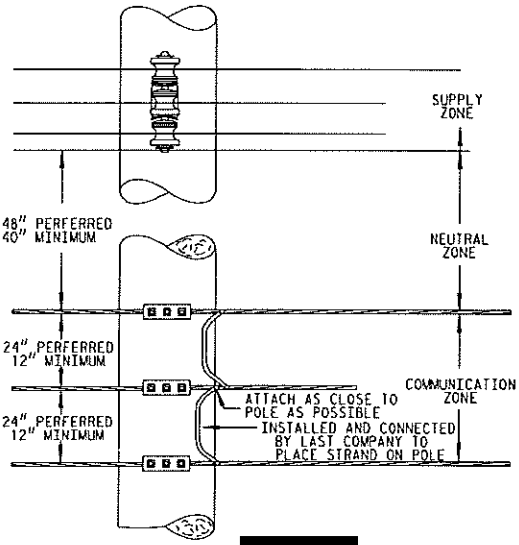
7. COMMON BONDING IS PREFERRED (DETAIL 407B) WHEN A POLE GROUND DOES NOT EXIST. IF IT IS ESSENTIAL OR DESIRABLE FOR OTHER REASONS TO ESTABLISH VERTICAL SEPERATION OF 40" OR MORE, BONDING IS NOT NECESSARY.

8. FOR FIGURE 8 COMMUNICATION CABLE GROUND CONNECTOR SEE DETAIL 2205G.

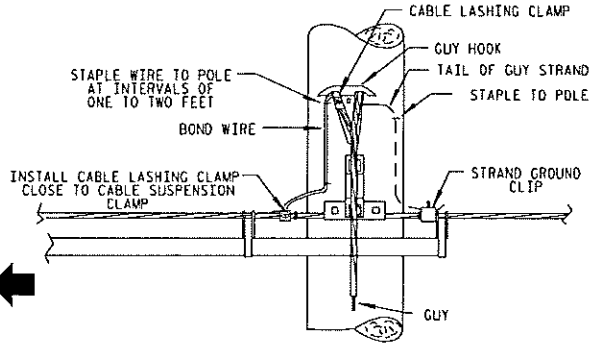
9. THERE IS NO SPECIFIED ORDER FOR FOREIGN CABLES.

10. THE BRACKET SHOULD BE BONDED WHEN A POLE GROUND IS PRESENT ON THE POLE. IN SUCH INSTANCES, THERE IS NO NEED TO MULTI-GROUND THE INDIVIDUAL CABLES.

11. CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-15-18.2 IN THE LINES CONSTRUCTION MANUAL.



FOREIGN STRAND TO [redacted] COMMUNICATION CABLE STRAND
DETAIL 407B



BONDING WITH TAIL OF GUY OR GROUND WIRE
DETAIL 407C

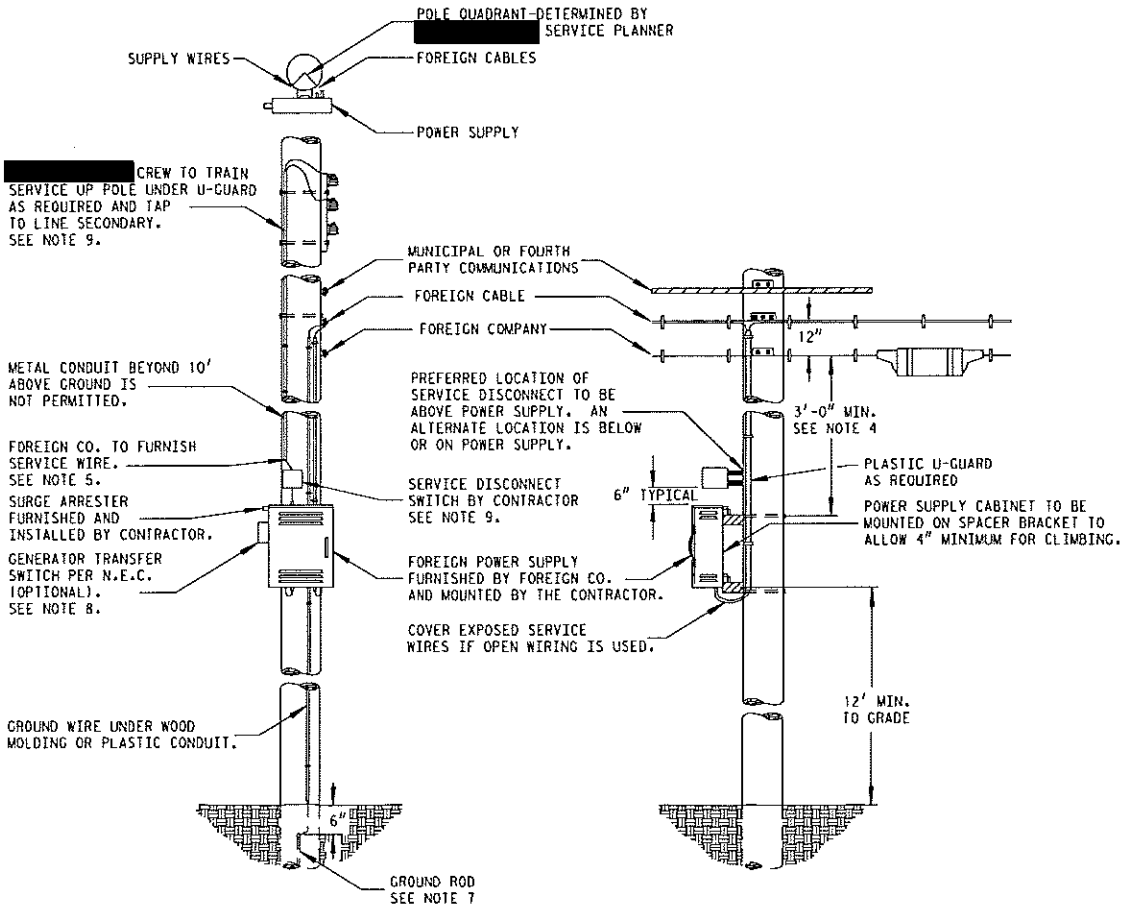
[redacted]

JOINT USE POLE COMMON GROUNDING AND BONDING (TELEPHONE AND CABLE TV)

EXHIBIT 15

1-4-8	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-8

4-JOINT USE



DETAIL 408

NOTES:

1. THE LOCATION OF A FOREIGN CABINET INSTALLATION SHALL BE COORDINATED BY THE FOLLOWING PERSONNEL.
   A. [redacted] SERVICE PLANNER
   B. FOREIGN Co. REPRESENTATIVE
2. THE POWER SUPPLY OR ASSOCIATED EQUIPMENT SHALL NEVER BE LOCATED ON A POLE WHERE IT WILL IN ANY WAY INTERFERE WITH THE CLIMBING SPACE OR MAINTENANCE OF EQUIPMENT.
3. POLES CARRYING UTILITY UNDERGROUND RISER CABLES OR POLES SUPPORTING TELEPHONE CROSS CONNECTING TYPE TERMINALS, AIR DRYERS, CONCENTRATORS, CARRIER CABINETS, APPARATUS CASES, POLE MOUNTED LOAD POTS AND POLES CARRYING HEAVY [redacted] SUCH AS TRANSFORMER CLUSTERS, REGULATORS, DAS EQUIPMENT, P.I.S., CAPACITOR BANKS, BUCK POLES, ETC., SHALL NOT BE SELECTED FOR A POWER SUPPLY LOCATION. CONTACT [redacted] INTERCOMPANY FACILITIES ADMINISTRATOR FOR SPECIAL SITUATIONS.
4. NORMALLY THE UPPER POWER SUPPLY SHALL BE MOUNTED ON THE FACE OF THE POLE 3'-0" MINIMUM BELOW THE LOWEST STRAND.
5. SUPPLY WIRES TO BE 2 #8 COPPER OR 2 #6 ALUM. OPEN WIRE OR EQUIVALENT SERVICE ENTRANCE CABLE. THE CABLE FOREIGN CO. SHALL IDENTIFY SERVICE NEUTRAL BY REMOVING SIX INCHES OF INSULATION FROM THE GROUND WIRE, COIL UP AND LEAVE ENOUGH WIRE TO REACH LINE SECONDARY. (IF WHITE OR GRAY WIRE USED, NEUTRAL DOES NOT HAVE TO BE SKINNED.)
6. TIE ALL EQUIPMENT GROUNDS TOGETHER INSIDE SERVICE DISCONNECT SWITCH.
7. FOREIGN CO. MAY GROUND THEIR POWER SUPPLY TO AN EXISTING [redacted] POLE GROUND WITH A NO. 6 AWG COPPER CONDUCTOR VERSUS INSTALLING A SEPARATE POLE GROUND. WHEN NO POLE GROUND IS PRESENT, THE CONTRACTOR SHALL FURNISH AND INSTALL AN APPROVED GROUNDING ELECTRODE AND POLE GROUND AS SPECIFIED FOR THE POWER SUPPLY.
8. IF A PORTABLE GENERATOR IS TO BE USED, A TRANSFER SWITCH PER NEC MUST BE INSTALLED. ALTERNATE LOCATION FOR TRANSFER SWITCH IS POLE MOUNTED BETWEEN DISCONNECT AND POWER SUPPLY.
9. [redacted] CREW TO LEAVE SERVICE DISCONNECT SWITCH IN "OFF" POSITION AFTER SERVICE IS CONNECTED.
10. ALL CONSTRUCTION MUST BE IN ACCORDANCE WITH APPLICABLE NATIONAL AND LOCAL CODES.

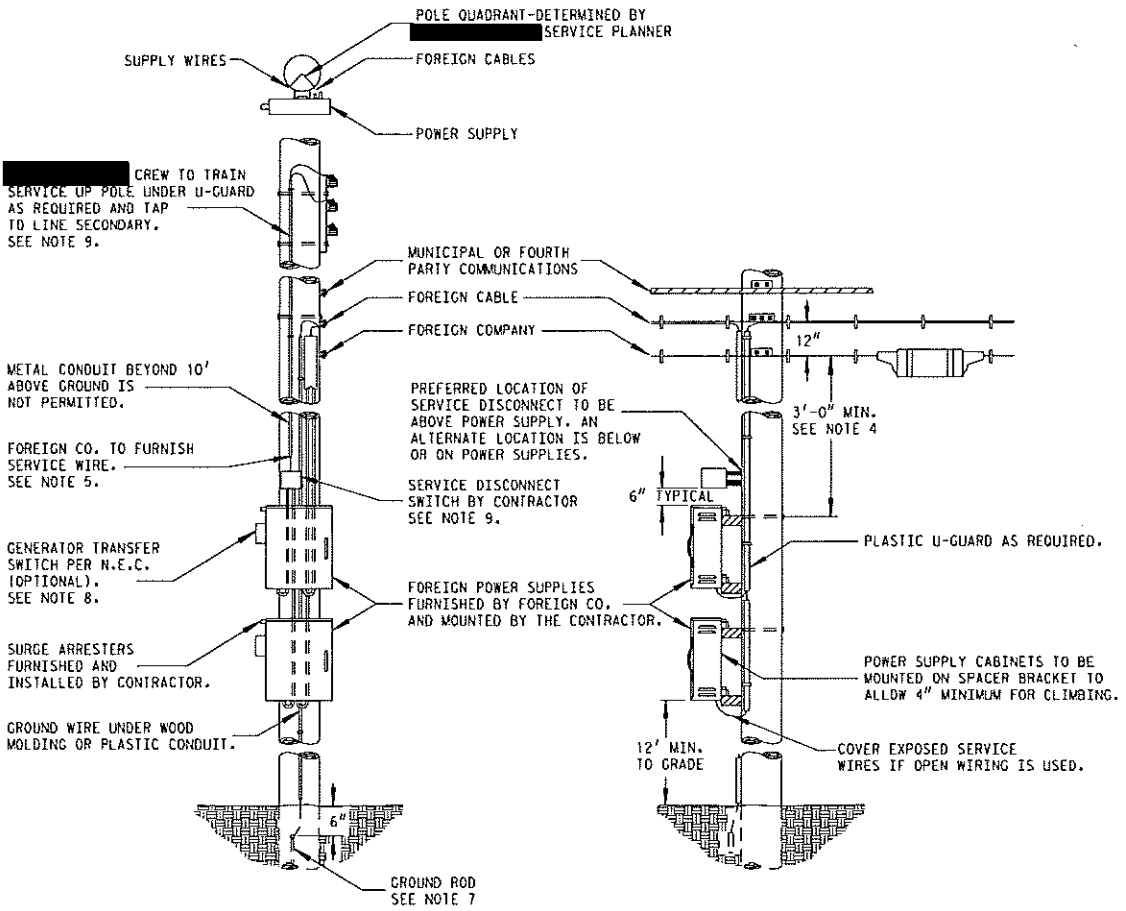
[redacted]

JOINT USE SPECIFICATION FOR
POLE MOUNTED POWER SUPPLY

EXHIBIT 16

1-4-8.1	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-8.1

4-JOINT USE



DETAIL 408A

NOTES:

1. THE LOCATION OF A FOREIGN CABINET INSTALLATION SHALL BE COORDINATED BY THE FOLLOWING PERSONNEL.
   A. [redacted] SERVICE PLANNER
   B. FOREIGN CO. REPRESENTATIVE
2. THE POWER SUPPLIES OR ASSOCIATED EQUIPMENT SHALL NEVER BE LOCATED ON A POLE WHERE IT WILL IN ANY WAY INTERFERE WITH THE CLIMBING SPACE OR MAINTENANCE OF EQUIPMENT.
3. POLES CARRYING UTILITY UNDERGROUND RISER CABLES OR POLES SUPPORTING TELEPHONE CROSS CONNECTING TYPE TERMINALS, AIR DRYERS, CONCENTRATORS, CARRIER CABINETS, APPARATUS CASES, POLE MOUNTED LOAD POTS AND POLES CARRYING [redacted] EQUIPMENT SUCH AS TRANSFORMER CLUSTERS, REGULATORS, DAS EQUIPMENT, CAPACITOR BANKS, P.T.S., BUCK POLES, ETC., SHALL NOT BE SELECTED FOR A POWER SUPPLY LOCATION. CONTACT [redacted] INTERCOMPANY FACILITIES ADMINISTRATOR FOR SPECIAL SITUATIONS.
4. NORMALLY THE UPPER POWER SUPPLY SHALL BE MOUNTED ON THE FACE OF THE POLE 3'-0" MINIMUM BELOW THE LOWEST STRAND.
5. SUPPLY WIRES TO BE 2 #8 COPPER OR 2 #6 ALUM. OPEN WIRE OR EQUIVALENT SERVICE ENTRANCE CABLE. THE CABLE FOREIGN CO. SHALL IDENTIFY SERVICE NEUTRAL BY REMOVING SIX INCHES OF INSULATION FROM THE GROUND WIRE, COIL UP AND LEAVE ENOUGH WIRE TO REACH LINE SECONDARY. (IF WHITE OR GRAY WIRE USED, NEUTRAL DOES NOT HAVE TO BE SKINNED)
6. TIE ALL EQUIPMENT GROUNDS TOGETHER INSIDE SERVICE DISCONNECT SWITCH.
7. FOREIGN CO. MAY GROUND THEIR POWER SUPPLY TO AN EXISTING [redacted] POLE GROUND WITH A NO. 6 AWG COPPER CONDUCTOR VERSUS INSTALLING A SEPARATE POLE GROUND. WHEN NO POLE GROUND IS PRESENT, THE CONTACTOR SHALL FURNISH AND INSTALL AN APPROVED GROUNDING ELECTRODE AND POLE GROUND AS SPECIFIED FOR THE POWER SUPPLY.
8. IF A PORTABLE GENERATOR IS TO BE USED, A TRANSFER SWITCH PER NEC MUST BE INSTALLED. ALTERNATE LOCATION FOR TRANSFER SWITCH IS POLE MOUNTED BETWEEN DISCONNECT AND POWER SUPPLIES.
9. [redacted] CREW TO LEAVE SERVICE DISCONNECT SWITCH IN "OFF" POSITION AFTER SERVICE IS CONNECTED.
10. ALL CONSTRUCTION MUST BE IN ACCORDANCE WITH APPLICABLE NATIONAL AND LOCAL CODES.

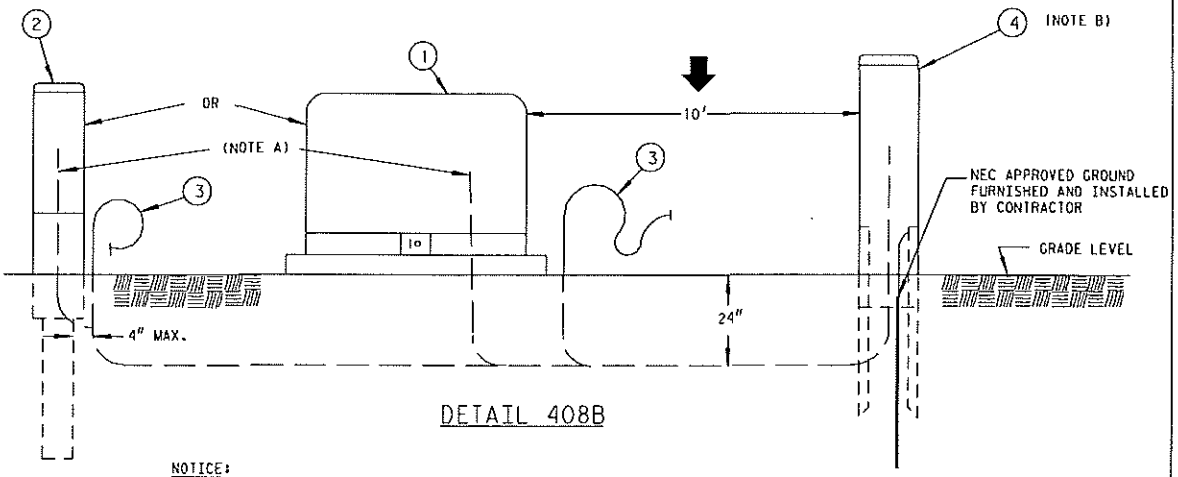
[redacted]

JOINT USE SPECIFICATION FOR
POLE MOUNTED TANDEM POWER SUPPLIES

EXHIBIT 17

1-4-8.2	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-8.2

4-JOINT USE



DETAIL 408B

NOTICE:
SERVICE CONNECTIONS WILL BE MADE TO TRANSFORMER ONLY WHEN NO PEDESTAL EXISTS.

LEGEND:

1. [redacted] PADMOUNT TRANSFORMER.
2. [redacted] SECONDARY PEDESTAL.
3. CUSTOMER UNDERGROUND CABLE.
4. FOREIGN POWER SUPPLY.

NOTES:

A - SERVICE CABLE

* SPECIFICATIONS
ALUMINUM SINGLE CONDUCTOR TYPE U.S.E. AND CROSS LINKED POLYETHYLENE RHH-RHW.

* RESPONSIBILITIES
CONTRACTOR WILL FURNISH AND INSTALL CABLE UP TO BUT NOT IN OR UNDER TRANSFORMER OR PEDESTAL. [redacted] WILL INSTALL AND TERMINATE SERVICE IN TRANSFORMER OR PEDESTAL.

* METHOD OF INSTALLATION
CONTRACTOR WILL CONTACT MISS DIG WHEN WORKING IN PROXIMITY OF [redacted] DISTRIBUTION CABLES. HAND DIG CLOSE TO TRANSFORMER, PEDESTAL, OR DISTRIBUTION CABLES. IDENTIFY NEUTRAL BY STRIPPING 4" OF INSULATION AT END. ALLOW SUFFICIENT CABLE FOR CONNECTION BY [redacted] [redacted] 8' AT TRANSFORMER, 4' AT PEDESTAL. SEAL CABLE ENDS AGAINST MOISTURE.

[redacted] DETAIL FOR INSTALLATION AND TERMINATION:
TRANSFORMER: SIMILAR TO DETAIL 23227E
PEDESTAL: SIMILAR TO DETAIL 23227F

B - CLEARANCES
FOREIGN POWER SUPPLY IS NOT TO BE INSTALLED DIRECTLY OVER [redacted] DISTRIBUTION CABLES OR DIRECTLY IN FRONT OF TRANSFORMER DOOR, NOR WITHIN 2' OF ANY EXISTING [redacted] FACILITY. IF INSTALLED AT SAME TIME AS [redacted] FACILITIES REFER TO PAGE 1-43-12 IN THE UNDERGROUND LINE CONSTRUCTION STANDARDS MANUAL.

C - [redacted] ASSUMES NO RESPONSIBILITY FOR INJURY OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION.

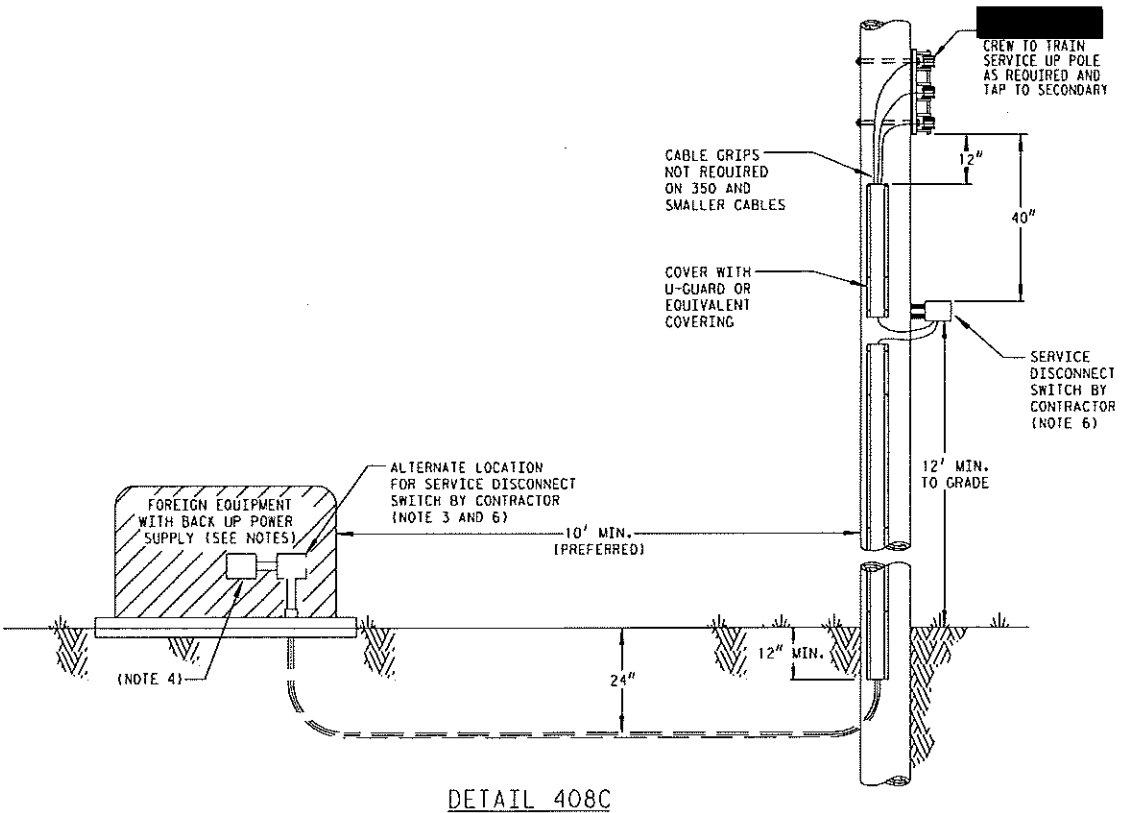
D - CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-9-236.

[redacted]

PAD MOUNTED POWER SUPPLY INSTALLATION

EXHIBIT 18

4-JOINT USE



DETAIL 408C

NOTES:

1. THE LOCATION OF THE CABINET INSTALLATION AND THE PLACEMENT OF THE CABLE ON THE POLE SHOULD BE COORDINATED BY THE FOLLOWING PERSONNEL:
   A. [redacted] SERVICE PLANNER
   B. FOREIGN Co. REPRESENTATIVE

2. THE UG SUPPLY CABLES ARE TO BE PROVIDED BY THE FOREIGN COMPANY. THE SERVICE NEUTRAL SHALL BE IDENTIFIED BY REMOVING SIX INCHES OF INSULATION FROM THE END OF THE WIRE COILED AT THE POLE. IF THE NEUTRAL WIRE IS WHITE OR GREY IT DOES NOT HAVE TO BE SKINNED BACK FOR IDENTIFICATION. THE COIL OF WIRE SHOULD BE LONG ENOUGH TO REACH THE SECONDARY AND THE COIL SHOULD BE LEFT AT THE BASE OF THE POLE FOR DTE PERSONNEL TO ATTACH TO THE POLE AND TAP TO THE SECONDARY.

3. TIE ALL EQUIPMENT GROUNDS TOGETHER INSIDE THE SERVICE DISCONNECT BOX.

4. IF THE EQUIPMENT IS DESIGNED SO THAT A PORTABLE 120 (240) VOLT GENERATOR CAN BE USED FOR STAND-BY POWER, AN ELECTRICAL TRANSFER SWITCH PER NEC MUST BE INSTALLED BETWEEN THE FEEDS FROM THE GENERATOR AND THE DTE SECONDARY. PLACEMENT OF THE TRANSFER SWITCH IN THE SUPPLY CIRCUIT IS SCHEMATICALLY SHOWN ON SPEC PAGE 1-4-10. THE TRANSFER SWITCH SHOULD BE INSTALLED ON THE EQUIPMENT CABINET. A SERVICE DISCONNECT SWITCH INSTALLED ON THE POLE OR ALTERNATELY ON THE EQUIPMENT CABINET IS REQUIRED TO ELIMINATE POSSIBILITY OF 120 VOLT BACKFEED ON TO THE DTE SYSTEM.

5. IF A DC GENERATOR IS USED AS THE BACK-UP POWER SUPPLY TO CHARGE THE STANDBY BATTERIES AND THERE IS NO POSSIBILITY OF BACKFEED TO THE DTE SECONDARY, NO TRANSFER SWITCH IS REQUIRED.

6. THE [redacted] CREW IS TO LEAVE THE SERVICE DISCONNECT SWITCH LOCKED IN THE "OFF" POSITION AFTER THE SERVICE IS CONNECTED. LOCK THE DISCONNECT IN THE "OFF" POSITION USING A DISPOSABLE LOCK.

7. ALL CONSTRUCTION MUST BE IN ACCORDANCE WITH APPLICABLE NATIONAL AND LOCAL CODES.

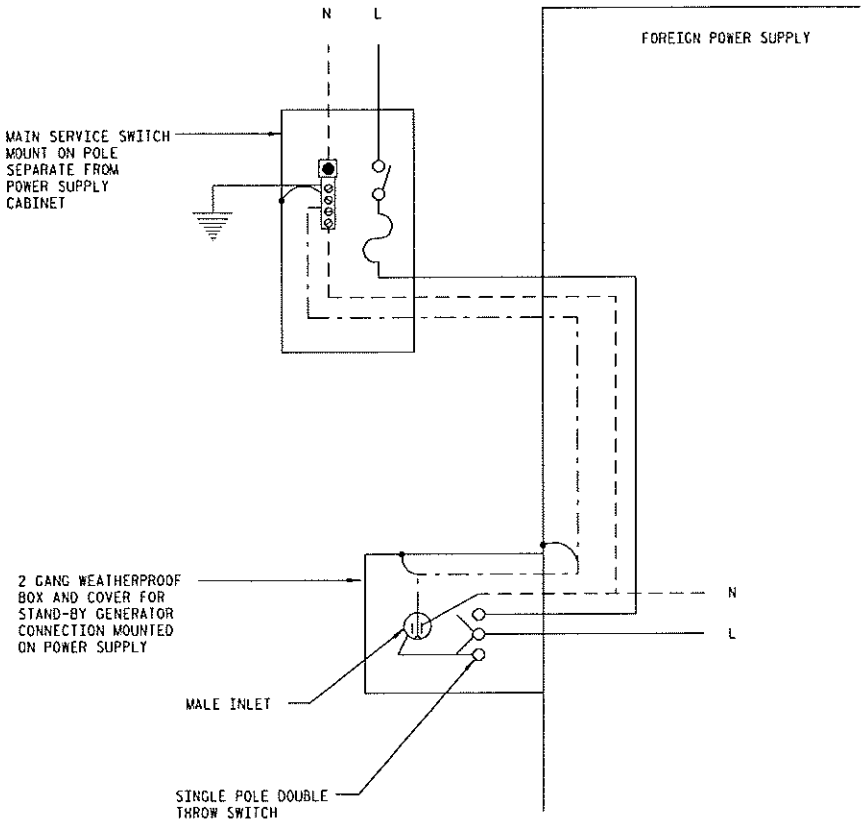
OH POWER SUPPLIES FOR FOREIGN EQUIPMENT WITH STAND-BY GENERATORS

[redacted]

EXHIBIT 19

1-4-8.4	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-8.4

4-JOINT USE



DETAIL 408D

NOTES:

1. DOUBLE THROW SWITCH MUST BREAK [redacted] COMPANY SUPPLY BEFORE CLOSING TO STAND-BY GENERATOR.
2. REFER TO PAGE 1-4-8, 1-4-8.1 AND 1-4-9 FOR LOCATION AND ASSEMBLY OF EQUIPMENT ON POLE.
3. USE ONLY 3 WIRE EQUIPMENT GROUNDING EXTENSION CORD TO CONNECT GENERATOR TO TRANSFER SWITCH INLET.
4. THE [redacted] ASSUMES NO RESPONSIBILITY FOR INJURY OR DAMAGES ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

[redacted]

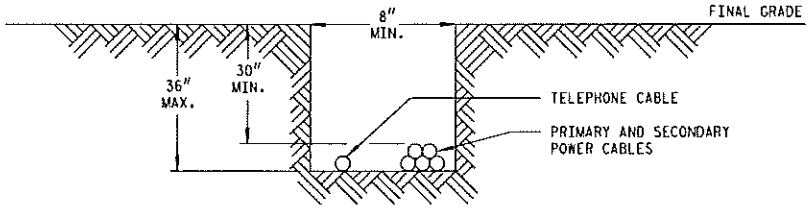
POWER SUPPLY SERVICES
AND STAND-BY GENERATOR CONNECTION

EXHIBIT 20

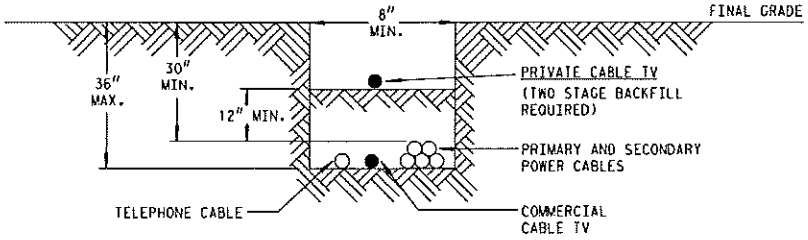
4-JOINT USE

MAIN TRENCH FOR JOINT PLACEMENT
DIRECT BURIED DELTA OR WYE CONNECTED PRIMARY

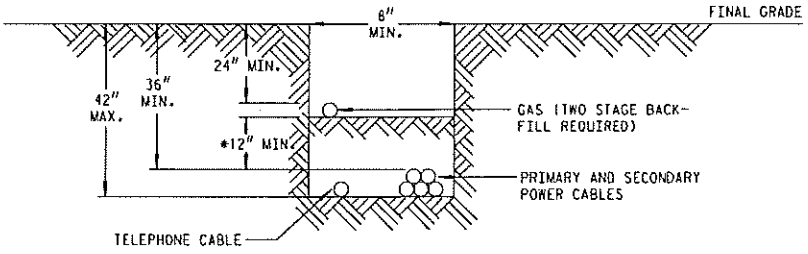
* MINIMUM COVER DIMENSIONS MUST BE MAINTAINED IN ALL CASES. MAXIMUM TRENCH DEPTHS SHOULD BE ADHERED TO FOR FRONT LOT LINE CONSTRUCTION TO PROVIDE CLEARANCE FOR WATER SERVICE INSTALLATIONS LOCATED BENEATH THE POWER CABLES.



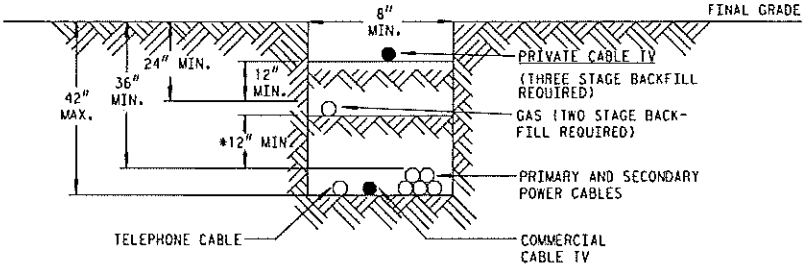
DETAIL 411A-(POWER, TELEPHONE-RANDOM SEPARATION)



DETAIL 411B-(POWER, TELEPHONE & CABLE TV-RANDOM SEPARATION)



DETAIL 411C-(POWER, TELEPHONE-RANDOM SEPARATION & GAS)



DETAIL 411D-(POWER, TELEPHONE & CABLE TV RANDOM SEPARATION & GAS)

NOTES:

1. FOR POWER AND TELEPHONE GROUND TAP DETAIL SEE SPECIFICATIONS 1-47-12.5 (III-18), 1-47-12.6 (III-19)
2. TELEPHONE SERVICE WIRE MAY BE PLACED AT RANDOM SEPARATION WITH PRIMARY POWER FOR ANY LENGTH PROVIDED THE PROTECTOR IS MOUNTED ON FIRE RESISTANT MATERIAL OR IN A FIRE RESISTANT LOCATION.
3. PRIVATE CABLE TV IS DEFINED AS A DEVELOPER OR CUSTOMER OWNED SYSTEM.
4. EXTRA DEPTH MAY BE REQUIRED WHERE LOCAL, COUNTY OR STATE REQUIREMENTS DICTATE.
*5. HORIZONTAL SEPARATION FOR GAS AND ELECTRIC IS ACCEPTABLE. MAINTAIN 12" MIN. SEPARATION.
6. CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-43-59.

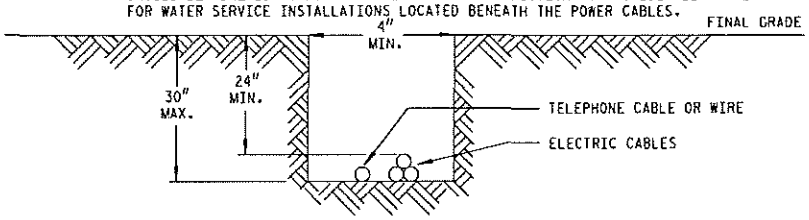
[redacted]

EXHIBIT 21

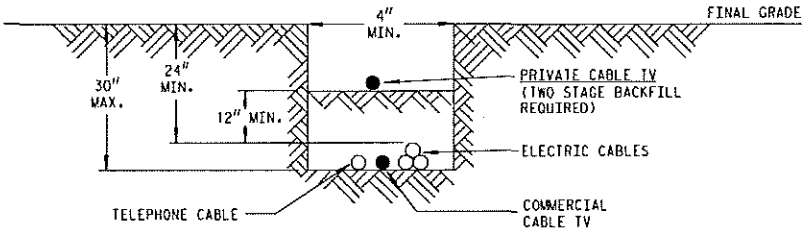
1-4-12	2002	**LINE CONSTRUCTION STANDARDS**	2002	1-4-12

4-JOINT USE

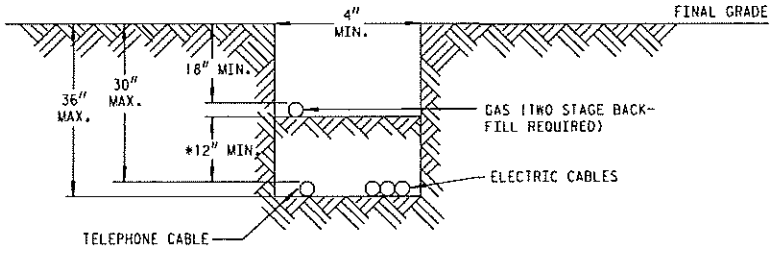
MINIMUM COVER DIMENSIONS MUST BE MAINTAINED IN ALL CASES. MAXIMUM TRENCH DEPTHS SHOULD BE ADHERED TO FOR FRONT LOT LINE CONSTRUCTION TO PROVIDE CLEARANCE FOR WATER SERVICE INSTALLATIONS LOCATED BENEATH THE POWER CABLES.



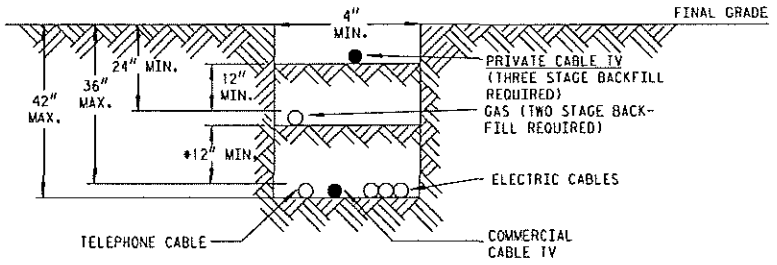
DETAIL 412A-(POWER, TELEPHONE-RANDOM SEPARATION)



DETAIL 412B-(POWER, TELEPHONE & CABLE TV-RANDOM SEPARATION)



DETAIL 412C-(POWER, TELEPHONE-RANDOM SEPARATION & GAS)



DETAIL 412D-(POWER, TELEPHONE & CABLE TV RANDOM SEPARATION & GAS)

NOTES:

1. FOR POWER AND TELEPHONE GROUND TAP DETAIL SEE SPECIFICATIONS 1-47-12.5 (III-18), 1-47-12.6 (III-19)
2. TELEPHONE SERVICE WIRE MAY BE PLACED AT RANDOM SEPARATION WITH PRIMARY POWER FOR ANY LENGTH PROVIDED THE PROTECTOR IS MOUNTED ON FIRE RESISTANT MATERIAL OR IN A FIRE RESISTANT LOCATION.
3. PRIVATE CABLE TV IS DEFINED AS A DEVELOPER OR CUSTOMER OWNED SYSTEM.
4. EXTRA DEPTH MAY BE REQUIRED WHERE LOCAL, COUNTY OR STATE REQUIREMENTS DICTATE.

➡ *5. HORIZONTAL SEPARATION FOR GAS AND ELECTRIC IS ACCEPTABLE. MAINTAIN 12" MIN. SEPARATION.

6. CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-43-60.

[redacted]

SERVICE TRENCH FOR JOINT PLACEMENT
ELECTRIC SERVICE FACILITY VOLTAGE DOES NOT EXCEED 300V TO GROUND

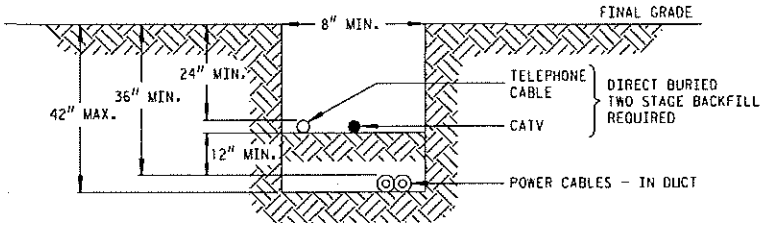
EXHIBIT 22

1-4-13	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-13

4-JOINT USE

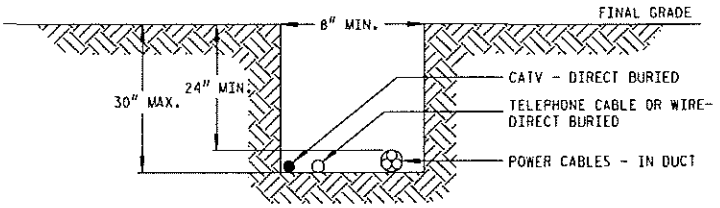
MINIMUM COVER DIMENSIONS MUST BE MAINTAINED IN ALL CASES. MAXIMUM TRENCH DEPTHS SHOULD BE ADHERED TO FOR FRONT LOT LINE CONSTRUCTION TO PROVIDE CLEARANCE FOR WATER SERVICE INSTALLATIONS LOCATED BENEATH THE POWER CABLES.

MAIN TRENCH



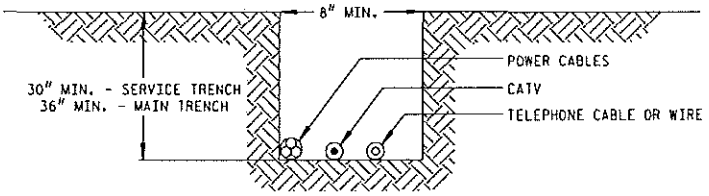
DETAIL 413A - TELEPHONE, CATV - RANDOM SEPARATION & POWER

SERVICE TRENCH



DETAIL 413B - TELEPHONE, CATV - RANDOM SEPARATION & POWER

MAIN OR SERVICE TRENCH



DETAIL 413C - POWER, TELEPHONE, CATV - IN DUCT

NOTE:

CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-43-61.

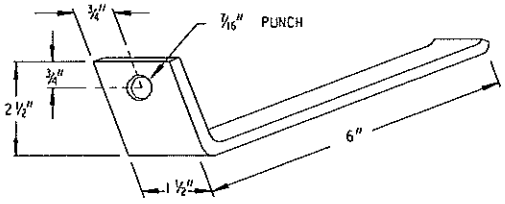
[redacted]

JOINT PLACEMENT WITH CABLE IN CONDUIT

EXHIBIT 23

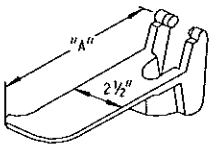
1-4-15	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-15

4-JOINT USE



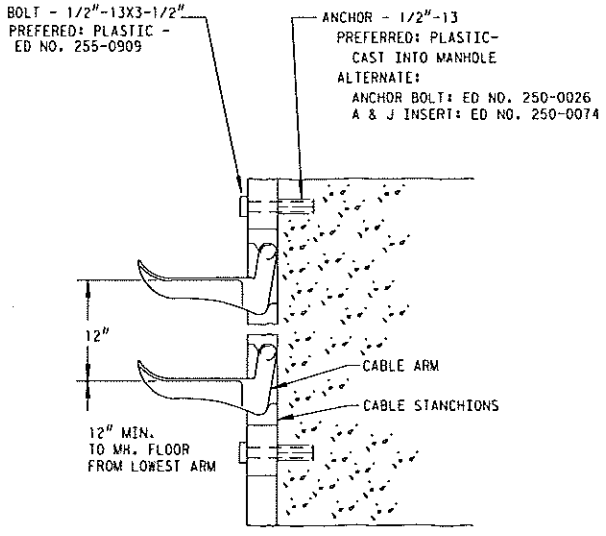
CABLE HANGER
DETAIL 415

GALVANIZED STEEL
ED. NO. 734-0183

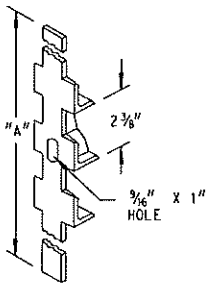


CABLE ARM
DETAIL 415A

"A"	MALLEABLE IRON ED. NO.	PLASTIC ED. NO.
6⅞"	-	-
11"	734-0006-D	-
14¼"	734-0007	734-0371
17½"	734-0008	734-0372
23⅛"	734-0065	734-0373



DETAILS OF STANCHION
INSTALLATION
DETAIL 415B



CABLE
STANCHION
DETAIL 415C

"A"	MALLEABLE IRON ED. NO.	PLASTIC ED. NO.
22"	734-0174	734-0374
33"	734-0175	734-0375

NOTE:

CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-47-8.

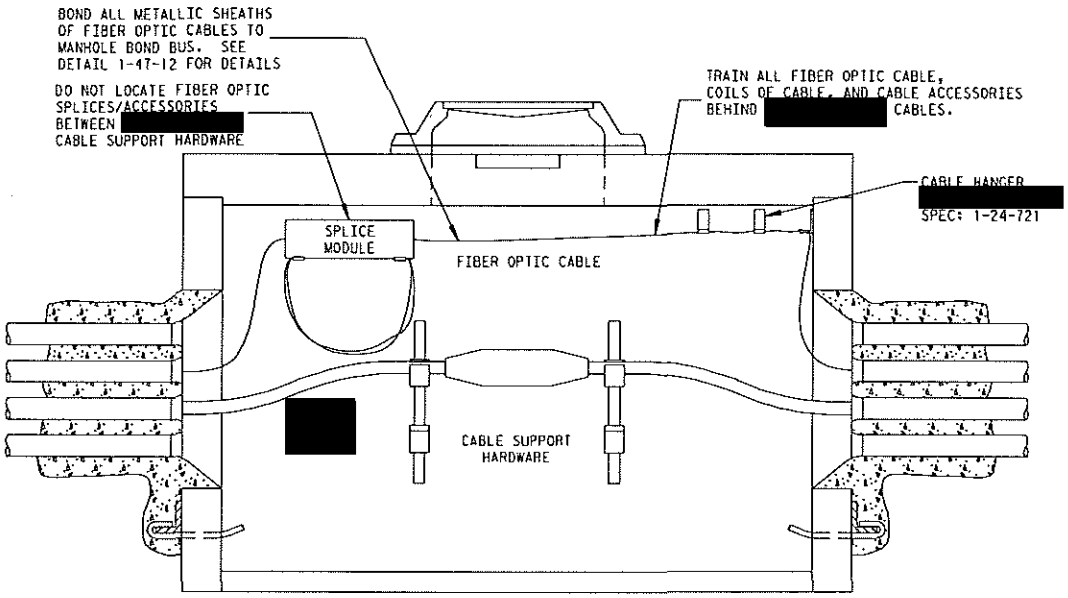
[redacted]

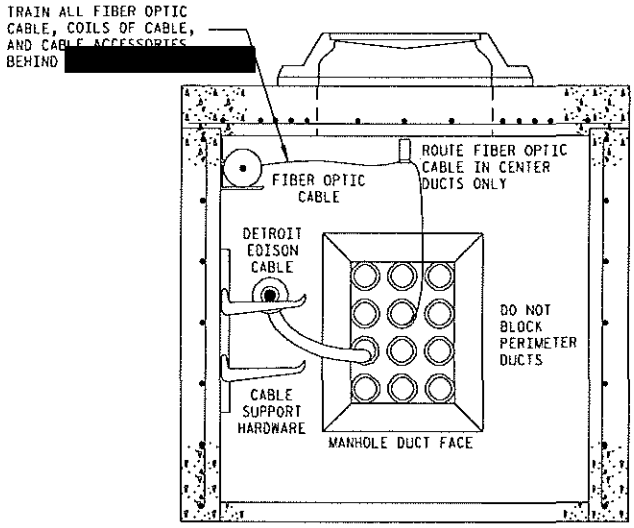
CABLE INSTALLATIONS
INSTALLATIONS OF CABLE STANCHIONS

EXHIBIT 24

1-4-16	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-16

4-JOINT USE





DETAIL 416

NOTES:

1. ALL CABLE HANGERS TO BE INSTALLED AS HIGH AS POSSIBLE IN MANHOLES. DO NOT USE [redacted] HARDWARE TO SUPPORT FIBER OPTIC CABLES.
2. INNER DUCTS TO BE INSTALLED IN CONDUIT ONLY & NOT IN [redacted] MANHOLE.
3. ALL INNER DUCTS TO BE OF THE SMOOTH TYPE ONLY.
4. CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-46-6.

[redacted]

TRAINING FIBER OPTIC SYSTEMS IN MANHOLES

CLIMBLING SPACE

Joint pole climbing space will be furnished by the communication companies through the communication zone on the street side of street poles, the alley side of alley poles, and the "open lot" side of easement or back lot line poles. "Open lot" side is the side opposite the rear lot line, not obstructed by fences, garages, etc.

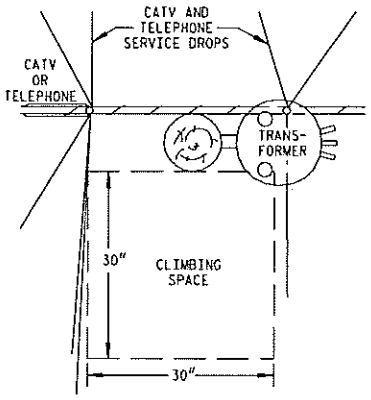
Where detail 418C exists, it will not be changed, except when a new transformer is hung or other major rearrangement is made. Equipment is not to be installed in the climbing area, as required by the NESC to provide access to the pole top.

All equipment on poles shall be constructed and maintained to provide an unobstructed vertical climbing space. The horizontal dimensions shall not be less than 24 inches square for wires of 300 volts or less. Climbing space of these dimensions shall be continued vertically 40 inches above and below limiting conductors. Where necessary it may shift from one position to another, provided the sections overlap at least 40 inches, and there are no obstructions between the two climbing columns.

[redacted]

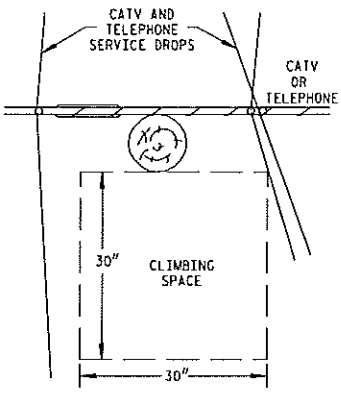
EXHIBIT 26

4-JOINT USE



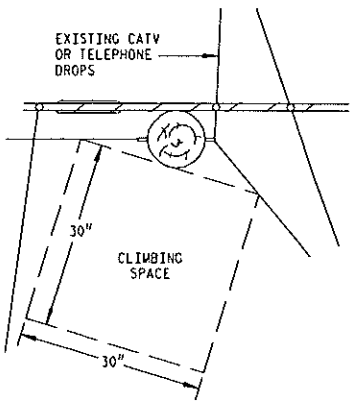
JOINT POLE WITH TRANSFORMER

DETAIL 418A



JOINT POLE WITHOUT TRANSFORMER

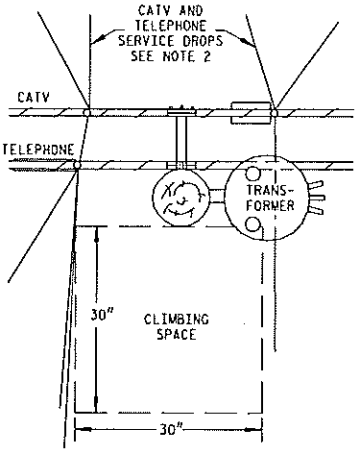
DETAIL 418B



JOINT POLE ACCEPTABLE ALTERNATE WHERE EXISTING

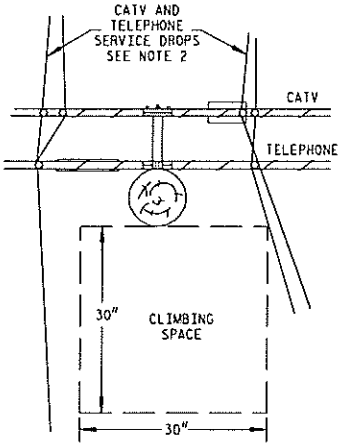
DETAIL 418C

(SEE NOTE 1)



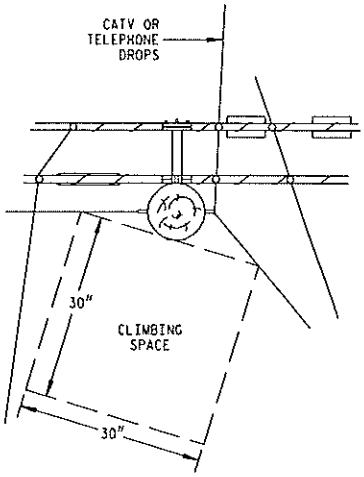
JOINT POLE WITH TRANSFORMER AND CATV 'L' BRACKET

DETAIL 418D



JOINT POLE WITH CATV 'L' BRACKET WITHOUT TRANSFORMER

DETAIL 418E



JOINT POLE ACCEPTABLE ALTERNATE WITH CATV 'L' BRACKET WHERE TELEPHONE EXISTS

DETAIL 418F

(SEE NOTE 1)

NOTE:

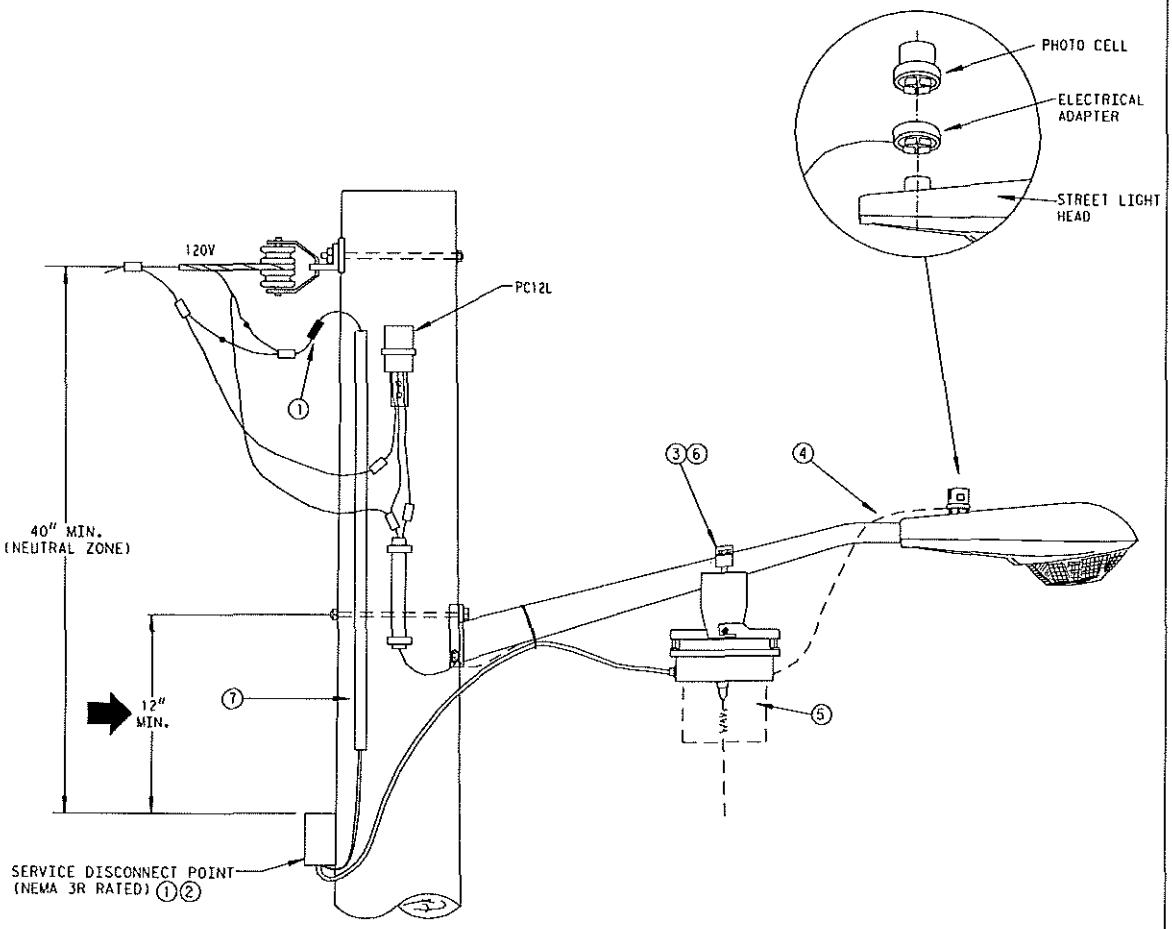
1. PREFERRED METHOD FOR SERVICE DROPS IS ATTACHMENT TO THE STRAND, AND NOT TO THE POLE. TELEPHONE OR CATV DROPS ALLOWED ON POLE WHERE EXISTING. SERVICE DROPS ARE TO BE RELOCATED PER DETAIL 418E WHEN TELEPHONE OR CATV WORK IS PERFORMED.
2. WHERE A SERVICE DROP CONTACTS A CABLE CLOSE TO THE POLE AND NO DEFLECTION OF THE CABLE OCCURS, IT WILL BE NECESSARY TO CONNECT THE SERVICE DROP TO THE CROSSING STRAND.
3. EQUIPMENT SUCH AS: CONNECTION BOXES, VERTICAL CABLES, TERMINALS, ETC. SHALL NOT BE INSTALLED IN THE CLIMBING ZONE.
4. NO ATTACHMENTS SHALL BE MADE IN THE CLIMBING SPACE OR WITHIN 30" OF POLE.
5. CHANGES OTHER THAN DETAIL NUMBERS MADE TO THIS PAGE MUST BE REFLECTED ON REFERENCE PAGE 1-11-36.

[redacted]

SERVICE DROP CLIMBING SPACE

EXHIBIT 27

4-JOINT USE



DETAIL 419

① THE SECOND PARTY WILL PROVIDE THE RADIO, WIRING AND SWITCH. ON INSTALLATIONS WHERE THE EQUIPMENT WILL BE MAINTAINED BY QUALIFIED ELECTRICAL WORKERS PER A JOINT USE AGREEMENT, THE DISCONNECT SWITCH IS NOT REQUIRED. INSTALL INLINE FUSE IN SERVICE WIRE NEAREST TO SECONDARY, SIZED APPROPRIATELY FOR EQUIPMENT INSTALLED.

② [redacted] CREW TO LEAVE SWITCH IN "OFF" POSITION IF EQUIPPED.

③ MOUNT THE REPEATER RADIO SO THAT THE RADOME ANTENNA IS AS VERTICAL AS POSSIBLE (0-DEGREES FROM VERTICAL IS PREFERRED). DUE TO THE VARIOUS MAST ARM STYLES USE THE ADJUSTABLE MOUNTING BRACKET IF REQUIRED (AS SHOWN HERE AND ON PAGE 1-4-22) TO MEET THE VERTICAL MOUNTING REQUIREMENT.

④ ATTACH 120V SOURCE ON MULTIPLE STREETLIGHT HEAD WITH PHOTO CELL ADAPTER. OTHER WIRING NOT REQUIRED IF APPROVED BY JOINT USE AGREEMENT.

⑤ ANTENNA MAY BE SINGLE WHIP (EXPOSED) OR RADOME PROTECTOR AS SHOWN.

⑥ THE RADIO SHOULD BE LOCATED ON THE MAST ARM FAR ENOUGH FROM THE LIGHT FIXTURE TO ALLOW THE FIXTURE TO BE OPENED WITHOUT DISTURBING THE RADIO.

⑦ WIRES RUN VERTICALLY DOWN THE SURFACE OF THE POLE ARE TO BE COVERED WITH A U-GUARD OR MOLDING.

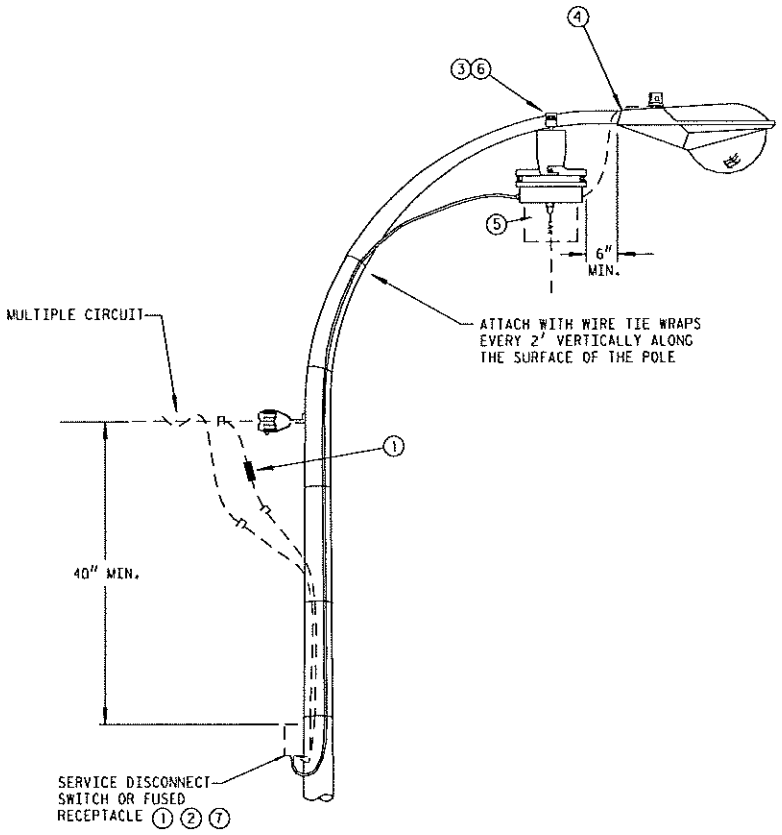
⑧ ANTENNA LOCATED ANY CLOSER THAN 40" TO THE POWER SUPPLY ZONE (WITHIN THE NEUTRAL ZONE) SHALL BE INSTALLED AND MAINTAINED BY QUALIFIED ELECTRICAL PERSONNEL UNDER THE DIRECTION OF [redacted] ANTENNA MOUNTED NEAR SECONDARY MUST BE LOCATED TO PROVIDE WORKING CLEARANCE FOR THE SECONDARY.

[redacted]

REPEATER RADIO STREET LIGHT INSTALLATION

EXHIBIT 28

4-JOINT USE



DETAIL 420

(1) THE SECOND PARTY WILL PROVIDE THE RADIO, WIRING AND SWITCH. ON INSTALLATIONS WHERE THE EQUIPMENT WILL BE INSTALLED AND MAINTAINED BY QUALIFIED ELECTRICAL WORKERS PER A JOINT USE AGREEMENT, THE DISCONNECT SWITCH IS NOT REQUIRED. INSTALL INLINE FUSE IN SERVICE WIRE NEAREST TO SECONDARY, SIZED APPROPRIATELY FOR EQUIPMENT INSTALLED.

(2) [redacted] TO LEAVE SWITCH IN "OFF" POSITION.

(3) MOUNT THE REPEATER RADIO SO THAT THE RADOME ANTENNA IS AS VERTICAL AS POSSIBLE (0-DEGREES FROM VERTICAL IS PREFERRED). DUE TO THE VARIOUS MAST ARM STYLES USE THE ADJUSTABLE MOUNTING BRACKET IF REQUIRED (AS SHOWN HERE AND ON PAGE 1-4-23) TO MEET THE VERTICAL MOUNTING REQUIREMENT.

(4) ATTACH 120V SOURCE ON MULTIPLE STREETLIGHT HEAD WITH PHOTO CELL ADAPTER. OTHER WIRING NOT REQUIRED IF APPROVED BY JOINT USE AGREEMENT.

(5) ANTENNA MAY BE SINGLE WHIP (EXPOSED) OR RADOME PROTECTOR AS SHOWN.

(6) THE RADIO SHOULD BE LOCATED ON THE MAST ARM FAR ENOUGH FROM THE LIGHT FIXTURE TO ALLOW THE FIXTURE TO BE OPENED WITHOUT DISTURBING THE RADIO.

(7) REFER TO PAGE 1-23-306 FOR UG FUSED RECEPTACLE INSTALLATION.

(8) ANTENNA LOCATED ANY CLOSER THAN 40" TO THE POWER SUPPLY ZONE (WITHIN THE NEUTRAL ZONE) SHALL BE INSTALLED AND MAINTAINED BY QUALIFIED ELECTRICAL PERSONNEL UNDER THE DIRECTION OF [redacted] ANTENNA MOUNTED NEAR SECONDARY MUST BE LOCATED TO PROVIDE WORKING CLEARANCE FOR THE SECONDARY.

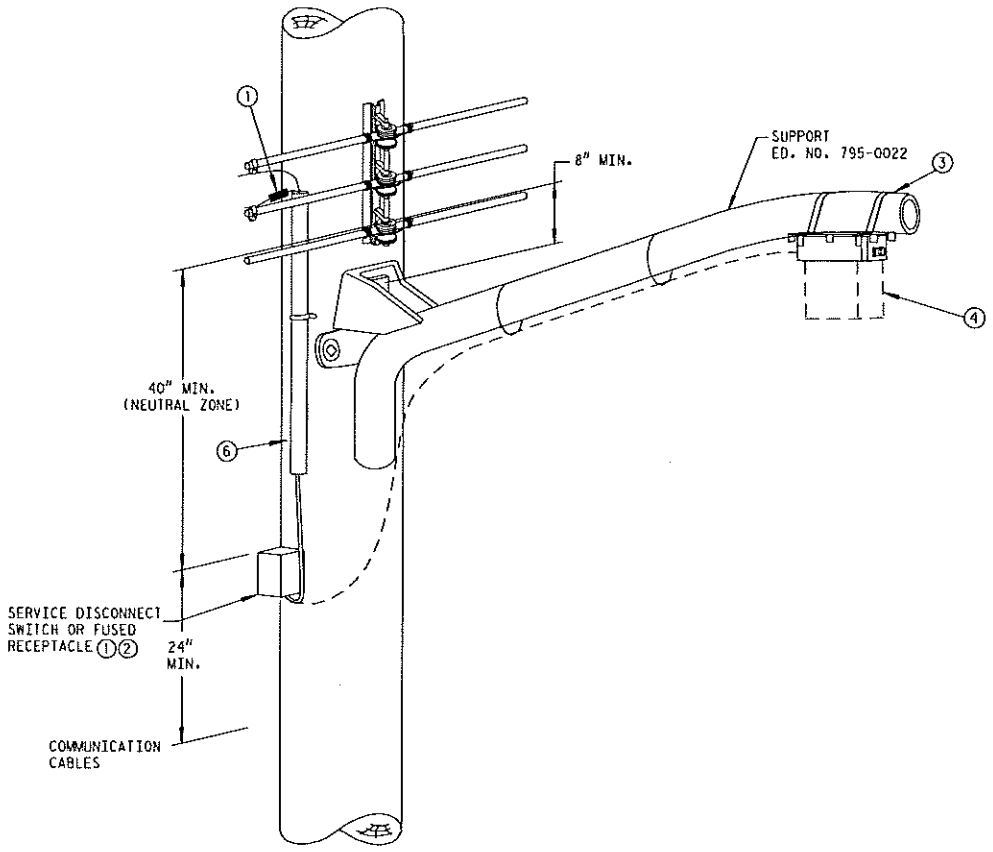
[redacted]

REPEATER RADIO ORNAMENTAL STREET LIGHT INSTALLATION

EXHIBIT 29

1-4-21	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-21

4-JOINT USE



DETAIL 421

1. THE SECOND PARTY WILL PROVIDE THE RADIO, WIRING AND SWITCH. ON INSTALLATIONS WHERE THE EQUIPMENT WILL BE INSTALLED BY QUALIFIED ELECTRICAL WORKERS PER A JOINT USE AGREEMENT, THE DISCONNECT SWITCH IS NOT REQUIRED. INSTALL INLINE FUSE IN SERVICE WIRE NEAREST TO SECONDARY, SIZED APPROPRIATELY FOR EQUIPMENT INSTALLED.
2. [redacted] CREW TO LEAVE SWITCH IN "OFF" POSITION.
3. MOUNT THE REPEATER RADIO SO THAT THE RADOME ANTENNA IS AS VERTICAL AS POSSIBLE (0-DEGREES FROM VERTICAL IS PREFERRED).
4. ANTENNA MAY BE SINGLE WHIP (EXPOSED) OR RADOME PROTECTOR AS SHOWN.
5. WHERE THERE IS INADEQUATE CLEARANCE TO INSTALL THE DISCONNECT SWITCH BETWEEN THE SECONDARY AND COMMUNICATION, THE DISCONNECT SWITCH CAN BE INSTALLED 24" BELOW THE COMMUNICATION CABLES TO PROVIDE WORKING CLEARANCE.
6. WIRES RUN VERTICALLY DOWN THE SURFACE OF THE POLE ARE TO BE COVERED WITH A U-GUARD OR MOLDING.
7. ANTENNA LOCATED ANY CLOSER THAN 40" TO THE POWER SUPPLY ZONE (WITHIN THE NEUTRAL ZONE) SHALL BE INSTALLED AND MAINTAINED BY QUALIFIED ELECTRICAL PERSONNEL UNDER THE DIRECTION OF [redacted] ANTENNA MOUNTED NEAR SECONDARY MUST BE LOCATED TO PROVIDE WORKING CLEARANCE FOR THE SECONDARY.

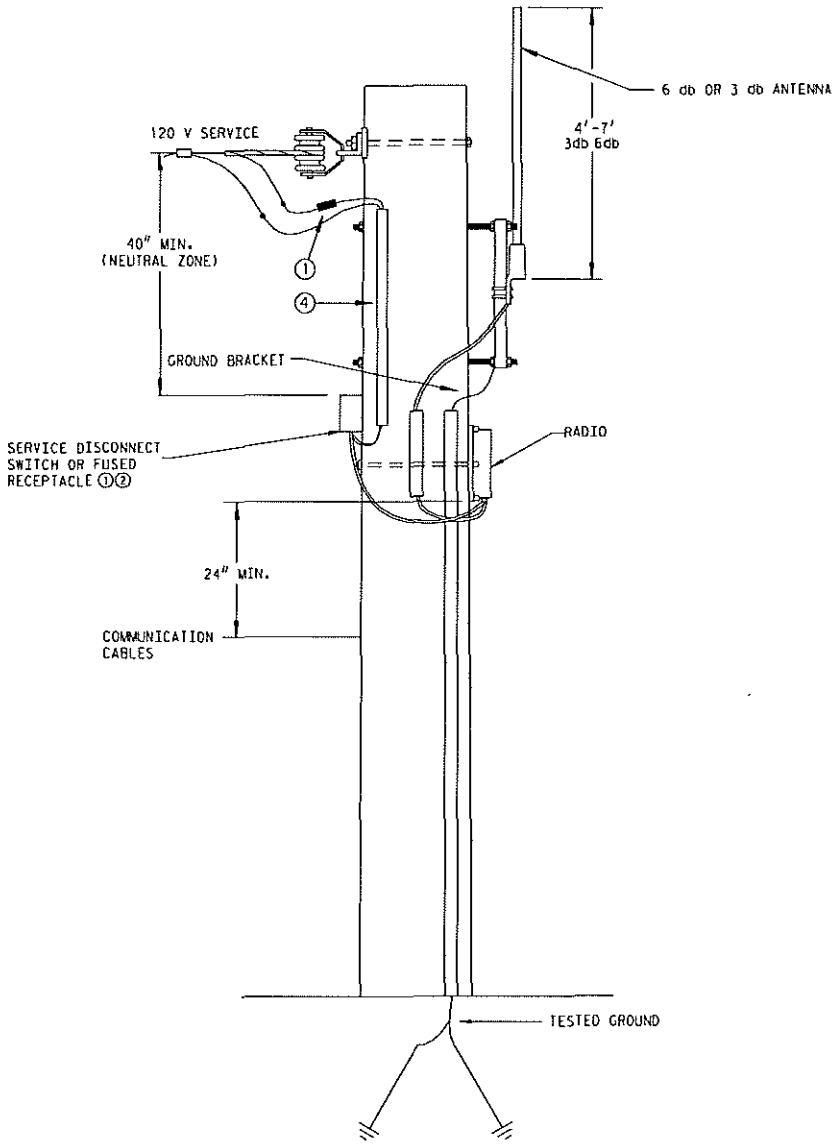
[redacted]

REPEATER RADIO WOOD POLE INSTALLATION
WITHOUT STREET LIGHT

EXHIBIT 30

1-4-22	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-22

4-JOINT USE



DETAIL 422

1. THE SECOND PARTY WILL PROVIDE THE RADIO, WIRING AND SWITCH. ON INSTALLATIONS WHERE THE EQUIPMENT WILL BE INSTALLED AND MAINTAINED BY QUALIFIED ELECTRICAL WORKERS PER A JOINT USE AGREEMENT, THE DISCONNECT SWITCH IS NOT REQUIRED. INSTALL INLINE FUSE IN SERVICE WIRE NEAREST TO SECONDARY, SIZED APPROPRIATELY FOR EQUIPMENT INSTALLED.

2. [redacted] TO LEAVE SWITCH IN "OFF" POSITION.

3. WHERE THERE IS INADEQUATE CLEARANCE TO INSTALL THE DISCONNECT SWITCH BETWEEN THE SECONDARY AND COMMUNICATION, THE DISCONNECT CAN BE INSTALLED 24" BELOW THE COMMUNICATION CABLES TO PROVIDE WORKING CLEARANCE.

4. WIRES RUN VERTICALLY DOWN THE SURFACE OF THE POLE ARE TO BE COVERED WITH A U-GUARD OR MOLDING.

5. ANTENNA LOCATED ANY CLOSER THAN 40" TO THE POWER SUPPLY ZONE (WITHIN THE NEUTRAL ZONE) SHALL BE INSTALLED AND MAINTAINED BY QUALIFIED ELECTRICAL PERSONNEL UNDER THE DIRECTION OF [redacted] EDISON. ANTENNA MOUNTED NEAR SECONDARY MUST BE LOCATED TO PROVIDE WORKING CLEARANCE FOR THE SECONDARY.

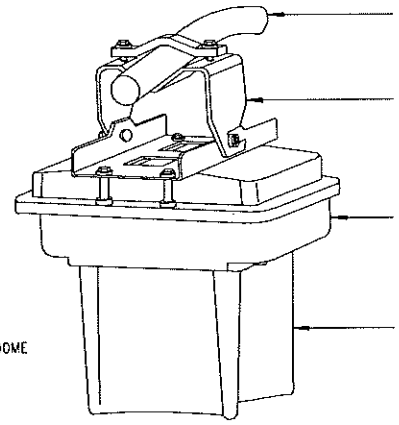
[redacted]

REPEATER RADIO
SERVICE POLE

EXHIBIT 31

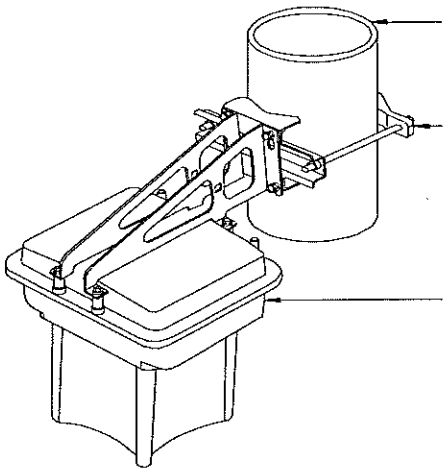
1-4-23	2000	LINE CONSTRUCTION STANDARDS	2000	1-4-23

4-JOINT USE



ADJUST THE RADIO ON THE BRACKET SO THAT THE RADOME POINTS DOWN VERTICALLY (I.E. PLUMB).

DETAIL 423A



DETAIL 423B

[redacted]

REPEATER RADIO
MOUNTING BRACKETS

EXHIBIT 32

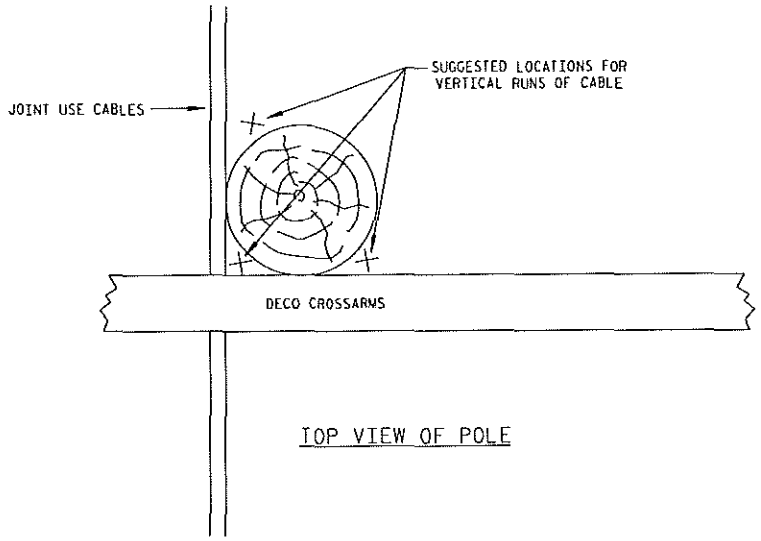
4-JOINT USE

COMMUNICATION ANTENNA

COMMUNICATION ANTENNAS CAN BE MOUNTED ON [redacted] OWNED POLES. THE LOCATION OF THE ANTENNA MAY BE IN ONE OF SEVERAL LOCATIONS ON A GIVEN POLE (SEE EXAMPLE SHOWN IN DETAIL 425). ANTENNA AND CABLES SHOULD BE LABELLED TO IDENTIFY THE OWNER.

ANTENNAS MOUNTED IN THE POWER SUPPLY ZONE (WITHIN 30" OF SECONDARY OR 40" OF PRIMARY) OR ABOVE ANY ELECTRICAL CONDUCTORS ON A POLE REQUIRE INSTALLATION AND MAINTENANCE BY BY QUALIFIED ELECTRICAL LINEMEN UNDER UNDER THE DIRECTION OF [redacted] ANTENNAS AND OTHER POLE-MOUNTED EQUIPMENT LOCATED IN THE COMMUNICATION ZONE ARE PERMITTED PROVIDED THEY DO NOT INTERFERE WITH OTHER EQUIPMENT ON THE POLES.

VERTICAL RUNS OF CABLE ON A POLE MUST BE COVERED WITH A U-GUARD OF ADEQUATE SIZE TO MECHANICALLY PROTECT THE CABLE LOCATED UNDERNEATH. THE CABLE SHOULD BE ROUTED DOWN A QUADRANT OF THE POLE (AS SHOWN IN DETAIL 424) TO PRESERVE THE CLIMBING QUADRANT ON THE POLE.



DETAIL 424

POLE MOUNTED ANTENNA CABLE ROUTING INSTRUCTIONS

1. ROUTE THE CABLES VERTICALLY DOWN THE POLE IN AN OPEN QUADRANT OF POLE (SEE DRAWING). PRESERVE AN OPEN VERTICAL QUADRANT ON THE POLE FOR CLIMBING SPACE AS SHOWN IN SECTION 11 OF THE OHL CONSTRUCTION MANUAL.
2. SUPPORT THE CABLES AT THE POLE TOP WITH KELLUM GRIPS SIZED FOR THE CABLES BEING INSTALLED.
3. FASTEN THE KELLUM GRIP TO THE POLE WITH A LAG SCREW OR BOLT OF APPROPRIATE SIZE TO SUPPORT THE WEIGHT OF THE CABLES.
4. COVER THE VERTICAL CABLES WITH A NON-METALLIC U-GUARD OF A SIZE NO LARGER THAN REQUIRED TO COVER THE CABLES.
5. LOCATE THE CABLES NO CLOSER THAN 3" FROM THE VERTICAL GROUND WIRE.
6. LOCATE CABLES NO CLOSER THAN 2" FROM ANY THROUGH BOLTS.

ANTENNA MOUNTING

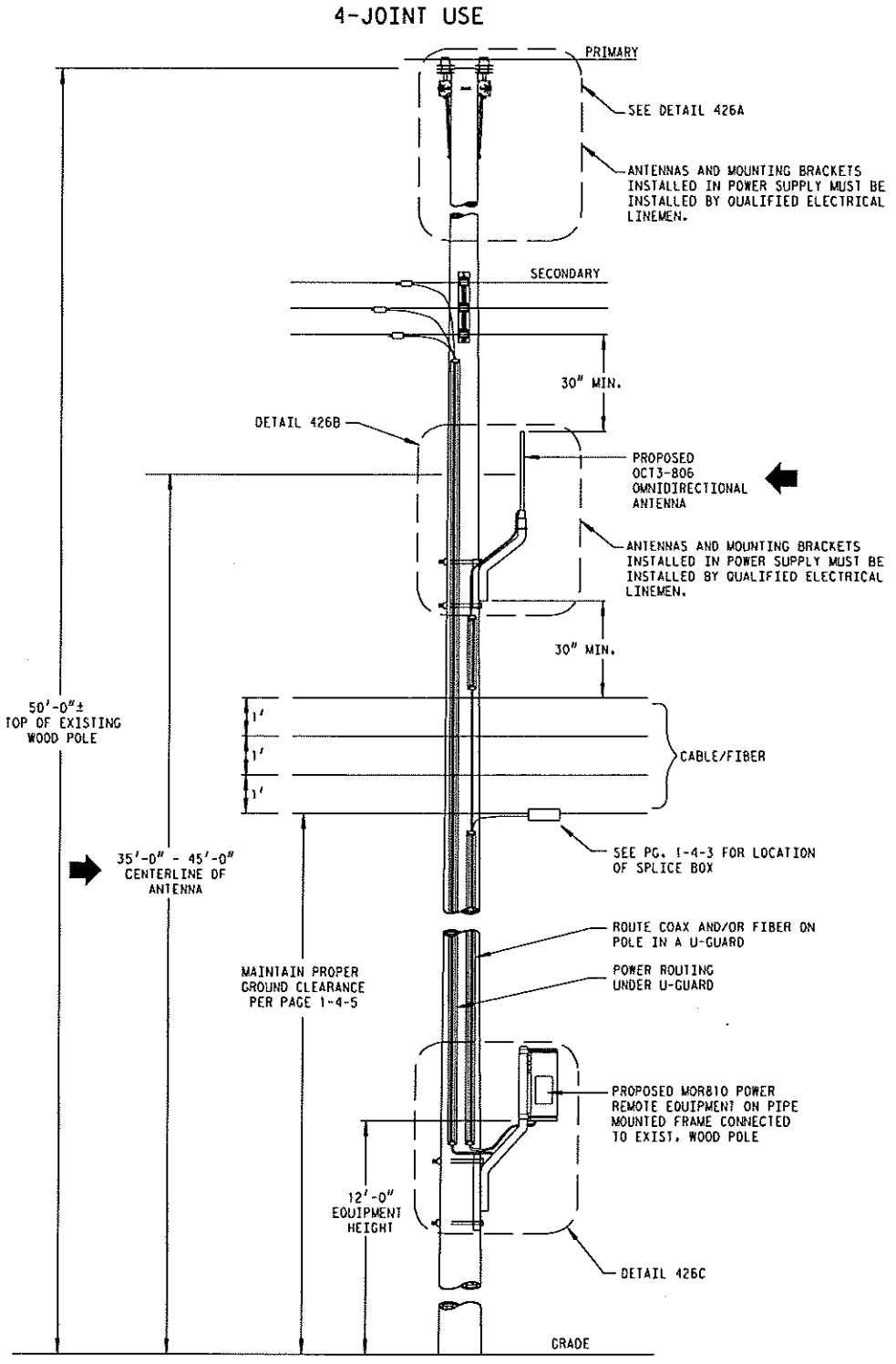
1. LOCATE ANTENNA OUTSIDE OF CLIMBING SPACE ON POLE.
2. LOCATE ANTENNA NO CLOSER THAN 30" FROM SECONDARY/NEUTRAL SUPPLY LINES.
3. LOCATE ANTENNA NO CLOSER THAN 30" ABOVE COMMUNICATION CABLES OR 40" BELOW COMMUNICATION CABLES.

[redacted]

COMMUNICATION ANTENNA

EXHIBIT 33

1-4-25	2003	LINE CONSTRUCTION STANDARDS	2003	1-4-25



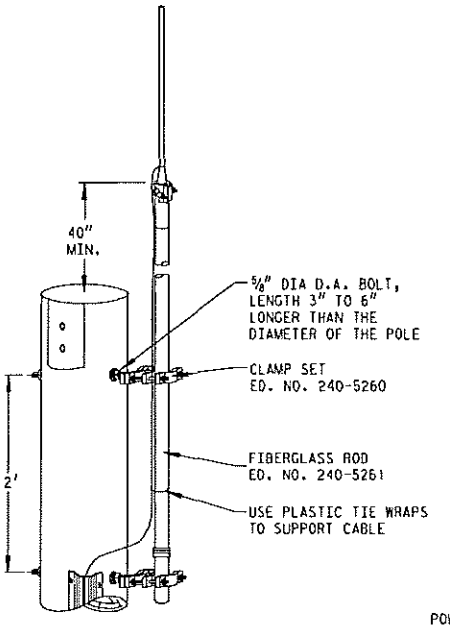
DETAIL 425 ELEVATION OF POLE WITH COMMUNICATION ANTENNA LOCATION OPTIONS

[redacted]

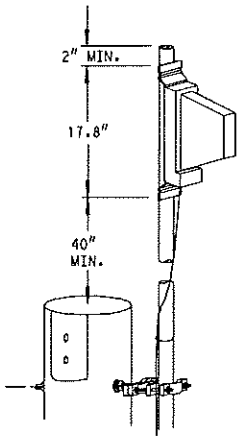
EXHIBIT 34

1-4-26	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-26

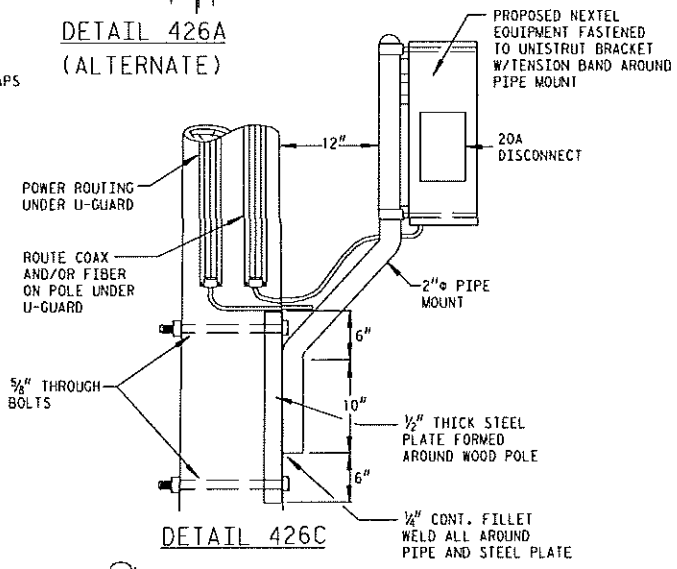
4-JOINT USE



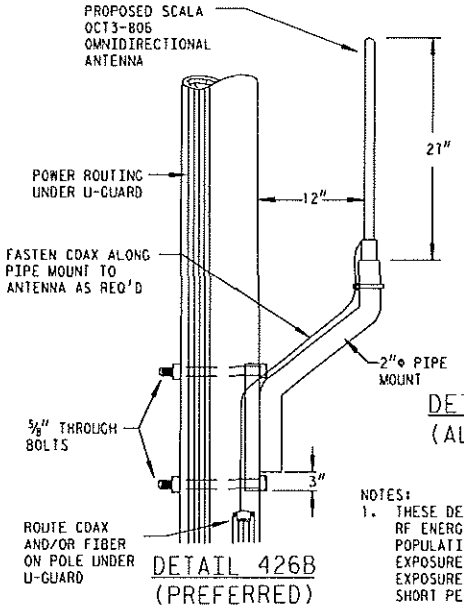
DETAIL 426A
(PREFERRED)



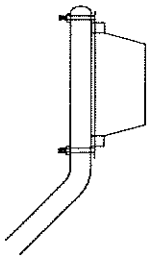
DETAIL 426A
(ALTERNATE)



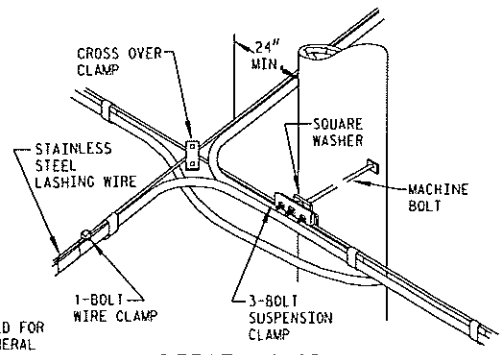
DETAIL 426C



DETAIL 426B
(PREFERRED)



DETAIL 426B
(ALTERNATE)



DETAIL 426D

NOTES:
1. THESE DETAILS HAVE BEEN REVIEWED FOR RF ENERGY LIMITS. THEY MEET GENERAL POPULATION LIMITS FOR CONTINUOUS EXPOSURE BEYOND 6" FROM EITHER ANTENNA. EXPOSURE LESS THAN 6" IS PERMISSIBLE FOR SHORT PERIODS (i.e. LESS THAN 30 MIN.)
2. ANTENNAS AND MOUNTING BRACKETS INSTALLED IN POWER SUPPLY ZONE MUST BE INSTALLED BY QUALIFIED ELECTRICAL LINEMEN.

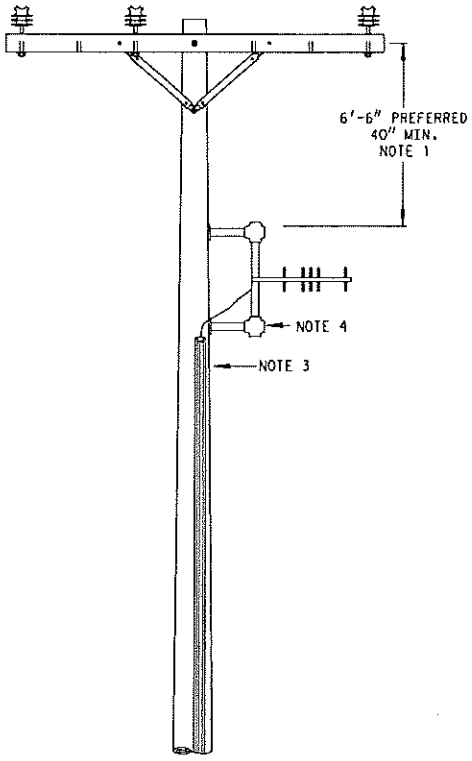
[redacted]

COMMUNICATION ANTENNA MOUNTING OPTIONS

EXHIBIT 35

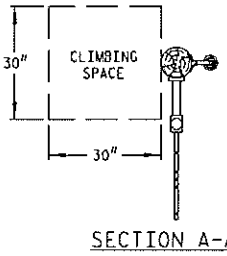
1-4-27	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-27

4-JOINT USE

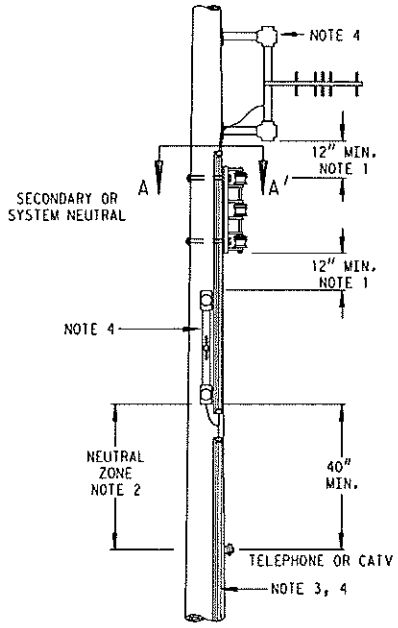


CLEARANCE FROM
PRIMARY VOLTAGE

DETAIL 427A



SECTION A-A'



CLEARANCE FROM
SECONDARY/SYSTEM NEUTRAL

DETAIL 427B

NOTES:

1. ANTENNA LOCATED ANY CLOSER THAN 40" TO THE POWER SUPPLY ZONE (WITHIN THE NEUTRAL ZONE) SHALL BE INSTALLED AND MAINTAINED BY [redacted] QUALIFIED ELECTRICAL PERSONNEL UNDER THE DIRECTION OF [redacted] ANTENNA MOUNTED NEAR SECONDARY MUST BE LOCATED TO PROVIDE WORKING CLEARANCE FOR THE SECONDARY.
2. A CLEAR NEUTRAL ZONE (MEASURED NO LESS THAN 40" VERTICALLY) MUST BE MAINTAINED ON JOINTLY USED POLES.
3. WHERE CABLES TRAIN VERTICALLY THROUGH THE NEUTRAL ZONE, A MINIMUM OF 2" CLEARANCE TO THE NEAREST COMMUNICATION CABLE IS REQUIRED AND THE ANTENNA CABLE SHALL BE COVERED WITH PLASTIC CONDUIT OR U-GUARD.
4. THE ANTENNA AND VERTICAL RUNS OF CABLE SHALL BE INSTALLED ON A QUADRANT OF THE POLE SUCH THAT A CLIMBING SPACE IS PRESERVED.
5. ANTENNA AND CABLES SHOULD BE LABELLED IDENTIFYING THE OWNER'S NAME AND PHONE NUMBER.
6. ANTENNA INSTALLED IN THE COMMUNICATION ZONE SHALL BE INSTALLED WITH A 12" VERTICAL SEPARATION FROM OTHER JOINT USE CABLES/EQUIPMENT.

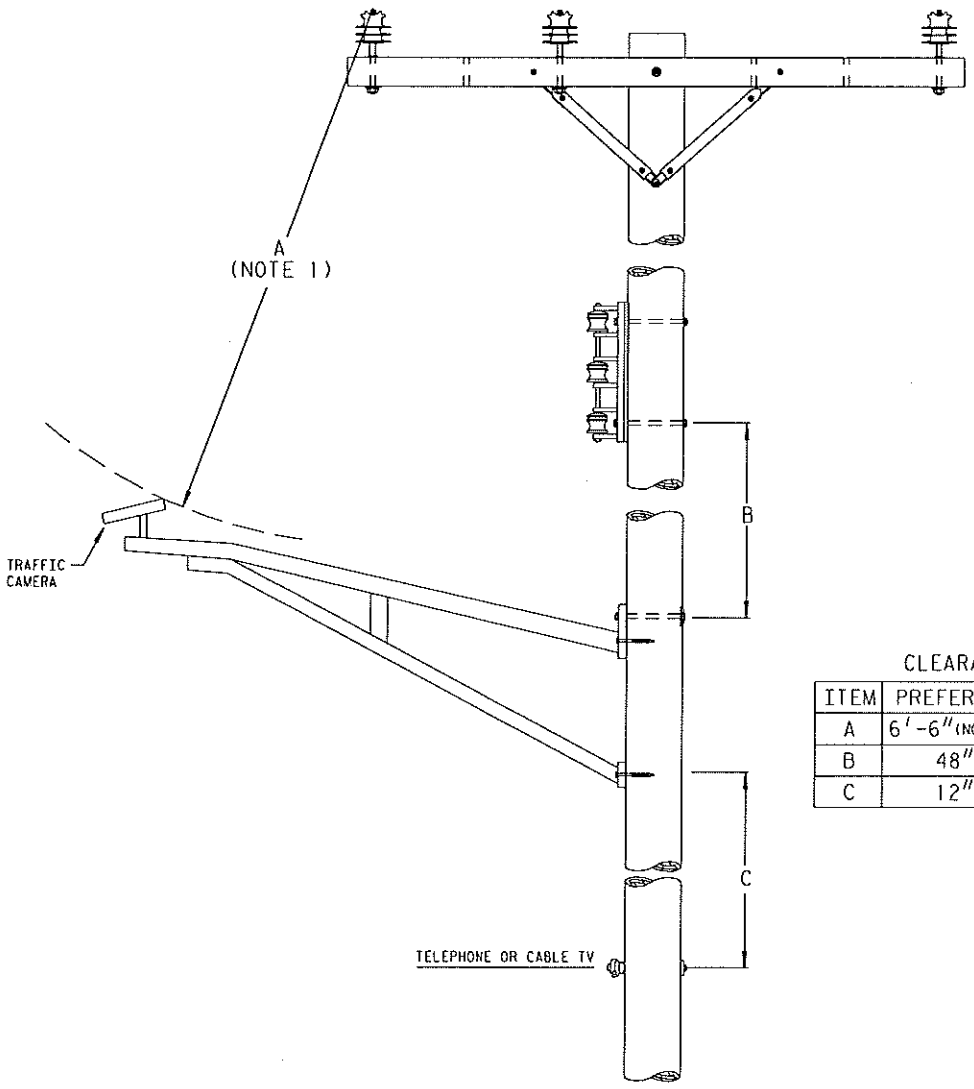
[redacted]

AUTOMATED TRAFFIC SIGNAL
ANTENNA CLEARANCES

EXHIBIT 36

1-4-28	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-28

4-JOINT USE



DETAIL 428

CLEARANCES

ITEM	PREFERRED	MINIMUM
A	6'-6" (NOTE 2)	40" (NOTE 3)
B	48"	40" (NOTE 3)
C	12"	12"

NOTES:

1. MIDSPAN CLEARANCE BETWEEN ELECTRIC CONDUCTORS AND A RIGID FOREIGN ATTACHMENT MUST ACCOUNT FOR VARIATION IN SAG OF THE CONDUCTOR DUE TO ICE, WIND, OR THERMAL SAG CONDITIONS.
2. WORKING CLEARANCE FOR ELECTRIC LINE MAINTENANCE.
3. NATIONAL ELECTRIC SAFETY CODE MINIMUM ALLOWABLE CLEARANCE.

MINIMUM CLEARANCE TO TRAFFIC CAMERAS AND SUPPORT ARMS

[redacted]

4-JOINT USE

(A) Cable Extension Brackets

Extension brackets can be used for the placement of cables on utility poles. These brackets can be installed anywhere on a pole provided the bracket or the cable(s) it supports doesn't violate code requirements specified by the NESC and also referenced in this manual for climbing space, clearances, and pole loading.

When used for communication cables the bracket must be placed in the communication zone on the pole (i.e. generally 40" below the electric supply zone). The prime benefit in the use of the bracket is to create a horizontal communication zone that requires less pole height than would be required for a vertical communication zone. This benefit allows the installation of cable(s) that otherwise couldn't be installed without replacing the existing pole with a taller pole to provide the required vertical clearances.

If used properly this bracket can be used to provide other benefits beyond those mentioned above. For example, this bracket can be used to create or preserve climbing space on a pole where existing cables are currently installed that block a climbing zone. The bracket can also be used as a means to reduce pole loading by keeping the cables inline with a lead when installed on a pole that is set slightly out of lead to provide clearance from an obstruction on the ground (i.e. curbs or sidewalks).

(B) Location of Extension Brackets on Poles

Generally for communication applications near vehicular accessible poles or leads the bracket should be installed on a pole between 18-1/2' to 23' above ground. For limited access areas, the bracket may be mounted lower on a pole provided the cable doesn't sag below the prescribed clearances referenced on page 1-4-5.

The bracket may be installed on a pole at heights other then those specified in the general case provided the calculated mid span clearances are met under worst case loading conditions. Regardless of mounting height, when the bracket is used for communication applications it must be installed 40" or greater from the electric supply zone. Placement of the bracket on a pole must take into account preservation of climbing space, clearances, and the loading impact associated with the bracket and cable(s).

On poles that have numerous cables installed vertically, the bracket should be located on the side of the pole opposite of the climbing zone unless the bracket is being used to offset the cables to create a 30" x 30" climbing zone♦ past the cables. In most cases, this will require the bracket to be installed on the side of the pole that has the majority of cables or the side where other extension brackets are installed.

On poles where no other communication cables exist, the bracket should be installed on the field side or the side opposite the roadway. See page 1-4-17 for climbing space requirements.

When the bracket is being installed for the sole purpose of adding new cable(s) to an existing pole, it should be installed in a location as to minimize the need to disrupt the existing facilities.

[redacted] *requirement per the JU agreements (NESC minimum requirement is a 24" x 24" climbing space in the communication zone)*

[redacted]

4-JOINT USE

(C) Placement of Cables on the Bracket

The bracket offsets the cable approximately 30" from the center of the pole when the cable is mounted in the inner most position on the bracket. The bracket has a horizontal slot capable of mounting two cables 13" apart (preferred) or mounting three cables 6-1/2" apart (alternate). To minimize the impact of loading on the pole, it is preferable to locate the lightest weight cable (i.e. the smallest or fiber optic type) in the outer most position. (See Book 3 for method of determining pole loading associated with the bracket and cables)

(D) Bonding Requirement

The bracket should be bonded when a pole ground is present on the pole. In such instances, there is no need to multi-ground the individual cables.

(E) Relocation of Cables to the Extension Bracket

Relocation of existing cables from a pole to a bracket should only be done when necessary to attain a defined benefit.

The bracket should be installed uniformly in height on poles in a lead along a given route. If in maintaining a uniform mounting height it is determined that the bracket be located adjacent to an existing cable(s) on a pole, the bracket should be mounted no closer than 4" from the existing mounting hole of an existing cable (see detail 431). If installation of the bracket blocks the 12" vertical working clearance below an existing cable on the pole, that cable should be relocated to the bracket in the inner most position to provide working clearance of 12" below the cable.

In all cases, when existing cables are installed or relocated to a bracket the clearances must be checked to confirm the cables do not violate code requirements as described elsewhere in this section of the manual.

(F) Transition Poles

In cases where zigzagging cable between poles is unavoidable, the cable should transcend gradually by use of a transition pole (a pole with no brackets) between the adjacent bracketed poles. The use of a transition pole is to reduce the pole loading due to the angle in lead created by the offset of the cables on the brackets.

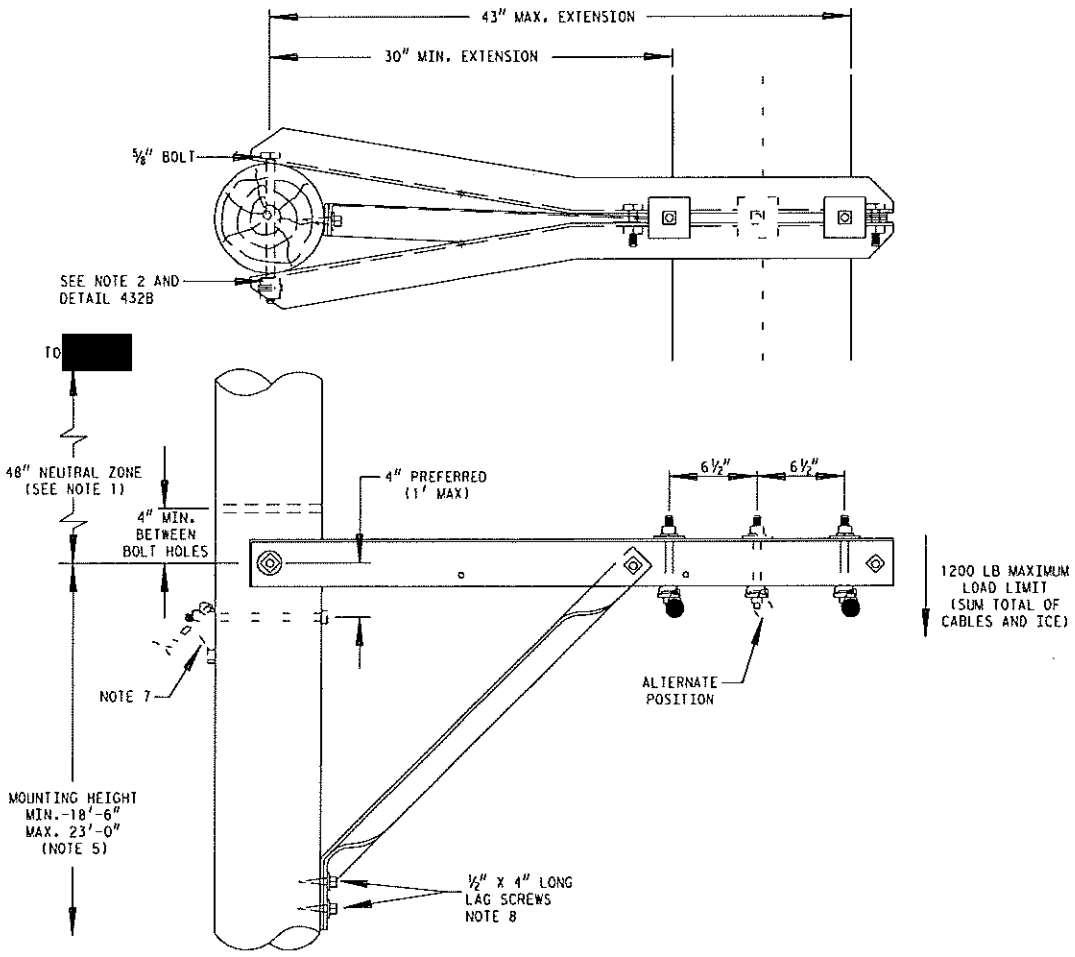
(G) Pole Loading Considerations

Cables located on an extension bracket exert an additional load component on the pole that must be accounted for in the design / evaluation of the pole. The cantilevered load from the cables introduces a moment couple that adds to the load at the groundline of the pole. Based on the extension bracket's strength limitations of a maximum vertical load of 1200 lbs (i.e. representing the maximum sum total of cables and ice), the moment created would be 4,500 ft-lbs. This moment should be added to the calculated groundline moment for a pole based upon NESC design conditions so that a pole can be appropriately evaluated or sized for the addition of the bracket and cable loads.

EXHIBIT 39

1-4-31	2002	LINE CONSTRUCTION STANDARDS	2002 R1	1-4-31

4-JOINT USE



CABLE EXTENSION BRACKET
DETAIL 431

NOTES:

1. NEUTRAL ZONE OF 48" PREFERRED (40" MINIMUM) MUST BE MAINTAINED FROM DECO ATTACHMENT TO COMMUNICATION CABLE EXTENSION BRACKET.
2. THE MOUNTING BOLT MUST NOT EXTEND MORE THAN 2" PAST THE RETAINING NUTS. (CUT OFF IF NECESSARY)
3. CABLE DATA PROVIDED BY JOINT USER.
4. INSTALL 2" (ED. NO. 243-0253) OR 3" (ED. NO. 243-0072) SQUARE WASHERS AS NEEDED TO BRIDGE GAP BETWEEN BRACKET.
5. THE MOUNTING HEIGHTS SHOWN ARE A GENERAL REQUIREMENT FOR THE MAJORITY OF CASES. EXEPTIONS ARE PERMITTED PROVIDED ALL THE CLEARANCE AND POLE STRENGTH REQUIREMENTS CAN BE MET.
6. FOR POLE DESIGN PURPOSES, A BRACKET AND CABLE(S) WILL INTRODUCE AN ADDITIONAL MOMENT OF 4,500 FT-LBS THAT MUST BE ADDED TO THE CALCULATED MOMENT ASSOCIATED WITH TRANSVERSE WIND LOADING. THE ADDED MOMENT SHOULD BE USED IN EVALUATING THE IMPACT OF ADDING A BRACKET TO EXISTING POLES OR DETERMINING NEW POLE REQUIREMENTS.
7. INSTALL GUY WIRE AND ATTACHMENT AS SHOWN WHEN REQUIRED TO BALANCE LOAD CAUSED BY ANGLE IN LEAD.
8. INSTALL ONE ½" DIA. THROUGH BOLT IN PLACE OF LAG SCREWS WHEN BRACKET IS EXPOSED TO UPLIFT DUE TO ELEVATION CHANGE IN CABLES.
9. WHEN A POLE GROUND IS PRESENT, GROUND THE BRACKET AT THE THROUGH BOLT AS SHOWN. USE 2-5/8" ROUND WASHERS, (ED. NO. 243-0257) AND A ⅝" NUT TO CLAMP THE #6 Cu GROUND WIRE ON THE BOLT. REFER TO DETAIL 432B FOR BONDING.

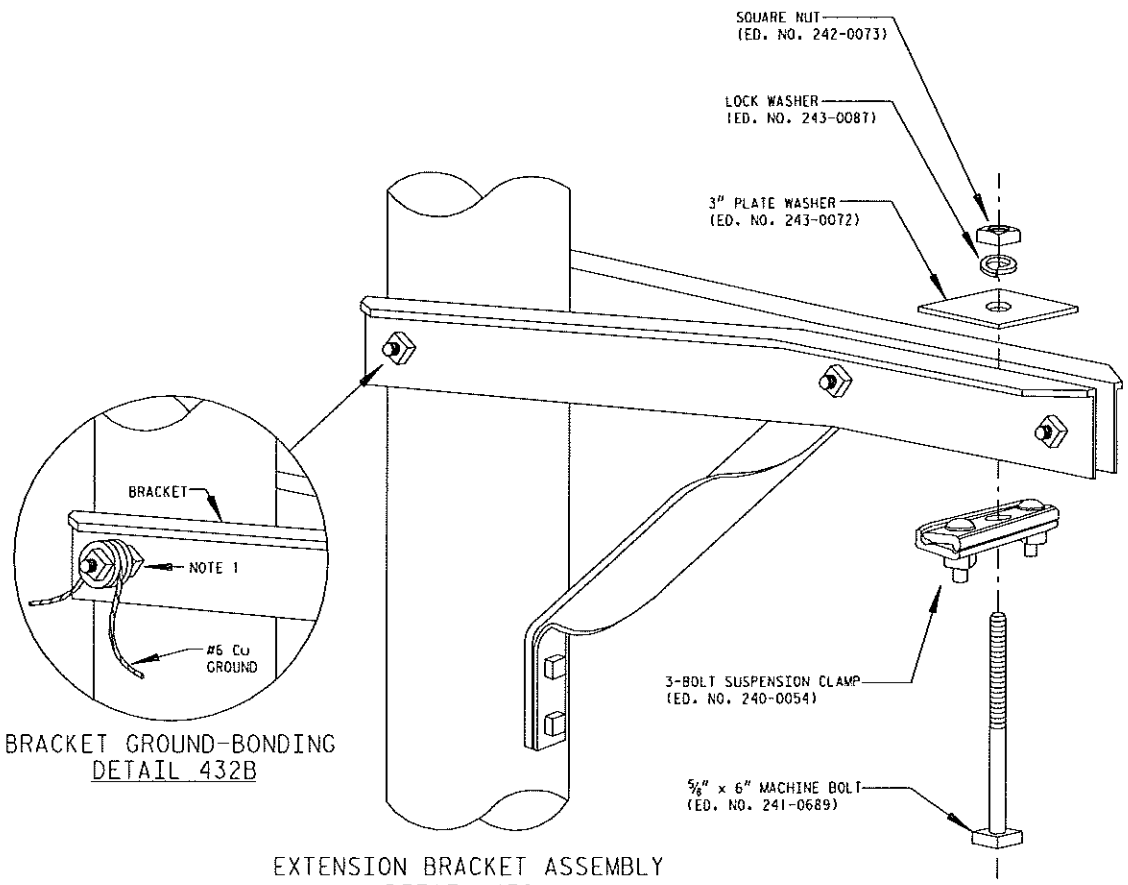
[redacted]

CABLE EXTENSION BRACKET

EXHIBIT 40

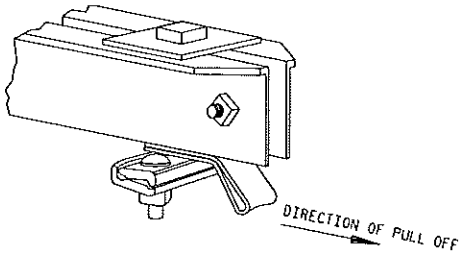
1-4-32	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-32

4-JOINT USE



BRACKET GROUND-BONDING
DETAIL 432B

EXTENSION BRACKET ASSEMBLY
DETAIL 432A



LOW TENSION CABLE
PULL OFF
DETAIL 432C

NOTE:
1. WHEN A POLE GROUND IS PRESENT, GROUND THE BRACKET AT THE THROUGH BOLT AS SHOWN. USE 2 - 5/8" ROUND WASHERS, (ED. NO. 243-0257) AND A 5/8" NUT TO CLAMP THE #6 Cu GROUND WIRE ON THE BOLT.
2. LOW TENSION PULL OFFS ARE TO BE CONSTRUCTED PER DETAIL 432C.

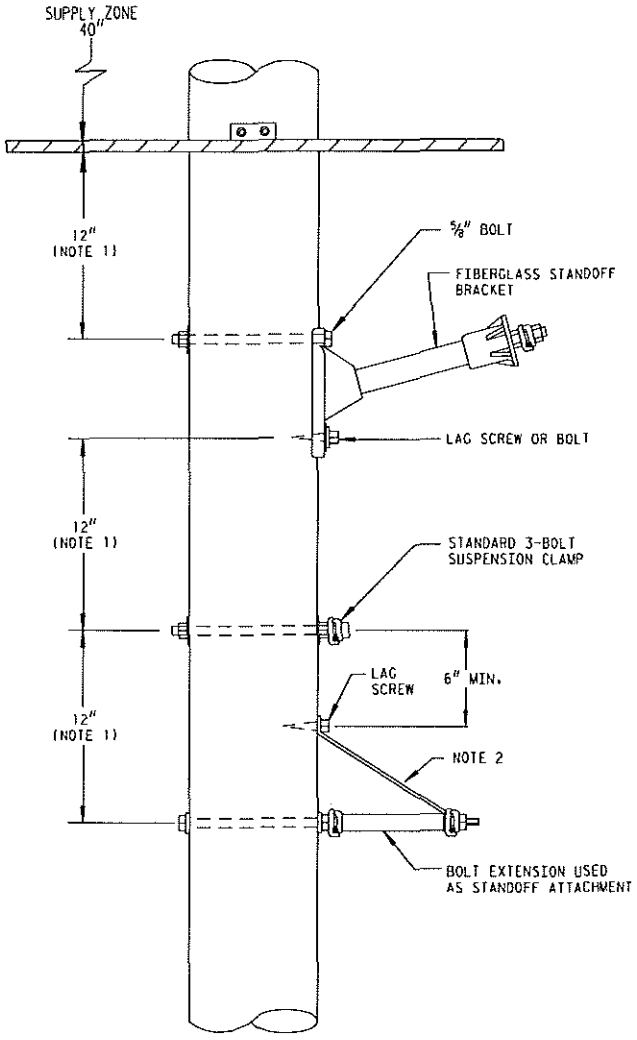
[redacted]

CABLE EXTENSION BRACKET

EXHIBIT 41

1-4-33	2002	LINE CONSTRUCTION STANDARDS	2002	1-4-33

4-JOINT USE



DETAIL 433

NOTES:

1. THE PREFERRED VERTICAL CLEARANCE IS 12" BETWEEN CABLES. A REDUCED MINIMUM CLEARANCE OF 6" IS PERMISSIBLE TO ATTACH NEW CABLES ON EXISTING POLES.
2. VERTICAL CLEARANCES OF CABLE ATTACHMENTS LOCATED HIGHER ON THE POLE ARE MEASURED FROM THE HIGHEST PIECE OF EQUIPMENT (EITHER THE CABLE OR BRACKET)
3. SUSPENSION STRANDS OR CABLES MUST BE ATTACHED TO THE POLE OR BRACKETS WITH BOLTS APPROXIMATELY SIZED FOR THE LOADS. LAG SCREWS OR J-HOOKS ARE NOT ALLOWED FOR CABLE ATTACHMENT TO POLES. (J-HOOKS ARE ALLOWED FOR SERVICE ATTACHMENTS)

[redacted]

TYPES OF ATTACHMENTS
AND CLEARANCE MEASUREMENTS

Attachment 2

CHARGES/TERMS OF PAYMENT
CLEARLINX NETWORK CORPORATION

[redacted]

1. POLES

[redacted]

2. CONDUIT SYSTEM

[redacted]

[redacted]

3. FEASIBILITY STUDY

[redacted]

4. MAKE READY CHARGES

[redacted]

[redacted]

5. INSPECTION

[redacted]

6. MISCELLANEOUS CHARGES

[redacted]

7. ESCALATION

[redacted]

8. TERMS OF PAYMENT

[redacted]

9. LATE PAYMENT

[redacted]

10. RATE INCREASES

[redacted]

Attachment 3

PROCESS AND CHARGES FOR CONDUCTING PERIODIC INSPECTION/CONSTRUCTION VIOLATION AUDIT JOINT USER

The purpose of [redacted] Periodic Inspection/Construction Violation Audit is to identify existing construction and safety violations created by third-party attachments to [redacted] poles. The inspection will include the entire plant, including all antennas, cables, repeaters, and associated hardware of JOINT USER and will result in the enforcement of safety and construction standards in accordance with the National Electric Safety Code (NESC), [redacted] Line Construction Standards and MPSC regulations. Inspections shall take place approximately once every three years; provided, however, EDISON reserves the right to conduct inspections more frequently if a pattern of safety violations has been shown to exist.

Joint User must reimburse [redacted] for the expense of all inspections, including overheads, as determined by [redacted]. Furthermore, [redacted] may require removal of Joint User facilities for non-payment of bills or for failure to fulfill their contractual obligations.

[redacted] policy for correcting violations is that the party who created the violation must correct the violation, if possible, or pay [redacted] to correct the violation. If it cannot be determined who created the violation, then the cost of correcting the violation will be allocated equally among all parties attached to the pole not including [redacted]

For reference purposes, specific sections of the [redacted] Line Construction Standards relevant to pole attachments are listed under Section D of Attachment 1 of the Pole, Conduit and Trench Use Agreement.

Periodic Inspection/Construction Violation Process

[redacted] personnel will manage the Periodic Inspection/Construction Violation Audit of the plant of Joint User. [redacted] or [redacted] contract personnel will conduct field work, record keeping, and documentation. Joint User will be given notification that [redacted] will conduct a Periodic Inspection/Construction Violation Audit of all Joint User equipment attached to [redacted] poles. Equipment includes, but is not limited to, the following:

Equipment

1. Thru bolt attachments
2. Dead End pole with down guy
3. L - Corner Pole with appropriate down guy(s)
4. Dead End pole with advanced guying
5. Angle pole with down guy attachment
6. Stand off bracket attachment
7. U-Guard attachment
8. Pole mounted power supply
9. Multiple services/J-hook attachment
10. Delayed pole pull
11. Over lashing
12. Antennas

A meeting will be held with Joint User's representatives to review the process, franchise areas, schedule, resource allocation and potential charges prior to the start of work. A plan for regularly scheduled meetings to review inspection findings may be mutually agreed to.

[redacted] will obtain Grid Maps and Outside Sales Product Maps from [redacted] Inter-Graphic Services for the franchise areas to be audited. Map processing fees will be charged to Joint User.

[redacted] will assign personnel to perform a field audit of each pole as indicated on the Outside Sales Product Maps. A record of all poles audited in the field will be maintained. Field personnel will document the violations and take a picture of each pole.

Upon written request by Joint User, a meeting may be scheduled to review the results of the Periodic Inspection/Construction Violation Audit, including the documentation and pictures.

Upon request by Joint User, [redacted] will provide written estimates for all work required to correct the violations. [redacted] or a [redacted] contractor will perform the work unless otherwise agreed to as noted below. If agreed to by [redacted], Joint User may perform some of the work required to correct their violations. Prior to any work being performed, [redacted] must be notified of the specific work to be performed and must approve any contractor hired by Joint User to correct the violations. Joint User is not allowed to move, or alter in any way, any other party's attachments on a [redacted] pole.

All work to be performed by Joint User must be started within 30 days of notification and must be completed within a time frame mutually agreed to by [redacted] and Joint User. Any work not started within schedule will be performed by [redacted] or a [redacted] contractor and billed to Joint User.

All work performed by Joint User or their contractor will be inspected by [redacted] or [redacted] contract personnel upon completion. Joint User will be notified of any sites that do not pass inspection. Joint User will be given a time frame in which to make necessary corrections. If corrections are not made within schedule, the work will be completed by [redacted] or a [redacted] contractor and billed to Joint User.

Periodic Inspection/Construction Violation Fees and Charges

- Inspection Fee

  The cost of this inspection will be the rate charged by EDISON or an EDISON-approved contractor, including EDISON overheads and administrative charges which will be charged to cover the inspection of JOINT USER's entire plant. The Inspection Fee includes the labor cost of Area Leaders, Field Personnel and Administrative and Clerical Support Staff plus associated overheads including travel and living expenses, material, equipment and supplies.

  Each invoice will identify the geographical area audited and include back-up documentation identifying the X/Y Coordinates of each pole audited, number of attachments and number and type of violations found.

- Map Processing Fee

  A flat fee per Outside Sales Product Map currently at the rate of [redacted] per map will be charged to JOINT USER. The cost of the maps are subject to change by Inter-Graphic Services. Grid Maps will be invoiced at an additional charge. Joint User will be invoiced for Map Processing Fees by Inter-Graphic Services based on the actual number of maps produced for the Periodic Inspection/Construction Violation Audit.

- Cost of Work Required to Correct Violations

Joint User will be charged the Accounts Receivable cost for specific job tasks as each job is designed. The estimated charges for all work to be performed by [redacted] or a [redacted] contractor will be payable up-front by Joint User.

Upon completion of all work, including post-inspection, and review of as-built construction information, Joint User may be required to pay an additional amount to [redacted] if the actual cost of the work exceeded the up-front payment to [redacted] or [redacted] may credit Joint User when the up-front payment exceeded the actual cost of the work.

Upon request by Joint User, an escrow account may be established for the deposit of funds to cover the estimated cost of all work to be performed in order to minimize the administrative burden of issuing multiple checks. The amount required will be mutually agreed to at the start of work and monitored on an ongoing basis.

Attachment 4

Work As A Contractor

"Work As A Contractor" is any work performed by [redacted] or a [redacted] contractor for Joint Use and Attaching Party Customers.

[redacted] will send the customer a Monthly Summary Report. This report indicates all work performed by [redacted] for that month, as noted below. At that time, the Customer will have thirty days in which to dispute any charges that are on the summary report. The summary report is not a bill, but only a report of work performed by [redacted] for the Customer for that month. The Customer will also receive a monthly invoice.

1. Monthly Summary Report

The Customer will receive a Monthly Summary Report. This is only a summary report and not an invoice. This report will indicate the work that was performed on behalf of the Customer by [redacted] or a [redacted] contractor. The report will include the following:

- RFW and COH number
- Address/location
- Actual task performed
- Price per unit
- Service Center where work was completed
- Sketch of job

Upon receipt of the above information, the Customer has the ability to verify the work that [redacted] has reported it has performed. The Customer has thirty days to verify that the work described in the Monthly Summary Report was performed and to notify [redacted] of any discrepancies or objections to the Monthly Summary Report. Whether the dispute resolution results in either a debit or credit, your account will be adjusted accordingly. See Exhibit 1 to this Attachment. Failure to report any discrepancies or objections to the work performed as stated in the Monthly Summary Report conclusively establishes that the work was performed as stated in the Monthly Summary Report and is satisfactory to the Customer.

2. Pole Report

[redacted] may provide a report to the Customer of pole sales, new pole installations, pole removals, and salvaged top cuts. The Pole Report is then attached to the Monthly Summary Report.

3. Monthly Invoices

The Customer will be invoiced on a monthly basis. Monthly invoices will accompany the Monthly Summary Report for actual tasks/work performed. In some cases the address for the Monthly Summary Report and the invoice address may be different. If the address for the Monthly Summary Report is different than the invoice address, a copy of the invoice will accompany the Monthly Summary Report. Payment of each invoice is due within thirty days of the invoice date.

5. Actual Task Pricing List

A pricing list, currently updated, is available upon request by the Customer for Non-Material Labor Units for Foreign Contacts. [redacted] shall have the right to unilaterally amend or change the tasks and pricing.

6. Amendments

[redacted] shall have the right to unilaterally amend or change its billing process.

EXHIBIT 1

JOINT USE "WORK AS A CONTRACTOR"

DISCREPANCY FORM

THIS FORM MUST BE RECEIVED BY [redacted] WITHIN 30 DAYS OF THE INVOICE DATE AND MONTHLY SUMMARY REPORT.

To report a discrepancy found on your Monthly Summary Report:

1. Please identify and provide a brief explanation below.

2. Include your name, company name, complete address and phone number with area code.

3. Attach Monthly Summary Report sheet which shows discrepancy along with the relevant sketch and mail to us at the address shown below:

[redacted]

4. Sign and date this form in the space provided.

Signed:

Date:

[redacted]

[redacted]

POLE ATTACHMENT AGREEMENT

between

[redacted]

and

EXTENET SYSTEMS, INC.

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POLE ATTACHMENT AGREEMENT

THIS AGREEMENT ("Agreement") is made Sep. 4, 2007, between [redacted], with its principal place of business located at [redacted] ("[redacted]") and ExteNet Systems, Inc., with its principal place of business located at [redacted], [redacted] ("Attacher"), each a "Party" and together, the "Parties".

Introduction. [redacted] is in the business of providing electrical service within its service area, and, for that purpose, installs and maintains distribution poles. Attacher desires to use the [redacted] distribution poles to support certain cables, antennas and/or other equipment of Attacher, and [redacted] desires to accommodate Attacher, consistent with the law, [redacted] service obligations and the terms of this Agreement. The Parties desire to set forth general attachment principles and provide a process by which [redacted] may license use of specific poles by Attacher. The Parties also desire to set out their agreement for use of procedures set forth in the [redacted] Pole Attachment Guidelines and Procedures (the "Guidelines").

[redacted] and Attacher, in consideration of the premises and other valuable consideration, agree as follows:

1. TERM

The initial term of this Agreement shall be five years ("Initial Term"), commencing on the Effective Date. Upon written notice of intent to renew by Attacher no less than 12 months before the end of the Initial Term, the Parties shall negotiate in good faith an extension of the Initial Term for a period of no more than five years. (The Initial Term and any renewal terms are herein collectively referred to from time to time as the "Term").

2. INSURANCE AND BONDING

Notwithstanding any other terms or provisions hereof, this Agreement shall not become effective until Attacher has fulfilled those specific financial and insurance requirements outlined in Appendix I or revisions thereof. Attacher shall provide annual certification of continued coverage in compliance with Appendix I or revisions thereof in a form satisfactory to [redacted]

3. POLE LICENSING

a. Attachments. This Agreement shall apply with respect to the following cables, antennas, and/or other equipment of Attacher:

i. Cable Television System Attachments. Any fiber optic cable, coaxial cable, the cable and wires connected to such fiber optic cable and coaxial cable, and any and all supporting cable used by cable television operators providing cable services ("Cable Attachments"), as may be more fully described in the Guidelines;

i. Telecommunications Service Attachments. Any fiber optic cable, coaxial cable, the cable and wires connected to such fiber optic cable and coaxial cable, and any and all supporting cable used to provide telecommunications service as defined in Section 153(51) of the Communications Act of 1934 (the "Act") ("Telecommunications Attachments");

ii. Antenna Attachments. Antennas and supporting equipment, including, but not limited to batteries, conduits and boxes for power supply and other purposes, support mounts and structures, radio access nodes, accessory equipment including associated hardware, the cables and wires connecting antennas to accessory equipment on the same pole, electronic equipment shelters and all property within such shelters, pedestals supporting equipment cabinets or panels, and other necessary communications equipment (collectively, "Antenna Attachments"), whether or not constituting part of a telecommunications service as defined in Section 153(51) of the Act; and

iii. Other Attachments. Any fiber optic cable, coaxial cable, the cable and wires connected to such fiber optic cable and coaxial cable, and any and all supporting cable, and any wire, box or equipment of any kind that is attached to a distribution pole of [redacted] and that is not described in paragraphs (i), (ii) or (iii), above ("Other Attachments").

iv. "Attachments" shall refer to all Cable Attachments, Telecommunications Attachments, Antenna Attachments and Other Attachments.

b. Guidelines. Except as provided in Subsection 2(e) below, before making any attachment to the poles of [redacted] Attacher shall make written application for permission to do so in accordance with the Guidelines as shall be in effect at the time such permission is required. In the event of conflict between the terms of the Guidelines and the terms of this Agreement, the terms of the Guidelines shall prevail. The Guidelines shall be accessible at all times through the general website of [redacted] It is Attacher's responsibility to ensure that it is operating in compliance with current Guidelines at all times.

c. Grant of Permission. Within 45 days after receipt of an application in satisfactory form, [redacted] shall notify Attacher in writing whether [redacted] will permit the use by Attacher of the pole or poles sought to be used and any conditions imposed on the installation or use of Attachments. [redacted] shall have the sole right to determine the availability of space on or in any such pole for use by Attacher and shall be under no obligation to grant permission for its use by Attacher, provided that such permission shall not be unreasonably withheld or delayed. If such permission is granted, and after [redacted] has determined that the Attachment has been installed in accordance with the approved application, [redacted] will issue to Attacher, for each approved application for use of a particular pole, a license ("Site License"), and Attacher shall have the right to use such pole in accordance with the terms of this Agreement and any other terms as may be agreed upon by the Parties at such time. Attacher shall not attach nor have attached any item to any pole without the written approval of [redacted] as provided in this Agreement.

d. Non-Exclusive and Limited Use; No Property Interest. The right granted to Attacher hereunder is a non-exclusive right to use poles. Nothing herein shall be construed as affecting the rights or privileges previously conferred by [redacted] or by law to others not party to this Agreement. Except as otherwise specifically provided, nothing herein shall be construed to give Attacher the right to grant any right under this Agreement to any other person without the written consent of [redacted] and [redacted] alone shall have the right to grant and extend such rights and privileges. The right herein granted shall at all times be subject to such previously conferred privileges. The Parties agree that [redacted] in granting permission hereunder to Attacher, in no way purports to grant to Attacher an interest in any property, but only grants Attacher the right, subject to the provisions of this Agreement, to attach to [redacted] poles. Attacher shall in all cases be entirely responsible for obtaining consent, where necessary, from landowners and governmental entities involved.

e. Service Drops. Attacher shall have the right to attach service drop cables to unlicensed poles for the purpose of providing service to Attacher's customers on an as-required basis, provided that the service drop is an extension of a previously-licensed Cable Attachment or Telecommunications Attachment installation. Attacher shall make installations and shall submit a written application for a Site License in accordance with the Guidelines within ten days of making any such service drop attachment. If Attacher fails to submit a license application for a service drop attachment in accordance with this Section 2(e), the attachment will be treated as an unauthorized attachment in accordance with Section 5. [redacted] reserves the right to reject any service drop application if subsequent review demonstrates that the installation does not comply with applicable attachment requirements.

f. Notice of Telecommunications Service. Attacher shall notify [redacted] within 30 days following Attacher's commencement of providing telecommunications services using attachments to [redacted] poles in accordance with Federal Communications Commission ("FCC") requirements. Failure to notify [redacted] of the commencement of such activity does not preclude [redacted] ability, upon discovery of such activity, to collect the annual pole attachment fee for telecommunications attachments in accordance with the applicable formula provided in Appendix II, retroactively to the date such activity began.

4. FEES AND CHARGES

a. General. [redacted]

b. Cable Attachments and Telecommunications Attachments. [redacted]

c. Antenna Attachments and Other Attachments. [redacted]

d. New Attachments. [redacted]

e. Fee Increase and Rate Changes. [redacted]

f. Other Fees. [redacted]

g. Payment of Attachment Fees and Service Fees. [redacted]

[redacted]

[redacted]

h. Payment of Other Fees. [redacted]

[redacted]

5. UNAUTHORIZED ATTACHMENTS

a. Treatment of Unauthorized Attachments. Attacher shall not make attachments to [redacted] poles without a Site License as provided herein; provided, however, if attachments are made without permission, such attachments shall be subject to the terms and conditions of this Agreement. Where Attacher makes attachments to the poles of [redacted] without permission, [redacted] shall have the right to impose, and Attacher hereby agrees to pay, upon written notice from [redacted] a charge of [redacted] per unauthorized Cable Attachment or Telecommunications Attachment or [redacted] per unauthorized Antenna Attachment or Other Attachment, as applicable, plus a charge equal to the total of the annual attachment fees and service fees, where applicable, for the number of years since the most recent inventory or the preceding five years, whichever is less, per unauthorized attachment, plus interest, which will be calculated using the applicable interest rate for federal tax refunds and additional tax payments as determined by the Internal Revenue Service for the period in question. Payment shall be due and payable as provided in Section 4.

b. Removal of Unauthorized Attachments. In addition to seeking payment as provided herein, [redacted] may, at its sole discretion, upon 60 days' written notice, require Attacher to remove unauthorized Attachments or Attachments with respect to which Attacher has failed to pay pole rental and/or service charges and other undisputed charges. SHOULD ATTACHER FAIL TO REMOVE ITS ATTACHMENTS WITHIN 60 DAYS AFTER RECEIPT OF SAID NOTICE, [redacted] OR [redacted] CONTRACTOR MAY REMOVE AND DISPOSE OF THEM AT ATTACHER'S EXPENSE WITHOUT ANY LIABILITY WHATEVER FOR SUCH REMOVAL AND/OR DISPOSAL OR THE MANNER OF EFFECTING SUCH REMOVAL AND/OR DISPOSAL, FOR WHICH EXPENSE [redacted] MAY INVOICE ATTACHER AND BE PAID AS PROVIDED IN SECTION

4. Such removal and/or disposal demand and rights to remove and dispose of Attachments are referred to herein as "Removal Rights."

c. Overlashing. Attacher shall not overlash or permit a third party to overlash Attacher's cable without giving notice to [redacted] of such overlashing within 30 days following any overlashing. Where Attacher fails to notify [redacted] within 30 days of an overlashing, [redacted] shall have the right to impose, and Attacher hereby agrees to pay, upon written notice from [redacted] a charge equal to [redacted] per overlashed attachment per pole per year, pro-rated according to the number of whole months remaining in the calendar year. Payment shall be due and payable as provided in Section 4. All such overlashings shall be performed in compliance with the National Electric Safety Code and other generally applicable safety codes and will be subject to inspection as prescribed in the Guidelines following notification by Attacher of the overlash. Should CenterPoint so choose, [redacted] or [redacted] contractor shall conduct a pole loading study for any or all of the poles on which an overlash has been placed. The cost of any pole loading studies performed as a result of the placement of an overlash will be borne by Attacher. Loading studies shall be performed by a Professional Engineer licensed to do business in the State of Texas. Where the inspection or pole loading study determines that as a result of the overlash the pole has become overloaded, Attacher shall make all necessary replacements, repairs or adjustments to its overlash or its third company overlash, as provided in Section 8. Under no circumstances or conditions shall any Antenna Attachment be overlashed.

d. No Liability. IN THE EVENT THAT [redacted] REASONABLY SHALL TAKE ANY OR ALL ACTIONS DESCRIBED IN THIS SECTION 5, [redacted] SHALL INCUR NO LIABILITY TO ATTACHER, AND ATTACHER SHALL BE LIABLE FOR ALL EXPENSES, INCLUDING ATTORNEYS' FEES, REASONABLY INCURRED BY [redacted] AND ALL DAMAGE SUFFERED BY [redacted] AND OTHER COMPANIES OR AS A RESULT OF [redacted] PURSUIT OF SUCH ACTIONS. THE REMEDIES PROVIDED HEREIN ARE CUMULATIVE AND IN ADDITION TO ANY OTHER REMEDIES AVAILABLE TO [redacted] UNDER THIS AGREEMENT OR OTHERWISE.

6. POLE COUNTS AND SAFETY AUDITS

In order to ensure that Attacher's physical contacts on [redacted] poles conform to applicable safety standards, a safety and/or compliance audit shall be made upon all of Attacher's Attachments to [redacted] poles, or if the Parties agree, a sample of Attacher's Attachments to [redacted] poles, upon request of either Party, but not more than once during any five-year period, upon 90 days advance written notice to the other Party, provided, however, following the occurrence of a Force Majeure event, as defined in Section 16(i), [redacted] shall have the right to audit any and all of Attacher's Attachments affected by such occurrence for conformance with applicable safety standards within 90 days of such occurrence, and provided further that [redacted] shall have the right to audit a sample of Attacher's Antenna Attachments or Other Attachments at any time for compliance with applicable safety standards. All safety and/or compliance audits will be limited to ascertaining Attacher's compliance or non-compliance with applicable safety standards. The cost of any safety and/or compliance audit will be borne by Attacher.

In order to ensure the accuracy of the inventory of Attacher's Attachments on [redacted] poles, a joint identification audit (or other method reasonably determined by [redacted] shall be made upon all of the [redacted] poles to which Attacher is attached, or, should [redacted] so choose, a sample of the poles bearing Attacher's Attachments, not more than once during any five-year period, upon 90 days advance written notice to Attacher. The cost of the joint identification audit shall be borne by CenterPoint. Should Attacher seek to conduct its own inventory of its physical contacts on [redacted] poles, Attacher shall conduct such audit at its own expense, unless the Parties agree otherwise.

7. RIGHTS-OF-WAY and SPECIFIC INDEMNITY

[redacted] shall not obtain or negotiate rights-of-way for the benefit of Attacher, and no guaranty is given by [redacted] of permission from property owners, municipalities or others ("Right-of-Way Owners") for the use of rights-of-way by Attacher. Attacher shall not attach Cable Attachments or Telecommunications Attachments to any [redacted] pole or structure in any place where Attacher does not have permission, license, right-of-way or other right authorizing Attacher's presence in such place, and in no event shall Attacher place an Antenna Attachment or Other Attachment on a pole located in any place other than a public road right-of-way. Attacher shall conform to the insurance requirements of the Right-of-Way Owners and provide [redacted] with proof of conformance in the form a copy of the Certificate of Insurance provided to the Right-of-Way Owners. IN ADDITION TO ANY OTHER INDEMNITY PROVIDED IN THIS AGREEMENT, ATTACHER INDEMNIFIES AND SHALL HOLD [redacted] HARMLESS AGAINST ANY CLAIM, LOSS OR DAMAGE ARISING FROM THE UNAUTHORIZED OR ALLEGEDLY UNAUTHORIZED PRESENCE OF ATTACHER IN A RIGHT-OF-WAY. If Attacher is denied or is unable to obtain consent or license from a Right-of-Way Owner that will permit Attacher to maintain its Cable Attachments or Telecommunications Attachments on [redacted] poles in the subject right-of-way, Attacher shall remove any attachments in such right-of-way, and, upon Attacher's failure to do so, [redacted] may invoke the Removal Rights described in Section 5 with respect to all such Attachments, unless Attacher has initiated appropriate legal action to establish its rights or is otherwise engaged in good faith efforts to obtain any necessary rights.

8. CONSTRUCTION AND MAINTENANCE REQUIREMENTS AND SPECIFICATIONS

a. Plans and Approval. Design, construction and installation practices for Attachments and Attacher's installation thereof shall be made in accordance with the Guidelines and in any applicable Appendix to this Agreement and shall be approved by CenterPoint in writing before any construction or installation of Attachments. [redacted] approval thereof shall not be unreasonably withheld or delayed.

b. Make-ready. If [redacted] determines, at its sole discretion, that a modification or "make-ready" is needed before one or more of its poles can be used by Attacher, then the Attacher shall pay [redacted] in advance the estimated cost of such modifications. Prior to commencement of any work, [redacted] shall provide Attacher with a written scope of work, estimate of the commencement and completion dates for the make-ready work and an estimate of the costs for the make-ready work to be performed by [redacted] on the structure(s). If

Attacher does not accept the scope of work and estimate within 30 days after receipt, [redacted] may at anytime thereafter deem Attacher's application for that distribution pole withdrawn. [redacted] shall have the option of billing Attacher for the actual costs for the work performed by [redacted]

Prior to installation of any new Antenna Attachment on a [redacted] pole, Attacher shall, if in [redacted] reasonable judgment determines is required, pay the cost of either: (1) the replacement of an existing pole with a new pole that is of height and strength sufficient to provide safe and efficient use of such pole by [redacted] preexisting attachers and Attacher, including space reasonably projected as needed for future use by [redacted] or, with the prior approval of [redacted] (2) the installation of a new in-line pole that is of height and strength sufficient to provide safe and efficient use of such pole by [redacted] and Attacher, including space reasonably projected as needed for future use by [redacted] In the case of a pole replacement, Attacher shall pay CenterPoint a sum equal to the actual cost of the new pole and associated installation costs plus the cost of removal of the existing pole, if any, minus the salvage value of the removed pole. Attacher also shall pay to [redacted] and the respective existing communications companies (A) the cost of removing all such companies' attachments from the pole and reestablishing the same or like attachments on the newly-installed pole, with appropriate salvage credit allowance for any Attachments which are not reused in such replacement; and (B) the cost of installing any new or additional attachments required solely because of the installation of such new pole. The new pole shall be the property of [redacted] regardless of any payments by Attacher toward its cost, and Attacher shall acquire no right, title or interest in or to such pole or any attachments of other persons thereon.

c. Limitations on Attachments.

i. In no event shall any single pole be mounted with more than one antenna or one housing containing multiple antennas, (in either case, appropriately sized for the pole and location, in [redacted] reasonable judgment), and one power supply unit.

ii. In no case shall the use of extension arms by Attacher be permitted.

iii. In no case shall the placement of electric meters by Attacher be permitted on [redacted] poles.

d. Use of Facilities. All Attachments shall be constructed and installed in accordance with generally applicable engineering requirements and with the specifications in the Guidelines and this Agreement, and so as not to interfere with [redacted] present or future use of any pole. [redacted] installs capacity only to the extent it is currently needed or foreseen to be needed in the future. Accordingly, all available space is subject to [redacted] bona fide plan for future use, as further detailed in the Guidelines. At all times, Attacher shall maintain, operate and construct all Attachments in such manner as to insure that [redacted] has full and free access to all of its facilities. Attacher shall not alter any [redacted] property except as specifically authorized by the applicable Site License.

e. Installation, Use, Maintenance and Disposal of Batteries. Any battery to be installed on [redacted] poles as part of an Antenna Attachment must be approved by [redacted] before installation in accordance with Section 8(a). Attacher shall provide [redacted] with the Material Safety Data Sheet (MSDS) information for the battery type before installation. Attacher shall modify, repair or conduct maintenance on any battery in accordance with Section 8(q), and shall provide [redacted] with updated MSDS information in the case of a modification, where applicable. Attacher shall dispose of batteries in accordance with the applicable MSDS and any other applicable laws.

f. Compliance with Law. In the design, installation and maintenance of its Attachments, Attacher shall follow the Guidelines and all other [redacted] safety guidelines in addition to safety and design requirements promulgated by the United States Occupational Safety and Health Administration, all agencies and municipalities of the State of Texas, the Public Utility Commission of Texas ("Commission") and any other regulatory body having jurisdiction over the work of constructing and installing the Attachments, all as may be changed from time to time. All work shall be performed in accordance with the applicable standards of the National Electrical Safety Code and the National Electrical Code, including amendments thereto adopted at any time by any jurisdiction in which such work occurs. Attacher shall take all necessary precautions, by the installation of protective equipment or other means, to protect all persons and property of all kinds against injury or damage caused by or occurring by reason of the construction, installation or existence of Attachments. Attacher shall follow best practices in the operation, maintenance and inspection of its Attachments, and shall make all regular and special inspections as necessary to ensure compliance with this Section 8(e).

g. Reports. Attacher shall make immediate report to [redacted] of (i) any damage caused to property of [redacted] or others in the course of installing or maintaining Attachments and (ii) any failure by Attacher to meet the requirements set forth herein for assuring the safety of persons and property or to comply with laws and regulations of public authorities and standard-setting bodies.

h. Monitoring. [redacted] may monitor Attacher's construction and installation of attachments.

i. Approved Contractor. Attacher's work within the Supply Space, as defined in the Guidelines, when authorized in writing prior to attachment, shall be undertaken only by a qualified contractor approved by [redacted] Within ten days after execution hereof, [redacted] shall provide Attacher with a current list of contractors authorized to work on facilities and shall notify Attacher of any changes thereto. All contractors for work within the Supply Space shall comply with all applicable labor agreements. Attacher and/or its contractors shall submit installation, operations and maintenance practices and procedures for Antenna Attachments for approval by [redacted] before undertaking any work or installation on CenterPoint facilities. [redacted] reserves the right, at any time, to prohibit one or more of Attacher's contractors from working on [redacted] facilities if [redacted] concludes, in its sole reasonable discretion, that such contractor(s) are not qualified.

j. Outside Contractor. Attacher may use qualified contractors of its own choice to perform work within the Communications Space, as defined in the Guidelines, provided,

however, that [redacted] or a designated affiliate may negotiate with Attacher or competitively bid to perform the installation of Attachments. If such installation is to be competitively bid, Attacher or its general contractor or designee responsible for such installation shall, if requested, provide [redacted] or its affiliate complete specifications for installation of Attachments, a bid package and other information and access to facilities and personnel reasonably necessary to permit preparation of a competitive bid and shall consider the bid of [redacted] or such affiliate in a fair, impartial manner.

k. Supply Space. No work or installation by Attacher or Attacher's subcontractors within the Supply Space shall affect the characterization of such space as anything other than Supply Space, and no Communications Space shall be created thereby above the Supply Space.

l. Environmental Issues. Attacher shall comply with all applicable Federal, state and local laws, rules and regulations with respect to environmental practices undertaken pursuant to its performance of this Agreement. Attacher shall not bring, store or utilize any Hazardous Materials, as defined in Section 9, on any [redacted] site or pole without the prior written consent of [redacted]

m. Substandard Installation. If [redacted] in its reasonable judgment, finds substandard construction or installation performed by Attacher or its contractor, Attacher, at its own expense, shall make necessary repairs or adjustments as demanded by [redacted] within 15 days after such demand. If Attacher fails to make such adjustments within 15 days, [redacted] at its option and without waiving any other rights, may make such repairs or adjustments, and Attacher shall pay [redacted] for the cost thereof at CenterPoint's or [redacted] approved contractor's prevailing wage rate plus associated expenses and applicable overhead. In all events, [redacted] shall retain the Removal Rights described in Section 5 with respect to all Attachments affected by such substandard construction or installation.

n. Representation and Warranty. Attacher at all times warrants compliance with all requirements set out in this Section 8, assumes the continuing responsibility for such compliance in the future and assumes all responsibility for any damage, fines or penalties resulting from any noncompliance. [redacted] undertakes no duty to require any specific action by Attacher and assumes no responsibility by requiring such compliance or by requiring Attacher to meet any specifications or to make any corrections, modifications, additions or deletions to any work or planned work by Attacher.

o. Interference or Hazard. Whenever [redacted] notifies Attacher in writing or orally with written confirmation that, in [redacted] reasonable judgment, the Attachments or the condition of Attachments of Attacher on any pole (i) interfere with the use of such pole or the operation of [redacted] facilities or equipment; (ii) constitute a hazard to the service rendered by [redacted] or any other persons authorized by [redacted] to use such pole; (iii) cause a danger to employees of [redacted] or other persons; or (iv) fail to comply with applicable law, codes or regulations, Attacher shall, within a reasonable period, remove, rearrange, repair or change its Attachments as needed or as directed by [redacted] In the case of any immediate hazard or danger, such period shall not exceed four (4) hours from receipt of such notice. IN CASE OF A HAZARDOUS CONDITION OR OTHER EMERGENCY WHICH IN [redacted] JUDGMENT REQUIRES [redacted] IMMEDIATELY TO REMOVE

OR RELOCATE THE ATTACHMENTS OF ATTACHER, [redacted] RESERVES THE RIGHT, WITHOUT PRIOR NOTICE AND WITH NO LIABILITY THEREFOR, TO REMOVE OR RELOCATE SUCH ATTACHMENTS AS REQUIRED; PROVIDED THAT [redacted] SHALL PROVIDE ATTACHER WITH NOTICE (WHICH MAY BE BY TELEPHONE OR EMAIL) OF ANY SUCH ACTION AS SOON AS REASONABLY POSSIBLE THEREAFTER.

p. Reserved Rights; Maintenance, Repair, Replacement and Operation of Poles. [redacted] reserves to itself, its successors, affiliates and assigns, the right to maintain, repair, and replace poles and other [redacted] property and to operate its business and maintain its property in such a manner as will, in its own judgment, best enable it to fulfill its own service requirements. At all times during the term of this Agreement, Attacher shall provide [redacted] access to power sources for the Attachments and capability to de-energize all Attachments for purposes of maintenance, repair, or replacement of poles and other [redacted] property or other attachments to poles and/or in conjunction with its operation of its business and maintenance of its property in such a manner as will, in its own judgment, best enable it to fulfill its own service requirements. Attacher shall provide to [redacted] diagrams and instructions for access to all electrically-powered or charged elements of the Attachments and shall not block or prevent [redacted] access to any such element in any way. EXCEPT IN THE CASE OF WILLFUL MISCONDUCT, [redacted] SHALL NOT BE LIABLE TO ATTACHER FOR ANY INTERFERENCE WITH THE OPERATION OF ATTACHER'S FACILITIES ARISING IN ANY MANNER OUT OF [redacted] OPERATION AND/OR MAINTENANCE OF ITS SYSTEM OR THE USE OF [redacted] POLES OR OTHER PROPERTY HEREUNDER..

q. Rearrangement, Removal, Relocation of Pole; New Pole.

i. If Attacher's desired Cable Attachments or Telecommunications Attachments can be accommodated on an existing pole of [redacted] only by rearranging facilities of [redacted] or existing attachments thereon, or if because of Attacher's proposed Cable Attachments or Telecommunications Attachments it is necessary for [redacted] to rearrange or transfer its facilities on or in any facility not owned by it, Attacher shall reimburse [redacted] and any such other person for their actual expense incurred in making such rearrangement.

ii. Upon 45 days prior written notice delivered to Attacher (except in emergency or dangerous situations, in which event [redacted] shall give only as much prior notice as it shall deem reasonable under the circumstances), [redacted] shall have the right to replace, relocate, remove or abandon any pole and to cause the alteration, relocation or removal of any Attachment, consistent with normal operating, maintenance and development procedures and prudent utility practices. [redacted] shall use its reasonable efforts to provide an alternate location on poles for any of the Attachments required to be relocated or removed. [redacted] will bear all costs and expenses of any relocation of the pole not attributable to or caused by Attacher or the Attachments, and Attacher will bear all costs and expenses of any relocation and removal of the Attachments and all costs and expenses attributable to or caused by Attacher or its Attachments. Attacher shall be solely responsible for any losses occasioned by the interruption of Attacher's business or operations.

iii. All available space is subject to [redacted] bona fide plan for future use, as further detailed in the Guidelines. Attacher shall be permitted to use such capacity for its Attachments until [redacted] actual business need arises. If Attacher has installed its Attachments in the reserved space and [redacted] business need for the reserved space arises, upon 45 days notice from [redacted] Attacher shall remove or relocate its facilities from the reserved space; provided, however, [redacted] may install new or taller pole(s), subject in all events to applicable engineering and legal limitations, either in place of, or in addition to the pole(s) in question (i) when requested to do so by Attacher, or (ii) if Attacher fails to remove its Attachments within 45 days. In either case, Attacher shall pay to [redacted] a sum equal to the actual cost of the new pole plus required engineering and installation, plus the cost of removal of the existing pole, if any, minus the salvage value of the removed pole. THE PARTIES AGREE THAT [redacted] SHALL HAVE NO LIABILITY FOR INTERRUPTION OF SERVICE OR OTHER LOSS OR COST TO ATTACHER AS A RESULT OF THE REMOVAL OF SUCH ATTACHMENT OR INSTALLATION OF THE NEW POLE OR OTHER NEW FACILITIES, AND EXCEPT AS SPECIFICALLY PROVIDED HEREIN, [redacted] SHALL HAVE NO OBLIGATION TO PROVIDE OR INSTALL ALTERNATE ROUTES OR FACILITIES FOR ATTACHER. If, upon notice from [redacted] Attacher does not remove or relocate its facilities, [redacted] may invoke Removal Rights. The terms of this Agreement and the Guidelines shall govern all installation, removal and replacement of facilities described in this subparagraph.

r. Notification of Repair, Maintenance, or Modification. Prior to any repair, maintenance or modification of Attacher's Antenna Attachments, including but not limited to any repair, maintenance or modification necessary in the case of an emergency situation where Attacher experiences an interruption or outage for which Attacher has no adequate ancillary communications equipment coverage at another location or locations which can be utilized without disruption of service at such alternate locations, Attacher shall provide notice to [redacted] of Attacher's intent to conduct such repair, maintenance, or modification in accordance with the Guidelines. Such notice shall be provided to the named representative(s) identified in the Guidelines. For any modifications to Attacher's Antenna Attachments, Attacher shall apply for and receive the necessary approvals, including a new Site License, from [redacted] before conducting such modifications in accordance with Section 3(c) of this Agreement.

s. Attacher's Abandonment of Poles. Attacher may at any time abandon the use of a pole hereunder by removing therefrom all of its Attachments and by giving written notice thereof to [redacted] Attacher shall bear all costs of removal and any [redacted] costs incurred as a result of such removal. [redacted] SHALL MAKE NO REFUND OF ANY AMOUNT PAID BY ATTACHER FOR USE OF SUCH POLE, NOR SHALL ANY OTHER OBLIGATION OR LIABILITY OF ATTACHER UNDER THIS AGREEMENT BE AFFECTED BY SUCH ABANDONMENT. PROVIDED, HOWEVER, ATTACHER SHALL NO LONGER BE OBLIGATED FOR FUTURE ATTACHMENT FEES FOR ANY EQUIPMENT SO REMOVED.

9. INDEMNITY

a. Attacher's General Indemnity. ATTACHER SHALL PROTECT, INDEMNIFY, RELEASE, DEFEND AND HOLD [redacted] AND ITS OFFICERS, DIRECTORS, EMPLOYEES, AND [redacted] AFFILIATED COMPANIES AND THEIR RESPECTIVE OFFICERS, DIRECTORS AND EMPLOYEES (COLLECTIVELY, THE "[redacted] INDEMNIFIED ENTITIES") FREE AND HARMLESS FROM ANY AND ALL LEGAL AND OTHER EXPENSES, COSTS, LOSSES, CLAIMS, DEMANDS, CAUSES OF ACTION, DAMAGES, INCLUDING BUT NOT LIMITED TO PUNITIVE AND/OR EXEMPLARY DAMAGES, OR INJURIES (COLLECTIVELY, "DAMAGES") TO ANY ENTITY AND/OR PERSON (INCLUDING WITHOUT LIMITATION THE CONTRACTORS, SUBCONTRACTORS OF ANY TIER, SUPPLIERS, EMPLOYEES OR AGENTS OF ATTACHER AND ANY OF ITS AND THEIR RESPECTIVE EMPLOYEES AND OTHER PERSONNEL FURNISHED BY THEM) OR PROPERTY ARISING IN OR FROM NEGLIGENCE, GROSS NEGLIGENCE, STRICT LIABILITY OR CONTRACT BY REASON OF THE INSTALLATION, CONSTRUCTION, USE, MAINTENANCE, PRESENCE, RENEWAL OR REMOVAL OF ATTACHER'S ATTACHMENTS ON [redacted] POLES INCLUDING DAMAGES THAT ARE OR ARE ALLEGED TO HAVE BEEN CAUSED BY THE SOLE, JOINT, CONCURRENT, CONTRIBUTING OR COMPARATIVE NEGLIGENCE OR GROSS NEGLIGENCE AND/OR WILLFUL MISCONDUCT OF THE [redacted] INDEMNIFIED ENTITIES.

b. No Causes of Action. WHERE PERMISSION HAS BEEN GRANTED PURSUANT TO THIS AGREEMENT AND ATTACHER OR ITS CONTRACTORS, SUBCONTRACTORS OF ANY TIER, SUPPLIERS OR AGENTS (INCLUDING IN EACH CASE THEIR RESPECTIVE EMPLOYEES OR OTHER PERSONNEL FURNISHED BY THEM) GO UPON OR MAKE ANY USE OF [redacted] POLES, EASEMENTS, OR OTHER PROPERTY FOR ANY PURPOSE, THEY SHALL DO SO AS BARE ATTACHERS AND [redacted] AND THE [redacted] INDEMNIFIED ENTITIES SHALL OWE SUCH ATTACHERS NO DUTY WHATSOEVER, AND SHOULD ATTACHER OR ITS CONTRACTORS, SUBCONTRACTORS OF ANY TIER, SUPPLIERS OR AGENTS (INCLUDING IN EACH CASE THEIR RESPECTIVE EMPLOYEES OR OTHER PERSONNEL FURNISHED BY THEM) SUSTAIN INJURY AND/OR DEATH AND/OR DAMAGE THEY SHALL HAVE NO CAUSES OF ACTION AGAINST [redacted] AND/OR THE [redacted] INDEMNIFIED ENTITIES.

c. Environmental Indemnity. IN ADDITION TO ANY OTHER INDEMNITIES HEREIN, ATTACHER HEREBY INDEMNIFIES THE [redacted] INDEMNIFIED ENTITIES AGAINST AND AGREES TO HOLD THE [redacted] INDEMNIFIED ENTITIES HARMLESS FROM ANY AND ALL LIABILITIES, DAMAGES, LOSSES, CLAIMS, DEMANDS, JUDGMENTS, COSTS, AND EXPENSES (INCLUDING THE REASONABLE COST OF DEFENSE THEREOF AND REASONABLE ATTORNEYS' FEES ACTUALLY INCURRED) INCURRED OR SUFFERED BY THE [redacted] INDEMNIFIED ENTITIES ARISING OUT OF (a) ANY RELEASE(S) OF HAZARDOUS OR HARMFUL MATERIALS AT OR FROM THE POLES TO THE EXTENT CAUSED BY OR ARISING FROM THE ACTS OR OMISSIONS OF THE ATTACHER OR ITS REPRESENTATIVES; (b) ANY RADIOFREQUENCY EMISSION, ELECTRIC OR MAGNETIC FIELDS, RADIATION, OR VIOLATION OF FCC REGULATIONS; (c) ANY DISPOSAL, TRANSPORTATION, SHIPPING OR ARRANGEMENT FOR DISPOSAL OF

HAZARDOUS MATERIALS HANDLED AT OR BROUGHT TO THE POLES BY THE ATTACHER OR ITS REPRESENTATIVES; OR (d) ANY VIOLATION OF ENVIRONMENTAL LAWS BY ATTACHER.

For purposes of this Subsection:

"Environmental Laws" shall mean all applicable federal, state, and local administrative, civil and criminal laws, permits, regulations, rules, ordinances, codes, decrees, judgments, injunctions, directives, or judicial or administrative orders relating to (a) the pollution, contamination, preservation, cleanup, restoration, remediation or protection of the environment, air, surface water, ground water or other natural resources, or human health and safety; (b) exposure to toxic or hazardous substances; (c) the safety or health of employees or subcontractors of any tier; or (d) noise.

"Hazardous Materials" shall mean any pollutant, contaminant, petroleum or petroleum product, dangerous or toxic substance, hazardous or extremely hazardous substance or chemical, or otherwise hazardous material or waste regulated under Environmental Laws, including without limitation any batteries and the contents thereof; and any other material causing a nuisance by its presence, odor, sound or other characteristic.

"Releases" shall mean any discharge, emission, spilling, leaking, pumping, pouring, injecting, dumping, burying, leaching, migrating, abandoning or disposing into or through the environment of any Hazardous Material including the abandonment or discarding of barrels, containers and other closed receptacles containing any Hazardous Material.

d. Radiofrequency Broadcast Indemnity. IN ADDITION TO ANY OTHER INDEMNITIES HEREIN, ATTACHER INDEMNIFIES THE [redacted] INDEMNIFIED ENTITIES AGAINST AND AGREES TO HOLD THE [redacted] INDEMNIFIED ENTITIES HARMLESS FROM ANY AND ALL LIABILITIES, DAMAGES, LOSSES, CLAIMS, DEMANDS, JUDGMENTS, COSTS, AND EXPENSES (INCLUDING THE REASONABLE COST OF DEFENSE THEREOF AND REASONABLE ATTORNEYS' FEES ACTUALLY INCURRED) INCURRED OR SUFFERED BY THE [redacted] INDEMNIFIED ENTITIES ARISING OUT OF ANY RADIOFREQUENCY EMISSION, ELECTRIC OR MAGNETIC FIELDS, RADIATION, OR VIOLATION OF FCC REGULATIONS RELATED IN ANY WAY TO THE INSTALLATION OR OPERATION OF THE RADIOFREQUENCY BROADCAST EQUIPMENT OR ITS PRESENCE ON [redacted] POLES..

e. Consequential Damages. NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR CONSEQUENTIAL, INCIDENTAL, OR INDIRECT DAMAGES SUFFERED BY THE OTHER PARTY OR BY ANY SUBSCRIBER, CUSTOMER OR PURCHASER OF THE OTHER PARTY'S SERVICES OR FOR LOST PROFITS OR OTHER BUSINESS INTERRUPTION DAMAGES, WHETHER BY VIRTUE OF ANY STATUTE, IN TORT OR IN CONTRACT, UNDER ANY PROVISION OF INDEMNITY, OR OTHERWISE, REGARDLESS OF THE THEORY OF LIABILITY UPON WHICH ANY SUCH CLAIM MAY BE BASED.

10. FRANCHISE ORDINANCE

In the event that Attacher shall operate a business, service or facility employing Attachments on [redacted] poles, Attacher shall be responsible for obtaining from the appropriate public and/or private authority any required approval, consent, or license to construct, operate and/or maintain its facilities at the location of attachment on [redacted] poles. Notwithstanding any other terms or provisions of this Agreement, no permission for attachment by Attacher shall become effective with respect to poles in any area within such municipality unless and until Attacher has first secured the consent of such municipality, where required, for the attachment of the facilities of Attacher on [redacted] poles. With respect to any unincorporated area or areas which become incorporated either by initial incorporation or by annexation after the date of execution of this Agreement that, following incorporation, require Attacher to obtain an approval, consent, or license to construct, operate and/or maintain its facilities at the location of attachment on [redacted] poles, any permission to make attachments to [redacted] poles within such previously unincorporated area or areas that may have been granted under the terms of this Agreement shall terminate unless Attacher has initiated appropriate legal action to establish its rights or is otherwise engaged in good faith efforts to obtain any necessary rights. If Attacher is denied or is unable to obtain consent or license from a municipality that will permit Attacher to maintain its Attachments on [redacted] poles in the subject municipality, [redacted] may invoke the Removal Rights described in Section 5 with respect to all such Attachments, unless Attacher has initiated appropriate legal action to establish its rights or is otherwise engaged in good faith efforts to obtain any necessary rights. IN ADDITION TO ANY OTHER INDEMNITY PROVIDED IN THIS AGREEMENT, ATTACHER INDEMNIFIES AND SHALL HOLD [redacted] HARMLESS AGAINST ANY CLAIM, LOSS, COST OR EXPENSE ARISING FROM ATTACHER'S USE OF RIGHTS-OF-WAY.

11. SUSPENSION AND TERMINATION

a. Termination by [redacted] may terminate this Agreement without liability to Attacher (i) at such time as it is determined in the reasonable opinion of [redacted] legal counsel that [redacted] performance hereunder would be illegal under applicable law or regulation or under any order or ruling issued by the Commission, or any other federal, state or local agency having regulatory jurisdiction over [redacted] and same cannot be cured by [redacted] without unreasonable expense or without materially and substantially altering the terms and conditions of this Agreement; (ii) upon giving 60 days advance written notice (or such shorter period as [redacted] shall deem reasonably necessary under the circumstances) if, in the reasonable opinion of [redacted] legal counsel, termination is required to preserve [redacted] rights under any franchise, right-of-way, permit, easement or other similar right which is material and substantial to [redacted] business or operations, or (iii) if Attacher fails to comply with any of the provisions of this Agreement or defaults in any of its obligations under this Agreement and fails to correct such default or noncompliance within 30 days after written notice from [redacted] In the event of such termination, the Parties shall pay and perform obligations which have arisen prior to the effective date of termination, but shall not be obligated to pay and perform obligations, which arise after the effective date of termination. No refund of any fee paid or due hereunder shall be made or waived on account of termination.

b. Termination by Attacher. Attacher may terminate this Agreement at any time upon written notice to [redacted] In the event of such termination, (i) Attacher shall forthwith and at its own expense remove all of its Attachments from the poles of [redacted] in consultation with [redacted] and subject to the reasonable direction of [redacted] (ii) in the event that Attacher shall fail to remove any of its Attachments within 75 days of the date of its notice of termination, such Attachments shall become unauthorized Attachments within the meaning of Section 5 and [redacted] shall be entitled to exercise its Removal Rights (among other rights) as described in said section; (iii) Attacher shall be responsible for all damage to property of [redacted] and other companies incurred or occurring as a result of such removal; (iv) no fee or charge paid by or due from Attacher to [redacted] shall be refunded or waived by reason of such termination; (v) NO OBLIGATION OR LIABILITY ASSUMED BY ATTACHER UNDER THIS AGREEMENT SHALL BE WAIVED OR TERMINATED BY REASON OF TERMINATION OF THIS AGREEMENT.

c. Delay or Nonperformance as a Result of Force Majeure. In the event Attacher or [redacted] is delayed in or prevented from performing any of its respective obligations under this Agreement due to acts of God, war, riots, civil insurrection, acts of the public enemy, terrorism, strike or other material labor difficulty, lockouts, acts of civil or military authority, fires, floods, earthquakes, an accident destroying a number of structures on [redacted] system, cable or other material failures, shortages or unavailability, loss of easements, lack or delay in transportation, any action of any regulatory authority to halt the use of any or all structures on [redacted] system, or failure of a third company to grant or recognize a right beyond the reasonable control of the Party delayed or due to any other causes beyond the reasonable control of the Party delayed (each such event being referred to herein as an event of "Force Majeure"), then such delay or nonperformance shall be excused unless the date, schedule or time period for performance of this obligation is expressly stated in this Agreement to be guaranteed. If any such delay or nonperformance due to the foregoing causes or events occurs or is anticipated, the Party affected promptly shall provide notice to the other Party of such event or expected event and the cause and estimated duration of such event. The Party affected by such event shall, at no cost to the other Party, exercise due diligence to shorten or avoid the delay or nonperformance and shall keep the other Party advised as to the continuance of the delay and steps taken to shorten or terminate the delay or nonperformance. Neither Party shall in any event be entitled to additional compensation by reason of the other Party having been delayed in performance of its obligations due to the foregoing causes or events, whether such delay was excused or not.

d. Suspension by Either Party. Either the Attacher or [redacted] may suspend its obligations in whole or in part under the Agreement should a Force Majeure event occur which makes it impossible to use all or a part of its system on a temporary basis. The Party desiring to suspend its obligations shall give written notice to the other Party as soon as practical under the circumstances and shall exercise commercially reasonable efforts to correct or remedy such event(s). The suspension of one Party's obligations under the Agreement shall relieve the other Party of its corresponding duties to perform, except for the Attacher's obligation to comply with the Guidelines.

e. Termination of Specific Site Licenses. [redacted] has the right to terminate specific site licenses with 90 days prior written notice should a Force Majeure event occur which

materially and adversely affects [redacted] primary business of transmitting or distributing electricity (or any part thereof), or if the Attacher fails to comply with the Guidelines.

f. Termination as a Result of Force Majeure. CenterPoint has the right to terminate this Agreement in whole or in part if Force Majeure events occur which make it impossible or impractical to restore or rebuild its entire system, or a part thereof. In the event that only a part of the [redacted] system is not restored or rebuilt, [redacted] may terminate the Agreement only as to the part of the system which is not restored or rebuilt.

g. Attacher Plan for Removal. In the event [redacted] terminates this Agreement or individual Site Licenses, Attacher shall submit to [redacted] within 60 days after receipt of notice of termination a plan for removal within 180 days of Attacher's Attachments from the affected structures. Attacher shall continue to be responsible for attachment fees and service fees associated with each Attachment until its removal.

12. PROVISION OF NOTICE

Any notices required or permitted by either Party under this Agreement shall be delivered by registered or certified mail or carrier to:

[redacted]

or such other address as shall be furnished in writing in the manner provided herein by either Party, and any such notice shall be deemed to have been given as of the date so mailed.

13. ASSIGNMENT OF AGREEMENT RIGHTS

Except as specifically provided herein, the right granted herein to Attacher to make attachments to CenterPoint poles shall not be assigned without the written consent of [redacted] which consent will not be unreasonably withheld, conditioned or delayed. Notwithstanding the foregoing, Attacher may assign or transfer this Agreement or any right or authorization hereunder to an entity that is a successor in interest to Attacher, acquires all or substantially all of Attacher's assets in the relevant service area, satisfies all of the financial and insurance requirements outlined herein, and is entitled to attach to [redacted] poles pursuant 47 U.S.C. § 224. Attacher shall notify [redacted] within 15 days of any such assignment or transfer; and (i) Attacher shall not be released from any of its obligations under this Agreement, including the payment of all fees as described in Section 4, arising prior to assignment up to and until the successor in interest to Attacher satisfies all bonding and insurance requirements hereunder, and (ii) Attacher provides to [redacted] the exact location and number of attachments affected by such assignment. NO SUCH ASSIGNMENT SHALL RELIEVE ATTACHER OF LIABILITY FOR OBLIGATIONS OF ATTACHER, KNOWN OR UNKNOWN, EXISTING AS OF THE DATE OF ASSIGNMENT. In the event that the assignee shall not be a cable system or telecommunications service provider, [redacted] shall have the right to terminate this Agreement without notice at any time after such assignment.

[redacted] acknowledges that Attacher may enter into a financing arrangement including promissory notes and financial and security agreements for the financing of Attacher's Antenna Attachments and/or the Telecommunications Attachments or any part thereof (the "Collateral") with a third party financing entity (and may in the future enter into additional financing arrangements with other financing entities). [redacted] consents to the installation of the Collateral, provided, however, neither Attacher nor a third party financing entity shall remove or modify the Collateral or go upon the poles of [redacted] except with the written consent of [redacted] and in all cases subject to the provisions of this Section 13. .

14. NEGOTIATION AND MEDIATION

a. Dispute Resolution. Except under circumstances requiring immediate injunctive relief, any dispute, controversy or claim arising out of or relating to the Agreement, the Parties' performance under it, or its breach (a "Dispute") shall be dealt with in accordance with the negotiation and mediation procedure set forth in this Section 14 before resorting to litigation.

b. Negotiation. If any Dispute is not resolved promptly in the ordinary course of business, the Parties shall attempt to resolve such Dispute by face-to-face negotiations with each other as provided herein before resorting to mediation or litigation. These face-to-face negotiations shall be initiated within five business days (or such other period as the Parties shall otherwise agree) after notice (the "Negotiation Notice") from one Party to the other and shall be conducted by a management representative of each Party with authority to settle the Dispute. Either Party may elect, upon two business days written notice to the other, to bring its legal counsel to such negotiations. Nothing said or disclosed, nor any document produced, in the course of such negotiations which is not otherwise independently discoverable shall be offered or

received as evidence or used for impeachment or for any other purpose in any future arbitration or litigation. All matters identified in a Negotiation Notice shall be resolved within 90 days of the date of the Negotiation Notice by execution of a written settlement agreement or the Parties shall proceed to mediation pursuant to Section 14(c).

c. Mediation. Following a good faith effort to negotiate a resolution of a Dispute, either Party (the "Initiating Party") may commence mediation proceedings by giving notice of the substance of the Dispute (the "Mediation Notice") to the other Party (the "Recipient Party") demanding that the Dispute be mediated and setting forth a list of the names and resumes of qualifications and experience of three (3) impartial individuals who are acceptable as mediators to the Initiating Party. Within 15 days after the date of the Mediation Notice, the Recipient Party shall give written notice (the "Counter-Notice") to the Initiating Party in which the Recipient Party may designate an individual to serve as a mediator from among the three individuals listed by the Initiating Party in the Mediation Notice (in which event such designated individual shall be the mediator). If none of the individuals listed in the Mediation Notice is designated by the Recipient Party in the Counter-Notice to serve as the mediator, the Counter-Notice shall set forth a list of the names and resumes of qualifications and experience of three (3) impartial individuals who are acceptable to the Recipient Party, and within ten days after the date of the Counter-Notice, the Initiating Party may designate an individual to serve as the mediator from among the three individuals listed by the Recipient Party in the Counter-Notice. Such designated individual shall be the mediator for the matter described in the Mediation Notice. If the Parties cannot agree on a mediator as set forth above, each Party shall identify a mediator and the two mediators so identified shall select a third mediator who shall serve as the neutral company for the Dispute. If the Recipient Party fails to send the Counter-Notice within the 15-day period described above, the first name listed in the Mediation Notice by the Initiating Party shall serve as the mediator.

d. Mediation Procedure. The mediation session shall take place on or before 30 days after the mediator has been selected, or as the mediator's schedule allows, at a time and place that is mutually agreeable to the Parties. If the Parties cannot agree on the time and place for the mediation, the mediator shall determine the time and place of the mediation. Under no circumstances shall the mediation continue beyond two business days, unless the Parties mutually agree otherwise. At least one representative of each Party attending such mediation session shall be a management representative with authority to settle the Dispute. If the Dispute cannot be settled at such mediation session or at any mutually agreed continuation thereof, either Party may give the other Party and the mediator written notice declaring the mediation process at an end, or the mediator may declare an impasse, following which either Party may commence litigation in an effort to resolve the Dispute. Each Party shall have the right to be represented by counsel at any mediation session.

e. Settlement Discussions. All conferences and discussions which occur in connection with the mediation conducted pursuant to this Section 14 shall be deemed settlement discussions, and nothing said or disclosed, nor any document produced, which is not otherwise independently discoverable, shall be offered or received as evidence or used for impeachment or for any other purpose in any current or future arbitration or litigation. Unless otherwise agreed, each Party shall bear its own cost and expenses, including attorneys' fees, incurred in connection

with the mediation, except that the expenses and fees of the mediator, expenses for mediation facilities, and other expenses of the mediation itself shall be shared equally between the Parties.

15. PROPRIETARY OR CONFIDENTIAL INFORMATION

a. Nondisclosure of Proprietary Information. For purposes of this Agreement, "proprietary information" or "confidential information" disclosed by either Party to the other shall mean this Agreement, any document or material clearly identified in writing as being confidential or proprietary, and any business plan, marketing and sales information, customer information or records, third party data, software, engineering material (drawings, specifications, hardware, software, etc.), operating reports, financial information, information concerning litigation involving CenterPoint, and audit and security information. Any such information shall be safeguarded and protected by a Party with no less care than the Party exercises in safeguarding and protecting its own proprietary and confidential information. A Party's obligation to safeguard and not disclose proprietary or confidential information of the other Party shall not apply to information that is generally available to the public, lawfully in the receiving Party's possession prior to receipt hereunder, or lawfully obtained from third companies. If required by order of a governmental or judicial body, a Party may release to such body the proprietary and confidential information required by such order; provided further, however, prior to such release the Party shall promptly notify the other Party of the order and allow the other Party to contest any release of the proprietary or confidential information; and provided, further, the Party shall use all reasonable efforts to prevent such proprietary or confidential information from becoming disclosed to the public, including but not limited to seeking protection of such information or documents from the governmental or judicial body and limiting the disclosure of same to relevant portions of documents or information. In such cases, a Party shall exercise prudent judgment and common sense to protect proprietary and confidential information from unauthorized access, use or disclosure, and shall employ the following security practices: destroying, deleting from memory, and/or rendering unreadable documents that are no longer needed, limiting access to and dissemination of proprietary or confidential information to individuals who need to know the information for business purposes, safeguarding proprietary or confidential information by taking precautions such as locking the information up or not leaving the information unattended, and properly marking or identifying proprietary or confidential information that is likely to be distributed or transferred to or shared with other parties in the ordinary course of business.

b. Maps of [redacted] Pole Locations. Attacher may purchase from [redacted] maps of pole locations derived from [redacted] Geographic Information System ("GIS") database, provided that Attacher executes the necessary non-disclosure agreements prior to purchase. Any information obtained by Attacher from [redacted] GIS database shall be considered proprietary and confidential information and kept confidential in accordance with subsection (a) of this Section.

c. Agreement Confidential. The terms and provisions of this Agreement shall be considered confidential and proprietary and shall not be disclosed to anyone other than a Party to this Agreement without the prior written consent of the other Party. Notwithstanding the foregoing, the Parties recognize that [redacted] is a regulated electric utility, and, as such is called upon to disclose information relative to its business to the Commission and other

administrative and judicial bodies with jurisdiction over [redacted] Therefore, in the event that either Party is required by law, or by operation of rule or regulation to disclose any portion of this Agreement to one other than a Party to this Agreement, such Party shall give immediate notice to the other in order that the other Party may intervene in any such governmental or judicial proceeding to contest such disclosure, and if unsuccessful in that endeavor, to attempt to secure a protective order relative to the contents of this Agreement. The Parties further recognize that [redacted] as the owner of the poles to which Attacher intends to affix its Attachments, is required to and will allow other parties to attach to its poles, and that information concerning Attacher's Attachments will be shared with other attaching parties at [redacted] reasonable discretion.

16. GENERAL

a. Identification of Licensees. In the event that [redacted] receives an inquiry from any public agency or body in response to a formal or informal complaint or proceeding that, in the reasonable judgment of [redacted] requires disclosure of the identity of or other information related to any of Attacher's customers using the Attachments, and [redacted] notifies Attacher of such requirement, Attacher shall provide such information to [redacted] within three business days of receipt of such notification.

b. Electricity to Attacher's Attachments. Attacher shall be responsible for arranging for the furnishing of any needed distribution electrical service and other electrical connections for Attacher's Attachments at sites where no electricity distribution exists as of the date Attacher seeks authorization for such Attachment. The cost of all such electrical connections shall be Attacher's additional expense outside the terms of this Agreement. Attacher shall contract with a Retail Electric Provider for the provision of electric power to the Attacher's Attachments. The provision of electric power shall be subject to the Retail Electric Provider's tariff for electric service.

c. Backup Generators. [redacted] will not furnish back-up electricity generators for any reason.

d. Radio Frequency Interference. Neither the installation nor operation of Attacher's Attachments shall interfere with the radio communications systems or other equipment of [redacted] Attacher shall not cause interference at any time with the radio communications systems or equipment of other persons, including communications companies, public safety agencies, and individuals. Attacher shall respond promptly to any complaints of interference and shall eliminate interference by modifying or removing equipment. [redacted] shall not be responsible for any interference caused or suffered by Attacher.

e. Noise Limitations. Attacher shall limit noise emissions from Attacher's equipment to levels undetectable to nearby residences and business locations. Attacher shall respond promptly to any complaints of noise emissions and shall eliminate noise emissions by modifying or removing equipment. [redacted] shall not be responsible for any noise emissions caused by Attacher's Attachments.

f. Identification Tags. All Attachments shall be tagged by Attacher with Attacher's identification symbol in accordance with the Guidelines. All Antenna Attachments shall be tagged with the appropriate radiation warnings in compliance with all governmental requirements and the Guidelines.

g. Recognition of [redacted] Primary Business. Attacher recognizes that [redacted] primary business is that of a public utility that transmits and distributes electricity and that such business takes priority over all grants to Attacher within this Agreement.

h. Vegetation trimming. [redacted] is responsible for trimming vegetation only on and around its own electrical conductors and other equipment. Attacher is responsible for any vegetation trimming necessary on or around its Attachments in compliance with applicable regulations and the Guidelines.

i. Fees To Other Persons. Nothing herein shall be construed as affecting in any way any right of [redacted] to establish fees chargeable to other persons for attachments to poles, regardless of similarity or differences in Attacher's and such other person's use of poles and the respective fees charged to Attacher and such other persons. Except as may be required by law, the fees chargeable to other persons for such attachments shall in no way affect the fees chargeable to Attacher under this Agreement.

j. Accounting Standards. In computing or estimating expenses, costs, or other charges to be paid or reimbursed by Attacher under this Agreement, [redacted] shall use the accounting principles, practices, and records commonly employed in its business and as permitted or required by Federal and state law.

k. Liens. IN THE EVENT ANY CONSTRUCTION LIEN OR OTHER ENCUMBRANCE SHALL BE PLACED ON THE ATTACHMENTS BY THE ACTIONS OF ATTACHER OR ITS CONTRACTOR, ATTACHER SHALL PROMPTLY DISCHARGE SUCH LIEN OR ENCUMBRANCE WITHOUT COST OR EXPENSE TO [redacted] AND HEREBY AGREES TO INDEMNIFY [redacted] FOR ANY AND ALL DAMAGES THAT MAY BE SUFFERED OR INCURRED BY [redacted] IN DISCHARGING OR RELEASING SAID LIEN OR ENCUMBRANCE.

l. Relationship of Parties and Independent Contractor Status. Neither [redacted] nor Attacher shall be deemed to be a partner, agent or joint venturer with or of the other by reason of this Agreement or the consummation of the transactions contemplated hereby. CenterPoint and Attacher shall perform their duties under this Agreement as independent contractors and at their own risk. Neither [redacted] nor Attacher shall at any time hold itself out as being a partner, co-venturer or agent of the other.

m. Publicity. Attacher shall obtain the written consent of [redacted] before (1) making any announcement or releasing any information concerning this Agreement or any part thereof to any member of the public, the press or any third party or (2) publishing any photographs or drawings identifying [redacted] property or its name, logo, customers or customers' property.

n. Execution. This Agreement may be executed in multiple counterparts, each being deemed an original and all together being deemed the same document.

o. Entire Agreement. This Agreement, the attached appendices and the Guidelines constitute the entire Agreement between [redacted] and Attacher regarding the Attachments, and all previous representations relative thereto, either written or oral, are hereby annulled and superseded. No modification shall be binding on [redacted] or Attacher unless it shall be in writing and signed by both Parties. Nothing contained in this Agreement, the appendices or the Guidelines shall be construed as having any effect in any future agreement or contemplated future agreement between the Parties.

p. Severability. Should any part of this Agreement be deemed invalid, illegal or unenforceable, such part shall be removed from this Agreement and the Agreement shall otherwise remain in full force and effect and shall be applied by the Parties in such manner as most nearly accomplishes the expressed purposes of the Parties in executing this Agreement.

q. Governing Law. Applicable federal law and regulations and the law of the State of Texas, without regard to the conflict of laws provisions thereof, shall apply to this Agreement and to its interpretation. All legal proceedings related to this Agreement shall be brought in the administrative or judicial forum deemed appropriate under the law of the State of Texas, Section 224 of the Act, and the regulations and precedent of the FCC, where applicable.

r. Injunctive Relief. The Parties acknowledge that they may not be compensated adequately by money damages in the event of a breach by the other Party of any of its covenants or agreements contained herein and that they shall be entitled to specific performance and injunctive relief of such covenants and agreements in addition to all other remedies.

s. Headings. Paragraph headings are for the convenience of the Parties only and are not to be construed as part of the terms of this Agreement.

IN WITNESS WHEREOF, the Parties hereto have caused this instrument to be executed in duplicate originals as of the date first hereinabove written.

[redacted]N
[redacted]C

[redacted]

Scott [redacted]

[redacted]

ATTACHER

[redacted]

APPENDIX I

BONDING AND INSURANCE REQUIREMENTS

I. BOND REQUIREMENTS

[redacted]

[redacted] retains and shall have the right to remove Attacher's Attachments and all other equipment from [redacted] facilities within six (6) months of termination or expiration of the Agreement. Thereafter, [redacted] may draw on the bond to cover any costs of removal of Attachments and to restore structures to pre-attachment configuration. The bond shall be delivered to [redacted] no later than the Effective Date of this Agreement.

Acceptable alternatives to the Surety Bond are:

- Cash Deposit with [redacted]
- Certificate of Deposit
- Irrevocable Bank Letter of Credit

II. INSURANCE REQUIREMENTS

During the term of this Agreement, Attacher shall carry at its expense for the benefit of Attacher and [redacted] (as additional insured in accordance with the provisions below) the following minimum insurance coverage:

A. **Worker's Compensation and Employers' Liability** – Attacher and subcontractors retained by or through Attacher and all their employees, workmen, servants or agents shall purchase Workers' Compensation insurance coverage and shall comply with all requirements of the Workers' Compensation laws of the state in which Attacher or any subcontractor retained by or through Attacher is performing any work hereunder. Attacher shall in addition carry Employer's Liability Insurance covering all operations and work hereunder in any amount not less than the following:

Each accident	$500,000
Each disease each employee	$500,000
Disease policy limit	$500,000

Likewise, coverage for U.S. Longshoreman's and Harbor Worker's Act and the Jones Act shall be included with appropriate limits where such exposure is present.

B. **General Liability Insurance** – Attacher or Attacher and its subcontractors retained by or through Attacher shall carry, at the sole expense of Attacher or Attacher and subcontractors, *Commercial General Liability Insurance,* including but not limited to *Broad Form Contractual Liability, Products/Completed Operations, Broad Form Property Damage,* and *XCU Hazards* (Explosion, Collapse and Underground) covering all operations and work hereunder for all liability arising out of injury to or death of one or more persons and injury to or destruction of property in any one occurrence in amounts not less than:

General Aggregate	$2,000,000
Products – Comp/Ops Aggregate	$1,000,000
Personal & Advertising Injury	$1,000,000
Each Occurrence	$1,000,000

Such insurance shall specifically refer to this Agreement and shall specifically cover the liability assumed by Attacher under Section 9 (Indemnity) of this Agreement.

C. **Automobile Liability Insurance** – Attacher or Attacher and its subcontractors retained by or through Attacher shall carry, at the sole expense of Attacher or Attacher and subcontractors, *Business Automobile Liability Insurance* on all automobiles owned and hired, as well as automobile non-ownership liability insurance in the amounts of not less than $1,000,000 combined single limit, for all liability arising out of injury to or death of one or more persons and all liability arising out of injury or destruction of property in any one occurrence.

D. **Excess/Umbrella Insurance** – Attacher or Attacher and its subcontractors retained by or through Attacher shall carry, at the sole expense of Attacher or Attacher and subcontractors, *Excess or Umbrella Liability Insurance*, in the amount of $10,000,000 per occurrence and annual aggregate. This coverage shall be in excess of: i) Employer's Liability, ii) Commercial General Liability and iii) the Business Automobile Liability. Attacher may have any combination of primary and Excess/Umbrella liability insurance as long as the combination equals $11,000,000 per occurrence and annual aggregate.

E. The insurance required by Sections B, C and D shall include [redacted] including subsidiaries and affiliates, as an Additional Insured with respect to all operations and work hereunder and shall provide that such insurance applies separately to each insured against whom claim is made or suit is brought. The additional insured status shall not be impaired in any manner whatsoever and shall provide the same coverage as the named insured receives. The insurance afforded to Additional Insureds is to be primary of any other valid and collectible insurance.

The insurance required by Sections A, B, C and D above, shall include a *Waiver of Subrogation* in favor of [redacted] including subsidiaries and affiliates.

F. Attacher and subcontractors retained by or through Attacher shall furnish CenterPoint with certificates of insurance required in the above sections, which shall be in a form satisfactory to [redacted] Such certificates shall provide that 30 days written notice shall be given to [redacted] prior to cancellation of or material change in the coverage. Subject certificates shall reflect a Wavier of Subrogation in favor of [redacted] including subsidiaries and affiliates, and [redacted] including subsidiaries and affiliates, as an Additional Insured, as appropriate.

G. All such insurance required above shall provide insurance for occurrences during the performance of services by Attacher and all subcontractors pursuant to this Agreement and for a period of two (2) years after completion of the Agreement. In the event that any insurance as required herein is available only on a "claims-made" basis, such insurance shall provide for a retroactive date not later than the Effective Date of this Agreement and such insurance shall be maintained by Attacher with a retroactive date not later than the retroactive date required above. If the purchase of an "optional extension period", "optional claims reporting period" or other similarly titled clause is necessary to maintain coverage as required hereunder, then such clause shall provide insurance for all occurrences as required herein. Aggregate limits of such insurance shall be reinstated to the full extent permitted by such insurance policy and shall provide insurance for all claims made after completion of the work under this Agreement by Attacher. The limits of liability of such insurance as required herein shall remain unimpaired to

the full extent permitted by such insurance policy and Attacher shall execute all procedures necessary to remove any such impairment.

Failure of Attacher to provide insurance as herein required or failure of [redacted] to require evidence of insurance or to notify Attacher of any breach by Attacher of the requirements of this paragraph shall not be deemed to be a waiver by [redacted] of any of the terms and conditions of this Agreement, nor shall they be deemed to be a waiver of the obligations of Attacher to defend, indemnify, and hold harmless [redacted] [redacted] including subsidiaries and affiliates, as required herein.

All insurance as required herein shall be primary to any other insurance coverage purchased and shall be issued by an insured authorized to do business in the state where the work is being performed having a A.M. Best's Rating of not less than "A-VII". Attacher's obligation to provide for the continuation of such insurance shall survive completion of performance by Attacher under this Agreement.

H. The above insurance requirements are minimum requirements and shall not limit Attacher's liability to [redacted] [redacted] including subsidiaries and affiliates, in any manner.

EXHIBIT A

Form of Bond for Pole Attachment Agreements

KNOW ALL MEN BY THESE PRESENTS:

That _____, hereinafter referred to as Principal, and hereinafter referred to as Surety, are held and firmly bound unto [redacted] hereinafter referred to as the Party, in the penal sum of _____ and No/100th Dollars ($_____.00), lawful money of the United States of America, to the payment of which well and truly to be made, Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal executed a pole attachment agreement on the ___ day of _____, 20_, the rights and duties of which shall become fully binding and effective only upon the date of execution by the Party (Party's execution being conditioned upon Principal satisfying certain financial responsibility requirements established by the Party, of which this surety agreement is a part), whereby the Party will permit the Principal to attach its lines to the poles of the Party in a specified territory, which agreement is by reference made a part hereof and is hereinafter referred to as the Agreement.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that, after execution of the Agreement by Principal and Party, Principal (and its successors and assigns if prior approval of the transfer of the Agreement to the successors and/or assigns is given by the Party) shall in all particulars faithfully and promptly perform, fulfill and keep each and all of the terms, covenants and conditions of the Agreement, including, but not limited to payment of all amounts due to the Party for rentals, fees and work performed and expenses incurred under the terms and conditions of the Agreement, which on the part of said Principal ought to be performed, fulfilled and kept according to the true meaning and intent of the Agreement, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

The initial term of this obligation is one (1) year from and including the date of execution hereof and this obligation shall not be cancelled, altered or modified by Surety during said one-year term or any part thereof after Principal has made attachments under the terms of the Agreement; and this obligation shall be automatically renewed for successive one-year terms without limit unless Surety gives Party, by certified or registered mail, written notice of its intent to cancel, alter or modify this obligation not less than 60 days prior to the end of the initial or any succeeding term of this obligation; provided, in the event Principal makes its first attachment under the terms of the Agreement more than eighteen (18) months after the execution of the obligation, then the initial term of this obligation shall be extended so that it shall not end one (1) year from the date Principal makes such first attachment.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals this the ____ day of _____, 20 ___.

Principal

By _____

President

(Seal)

Surety

By _____

Title _____

(Seal)

APPENDIX II

POLE ATTACHMENT RATE CALCULATION FOR CABLE ATTACHMENTS AND TELECOMMUNICATIONS ATTACHMENTS

Annual Rate Calculation and Annual Invoice. The pole attachment fee calculation for Attacher for each year shall be provided annually to Attacher based on the formulas set out in this Appendix II, where applicable. The pole attachment fee due will be invoiced on an annual basis.

Cable Television Company Attachers. The annual pole attachment fee for Cable Attachments by cable television operators providing cable services shall be calculated in accordance with 47 U.S.C. § 224(d) and Federal Communications Commission ("FCC") regulations and orders thereunder. The formula for determining such fee, as set forth in such regulations, is as follows:

$$\text{Maximum Rate Per Pole} = \frac{\text{Space Occupied}}{\text{Usable Space}} \times \text{Net Cost of a Bare Pole} \times \text{Carrying Charge Rate}$$

Assumptions and Factors:

Space Occupied = 1 foot (presumed, but subject to change)

Usable Space = 13.5 feet (presumed, but subject to change)

$$\text{Net Cost of a Bare Pole} = \frac{\text{Net Pole Investment} \times .85}{\text{Number of Poles}}$$

$$\text{Net Pole Investment} = \text{Gross Pole Investment (Account 364)} - \text{Accumulated Depreciation (Account 108) (Poles)} - \text{Accumulated Deferred Income Taxes (Account 190, 281-283) (Poles)}$$

$$\text{Carrying Charge Rate} = \text{Administrative Element} + \text{Maintenance Element} + \text{Depreciation Element} + \text{Taxes Element} + \text{Return Element}$$

$$\text{Administrative Element} = \frac{\text{Total General and Administrative}}{\text{Gross Plant Investment (Electric)} - \text{Accumulated Depreciation (Account 108)} - \text{Accumulated Deferred Taxes (Plant)(Accounts 190, 281 – 283)}}$$

$$\text{Maintenance Element} = \frac{\text{Account 593}}{\text{Pole Investment in Accounts 364, 365, \& 369} - \text{Depreciation (Poles) Related to Accounts 364, 365, \& 369} - \text{Accumulated Deferred Income Taxes related to Accounts 364, 365, \& 369}}$$

$$\text{Depreciation Element} = \frac{\text{Gross Pole Investment (Account 364)}}{\text{Net Pole Investment}} \times \text{Depreciation Rate for Gross Pole Investment}$$

$$\text{Taxes Element} = \frac{\text{Accounts } 408.1 + 409.1 + 410.1 + 411.4 - 411.1}{\text{Gross Plant Investment (Total Plant)} - \text{Accumulated Depreciation (Account 108)} - \text{Accumulated Deferred Taxes (Plant) (Account 190,281 – 283)}}$$

Return Element = Applicable Rate of Return (Default rate is 11.25%)

Telecommunications Company Attachers. The annual pole attachment fee for Telecommunications Attachments by telecommunications carriers or cable operators providing telecommunications services shall be calculated in accordance with 47 U.S.C. § 224(e) and FCC regulations and orders thereunder. The formula for determining such fee, as set forth in such regulations, is as follows:

$$\text{Maximum Rate} = \left[\frac{\left(\frac{\text{Space}}{\text{Occupied}}\right) + \left(\frac{2}{3} \times \frac{\text{Unusable Space}}{\text{No. of Attaching Entities}}\right)}{\text{Pole Height}}\right] \times \frac{\text{Net Pole Investment}}{\text{Number of Poles}} \times \left[\begin{matrix}\text{Carrying}\\ \text{Charge}\\ \text{Rate}\end{matrix}\right]$$

Assumption and Factors:

Number of Attaching Entities = Number determined based upon attachments in existence, according to the [redacted] Geographic Information System database, at the time the attachment fee for the upcoming year is calculated.

The same assumptions and carrying charge rate calculations used in the rate formula provided above for cable television operators providing cable services shall apply for purposes of application of the rate formula for telecommunications carriers or cable operators providing telecommunications services.

Unregulated Attachments. Nothing in this Agreement shall be interpreted to entitle an attacher to an attachment fee described in this Appendix II in the event such attacher makes attachments that are not subject to rate regulation under federal or state law.

Rate Changes. Notwithstanding any other provision to the contrary in this Agreement, in the event that the FCC adopts rules and/or follows procedures in its regulation of pole attachment fees, rates or charges that would produce a higher pole attachment rate than the rate provisions provided above, such higher rate shall be effective as of the earliest effective date of such rules or procedures, but in no event less than 60 days after written notice to Attacher. In the event that the Public Utility Commission of Texas ("Commission") or any municipality in the State of Texas asserts jurisdiction over the pole attachment fees, rates or charges of [redacted] and adopts rules or follows procedures in its regulation of pole attachment fees which would produce higher pole attachment fees than the formulas and assumptions provided above, such higher fees shall be effective as of the earliest effective date of such rules or procedures. At such time as the FCC shall cease to have or assert jurisdiction over the pole attachment fees, rates or charges of [redacted] and no agency or municipality of the State of Texas shall have asserted such jurisdiction, [redacted] may, upon 60 days' notice to Attacher, change the fees provided above. In the event that the FCC, the Commission, or any other agency or municipality of the State of Texas determines that the service of providing space for pole attachments is to be offered pursuant to a tariff or at a price other than as agreed to herein, or using a rate or implied rate for such service other than the rate agreed to herein, then the terms and conditions of such service, including the rate charged for such service, shall be those required by such tariff rate or price, notwithstanding any other terms and conditions in this Agreement; provided, however, that no new rate shall be applied retroactively.

APPENDIX III

ANTENNA ATTACHMENT CHARGES

[redacted]

APPENDIX IV

ANTENNA SERVICE CHARGES

PER POLE SERVICE FEE FOR ANTENNA ATTACHMENTS

[redacted]

Questions:

19. *Reference: p. 4 and 6, Q. 5 and 6 (also paragraph 6.2 of the Application)*

CANDAS states that "ExteNet and its parent company have significant experience in the design and construction of DAS networks."

Mr. Vinyard states that "…ExteNet Systems has entered into approximately 80 attachment agreements with over 35 utilities, most of which involvement attachment to power poles." And "Given that attachment rates are a matter of public record….."

(a) When (and in what jurisdiction) was ExteNet Systems' first transaction involving a wireless attachment?

(b) Aside from the proposed Toronto DAS Network, what other DAS networks does ExteNet Systems operate in North America?

(i) please indicate with reference to the nearest city, state or province, the jurisdiction in which each DAS network is located;

(ii) for each of these networks, please indicate what percentage of all of the wireless attachments that constitute that network rely on distribution utility poles to attach to, and what percentage rely on attachments to other types of infrastructure (traffic lighting pole, side of building, rooftop, macro cell tower, stand alone tower, billboards, signage, etc.); and

(iii) for each DAS network, please describe the specific other infrastructure being used by ExteNet for its wireless attachments.

(c) In respect of these 80 attachment agreements, what percentage of ExteNet Systems wireless attachments are mounted strictly within the 2ft communications space of the distribution poles, what percentage are mounted in part within the 2ft communications space and in part outside of that space, and what percentage are mounted entirely outside of the 2ft communications space, and finally what percentage would be classified as pole top antennas?

(d) Please provide all wireless attachment pricing information paid by ExteNet Systems over the past five years in respect of each of the networks noted in your response to the questions above.

Responses:

(a) ExteNet Systems constructed its first DAS network in the state of Michigan beginning in 2004.

(b)

(i) ExteNet Systems does not and will not operate the proposed Toronto DAS Network, which at this time is not in operation. The following table provides summary information with respect to the outdoor DAS networks currently being operated or monitored and maintained by ExteNet Systems, directly or through its operating subsidiaries, in the United States:

States where ExteNet Systems Outdoor DAS Networks Are Located	Number of Outdoor DAS Networks	Number of Outdoor DAS Networks with Any Nodes Attached to Structures Other than Utility Poles, Streetlight Poles, or Traffic Signal Standards
California	6	1 (building that also houses the hub facility)
Florida	1	0
Illinois	8	0
Massachusetts	9	0
Michigan	4	0
Nevada	1	1 (standalone poles placed by ExteNet Systems)
New York	2	0
Pennsylvania	1	0
Rhode Island	3	0
Texas	3	0

To the extent that the interrogatory purports to require a much more detailed answer, the information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(ii) The foregoing table indicates the numbers of outdoor DAS networks in each jurisdiction in which any meaningful portion of the DAS antennas and DAS-related equipment (excluding fibre optic cabling installed in conduits) are attached to facilities other than power poles, streetlight poles (including lampposts) or traffic signal standards for purposes of any outdoor DAS network deployment. To the extent that the interrogatory purports to require a much more detailed answer, the information

requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(iii) Except as otherwise described above, no meaningful portion of any of the referenced outdoor DAS networks involves attachments to any infrastructure other than utility poles in the public rights of way or in utility easements, streetlight poles or traffic signal standards. For purposes of this response, "no meaningful portion" means that CANDAS is not aware of any such exceptions but could not absolutely rule out all exceptions without requiring ExteNet Systems to conduct an onerous and burdensome search of all of its documentation. To the extent that the interrogatory purports to require a much more detailed answer the information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(c) See the Table at THESL 18(a) for information regarding the number of ExteNet Systems' attachment agreements with electric utilities in the United States that permit pole-top antenna attachments (before taking into account any changes in such agreements or related utility or state regulatory policies related to the FCC Decision 11-50 dated April 7, 2011 (Application, Tab 22)). ExteNet Systems does not have information or a method for determining the precise percentages of wireless attachments that are mounted within, without or partly within and partly without the communications space, which is not properly characterized as "the 2ft communications space" on the electric utility poles to which its DAS nodes are affixed. As discussed and described elsewhere in the responses to these interrogatories and the Board Staff Interrogatories, DAS antennas and all associated DAS node equipment are virtually never designed to fit entirely within the communications space, which would be needlessly disruptive to the pole owner and other attachers. Instead, equipment other than the DAS antenna is typically mounted below the communications space and the antenna, if not mounted on the top of the pole (in which case all of the DAS node equipment would be located outside the communications space), is typically mounted on an extension arm affixed within the communications space on the pole. To the extent that the interrogatory purports to require a much more detailed answer the information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

(d) The information requested is not relevant to the issues raised by the Application; moreover, production of this information would be unduly onerous relative to its probative value, if any.

Questions:

20. *Reference: p. 6 and 9, Q. 6 and 10*

Mr. Vinyard states that "ExteNet acknowledges and accepts that telecommunications attachments to electricity distribution poles should be accommodated and carried out in a manner that: (i) is fully compliant with all applicable safety regulations; (ii) does not interfere with the primary function of the pole owner, i.e., the reliable delivery of power to electricity customers; and (iii) does not impose incremental costs or burdens on rate-payers that are not recovered in rates (e.g. by requiring construction of additional pole lines or imposing obligations to perform make-ready work, including pole replacements, where the attachers do not pay the full cost of the required work).

Mr. Vinyard also states that "The principal method for avoiding the imposition of costs on utility ratepayers should be the establishment of appropriate rates or rate formulas designed to allow the utility to capture any and all costs that are attributable or properly allocable to the attachments in questions."

(a) In respect of safety regulations, are ExteNet's employees fully qualified to work safely within the vicinity of distribution power lines operating at 50kV or less? If not, who would do this work?

(b) In respect of costs, is it your position that a rate of $22.35 per year per pole captures the scope of utility costs reflected in the above quotes with respect to DAS and DAS related attachments as contemplated by ExteNet?

(c) Do you agree that the true market value derived from the ability to attach wireless equipment to utility poles is the best metric to ensure that electricity ratepayers, who ultimately have paid for the utility poles through rates over the past century, capture the incremental economic benefits associated with the attachment revenues? If not, please explain why.

Responses:

(a) ExteNet does not have employees that do construction and installation work. All such work is contracted or subcontracted to companies (usually local) who are fully qualified to perform the work contracted or subcontracted to them. If ExteNet were permitted to have work performed "within the vicinity of distribution power lines" it would use only contractors that are specifically approved to perform such work by the electric distribution company that owns or is responsible for the lines.

(b) CANDAS has formulated no position with respect to the adequacy of the currently approved rate for distribution pole access as determined in the CCTA Order. Neither CANDAS nor, to CANDAS' knowledge, any other party is requesting that the Board modify the current pole access rate. Accordingly, the information requested is not relevant to the issues raised by the Application.

(c) CANDAS does not agree with this statement or the implicit assumptions. CANDAS does not agree with the implication that any relevant metric should be different for wireless attachments than for any other communications attachments. However, neither CANDAS nor, to CANDAS' knowledge, any other party is requesting that the Board modify the current pole access rate. Accordingly, the information requested is not relevant to the issues raised by the Application.

Question:

21. *Reference: p. 8, Q. 9*

In his response to the question: "What are reasonable terms and conditions for assuring full compliance with all applicable safety regulations and protecting the reliability of the hydro's primary services, while also accommodating, to the extent feasible, the legitimate needs of the telecommunications carriers?", Mr. Vinyard does not provide specifics regarding the DAS-related equipment that CANDAS proposed to attach to utility poles.

(a) Please provide a complete, detailed listing of all DAS-related equipment that is proposed to be attached to utility poles, including for each separate piece of equipment: dimensions, weight(s), manner of attachment, above grade height of attachment, power supply requirements, rated power consumption, and expected equipment useful life.

Response:

(a) This interrogatory is argumentative and does not appear to be framed to elicit information that is relevant to the issues raised in this Application. CANDAS's position is that standard, Board-approved terms and conditions of access should include a requirement that all wireless and wireline attachers comply with applicable safety legislation, codes and standards (eg., CSA, O.Regs., ESA, etc) with respect to equipment and the installation, maintenance and operation of such equipment.

CANDAS, as an association, does not seek to attach anything to any poles. The DAS related equipment attachments in connection with the proposed Toronto DAS Network that were to be and have in part been made pursuant to the pole access agreement between THESL and DAScom are well known to THESL and adequately described in the Written Evidence of Tormod Larsen (Exhibit D, sheets 3 and 4 of 4).

Questions:

22. *Reference: p. 9, Q. 10*

The evidence alludes to the 2005 CCTA decision when Mr. Vinyard states that "current rates for attachments established by the Board". The CCTA decision was specific about the 2 ft communication space for attachments.

(a) Please confirm that the CANDAS Application is limited to wireless attachments that can all be contained within the communication space as defined in the CCTA decision.

(b) If ExteNet believes that there is additional space outside of the communication space where wireless attachments may be placed, please provide the legal basis for that position from the CCTA decision.

Responses:

(a) Not confirmed. The Application is not limited to wireless attachments, nor is it limited to wireless attachments that can be contained within the communication space, however defined.

(b) The CCTA Order focused on attachments in the communications space as it related to a determination of rates. The CCTA Order included determination in respect of attachers, not attachments. The CCTA Order, as well as the Mearie Model Agreement, clearly contemplated that ancillary equipment such as amplifiers and power supplies would have to be placed outside the communications space. It is not correct or appropriate to read the CCTA Decision as limiting all attachments to the communications space. Rather, the Board focused on that space because it was of limited and particular interest to the parties in respect of a determination of rates.

Questions:

23. *Reference: p. 9, Q. 10*

Mr. Vinyard states that "The principal method for avoiding the imposition of costs on utility ratepayers should be the establishment of appropriate rates or rate formulas designed to allow the utility to capture any and all costs that are attributable or properly allocable to the attachments in question."

(a) Please specifically identify by category "any and all costs that are attributable or properly allocable to the attachments in question" that would be recoverable by utilities from wireless attachers.

(b) In the event that the communications space on an existing pole with substantial remaining life is fully occupied, thus necessitating replacement of the pole line for the purpose of erecting DAS equipment, please confirm whether CANDAS proposes that DAS attachers reimburse the utility for the entire amount of:

(i) the stranded asset value of the existing pole line?;

(ii) the costs (both direct and administrative) of relocating other existing attachments; and/or

(iii) the incremental maintenance costs (such as tree trimming) attributable to the larger pole size.

Responses:

(a) The information requested is not relevant to the issues raised by the Application. No party in this proceeding has requested that the Board review and vary the approved pole access rate.

(b) The information requested is not relevant to the issues raised by the Application. No party in this proceeding has requested that the Board review and vary the approved pole access rate. In the event THESL believes there are additional costs related to installing DAS equipment, that are not reflected in the current approved rate, it should seek to vary the rate in the context of a rate application.

Questions:

24. *Reference: p. 9, Q. 11*

In his response to the question: "What are the reasonable terms and conditions relating to indemnification, limitations of liability, insurance and security for certain obligations?", Mr. Vinyard does not address what personnel CANDAS proposes to rely on to install DAS equipment.

(a) Please provide this missing information.

(b) If CANDAS proposes that its members install DAS equipment, are the staff of its members certified linepersons? If so, please provide the qualifications of staff who would be installing and maintaining this equipment, including the number of trained linepersons available to install the equipment, the details of their certification and expected scope of duties.

(c) If CANDAS proposes that utility staff install that equipment, please indicate whether:

(i) CANDAS has confirmed with all utilities that their staff are available to undertake this work;

(ii) CANDAS proposes that existing utility staff be diverted from electricity distribution work in order to install DAS equipment; and/or

(iii) CANDAS proposes that DAS installations take priority over other electrical distribution and customer demand work.

Responses:

(a) CANDAS as such does not propose to install any DAS equipment.

CANDAS' position is that terms and conditions governing the installation, maintenance and repair of attachments may include: requirements that work which requires adherence to statutory safety standards be performed by certified electrical linespersons in the employ of the electric utility, qualified personnel in the employ of third party approved contractors for work in the neutral or power space, or by qualified communications linespersons for work performed in or below the communications zone.

CANDAS' position is that terms and conditions should permit the use of properly qualified telecommunications workers (whether in the employ of the attacher or

of a third party contractor and with the approval (not to be unreasonably withheld, conditioned or delayed) of the pole owner) to perform make ready engineering, communications cable rearrangements as a component of the make ready construction, and to install DAS–related equipment in and below the communications space.

CANDAS does not perceive a logical connection between terms and conditions pertaining to liability and the personnel that any given attacher will rely on to install DAS equipment. This proceeding is about generic issues of general application. This question cannot be answered with specificity because the particulars will be determined by reference to a specific DAS deployment in a specific jurisdiction.

(b) The members of CANDAS do not propose to use their employees to install DAS equipment in areas where, under applicable safety legislation, standards and practices, the work must be done by certified or qualified communications electric linespersons.

(c)

(i) CANDAS does not understand the relevance of this question to the issues raised by the Application.

CANDAS has not confirmed with all utilities that their staff is available to undertake such work. CANDAS assumes that each utility will comply with all applicable regulatory mandates with respect to pole access and, in so doing, will decide whether it wishes to condition access upon a requirement that its staff perform such work. If a utility does choose to impose such a condition, CANDAS assumes that it will take the necessary steps to employ sufficient personnel and make them reasonably available to perform such work within a reasonable time frame.

(ii) CANDAS does not understand the relevance of this question to the issues raised by the Application.

CANDAS does not propose that existing utility staff be diverted from other work of equal or greater priority and urgency to install DAS equipment, but as noted above CANDAS does propose that if the utility will not allow any DAS installation work to be performed by qualified and approved third party contractors, then the utility will be obligated to manage its affairs in such a manner that the personnel are reasonably

available to perform such DAS installation services without unduly disrupting the utility's other work and service priorities.

(iii) CANDAS does not understand the relevance of this question to the issues raised by the Application.

CANDAS does not propose that DAS installations take priority over other electrical distribution and customer demand work. As noted above CANDAS does propose that if the utility will not allow the DAS installation work to be performed by qualified and approved third party contractors, then the utility will be obligated to manage its affairs in such a manner that its personnel are reasonably available to perform such DAS installation services without unduly disrupting the utility's other work and service priorities. Furthermore, CANDAS would propose that all communications attachers be treated fairly as a customer with respect to the timely delivery of electric power to their node sites or other power interconnection points.

Questions:

25. *Reference: p. 10, Q. 12*

On these pages, Mr. Vinyard provides an overview on the US federal statutory and State regime on the issue of access or the conditions for the denial of access. Specifically, on page 11, he states "… ExteNet Systems has seldom, if ever, encountered a situation in the United States in which it could not attach its facilities by reason of insufficient capacity."

(a) Are there any differences between the regulation of telecommunications attachments in the United States and in Canada that the Board should be aware of, or is CANDAS suggesting that regulation in Canada in the United States is effectively identical?

(b) Please provide specifics of any Federal or State law that has adopted the definition of "communications space" as adopted by the OEB in the CCTA decision.

(c) Does the statement "insufficient capacity" make reference to the 2ft communications space specification contained within the CCTA Decision?

Responses:

(a) See the discussion in the Written Evidence of George Vinyard (at page 11) of salient features of the regulation of telecommunications attachments in the United States, including the FCC's April 2011 report and order in Docket No. 07-245, in which the FCC rejected the proposition that a blanket refusal to allow pole-top antennae attachments would be justifiable.

(b) CANDAS does not believe that the Board expressly considered and adopted a definitive and exclusive definition of "communications space" in the CCTA Order. The Board utilized a working definition of that term for the purpose of determining an access rate, rather than as a limitation on pole access for all attachments and all purposes.

To CANDAS knowledge, no U.S. Federal or state law or agency has adopted the specific definition of "communications space", as that term was utilized in the CCTA Order. The FCC and various state authorities use a definition based on standards and practices prevailing in the industry whereby the "communications space" is deemed to be the space between an upper point on the pole that allows for sufficient clearance below the power (and where applicable the neutral) zone and a lower point on the pole that is at a height above grade that is

required for achieving the prescribed minimum clearance beneath the span. Recognition of this definition, and of the utility of the space on the pole below that communications space that is "unusable" for attachments of cable spans, is reflected in the Federal formula for computing attachment rates.

(c) No. As noted above, CANDAS does not agree that the CCTA Order determined a rigid "specification" of a communications space limited to 2 feet as implied by THESL, nor does CANDAS agree that the references to communications space in the CCTA Order should be interpreted as a literal limitation on each and every specific attachment to a pole, rather than an indication of the most significant space to which cable companies and Canadian Carriers should be granted access.

Questions:

26. *Reference: p. 12, Q. 12*

Mr. Vinyard states that "The FCC Report and Order relating to pole attachments is now in effect, although electric industry members have requested reconsideration by the FCC and sough relief in the courts".

(a) Please provide case references, file and court docket numbers for the reviews and appeals referred to in your answer in order to allow the Board and parties to understand the nature of these reviews that are referenced.

(b) Is ExteNet's position that the underlying business case or hurdle rate for its enterprise in Ontario is entirely dependent on the ability to attach its wireless technology to: (i) LDC poles; or (ii) LDC poles at a rate of $22.35 per pole per year? Please explain and provide the relevant particulars.

Responses:

(a) This information is publically available.

(b) ExteNet's position is the same as that of CANDAS which is set forth in the Application and the Written Evidence, previously submitted, and, as such, is clear. However, to elaborate, ExteNet is not asserting that the viability of DAS network solutions in Ontario is entirely dependent upon the ability of Canadian Carriers to attach DAS antennas and other DAS related equipment to electric distribution poles at the current regulated rate of $22.35 per pole per year.

Questions:

27. *Reference: p. 12, Q. 13*

Mr. Vinyard states that "Without the relief that CANDAS is seeking in this proceeding, ExteNet will have no option but to withdraw entirely from the market for outdoor DAS network services in Ontario. In doing so ExteNet would realize the loss of its entire investment in the Toronto DAS Network…".

(a) Prior to making its investment in Toronto, please describe the due diligence undertaken by ExteNet to assess whether its business model (wireless attachments to LDC poles) was compliant with Ontario law, including past decisions of the Ontario Energy Board?

(b) Regarding the response to (a), please provide the relevant particulars in support, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents. Specifically, please describe and provide supporting documents in respect of discussions or other communications ExteNet had with any Province of Ontario officials, OEB staff, or any legal opinions rendered in this regard, etc.

Responses:

(a) None of the CANDAS members are seeking to recover their stranded costs in this proceeding. Accordingly, this information is not relevant.

(b) None of the CANDAS members are seeking to recover their stranded costs in this proceeding. Accordingly, this information is not relevant.

Question:

28. *Reference: p. 12, Q. 14*

Mr. Vinyard states that "If the Board grants the relief that CANDAS is seeking as described above, it will mean that ExteNet and DAScom, along with other potential providers of DAS network infrastructure and services, will have the opportunity to obtain contracts from wireless carriers….."

Please confirm that a DAS application is a one time backbone service which is thereafter resold to resellers. That is, after the first installation of a DAS network application, is it the case that there is no opportunity for other backbone providers to also attach? In other words, please confirm that the first to attach, for all intents and purposes, becomes the monopoly provider of DAS?

Responses:

CANDAS does not agree or confirm that the first to attach a DAS "becomes the monopoly provider of DAS".

CANDAS does not agree or confirm that after the first installation of a DAS network "there is no opportunity for other backbone providers to also attach."

CANDAS does not agree or confirm that "a DAS application is a one-time backbone service which is thereafter resold to resellers."

CANDAS finds THESL Interrogatory 28 altogether unclear because the references to backbone providers and backbone service are not applicable, in any meaningful way, to DAS network architecture. However, as demonstrated in the City of Montreal, more than one DAS network can coexist in a given location.

III. Written Evidence of Tormod Larsen[3]

Questions:

29. *Much of Mr. Larsen's evidence appears to be in the nature of argument and opinion.*

(a) Does CANDAS intend to qualify Mr. Larsen as an expert in this proceeding? If so, on what basis?

(b) If CANDAS does not intend to qualify Mr. Larsen as an expert in this proceeding, are his views simply intended to reflect the views and opinion of the Applicant?

Responses:

(a) Mr. Larsen is an expert in the areas described in his CV. CANDAS does not intend to qualify him as an independent expert witness. Mr Larsen is presented as a company witness with a specific expertise in specific areas, similar to "expert witnesses" that are typically proffered by regulated entities in OEB proceedings.

(b) See answer THESL 29(a), above.

[3] As filed July 26, 2011.

Questions:

30. *Reference: p. 5, Q. 4*

Mr. Larsen states that a "typical configuration of a DAS node site" includes, among other elements, a "60cm tall canister antenna with a diameter equal to or slightly larger than the pole…."

(a) In such a "typical configuration", is it the case that a utility pole will support only one such antenna at any given time?

(b) If CANDAS' position is that a utility pole will support more than one such antenna at any given time (in a "typical configuration"), please provide the particulars in support of this position, including pictures and diagrams as well as other supporting documents, as is relevant to the response.

Responses:

(a) In such a typical configuration, a utility pole will only support one such antenna and one such antenna is all that would be required to support multiple wireless users. Physically, a given utility pole supporting such an antenna could support one or more additional antenna, if needed. However, even though poles are usually capable of physically supporting more than one antenna, it is generally preferable that any given DAS node be limited to a single antenna unit, i.e., only one point from which signals in the mobile telephone frequency bands are transmitted.

(b) Not applicable.

Question:

31. *Reference: p. 5, Q. 4*

Mr. Larsen states that "It is also a fact that with the antenna on the top of the pole it is farther away from power lines, fibre and other equipment improving the operational environment for everyone."

(a) Please provide evidence from the Canadian and US electricity industry to support this statement, including the affect of placement of equipment on the ability of staff to climb poles, and work around pole-top antennae.

Response:

(a) An antenna or apparatus that is placed on top of a pole is only accessible to a small number of qualified workers would not be an impediment within the communications space, which is accessible to significantly more workers with lesser training and qualifications. Pole top antennas are generally installed vertically above the pole, and are more accessible and less of an obstacle than antennas mounted on side arms or other extensions laterally off the pole. In relation to climbing space, statistically 95% to 98% of all work performed on distribution poles is performed in a bucket truck, not by gaffing or climbing the pole, however when climbing is required, pole top antennas are not in the work zone or climbing zone, only the riser or U guard is attached to the pole itself and they are not materially different than any other risers currently used for electrical cables. To CANDAS' knowledge, in all cases in the United States where pole top antennas have been approved for use, installation and maintenance is performed either by the electric utility's own linemen as a compensated service or by qualified electrical contractors that are approved by the utility to perform these services.

Question:

32. *Reference: p. 8, Q. 6*

Mr. Larsen states that "DAS technology has been used for years in tunnels, canyons, indoors, and other hard to reach areas".

(a) Given the flexibility in the deployment inferred by this quote and to the extent that the response to this question is not provided by the response to question 5, please identify a comprehensive range of attachment alternatives, beyond utility poles, that may be possible for deployment of DAS technology.

Response:

(a) The alternatives are set out in the evidence and in the answers to the Board Staff Interrogatories at 6.1.

Questions:

33. *Reference: p. 12, Q. 9*

Mr. Larsen states that "there are no real practical alternatives to electrical utility infrastructure for large scale outdoor DAS deployment."

(a) What is meant by "large scale outdoor DAS deployment"?

(b) What other alternatives did ExteNet and CANDAS consider for the City of Toronto?

Responses:

(a) "Large scale outdoor DAS deployments" refers generally to DAS networks with substantial numbers of nodes, including but not limited to very large DAS networks with 100 or more nodes, such as the proposed Toronto DAS network. Wireless service market entrants will typically have to install "large scale outdoor DAS deployments". In most circumstances, the quoted statement is accurate for small scale (fewer than 10 nodes), medium-scale (10 to 50 nodes) and large-scale (more than 50 nodes) DAS networks. Alternative means of deployment may be possible for smaller DAS networks involving a limited number of node sites, but the scale of small DAS networks are not likely to support deployment costs associated with an alternative deployment approach, even if the alternative is technically feasible.

(b) CANDAS, as a collective, and Public Mobile, as a member of CANDAS, did not consider other alternatives for DAS deployments in the City of Toronto.

Questions:

34. *Reference: p. 13, Q. 9 (also Page 6 of Exhibit B)*

Mr. Larsen states that "In the case of the Toronto DAS Network, alternative solutions (e.g. placement of antennas on buildings), even if workable sites had been available, would have required literally hundreds of agreements with private property owners to permit placing the node equipment on their structures and providing the needed fibre connectivity would require taking fibre connections through many streets and sidewalks."

(a) Does this statement imply that a new, dedicated, overhead fibre optic system is necessary to support DAS?

(b) Page 6 of Exhibit B: this photo appears to be of an antenna mounted on top of a pole. Please explain how this installation was feasible, and would be feasible for a Toronto DAS Network.

Responses:

(a) The statement implies that outdoor DAS networks require a substantial amount of dedicated fibre cabling. Typically, a minimum of one optical fibre strand per node site runs between the node site and the hub facility. The required fibre also must extend over a fairly dense grid corresponding to the areas over which the node sites are distributed in order to provide seamless wireless service in the targeted area. The preferred approach is aerial fibre, but underground fibre is often used in central business districts where extensive duct banks are available. Where existing dark fibre is available at the needed locations and in sufficient quantities at commercially reasonable prices, DAS providers generally seek to use such resources rather than constructing new fibre. In fact, the proposed Toronto DAS Network project was planned in a manner intended to make use of existing and planned Cogeco fibre cable routes. However, regardless of the availability of existing dark fibre capacity in or near the area to be covered by a DAS network, additional fibre must almost always be installed to extend from existing fibre backbones to the individual DAS node sites.

(b) The referenced photograph is of an antenna mounted on the top of a streetlight pole and other DAS equipment attached lower on the pole. Except for the general observation that there is no reason to think that pole-top antenna installations on similar poles, if any, in Toronto would not be feasible, CANDAS does not believe the detailed information requested with respect to this particular installation is relevant to the issues raised by the Application.

Questions:

35. *Reference: p. 13, Q. 9*

Mr. Larsen appears to be making the point that if LDC poles are not available to DAS networks and you had to pursue alternative options, then "The estimated impact on construction costs could exceed $200,000/node site just to provide such connectivity, with the total running into many millions of dollars which would render the project economically unfeasible."

(a) Please provide all calculations related how the $200,000/node estimate was generated.

(b) Mr. Larsen's evidence provides that construction costs "could exceed" $200,000/node site. In addition to this upper end of the range, please provide a low end cost estimate per node site and an average cost estimate per node site if you had to pursue alternative options.

(c) What is the all-in construction cost estimate per node site if CANDAS was to utilize LDC utility poles?

(d) Is it Mr. Larsen's position that, setting aside the issue of costs, it is possible to deploy a DAS network in downtown Toronto using alternative outdoor locations other than utility poles? Please explain.

(e) Is it Mr. Larsen's position that $200,000 per node site is a fair and accurate proxy for the avoided costs enjoyed by DAS providers like ExteNet, if DAS networks are attached to LDC poles instead of the other alternatives he describes in this section?

(f) Please provide all other relevant particulars in support of this statement, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Responses:

(a) The $200,000+ number is based on experience from fibre companies bringing fibre into buildings in similar environments as Toronto. The estimate breaks down as follows:

Category	**Cost**
Site Acquisition & Leasing	$12,800

Site Zoning, Planning, Permitting including Legal & Municipal Hearing	$13,000
Engineering (RF, A&E, Electrical, Fibre (indoor and outdoor), Foundation etc)	$48,700
Fibre construction (incl. trenching, road & sidewalk restoration etc.)	$183,600
Indoor installations (incl. exterior antenna)	$29,600
TOTAL	**$287,700**

The biggest cost driver is the fibre construction from the manhole to the building. This would typically involve trenching, road and side walk restoration, flagmen etc. In metropolitan areas like Toronto this could carry significant costs because it typically involves after hours work. The above estimate assumes an 80m distance from closest available manhole to the building.

(b) In a metropolitan area like Toronto, there are few available and consistent alternatives. ExteNet has conducted some analysis based on typical costs for alternative solutions. Costs are summarized below:

Line Item	**10 Meter Existing Utility Pole**	**10 Meter Replace Utility Pole (Electric Utility)**	**10 Meter Street Lamp with Equipment and Antenna Attached - Replace Pole and Foundation**	**Meter Building**	**Meter Tower**	**Meter Water Tank**
Engineering and Construction Estimate Totals	**$6,400**	**$14,700**	**$109,050**	**$287,700**	**$211,000**	**$152,600**
Deviation from Base (Existing Utility Pole)	Base	230%	1704%	4495%	3297%	2384%

(c) Using the same metrics as those shown in Tables 1 and 2, the estimated cost per node would range toward $7000 only for node engineering and construction. Estimating an "all in figure" for a typical node configuration is neither practical nor meaningful because of variability in the particular configuration and cost of the DAS node equipment.

(d) No. Even if "setting aside the issue of costs" were an appropriate or practical approach to this analysis, the technical design and performance requirements for an effective DAS network in this area and commercial requirements for a reasonably predictable and prompt time to market could not be satisfied using alternative outdoor locations. The potential feasibility of alternative locations could conceivably be enhanced if the City were to allow the DAS provider to place new standalone DAS node poles in the public right of way and if the particular area in question included the necessary fibre and power connectivity, e.g., by way of existing dark fibre and/or available conduit space.

(e) No. As noted above, the dollar amount in question is a high-end estimate. More importantly, it is neither fair nor logically accurate to suggest that costs that far exceed any level that would render an entire enterprise economically infeasible somehow represent "avoided costs" that are a benefit "enjoyed by" a party that chooses to invest substantial capital based on a business model with costs that do not exceed such levels of infeasibility.

(f) To the extent that this question seeks information beyond that set forth above and otherwise in the Application and the Written Evidence, such information is not relevant to the issues raised by the Application; moreover, production of such information would be unduly onerous relative to its probative value, if any.

Questions:

36. *Reference: Exhibit "B", slide 2*

This Exhibit states that "ExteNet uses both outdoor and indoor Distributed Antenna Systems (DAS) Networks" and that "over 2000 outdoor DAS Nodes in Operation or under construction in Canada".

(a) How many outdoor DAS Nodes are in operation or under construction in Canada? How many in the United States?

(b) Please identify and explain any substantive technical differences, if any, in deploying indoor versus outdoor DAS Networks.

(c) Is it possible to deploy a DAS network in downtown Toronto using an indoor DAS network?

(d) Are you aware of any US cities that deploy indoor DAS networks for concentrated areas (downtown core, specific shopping areas, large office towers, etc)? Please explain.

Responses:

(a) The quote cited in this interrogatory is incomplete and, thus, out of context. The number in the quote refers to the total nodes in both Canada and the United States. The current outdoor DAS node totals (in operation or under construction in which ExteNet Systems or any of its subsidiaries including ExteNet have been involved) are set out in the evidence and in responses to Board Staff Interrogatories.

(b) The architecture of indoor DAS networks is similar to outdoor DAS but more costly. There are following substantive technical differences: (i) indoor DAS networks are installed within buildings or other effectively enclosed structures such as tunnels; (ii) as a matter of technical feasibility and customer requirements, indoor DAS networks are almost always designed to provide controlled coverage within structures and to limit and restrict RF signals from getting outside the building; (iii) indoor DAS networks utilize significantly lower (1/1,000 to 1/10,000 of outdoor) radio frequency output power; (iv) the DAS hub facility for an indoor network is typically located within the building. The distances from an indoor hub to each node site is hence limited to a few hundred meters at most; (v) indoor DAS antennas and nodes are typically located in the ceiling and or telecom closets within the building; (vi) indoor DAS networks are typically not subject to approval or permitting by external

authorities other than a single party, the owner or manager of the building; (vii) an indoor DAS network typically has a large number of antennas throughout the facility. It is not uncommon to have 4-10 antennas per floor in a high rise structure; (viii) the total deployment time for an indoor DAS network in a single building is typically relatively quick (weeks or a few months) compared to typical outdoor DAS networks; and (ix) because of the relative simplicity and significantly smaller scale of most indoor DS deployments, each network project is typically much less costly and requires significantly less capital than even a small scale outdoor DAS network.

(c) No. Indoor DAS networks can complement outdoor wireless networks, but by reason of the differences described above, they are not an alternative. Indoor DAS networks cannot provide adequate outdoor street coverage. In addition, while there are vast numbers of buildings of various sizes throughout the area that would have been covered by the proposed Toronto DAS Network, indoor DAS networks are typically deployed only in buildings larger than 10,000 sq. meters. Other obstacles aside, indoor systems alone would leave a large number of buildings and people without reliable coverage either outdoors or in their own buildings.

(d) CANDAS is not aware of any indoor DAS deployments that have been implemented for purposes of providing outdoor wireless coverage. Indoor DAS networks have been deployed in selected structures in a number of cities as a supplement to outdoor coverage that does not adequately penetrate these buildings. The deployments have been done by wireless carriers and by indoor DAS companies like ExteNet, not by any cities. The facilities where indoor DAS deployments have mostly been implemented are large, commercial buildings, such as high-rise offices, and some large hotels and casinos, as well as large transportation facilities such as airports and subways.

Questions:

37. *Reference Ex. B, slide 6 and Ex. C, slide 2*

(Slide entitled "DAS – The wireless solution for modern cities" and slide entitled "Las Vegas – DAS Nodes")

(a) The photographs on these slides shows antennae and remote radio units on street lighting pole (Exhibit B) vs. a standalone pole adjacent to a street lighting pole (Exhibit C). What are the total dimensions (width and height) of each component of this equipment?

(b) Does this installation fit entirely within the 2ft communications space?

(c) Why did ExteNet use a stand alone pole in Las Vegas rather than attaching to the adjacent street lighting pole?

Responses:

(a) Antennas:

Type A Kathrein (http://www.kathrein-scala.com/catalog/84010515.pdf)

Height: 60.9cm

Diameter: 40.7 cm

Weight: 22.7kg

Type B CellMax (http://www.cellmax.se/UploadFiles/Files/CMA_TRI_6515_A2.pdf)

Height: 58.8cm

Diameter: 26.6cm

Weigth: 12kg

DAS nodes/RRU:

ZTE

Dimensions of cabinet (H*W*D): 50cm*32cm*17.2cm.

Weight of a single cabinet with full configuration : < 22 kg

DeltaNode

Dimensions of cabinet (H*W*D): 70cm*30cm*22cm.

Weight of a single cabinet with full configuration : < 24 kg

VA insert

We can provide node elevation drawings for one of these nodes.

(b) There is no defined communications space on these poles as they were placed and are owned by ExteNet and are not classified as utility distribution poles.

(c) ExteNet made a commitment to a customer to deliver this network by a static launch date specified by the customer. While utility poles were available, the pole owners' delays in performing make ready engineering and construction put the timeline in jeopardy. While these sites were more costly to construct, ExteNet absorbed the additional cost at a significant financial loss to ensure the customers launch objectives were maintained. With a small amount of additional time, this network would have been constructed using utility poles excepting only those areas where utility poles were previously removed.

Question:

38. *Reference: Ex. C, Second last slide entitled "Toronto DAS –Sidearm Installations"*

(a) Does this installation fit entirely within the 2ft communications space on the distribution pole?

Response:

(a) CANDAS believes that the point at which the side arm supporting the antenna attaches to the pole in the pictured installation fits within the applicable communications space. It occupies less than the 6 inches allowed between wireline cable attachments. Obviously, because the antenna itself is mounted on a stand-off support and projects away from the pole, the antenna and the side arm do not occupy any of the space in the communications space that is required for clearance between wirelines. The node equipment and power unit are shown affixed to the pole in an area below the communications space. The electric utilities often refer to this space as the unusable space (clearly a misnomer) because it is unusable for running power conductors or other wireline attachments, but it can be and often is used for wireless and other equipment installations.. This area of the pole below the communications space is also sometimes referred to as the common area of the pole. Cable TV companies use it to host power supplies and equipment enclosures. Wireline telecommunications companies also use this common space to install splice cases and equipment and some municipalities and public works departments use it to install traffic signal and surveillance equipment.

Question:

39. *Reference: Exhibit "D" (DAScom As-Built Fibre Optic Node Installation)*

(a) To the extent that any of the planned Toronto DAS Network node installations were intended to be materially different than that which is presented in Exhibit "D", please provide detailed drawings of the proposed node installations and in a form similar to the information contained in Exhibit "D".

Response:

(a) Except for streetlight pole installations such as those depicted in Exhibit C with pole-top antenna installations, all of which have been removed from THESI's poles, none of the planned Toronto DAS Network node installations were intended to be materially different than that presented in Exhibit D.

IV. Written Evidence of Bob Boron[4]

Question:

40. *Please provide a detailed curriculum vitae, including a listing of all appearances before regulatory or judicial entities.*

Response:

Mr. Boron's curriculum vitae is attached at Schedule 40-1.

[4] As filed July 26, 2011.

Resume of Robert P. Boron

Summary:

Bob Boron is the Vice President, Legal & Regulatory Affairs and General Counsel for Public Mobile and he has been held this position since October 2009. In this role, he has responsibility for all matters related to legal and regulatory matters at the company.

Boron served as Executive Vice President and General Counsel at Call-Net Enterprises & Sprint Canada, one of the largest long distance and local telecommunications services providers in Canada, during a period of acute change and extremely rapid growth (from 1990 to 1998). While at Call-Net / Sprint Canada, Boron was elected to the board of directors of Microcell, a publicly-traded, national cellular carrier which operated under the "Fido" brand across Canada, and he helped to guide the company through its initial public offering.

After Call-Net, Boron co-founded and was an Executive Vice President of a start-up telecom venture, Riptide Communications. After Riptide, for a period of time Boron had global responsibility for e-marketing and knowledge management at Deloitte Touche Tohmatsu, one of the world's largest professional services firms.

Immediately prior to joining Public Mobile, Boron was a Co-Founder and President of Jade Tower, an independent communications tower and antenna site company servicing the Canadian wireless sector. In 2009, Jade was sold to SBA Communications, a large tower company based in the United States.

Boron has over twenty years' experience in the telecommunications sector in Canada. Over this period, Boron has been responsible for and has participated in dozens of regulatory proceedings related to telecommunications, predominately before the Canadian Radio-television and Telecommunications Commission, but also before other bodies and agencies, including Industry Canada, the Competition Bureau, the Federal Communications Commission (U.S.), U.S. Trade Representative and various House of Commons and Senate Committees. Regulatory proceedings that Boron has been involved with include those related to long distance competition, local services competition, international services competition, incumbent carriers' price caps, foreign ownership and control, and anti-competitive activities by providers with market power.

Boron has a Bachelor of Sciences degree from Dalhousie and McGill Universities, and a law degree from Dalhousie Law School.

Experience:

- ***2009 - present***
  Vice President, Legal & Regulatory Affairs and General Counsel, Public Mobile, a mobile wireless telecommunications carrier holding licences to offer services using PCS spectrum in the 2 GHz band in the provinces of Ontario and Quebec; member of the senior executive team having responsibility for all matters for Public Mobile related to legal and regulatory matters.

- ***2006 - 2009***
  President, Corporate Development and Co-Founder, Jade Tower, an independent owner and operator of wireless communications towers and antenna sites serving the Canadian wireless sector.

- ***2001 - 2005***
  E-Marketing and Knowledge Management, Deloitte Touche Tohmatsu, responsible for global e-marketing and knowledge management strategies and operations, including Deloitte's global public web site (Deloitte.com), and Deloitte's global intranet and client extranets.

- ***1998 - 2000***
  Co-Founder, Executive Vice President & General Counsel, Riptide Communications, a wholesale broadband telecommunications service provider; responsible for general management of the business with direct responsibility for all legal, regulatory, government relations, strategic alliance and human resources matters.

- ***1990 - 1998***
  Executive Vice President, General Counsel and Corporate Secretary, Call-Net Enterprises & Sprint Canada, one of Canada's leading competitive telecommunications companies; a member of the senior executive team during a revolutionary period of acute change and significant growth; reported to the CEO and Board of Directors with direct responsibility for legal, regulatory and government relations, human resources, real estate / facilities and corporate secretarial functions; played a key role in the company's financings, M&A and strategic alliances; responsible for relations with Canadian and U.S. regulators, including the CRTC, Industry Canada, Federal Communications Commission (U.S.), U.S. Trade Representative; presented to various House of Commons and Senate Committees; presented at numerous industry conferences and client symposia.

- ***1997 - 1998***
  Board of Directors, Microcell Telecommunications, elected to the Board of Directors of a national, publicly-traded mobile wireless telecommunications carrier.

- ***1987 - 1989***
  Lawyer, Johnston & Buchan, advised clients on regulatory and business law issues, focused primarily on telecommunications, broadcasting and media.

Education:

- LL.B., Dalhousie University Law School
- Graduate Studies, Dalhousie University
- B. Sc., Dalhousie and McGill Universities

Question:

41. *Reference: p. 2, Q. 1*

Mr. Boron states that he is "a Co-Founder and President of Jade Tower Inc. , a company focused on owning and managing wireless communication (cellular) towers and antenna sites…."

(a) Given Mr. Boron's experience, please provide a breakdown of market prices that exist for the different types of communication towers and antenna site alternatives utilized for wireless attachments (tops of buildings, sides of buildings, stand alone towers, utility poles, traffic lights, billboards, signage, attachments inside buildings, etc.).

Response:

(a) The information requested is not relevant to the issues raised by the Application.

Question:

42. *Reference: p. 3, Q. 3*

Mr. Boron states that to the extent that "THESL is suggesting that the board-approved attachment rate is too low for wireless attachments", then he disagrees.

(a) Please explain the basis for, and provide the relevant particulars in support of this statement, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Response:

(a) The quote in this question is taken out of context. The basis for Mr. Boron's statement is set out in the entirety of his response to Question 3 in his Written Evidence.

Questions:

43. *Reference: p. 3. Q. 4*

Mr. Boron states that "to the extent that there is no alternative but to attach DAS to existing power poles, access to such power poles does constituted a monopoly-controlled resource."

(a) Is it Mr. Boron's evidence that there are no alternatives for DAS but to attach to existing power poles?

(b) If the answer to (a) is yes, then please provide the relevant particulars in support of this position, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(c) If the answer to (a) is no, then please explain the alternatives options that exist, including providing the relevant particulars of same.

(d) Please define the term "monopoly-controlled" as it is used in this context.

Responses:

(a) No.

(b) N/A

(c) The options are set out in the response to the THESL Interrogatories 3(b).

(d) The term is self-explanatory.

Questions:

44. *Reference: p. 3, Q. 5*

Mr. Boron states that "It would be strange indeed if power poles were classified as essential facilities for cable companies and wireline attachers, but not for wireless attachers."

(a) Please define the term "essential facilities" as it is used in this context.

(b) Please explain the extent to which it is Mr. Boron's and/or Public Mobile's view that THESL's poles are "essential facilities" within the context of Public Mobile's provisioning of wireless services in and around Toronto.

Responses:

(a) Both the OEB and the New Brunswick Board of Commissioners of Public Utilities have determined that power poles are "essential facilities". CANDAS members rely on these determinations.

(b) See answer to THESL 44(a), above.

Questions:

45. *Reference: p. 4, Q. 7*

Mr. Boron states that: "all available capacity must be distributed equitably, in a non-discriminatory and transparent fashion - to all classes of users. THESL cannot decide to grant access to wireline attachers and cable companies, but not wireless attachers, on the basis of professed but unsubstantiated capacity issues."

(a) Does CANDAS propose:

(i) that "all available capacity" consists of the entire communications space?

(ii) that "all available capacity" consists of the unoccupied communications space?

(b) How does Mr. Boron/CANDAS propose applying this principle to the situation where multiple, competing suppliers for a DAS Network may exist within the City of Toronto?

(c) If all communications space on a pole is currently occupied, does CANDAS propose that that space be reallocated among more users (now including DAS attachers) with the result that one or more current occupants are displaced from the pole?

(d) What method does CANDAS propose for the rationing of available pole communications space among "all classes of users"?

(e) Please provide examples of permit applications that were denied for "professed but unsubstantiated capacity issues".

Responses:

(a) In the context of this question CANDAS does not propose that "all available capacity" is limited to the communications space, whether, (i) in its entirety or (ii) the unoccupied portion thereof. While the communication space that is available for the safe attachment of wireline cables is clearly the most significant portion of a pole and generally limited by external factors in such a way that space in this portion of the pole may be more readily subject to exhaustion, it is clear that for items of equipment related to both wireless and wireline services, other areas of a pole may be the most appropriate places for attachment. Additionally, even though the communications space is limited its dimensions may be different depending on the characteristics of each pole (CANDAS does

not agree that it is invariably defined as two feet of vertical space) and the capacity of the communication space to accommodate wireline and other attachments may vary depending on attachment methods and configurations. In sum, exclusion of attachments of different categories or types or exclusion of additional attachers should not be justified by the establishment of arbitrary standards and generic universally followed rules that are not administered in such a way as to accommodate additional attachers when that can reasonably be done in full compliance with all applicable safety rules and standards and without interfering to any material extent with the use of the pole by the owner and other attachers as then in effect. This is not to say that a new applicant for attachment to a pole should in any way take priority over existing attachers, but it is to suggest that reasonable efforts, including where appropriate planning and design consultation, make ready engineering and make ready construction, should be made to evaluate and accommodate proposed attachments on a case by case basis. Rejections of attachment applications based on limited or exhausted capacity should be justified on the basis of the particulars of the application and the relevant characteristics of the specific proposed attachments and poles.

(b) In general, CANDAS believes that attachers who have made the investment of time, effort and money to obtain attachment permits and construct infrastructure on utility poles should take precedence over later permit applicants seeking attachments on the same poles. However, if the foregoing principles and processes, fairly applied, result in attachment permits being granted to competing DAS providers, that should not be deemed a problem.

(c) No. However, if the communications space could reasonably be reallocated so as to accommodate an additional attacher without either displacing or significantly disadvantaging any current occupants, then that should be done. In other words, reasonable efforts should be directed toward determining whether all of the communications space is necessarily fully occupied or might be allocated and occupied in a more efficient manner.

(d) CANDAS does not propose rationing of available communications space among classes of users. Rather CANDAS proposes fair, equitable, non-discriminatory and transparent treatment and accommodation of attachers without regard to how they may be classified based on the nature of the technology they employ to provide services to their customers. As noted above, CANDAS is not proposing that earlier attachers be displaced by later attachers.

(e) CANDAS does not have examples of permit applications that were denied for such issues. However, CANDAS believes that some electric utilities in Ontario

have adopted or professed to adopt what are, arguably, arbitrary limitations such as caps on the numbers of attachers per pole or on the total loading on pole lines and have purported to apply such limitations universally, without regard to the specific nature or characteristics of particular proposed attachments and without regard to the actual capacity (spatial or load-bearing) of the particular poles or pole lines.

V. Written Evidence of Brian O'Shaughnessy[5]

Question:

46. *Please provide a detailed curriculum vitae, including a listing of all appearances before regulatory or judicial entities.*

Response:

See Schedule 46(a)-1 for the curriculum vitae of Brian O'Shaughnessy.

[5] As filed July 26, 2011.

BRIAN O'SHAUGHNESSY, P.ENG.

PROFILE

A proven bilingual executive with extensive experience leading the development and deployment of new leading edge wireless and data communications networks. A track record of navigating uncharted waters while establishing processes and procedures in the evolving wireless industry.

- Fosters collaboration and motivates highly technical teams
- Understands the end to end implications of technology in a wireless business
- Drives new thinking and innovation

CAREER HISTORY

PUBLIC MOBILE **2008 – PRESENT**
Chief Technology Officer
As one of the initial employees of this startup wireless company, established a team to manage all aspects of the network from business plan development through, vendor selection, network design, network build and network operations resulting in the successful launch of wireless service in Montreal and Toronto in 2010.

- Implemented cost effective outsource model for both network build and operations.
- Built the lowest cost network architecture in the market.
- Drove the launch of the world's first G band PCS phones and base stations to the market by a variety of vendors.

BELL CANADA **2004 – 2008**
Vice President, Video & Access Technology Development
Established direction, selected vendors, developed and implemented new technologies to meet the company's TV and Internet access business goals. Managed a direct staff of 70 and an indirect staff of 200+ employees and held accountability for a significant IPTV development and deployment capital and expense budget.

- Appointed as the company's overall executive prime to align the executive team around one clear IPTV vision resulting in a solid team as well as capital resources.
- Created and managed a highly effective cross company team of TD, Marketing, IT, Operations, Customer Service and Finance experts which delivered on the vision while operating as a "start up" within the larger company.
- Developed and implemented a 30 Mbps DSL access network, IT front and back office support systems, video encoding head end, and the acquisition competitive live and on demand content for the service.
- Created an operations expert team as well as the necessary processes for delivery of the required customer experience. Placed technology development experts into the field for full knowledge transfer as well as faster and more accurate issue resolution.

- Established a Customer Service Centre of Excellence focussed on the seamless delivery of the new wireline TV service.
- Implemented a 400 customer market trial on a commercial ready system in Toronto.

BELL MOBILITY **1985 – 2004**

Vice President, Wireless Technology Development (1995 – 2004)

Provided technology leadership for a business that grew rapidly from 0.8M to 4.5M customers, and managed a staff of 120 engineers/technicians and a capital budget of $10-20M / year. This program drove the strategy and technology to allow the timely and effective deployment of more than $200M in network capital annually.

- Developed and launched the CDMA PCS network resulting in the highest capacity and quality service in the market. A launch pad for all traffic growth and service enhancements for the next 10 years including text messaging and wireless data services.
- Provided industry leadership by conceptualizing, promoting to vendors and launching the first tri-mode phone allowing the company to fully and seamlessly deploy service across its 800 MHz and PCS spectrum licences. Tri-mode phones went onto to become the industry standard device.
- Spearheaded the design and implementation of an innovative transaction billing mediation system which allowed the rapid introduction of new services by the marketing team without requiring costly and time consuming IT development. Negotiated the contract to pay for the system as revenue was generated.
- Drove the launch of the CDMA2000 1x network resulting in the highest speed data service in the market and further extending network capacity.
- Developed and launched Bell's enhanced services architecture including: Location Based Services, WAP 2.0, LDAP and J2ME based application download service.
- Led technology aspects of the company's regulatory policy through direct interaction with Industry Canada and lobbying of other wireless companies. This resulted in Industry Canada changing its spectrum cap policy and thereby allowing the company to successfully acquire 20 MHz of spectrum in the 2000 PCS spectrum auction.
- Successfully primed the 2.4 / 3.5 GHz Spectrum Auction team in 2004 resulting in the acquisition of 138 licences for $1.5M across the country.

Director Technology Planning (1990 – 1995)

Established wireless technology direction by working directly with vendors, International Cellcos and researchers resulting in the deployment of an architecture which formed the basis for network evolution for the subsequent 10 years.

- Gained approval from the BCE CEO and BCE Mobile Board for the evolution from TDMA to CDMA PCS technology. This activity required the development of market demand forecasts and economic models, conducting technical field trials, talking to Cellcos from around the world and direct discussions with the Board.
- Led the successful effort on behalf of the Mobility Canada Cellco Presidents in securing a 10 MHz national PCS licence through the Industry Canada application process.
- Through technical, business and regulatory arguments, led the introduction of enhanced services by securing CCS7 connectivity for all Cellcos in the Canadian market. This capability produced faster call connection time and introduced CLID.

Director Network Engineering (1988 – 1990)
Manager Provisioning & Engineering (1985 – 1988)
Developed cellular system design specifications and practices, secured leased tower locations, created and managed $200M annual capital budget and project managed the build of Bell Mobility's network as it grew from start up to more than 400 cell site and more than 200K customer.

MOTOROLA CANADA **1982 – 1985**
Radio Systems Engineer

EDUCATION

Registered Professional Engineer, (Association of Professional Engineers of Ontario),1985
B.Sc. Electrical Engineering, Queen's University, 1982

ASSOCIATIONS & MEMBERSHIPS

- Past-President, CDMA Development Group, an organization dedicated to the development and advancement of CDMA technology and services around the world, (1996 -2003)
- Member, BCE Capital Advisory Board (2002-2006)
- Member, InCode Labs Advisory Board (2001-2004)
- Represent Bell Mobility on the Board of the Bell Wireless Alliance Services (2002-2004)
- Represented Bell Mobility on the Board of AirIQ (1998-2001)
- Represented Bell Mobility on the Board of Mobility Canada, (1999-2002)
- Conference Chair, IEEE Vehicular Technology Conference, Ottawa,(1998)
- Participated in numerous North American Wireless Industry technology standards activities including the CTIA Advanced Radio Technology Subcommittee and chairing the CTIA Wireless Numbering Committee (1990-1995)
- Along with Vodaphone-Airtouch and China Unicom, jointly created and led global effort to successfully harmonize many specifications for 3rd generation cellular / PCS standards (1998-99)

VOLUNTEER & INTERESTS

- Past-Chairman of the Board of Directors, Shad International, a privately funded not for profit organization dedicated to the advancement of the scientific, technological and entrepreneurial capabilities of youth, 1995-2005
- Volunteer, Scouts Canada
- Gourmet Oriental cooking, Golf, Piano, skiing and youth volunteer activities

Questions:

47. *Reference: p. 3, Q. 3*

Mr. O'Shaughnessy states that "Public Mobile's objective in participating in CANDAS and in this proceeding is the creation of a level playing field with our competitors who do have access to power poles in Ontario."

(a) Please identify each of the entities that are considered to be Public Mobile's "competitors".

(b) Please indicate whether and to what extent these competitors use access to utility poles for purposes of constructing, maintaining and/or operating an outdoor DAS in Toronto.

(c) Please explain how a level playing field can be established with respect to the deployment of a DAS Network within the City of Toronto. What consideration for establishing a level playing need to be taken into account where there are potentially multiple competing suppliers of DAS Networks for the identical geographic area within the City of Toronto (e.g. the downtown core)?

(d) Please identify the difference in compensation paid for wireless attachments associated with tower structures, traffic lights, signage, roof tops, other alternatives Mr. O'Shaughnessy is aware of, and distribution utility poles.

Responses:

(a) Public Mobile's competitors in the telecom industry include: Bell, Rogers, TELUS, Wind and Mobilicity as well as the sister companies and sub-brands of each of these companies (e.g. Fido, Solo, Koodo, Chatr, Virgin).

(b) Large incumbent carriers, such as Bell and Rogers, have attached their equipment to poles of Ontario electricity distributors. At present, there is no operating DAS network in Toronto.

(c) If some of the "multiple competing suppliers" referred to in the question have access to hydro poles and others do not, there is not a level playing field. A level playing field can be established by ensuring that public utilities with public utility obligations do not create barriers to entry by discriminating among competing suppliers in terms of who gets access and who does not.

(d) The information request in this question is not relevant. No party to this proceeding is requesting that the Board review and vary the current Board-approved pole access rate.

Questions:

48. *Reference: p. 7, Q. 10*

Mr. O'Shaughnessy states that "The Toronto DAS Network, as originally conceived, would have comprised a one-time build of approximately 700 to 800 nodes to provide the capacity to meet the needs of Public Mobile's customers for four to five years. Public Mobile also entered into agreements with ExteNet to build a DAS network on the Island of Montreal, in partnership with Hydro Québec and the Municipality of Montreal."

(a) Was it Public Mobile's intent to utilize each of the "700 to 800 nodes" included in the Toronto DAS Network as originally conceived or was it Public Mobile's intent to utilize only sub-set of the "700 to 800 nodes"?

(b) Please specifically identify all nodes Public Mobile intended to utilize and the particulars regarding same.

(c) Please provide copies of all said agreements between Public Mobile and ExteNet.

(d) Please provide copies of the all said partnership agreements involving Hydro Quebec and/or the Municipality of Montreal.

(e) Are any other parties involved in the development of this network? If so, please provide details of their roles and any understandings and agreements that have been reached.

(f) Please explain how many nodes beyond 800 would be needed by Public Mobile between the years of 5 and the "long term pole access" (as referred to on page 3) that is being sought.

Responses:

(a) 700-800 nodes were required to meet Public Mobiles needs.

(b) 700-800 nodes were required to meet Public Mobiles needs.

(c) The information requested is not relevant to the issues raised in the Application.

(d) The information requested is not relevant to the issues raised in the Application.

(e) The information requested is not relevant to the issues raised in the Application.

(f) The information requested is not relevant to the issues raised in the Application.

Question:

49. *Reference: p. 8, Q. 11*

Mr. O'Shaughnessy states that "It is likely that all wireless carriers will move towards a DAS-type architecture in the future."

(a) Please provide any studies, analyses or reports which would support this statement.

Response:

(a) The basis of the statement that "all wireless carriers will move towards a DAS-type architecture in the future" is the fact that the majority of operators in the United States have already deployed DAS across a variety of markets and that the wireless industry, as a whole, is working hard to find ways of managing the significant traffic demand presented by data services. A combination of more sites and more spectrum is required to support future data traffic demand. As more and more cell sites are added to meet the needs of customers in residential single family home neighbourhoods, existing poles, such as power poles, will be the only available structures to meet the demand.

Questions:

50. *Reference: p. 8, Q. 12*

Mr. O'Shaughnessy describes a process by which Public Mobile first moved to temporary macro sites, and then from those macro sites to permanents structures. In particular, he states that "Public Mobile decided to switch to traditional Macro Cell Site strategy, installing antennas on building rooftops and special-purpose towers…It is now incurring the cost of upgrading each temporary Cell Site to a permanent structure." and that "…Public Mobile has incurred the increased cost of building rooftop Macro Cell Sites as mentioned earlier."

(a) Please identify the precise date on which Public Mobile made this decision to switch to its Macro Cell Site strategy.

(b) Please provide the location of each of the "Macro Cell Sites", and please indicate whether and to what extent each site is located on a roof top, balcony, special-purpose structure or other location (specify if other).

(c) Regarding the response to (b), please also provide the coverage area for each site and describe the propagation characteristics of the antennas used at each site.

(d) Please identify the date on which Public Mobile began to utilize the traditional Macro Cell Sites.

(e) Please provide copies of the agreements entered into by Public Mobile associated with the said Macro Cell Site strategy including pricing paid by Public Mobile for these attachments.

(f) Please provide the particulars that demonstrate whether and to what extent the coverage area intended to be supported by the Toronto DAS Network (as originally conceived) differs from the coverage area supported by the Macro Cell Sites, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents

(g) Please provide the particulars that describe the costs that Public Mobile incurred to install the Macro Cell Sites, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(h) Please provide the particulars that describe the costs Public Mobile incurred to upgrade "each temporary Cell Site to a permanent structure", including all

reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(i) Please describe the extent to which each of the permanent antenna towers, sites or structures discussed are shared with other wireless providers in Toronto.

(j) Please provide the location of each permanent structure and indicate whether the site is located on a roof top, balcony, special purpose structure or other location (specify if other).

(k) Regarding the response to (i), please provide the coverage area for each site and describe the propagation characteristics of the antennas used at each site.

(l) Please provide the particulars that demonstrate whether and to what extent the coverage area intended to be supported by the Toronto DAS Network as originally conceived differs from the coverage area supported by the permanent structures, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents

(m) Please provide the particulars that demonstrate whether and to what extent the call carrying and data capacities intended to be supported by the Toronto DAS Network (as originally conceived) differs from the call carrying and data capacities supported by the permanent structures – please include with such particulars all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(n) Regarding the response to (l), please also identify and describe the extent to which Public Mobile is currently capacity-constrained in that it is unable to provide call carrying and/or data related services to it current customer base in Toronto.

(o) Please provide the particulars that describe the costs (both initial costs and on-going monthly expenses) Public Mobile would have incurred for its part in the construction of the Toronto DAS Network had it been completed (as originally conceived), including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Responses:

(a)-(o) CANDAS does not understand the relevance of the questions to the issues raised in the application. Moreover, requiring responses to the 15 sub-parts of the question, having regard to the probative value, if any, would be unduly onerous.

Questions:

51. *Reference: p. 9, Q. 12*

Mr. O'Shaughnessy states that "The loss of the Toronto DAS network opportunity, delayed Public Mobile's Toronto market launch by six months (to May 2010), resulting in a related loss of market share."

(a) Please provide the particulars that describe "the loss of market share" referred to here, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(b) Please provide Public Mobile's current market share in Toronto and/or the market relevant to Mr. O'Shaughnessy's statement.

(c) Absent completion of the Toronto DAS Network, is it Public Mobiles intention to withdraw from the Toronto wireless market?

(d) If the answer to (c) is yes, please provide the particulars in support of this position, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Responses:

(a) The information requested is not relevant, particularly since Public Mobile does not seek to recover its losses in this proceeding.

(b) The information requested is not relevant, particularly since Public Mobile does not seek to recover its losses in this proceeding.

(c) A determination has not yet been made.

(d) N/A

Question:

52. *Reference: p. 10, Q. 15*

Mr. O'Shaughnessy states that "There is one issue – the technical attachment requirements – that I would like to address however. This issue has to do with what appears to be the current THESL restriction on communications attachments to a two-foot communication zone below the power pole. Permitting antennas to be installed at the top of a utility pole would facilitate better node coverage in terms of both range and quality, thereby reducing the total number of nodes required to provide service to customers."

(a) Please explain why the two-foot communications zone is problematic for wireless attachments such as the DAS Network?

Response:

(a) Mr. O'Shaughnessy's Written Evidence does not characterize the two foot communication zone as "problematic" for wireless attachments. The statement is intended to identify additional benefit if, as has been the case in some cities in the United States, the antenna portion of the DAS installation was permitted to be installed at a higher point on the pole.

VI. Written Evidence of Johanne Lemay[6]

Question:

53. Please provide a detailed curriculum vitae, including a listing of all appearances before regulatory or judicial entities.

Response:

Ms. Lemay's curriculum vitae are attached at Schedule 53-1.

[6] As filed July 26, 2011.

CURRICULUM VITAE

Johanne Lemay, ing., MBA
Co-President

BIOGRAPHICAL NOTES

Ms. Lemay is Co-President of LEMAY-YATES ASSOCIATES INC. She has more than 25 years of experience in the telecommunications industry including 15 years as a consultant and positions at Nortel (Northern Telecom) and Bell-Northern Research.

Ms. Lemay is a recognized expert in telecommunications, with particular emphasis on the development of business plans, due diligence, market research, development and assessment of pricing plans. Ms. Lemay has also been actively involved in consultations for the development of public policy in telecommunications and in regulatory proceedings on subject matters involving both fixed wireline and mobile wireless matters.

Ms. Lemay has also co-authored many independent market research reports published by LEMAY-YATES ASSOCIATES INC, including research reports on mobile broadband in Canada (2008 and 2010) and Over-The-Top services (2011).

Prior to founding LEMAY-YATES ASSOCIATES INC., Ms. Lemay was in charge of International Marketing for all Nortel transmission equipment product lines. At Nortel, Ms. Lemay also created a fiber multiplex product line which was extensively deployed by operators in the US and Canada.

Ms. Lemay is a frequent speaker at industry conferences and seminars in Canada, in the United States and abroad as well as on BNN and other television channels. She holds an Engineering Physics degree from Laval University and an MBA, Executive Option, from Concordia University.

Lemay-Yates Associates Inc. (1993 -)

Co-founder and Co-President

Spectrum auctions and licensing

- Review of digital dividend spectrum developments
- International review of spectrum award processes and conditions of license to enable new entry in mobile markets
- International review of prices paid for mobile spectrum in a number of countries including the US, Australia, UK, Belgium, Austria and Germany
- Economic analysis of impact of license fees compared to overall business valuation
- Spectrum auction strategy development and bidding tool preparation (AWS and prior auctions)
- Development of the various submissions on behalf of a major Canadian cableco during the AWS consultation process in Canada

- Development of mobile and fixed wireless license applications and valuations (Canada, Eastern Europe, Latin America)

Regulatory and policy development
(A list of expert evidence prepared by Ms. Lemay is provided as an appendix to this CV)

- Assessment of the impact of LTE and 700 MHZ on the deployment of broadband services
- Development of a cost estimate for the transport of incremental Internet capacity in the context of the CRTC hearing on Usage Based Billing
- Comparative assessment of the performance of broadband networks in Canada versus other countries
- Discussion of the competitive environment in next generation broadband services in business markets
- Economics of competition and impacts of regulations, tariffs, interconnection
- Review of the development of the regulatory framework for VoIP worldwide and impact assessment in the Canadian context
- Assessment of mobile industry structure and economics of competition
- Participation in GSM licensing processes internationally
- Fixed line competitor business case analyses and economics of wholesale regulation
- Financial and regulatory analysis of tariffs, markets, interconnection
- Policy issues in universal service, local competition, pricing, mandated interconnection pricing, unbundled elements
- Comparative analysis of worldwide policy and regulatory policies and frameworks
- Support to a telco regarding policy issues related to BRS spectrum licenses
- Expert evidence assessing broadband deployment plans of telephone companies

Due diligence, business case development and other mandates related to mobile carriers and mobile services

- Development of a strategy and business plans for mobile broadband deployments across many areas of Canada (20110
- Development of business plans supporting the deployment of mobile broadband services in many rural areas (2009 up to 2011)
- Review and benchmarking of the current framework and prices for domestic or national roaming for voice and data services around the world, including the US as well as EU countries; development of cost estimates for national roaming services in Canada (2008/2009)
- Due diligence on the network deployment plans of a potential mobile carrier in Canada (2007)

- Benchmarking of capital intensity ratios between Canadian mobile carriers and carriers in other countries (US, UK, Australia, EU countries)
- Development of a business case for the deployment of a mobile network in Eastern Canada
- License and business case valuation for mobile and fixed spectrum businesses operating in various frequency bands and in licensed and unlicensed spectrum
- International review of international and national roaming for SMS and mobile data
- Development of penetrating estimates and forecast for mobile broadcasting services and related value chain
- Development of the business plan for antenna siting companies including towers and rooftops

Due diligence, business plans and enterprise valuation related to fixed networks

- Due diligence reviews of operating companies and of network assets for a wide range of telecom companies on behalf of investors or potential acquirers. These include telcos, cablecos, wireless operators, resellers, etc., in Canada, USA, Europe and Latin America
- Identification of acquisition targets, enterprise valuation and negotiations in support of acquisition opportunities
- Development of private and public fiber optic networks and support to local utilities or cities in assessing telecom assets (Ottawa, Toronto)
- Start up venture to offer competitive local telecommunications services
- Development of business plans for Competitive Local and Long Distance Carriers
- Introduction of telecommunications services by cable TV operators (a number of mandates over the years)
- Financial analysis and benchmarking for fixed and mobile telecom ventures in North America and emerging markets (Eastern Europe and Latin America)

Market research and marketing plans

- Research on LTE services and their early impact in mobile broadband markets
- Research and assessment of business Ethernet services in a number of major Canadian cities, including primary research among end business customers
- Market research related to business telecom services to be provided by a major cableco in a large number of cities and estimates of the geographical reach of the existing cableco fiber network
- Market assessment and marketing plan for competitive local services to business subscribers

Evaluation of technology trends

- Technology roadmap for 3GPP and 4G mobile broadband technologies per frequency band
- Fixed broadband wireless (WiFi, WiMAX, MCS, LMDS/LMCS, Point to point, WLL)
- Digital mobile networks (GSM, GPRS, EDGE, HSPA, LTE, 1xRTT, EVDO)
- Development of broadband access and transport networks (DOCSIS, DSL, Ethernet, MPLS and SONET)
- Mobile TV deployment

CURRICULUM VITAE

Johanne Lemay, ing., MBA
Co-President

PRIOR EMPLOYMENT

Northern Telecom (1983 To 1990)

International Marketing Manager

- All Northern Telecom transmission equipment (FiberWorld, digital microwave radio)
- Target markets: Taiwan, Korea, Hong Kong, the People's Republic of China, Germany, France and the Caribbean
- Strategic marketing and product planning
- Quotations and sales support

Product Line Manager

- Creation of a fiber optic multiplexer product line (>$500 million sales over 5 years)
- U.S. & Canada markets
- Business plan development:
  - product concept
  - market study
  - sales forecasts
  - market introduction plans
  - R&D plan
- Operational requirements and planning
- Financial viability
- Management of software and hardware product
- Development teams
- Strategic marketing and product positioning

Development Project Engineer

- Product development, introduction to manufacturing and customer support (hardware and software)

Bell Northern Research (1980 to 1983)

Member of Scientific Staff

- Development of economic evaluation software
- Network planning studies
- Product field evaluations

EDUCATION

- Master of Business Administration (MBA) (Executive option), Concordia University
- B.Sc.A. (Engineering Physics), Laval University

CURRICULUM VITAE

Johanne Lemay, ing., MBA
Co-President

APPENDIX

List of Expert Evidence Reports of Ms. Johanne Lemay

- **Digital Economy Strategy**
  - The Performance of Canada's Consumer Broadband Networks in 2010, July 13, 2010 on behalf of Rogers Communications Inc., submitted to Industry Canada.
- **Spectrum Auctions and Licensing**
  - The Impact of 700 MHz Spectrum on LTE Deployment and Broadband in Canada, February 28, 2011 on behalf of Rogers Communications Inc., submitted to Industry Canada.
  - A Discussion of Spectrum Licence Conditions and the Impact on New Entrants, May 25, 2007 on behalf of Vidéotron Ltée., submitted to Industry Canada.
- **Telecom Policy and Regulation**
  - Discussion of Tariff Proposals for the Incremental Usage and of Investment in Wireline Networks, April 29, 2011 on behalf of Netflix, submitted to CRTC.
  - The Cost of Incremental Internet Transit Bandwidth in the Local Access Cloud, March 28, 2011 on behalf of Netflix, submitted to CRTC and to the FCC.
  - Next Generation Network Access: A Canadian and international perspective on why wholesale services should be regulated as essential facilities, March 11, 2009 on behalf of MTS Allstream, submitted to the Governor-In-Council.
- **Foreign Direct Investment**
  - Summary Table on FDI Limits in Carriage and Content in Selected OECD Countries, April 23, 2010 on behalf of MTS Allstream Inc., submitted to the Standing Committee on Industry,Science and Technology .
- **Broadcast Policy and Regulation**
  - International Review of Issues in Exclusivity Agreements Concerning Video on Demand Programming (in French only), 25 October, 2010 on behalf of Quebecor Media Inc., submitted to CRTC
  - Satellite Capacity for the Carriage of Local TV Stations Across Canada, September 8, 2010 on behalf of Rogers Communications Inc., submitted to CRTC .
- **Regulatory Framework for Voice Communication Services**
  - A Comparison of VoIP Regulations between Canada and other countries, June 5, 2006 on behalf of Cogeco Cable Inc., MTS Allstream, Primus Telecommunications Canada, Quebecor Media Inc., Rogers Communications Inc. and Shaw Communications Inc., submitted to CRTC.
  - Reply comments with respect to regulatory experience with VoIP internationally, July 15, 2006 on behalf of Cogeco Cable Inc., MTS Allstream, Primus Telecommunications Canada, Quebecor Media Inc., Rogers Communications Inc. and Shaw Communications Inc., submitted to CRTC.
  - A Discussion of the Evolution of VoIP regulation Worldwide, November 7, 2005 on behalf of Canadian Cable Telecommunications Association (CCTA), submitted to the Governor-In-Council.

CURRICULUM VITAE *Johanne Lemay, ing., MBA*
Co-President

APPENDIX (cont'd)

List of Expert Evidence Reports of Ms. Johanne Lemay

- **Mobile TV Technology Report**
  - Mobile TV Technology Discussion, September 12, 2005 on behalf of Canadian Wireless Telecommunications Association (CWTA), submitted to CRTC
- **Mobile Spectrum Valuation**
  - The relative value of a pure-play PCS operator to an incumbent mobile carrier in Canada, March 2003 on behalf of Microcell Telecommunications Inc., submitted to Industry Canada
  - Evolution of Spectrum Valuation for Mobile Services in Other Countries, March 2003 on behalf of Microcell Telecommunications Inc., submitted to Industry Canada

Question:

54. Please identify, and provide curriculum vitae for any individuals that were involved in the preparation of this report.

Response:

Ms. Lemay is the author of the Lemay-Yates Associates Inc. Report dated 26 July 2011 (the LYA Report).

Questions:

55. *Reference: section 3, p. 21*

Ms. Lemay states that "DAS deployment is environmentally friendly and has lower visual impact than traditional towers."

(a) Please provide the particulars in support of this statement, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

(b) Please also provide the particulars that compare the environmental and visual impact of existing traditional wireless towers that are shared by multiple wireless carriers to the development of new DAS when none previously existed, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.

Responses:

(a) The Australia Mobile Carriers Forum has published “Guidelines for Better Visual Outcomes: Low-impact Mobile Facilities” (the “Australia Guidelines”). The stated intent of the Australia Guidelines is to assist “in siting and design of new low-impact mobile telecommunications facilities, with the aim of minimizing visual impact and achieving appropriate and acceptable outcomes”. Page 5 of the Australia Guidelines provides as follows: “New Towers (which include lattice towers, poles and masts not attached to a building) are not low-impact.” Page 19 of the Australia Guidelines provides an example of a low impact deployment, depicting an antenna on top of a light pole.

A copy of the Australia Guidelines is attached at Schedule 55(a)-1.

(b) LYA is not in possession of the information requested.

Guidelines for Better Visual Outcomes

Low-impact Mobile Facilities

A design guidelines document prepared
for the mobile telecommunications industry
by the Mobile Carriers Forum

MCF

Contents

Disclaimer
This document has been prepared solely for the purpose of assisting mobile carriers in their planning and installation of specific low-impact mobile telecommunications facilities. The Mobile Carriers Forum has compiled the information contained in this document in good faith and has attempted to ensure that all information is current and accurate at the time of inclusion but this information is subject to change. The information contained in this document does not constitute the giving of legal or professional advice. You should seek legal or professional advice before acting on the basis of any information contained in this document.
These guidelines do not affect any rights given to mobile carriers under the Telecommunications Act 1997, and specifically the Telecommunications (Low-impact Facilities) Determination 1997 (as amended). Compliance with the guidelines is not compulsory. A mobile carrier's ability or decision to adopt these guidelines will depend on the particular circumstances of each new installation.

Chapter 1
Introduction and explanation

What is the purpose of these guidelines and who are they for?

These guidelines have been prepared to assist in the siting and design of new low-impact mobile telecommunications facilities, with the aim of minimising visual impact and achieving appropriate and acceptable outcomes.

The guidelines were initiated by the Mobile Carriers Forum. The Mobile Carriers Forum was formed under the Australian Mobile Telecommunications Association to improve communication and cooperation between the carriers. All infrastructure building mobile carriers operating in Australia have contributed to the development of this document.

An important objective of the Mobile Carriers Forum is to maintain an environmentally and socially responsible approach to mobile network rollouts.

The Mobile Carriers Forum has worked together to prepare these guidelines to assist and inform those using the Low-impact Determination to plan for, and install, mobile telecommunications facilities, and to provide a guide for the siting and design of low-impact facilities.

Low-impact CBD rooftop installation

The guidelines are conceptual rather than prescriptive, and promote appropriate site selection and design for future facilities.

The guidelines relate only to mobile telecommunications facilities and they are written for the mobile carriers and their contractors. It is recognised, however, that the principles and explanations within the document will also be useful to other groups, including Local and State government and community groups.

These guidelines do not affect any rights given to mobile carriers under the Telecommunications Act 1997, and specifically the Telecommunications (Low-impact Facilities) Determination 1997, as amended. Compliance with the guidelines is not compulsory. A mobile carrier's ability or decision to adopt these guidelines will depend on the particular circumstances of each new installation.

Chapter 1
Introduction and explanation

What does ''low-impact'' mean?

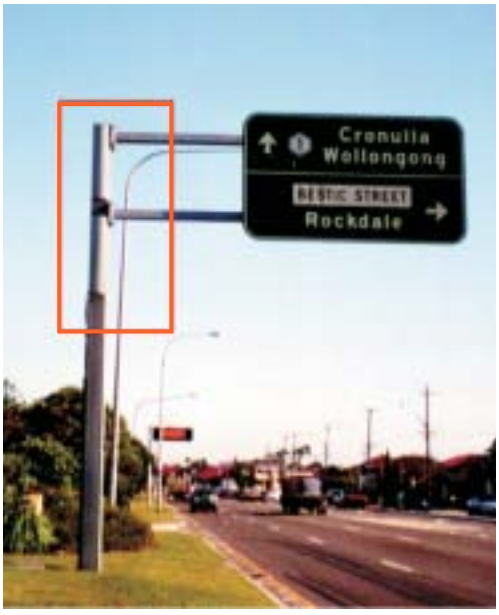
Telecommunications facilities are primarily regulated under Commonwealth law. Prior to 1 July 1997, the installation of all telecommunications facilities were exempt from State and Territory laws. On this date the Telecommunications Act 1997 came into effect and carriers must now comply with State and Territory laws in relation to the installation of certain types of telecommunications facilities.

The government recognised however, that there are some telecommunications facilities and activities that are unlikely to cause significant community disruption or significant environmental disturbance. These are exempt from certain State and Territory laws. These new telecommunications facilities and activities are described in the Telecommunications Act 1997 (as amended), (referred to as ''the Act''), and in a Ministerial determination made under the Act – the Telecommunications (Low-impact Facilities) Determination 1997 (referred to as the ''Low-impact Determination''), as amended.

The Act and the Low-impact Determination define what low-impact installation activities may be undertaken in certain areas without reference to particular State and Territory laws.

The activities are tabulated and categorised from Part 1 to Part 7 in the Schedule to the Determination. Part 1, Part 3 item 5 and Part 7 describe activities that are of particular relevance to the mobile carriers.

The regulatory framework for low-impact facilities is discussed more in the following chapter, and the relevant parts of Low-impact Determination are covered in chapter 4.



Panel antennas co-located on a road sign.

Chapter 1
Introduction and explanation

Are all installations "low-impact"?

As will be discussed later, the Low-impact Determination defines those activities that are low-impact by reference to what type of facility is proposed and where it is proposed to be installed. Facilities in areas of environmental significance are never low-impact. (The Determination sets out what is an area of environmental significance.)

New towers (which includes lattice towers, poles and masts not attached to a building) are not low-impact. However, an extension to a tower or a tower on a building may be treated as a low-impact facility, provided certain conditions are met. The replacement of a tower or pole at the same location with one of equivalent height and displacement is also a "low-impact" installation.

Key factors in the siting and design of low-impact mobile facilities

Whilst minimising visual impact is a very important objective, and that is the subject of this document, one or more other factors may have a substantial bearing on the final outcome. It should be recognised that not all future installations will be able to incorporate the techniques and methods proposed in this document, and that the best visual outcome is not always possible to achieve.

Some of the issues which often need to be considered in parallel with visual impact include:

- the availability and suitability of land
- any reasonable requirements of the landlord
- radio frequency performance
  - coverage objectives
  - capacity
  - network design constraints
  - relationship to other base stations
  - line of site
  - height of surrounding buildings, trees and other structures

Low-impact prefabricated equipment cabin.

Chapter 1
Introduction and explanation

- occupational health and safety
- the impact on other facilities located at the same site
- noise – usually from air conditioners
- access for maintenance purposes
- installation time frames and availability of materials
- the individual carriers' design
- construction issues – structural and loading feasibility
- cost
- compliance with relevant and applicable national EME standards
- co-location opportunities
- topographical constraints

What about EME?

Mobile carriers must comply with standards on exposure to electromagnetic energy (EME) set by the ACA. This requirement is given effect through the Radio Communications Act 1992 and the Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard 2003.

On 7 May 2002, ARPANSA published the Radiation Protection Standard – Maximum Exposure Levels to Radiofrequency Fields – 3kHz to 300GHz. This Standard also includes requirements for protection of the general public and the management of risk in occupational exposure, together with additional information on measurement and assessment compliance.

It is important to remember that these guidelines focus specifically on visual outcomes and are not intended to address issues relating to EME.

Chapter 2
Regulatory framework for low-impact facilities

There are several regulatory documents for low-impact telecommunications facilities that must be read in conjunction with one another. This outline is provided in these guidelines for general background.

Note that the information contained below does not constitute the giving of legal or professional advice, and reliance should not be placed upon it in place of such advice.

Principle legislation

Telecommunications Act 1997

The Telecommunications Act 1997 (as amended), which is Commonwealth legislation, provides that telecommunications carriers have certain rights to engage in particular activities, together with certain immunities from State, Territory and local government laws in relation to the conduct of those activities.

These activities include:

- the inspection of land to determine whether it is suitable for the carrier's purpose
- the installation of specified facilities, including low-impact facilities
- the maintenance of facilities.

In carrying out these activities, a carrier must comply with a number of requirements which include:

- do as little damage as practicable
- act in accordance with good engineering practice and comply with recognised industry standards
- take all reasonable steps to restore the land and to protect the environment
- give notice to the owner and occupier/s of the land.

The Act also specifies that, in carrying out these activities, carriers must comply with the Telecommunications Code of Practice.

An extension to a tower is low-impact in industrial and rural areas, but not in residential or commercial areas (as long as the extension is no more than 5 metres and there have been no previous extensions to the tower).

Chapter 2
Regulatory framework for low-impact facilities

Supporting legislation

Telecommunications Code of Practice 1997

Schedule 3 (Clause 15) of the Telecommunications Act 1997 requires carriers to comply with a Ministerial Code of Practice.

Generally speaking, the Code places requirements on carriers to conduct their activities for which they are to exercise their statutory rights and immunities in a way that responds to the rights of individual landowners, affected utility service organisations and management authorities and to broader community concerns on environmental issues.

Those requirements include:

- Before commencing installation carriers must notify landowners (and occupiers if they are different from the owners), including a local council where it is the landowner or manager of public land.
- Carriers must do as little damage as practicable and act in accordance with good engineering practice.
- Carriers must comply with an objection and consultation process to resolve particular objections to their activities.
- When installing a low-impact facility between 10.00pm and 7.00am, carriers must make no more noise than is allowed under State or Territory law applying to similar activities.
- Carriers must take all reasonable steps to ensure that the land is restored to a condition similar to the condition before the activity began. This must start within 10 days of the facility being installed, unless otherwise agreed with the landowner/occupier.
- Before engaging in a low-impact facility activity, carriers must consider opportunities to co-locate.

A 1.8m dish is low-impact in industrial and rural areas, but in residential and commercial areas the dish must be no more than 1.2m in diameter to be low-impact.

Chapter 2
Regulatory framework for low-impact facilities

Telecommunications (Low-impact Facilities) Determination 1997 (as amended)

The Telecommunications (Low-impact Facilities) Determination 1997 (as amended) is a Ministerial determination made under Clause 6(3) of the Telecommunications Act.

The Low-impact Determination defines those new installation activities that are low-impact, by reference to WHAT facility is proposed and WHERE it is proposed to be installed.

Chapter 4 of these guidelines deals with the WHAT part of the definition. It goes through, in some detail, those parts of the Low-impact Determination that are relevant to mobile carriers.

ACIF: C564: 2002 Deployment of Radiocommunications Infrastructure Code

From October 2002, all carriers must comply with the ACIF: C564: 2002 Deployment of Radiocommunications Infrastructure Industry Code, also referred to as the "ACIF Code".

The ACIF Code requires carriers to notify and consult on certain types of low impact facilities. These notification and consultation provisions came in to place in April 2003.

The Code requires carriers to:

- have written procedures for site selection;
- improve notification and community consultation procedures;
- design and operate base stations with the objective of minimising electromagnetic emissions; and
- provide electromagnetic radiation emission reports as per the Federal Departments of Health's requirements.

The following is an explanation of the *WHERE* part of the definition.

WHERE a facility is located affects whether it is low-impact or not

When assessing whether a facility is low-impact we must first establish the nature of the land use where the facility is proposed.

The Low-impact Determination identifies five land use types or areas by reference to the Principal Designated Use. **The areas have an order of importance, based on zoning under State or Territory law, so that an area only has its highest possible zoning.**

The order of priority is:

1. Environmental Significance areas
2. Residential areas
3. Commercial areas
4. Industrial areas
5. Rural areas

Chapter 2
Regulatory framework for low-impact facilities

Roles and responsibilities of the regulators

Department of Communications, Information Technology and the Arts

The Department of Communications, Information Technology and the Arts provides strategic advice and professional support to the Australian Government on a wide range of policy areas including telecommunications, information technology and the information economy.

The Minister for Communications, Information Technology and the Arts is ultimately responsible for telecommunications regulation.

Australian Communications Authority

The Australian Communications Authority (ACA) is responsible for regulating telecommunications and radio communications, including promoting industry self-regulation and managing the radio frequency spectrum. The ACA also has significant consumer protection responsibilities.

Specifically, the ACA is responsible for the following:

- issuing carrier licences
- regulating service providers
- reporting on the performance of service providers with reference to consumer satisfaction and benefits, and quality of service
- registration (with safety-net style enforcement powers) of industry
- operations and technical codes of practice
- setting industry standards where codes fail or fail to be created
- regulating and enforcing carriers' powers and immunities
- handling public enquiries about certain matters related to telecommunications
- handling investigations of certain matters related to telecommunications, in particular those related to breaches of the Act
- ensuring industry compliance with mandatory standards and codes

So, even though low-impact facilities are exempt from State and Territory planning law, it does have relevance in defining the "areas" referred to in the Low-impact Determination.

Where the land use/zoning objectives for the land relates to more than one area and there is no indication of the predominant, preferred or most likely use, the provisions relating to most sensitive area must be applied in determining the Principal Designated Use. For example, in the case of a mixed use designation which allows for residential, commercial and industrial land uses, the site should be considered to have a residential Principal Designated Use.

Land that is in a built up area that cannot be otherwise described as a commercial, industrial or rural area, is to be considered a residential area.

Chapter 2
Regulatory framework for low-impact facilities

Telecommunications Industry Ombudsman

The Telecommunications Industry Ombudsman (TIO) is a formal and independent dispute resolution scheme. The TIO can investigate a complaint about failure to give notice or the manner in which a carrier has entered on to land. Carriers must comply with a direction issued by the TIO, pursuant to the TIO's constitution.

Australian Communications Industry Forum

The Australian Communications Industry Forum (ACIF) is an industry owned, resourced and operated company established by the telecommunications industry in 1997 to implement and manage communication self-regulation within Australia.

ACIF's role is to develop and administer technical and operating arrangements that promote both long term interests of end-users and the efficiency and international competitiveness of the Australian communications industry. This primarily involves:

- developing Standards and Codes to support competition and protect consumers, driving widespread compliance
- facilitating resolution of strategic and operational industry issues

Land that is not part of a built up area and cannot be otherwise described as a commercial, industrial or residential area, is to be considered a rural area.

A facility in an area of Environmental Significance is never low-impact.

There are provisions in the Low-impact Determination which explain what is an area of Environmental Significance.

Chapter 3
Key principles for the design and siting of low-impact facilities

Begin by analysing the site.

Achieving better visual outcomes for low-impact facilities should start with a good understanding of the site and its context.

The purpose of this is to ensure that an appropriate site in the search area is selected for the proposed facility. The following page has a list of issues and questions that may be considered when assessing a potential site. The issues may not be relevant for all sites, and this will depend on the nature of the site and facility proposed. For example, consideration of "design" of the existing site may be relevant to a proposal for a building rooftop, but may be less so for a proposal to co-locate on an existing telecommunications tower (unless that tower is specifically "designed" for the location).

Begin by analysing the site...

In the first place, the siting of a facility is influenced by the "key factors in the siting and design of low-impact mobile facilities", as outlined on pages 4 and 5 of this document. The design of the facility is then very much dependent on the opportunities and constraints of the selected site. These opportunities and constraints directly influence the ability to minimise visual impact.

The siting and design of a facility requires a PROCESS of investigation and analysis – here are some of the visual issues typically considered as part of that process.

Are there any other towers or public utility structures in the area?

Carriers are obliged by law to consider co-locating on any existing towers or public utility structures in the area before engaging in a low impact facility activity.

In some cases however, even though a tower or structure may exist in the area, it may produce a better visual outcome to locate on a rooftop or elsewhere. Co-locations don't always result in the best visual outcome.

Co-location on a water tank

In this case three carriers co-locating results in substantially increased visual bulk (note that the lower tower has since been removed).

Co-location facility with antennas flush mounted below the original headframe.

Chapter 3
Key principles for the design and siting of low-impact facilities

The existing site

Key elements	Typical considerations
Colour	• Is it possible or appropriate to colour the facility to blend with the colour of this site? • Would it be more appropriate to colour the facility so that it contrasts, or would a neutral colour have less impact?
Texture	• Is it possible or appropriate to match the texture or materials of the facility to the texture or materials of the background? For example, could an equipment cabin be brickwork?
Form	• Is the form of this building blocky or finely articulated? • Could a low-impact facility on this site be sympathetic to the form? • How could antennas be mounted so that they will have the least impact? For example, should they be flush mounted to maintain the flat profile of the building, or is it more appropriate to mount them on the rooftop? • Could the form of the building assist to minimise the impact of a facility? • Does the form lend itself to the use of radio transparent screening?
Bulk and Scale	• Is this site/building of a bulk and scale so that a facility here would not be visually obtrusive? • How does the bulk/scale relate to the form, and how does this impact on whether or not this site is appropriate for a telecommunications installation?
Design	• Could the proposed facility on this site be designed so it is sympathetic with the design of this building/site?
Existing telecommunications infrastructure	• Are there other telecommunications facilities on the site? • Will the proposed facility create or add to the existing clutter? • How could this be avoided or corrected?

Surrounding the site

Key elements	Typical considerations
Views and view corridors	• Will the facility detract from a significant view corridor? What can be done to minimise this?
Local landmarks, places of heritage or cultural significance	• Will the facility detract from any local landmarks or places of significance? For example, it is located on a rooftop next to a church steeple which currently dominates the skyline?
Vegetation	• Is there vegetation around the site? Could vegetation be used to minimise the visual impact of a facility in this area? For example, could plants around the equipment cabin screen it from the footpath?

Chapter 3
Key principles for the design and siting of low-impact facilities

...then consider how the visual impact of the facility could be minimised on this site

The ability or decision to adopt these suggestions depends on the opportunities and constraints of the particular site as well as the technical requirements of the facility and other factors outlined on pages 4 and 5 of this document.

1. Maintain the integrity of landmarks and places of significance

Low-impact telecommunications facilities may detract from the integrity of landmarks or places of cultural or heritage significance. It is important to consider the visual impact of the facility on the buildings and places surrounding the site, as well as the site itself.

The impact upon the church may be minimised by locating antennas on the neighbouring building where the colour of the background makes the profile of antennas less visible.

2. Avoid interrupting significant views

It is preferable that facilities should not substantially impact on the integrity of important views. If a proposed facility may interrupt such a view, then options to minimise the visual impact should be considered. It may be appropriate to integrate the facility in some way in order to reduce the visual clutter.

The form of this building enables the vertical element to be "extended" so that the addition looks like part of the original building. Careful detailing and colour matching are also very matching important in integrating this facility.

An example of a view which should probably not be cluttered with mobile phone facilities.

Chapter 3
Key principles for the design and siting of low-impact facilities

3. Integrate the facility

Facilities can in many instances be integrated with existing structures. Opportunities for site sharing could be used where appropriate.

Where facilities are located on an existing building, the ability to integrate the facility depends largely on the form of the building.

The engineering design of this facility allowed the antenna to be constructed as the "mast" and the dish to be placed within the "air conditioning unit".

Taking advantage of a modulated form

A building with a modulated roofscape or façade may provide opportunities to locate antennas so that they emphasise the form or are not seen from some vantage points.

The placement of antennas in this example emphasises the form of the roof.

Using screening

On other sites it may be appropriate to use radio transparent material to screen a facility from view. That screening may be in front or behind the facility.

Screening in front of a facility shields it from direct view and may be appropriate on a rooftop, for example, where there are multiple facilities.

Screening behind a facility reduces the visual impact by making the profile less visible. It is particularly important to complement the colour of the facility and the screening when this technique is used.

The form and bulk of the original building is blocky and massive. Screening elements can be made to look like part of the original building.

The placement of antennas here repeats the pattern of the windows below.

Chapter 3
Key principles for the design and siting of low-impact facilities

Screening may be more appropriate on some building forms than on others. For example, it's easier to replicate or extend a simple block form using screening (a lift motor room for example) than a detailed, modulated façade (a carved sandstone building for example).

On some sites it may be appropriate to use radio transparent material to construct new building elements to screen mobile facilities.

For example, radio transparent material could be used to construct advertising signs, false chimneys, bell towers and other elements, and the mobile facilities placed inside these structures.

Remember that these screening techniques may not always be feasible for technical, structural, financial and other reasons. The wind loading of screening must be considered as some buildings are not capable of accommodating the additional load. Screening solutions also substantially increase the cost of a facility.

Rooftop screening shown from behind the facility.

Is screening low-impact?

Screening is not expressly referred to in the Low-impact Determination. In particular instances however, the use of screening may be authorised under Clause 6(2) of Schedule 3 of the Telecommunications Act. This clause provides that where a carrier is installing a low-impact facility, a carrier may, for purposes in connection with that installation, do anything necessary or desirable for that purpose on, over or under the land.

Here, the antennas are within the rooftop signage.

The bell tower has antennas within it.

Antennas are located within the column elements in this example.

Screening need not necessarily hide the antenna to be effective.

Chapter 3
Key principles for the design and siting of low-impact facilities

4. Minimise clutter

This is particularly important when there are several facilities on the one site. One means to reduce the visibility is to use screening as discussed in the previous section. Another is to organise or arrange facilities in an ordered way, all at the same height for example.
It is acknowledged that this sometimes cannot be achieved however, due to the differing technical objectives of each of the carriers, and the different types of equipment used.

5. Respect an existing designed facility

In instances where one carrier has gone to lengths to design a facility so that visual impact is minimised, if a new carrier is considering co-locating or site sharing, then that carrier should respect the

Consider the impact of co-locating on this structure.

This example demonstrates an ordered approach to the placement of antennas to reduce clutter while fulfilling the site's radio requirements.

However, radio requirements have necessitated a less ordered outcome for this site, which is in a visually remote area.

It may be inappropriate to use a bulky headframe if co-locating on this pole.

Chapter 3
Key principles for the design and siting of low-impact facilities

design of the original facility. For example, it may be inappropriate to co-locate a bulky triangular headframe on an existing slim pole. In this instance, the use of flush mounted panel antennas, coloured to match the pole, would look more appropriate.

Likewise, if a part of a rooftop has been carefully screened, it may be inappropriate to locate visually obtrusive antennas next to that screening.

A better visual outcome may be achieved if the lower antenna were colour-matched like the one before.

6. Choose appropriate colours and textures

Using appropriate colours and textures is a very useful technique to reduce the visibility of facilities.

Generally, facilities should be matched to their background.

Where facilities are seen against the sky, a better visual outcome is generally achieved by using a non-reflective grey. There are sites however, where it may be appropriate that facilities seen against the sky be the same colour as the building or structure on which they are mounted, or some other colour.

As well as colour matching the antennas, it is also sometimes appropriate to treat equipment cabins so that they blend with the surroundings. For example, a brick (or "brick-like") cabin may be more appropriate than a standard metal cabin when adjoining a brick building.

Flush mounted panel antennas carefully matched to the colour of the sign to which they are attached.

A microcell installation coloured to match the traffic lights.

The colour of the antenna (and cables) matches the colour of the building.

Antenna matched to the brick background on a landmark building.

Chapter 3
Key principles for the design and siting of low-impact facilities

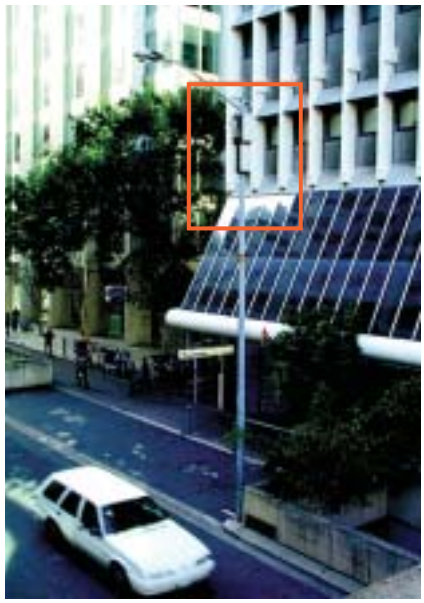
7. Place the facility so it is less likely to be seen by pedestrians

Where practical, facilities should be located out of the viewshed of pedestrians. This may be particularly relevant in areas where there is a lot of pedestrian traffic, such as the CBD.

For microcell installations in particular, a better visual outcome may be achieved if antennas are located above awning height. Consideration should also be given to the placement of associated equipment.

Better visual outcomes for other types of facilities may also be achieved by siting them out of the direct pedestrian viewshed. For example, a panel antenna on the edge of a building awning may be less visible if set back onto the building parapet, where the awning acts to screen it from view.

A whip antenna mounted on top of an awning.



Antennas mounted at the top of a light pole out of the normal line of sight of pedestrians below.

8. Use vegetation where appropriate

Planting may be used to partially screen equipment, and is often successfully used around cabins at ground level. Existing vegetation that does not compromise radio objectives may also be used to provide long distance screening or larger facilities.

Examples of where planting has been used to partially screen and soften the view of an equipment cabin.

Rooftop panel antennas.

Chapter 4
The Low-impact Determination – guidelines relating to mobile facilities

This is the WHAT part of the definition of low-impact facilities, introduced on page 8.

To make it easier to use, this chapter deliberately follows the same structure as the Schedule to the Low-impact Determination.

It includes only those parts of the Schedule which are relevant to mobile telecommunications. The guidelines provide explanations and examples of how the visual impact of each type of facility may be minimised.

Part 1 – Radio facilities

Item No.	Facility	Areas
2	Panel, yagi or other like antenna: (a) Flush mounted to an existing structure; and (b) Either: (i) colour-matched to its background; or (ii) in a colour agreed in writing between the carrier and the relevant local authority.	Residential Commercial Industrial Rural

Guidelines

Mounting

- The closer the antenna is mounted to a structure, the better the visual outcome.

Flush mounted panel antennas. The two on the right have not yet been coloured to match the background.

Chapter 4
The Low-impact Determination – guidelines relating to mobile facilities

- Flush mounting may result in a better visual outcome than mounting antennas which protrude from near the edge of building to which they are attached (Item 3 of the Schedule). Centrally locating protruding antennas on a rooftop may produce a better visual outcome than flush mounting, by removing antennas from the view from street level.

This example illustrates the difference between a flush mounted antenna and protruding antennas mounted near the edge of a building.

- A better outcome is generally achieved by flush mounting the entire antenna, rather than having a part of it seen against a building, and a part of it protruding from it.
- Consider the location of the feeder cables. A better visual outcome is generally achieved if the cables are not visible.
- Note that flush mounting is not always achievable for technical, structural or safety reasons. For example, it is not possible to flush mount antennas on a glass fronted building. Flush mounted antennas may also not be achievable due to occupational health and safety requirements for maintenance purposes.

CBD flush mounted antenna.

Chapter 4
The Low-impact Determination – guidelines relating to mobile facilities

Colour matching

- Flush mounted antennas that are colour matched to their background often have better visual outcomes
- As well as matching the colour of the background, also matching the pattern of the background, brickwork for example, can further reduce the impact. This may be appropriate on landmark buildings

Item No.	Facility	Areas
3	Panel, yagi or other like antenna: (a) Not more than 2.8 metres long; and (b) If the antenna is attached to a structure – protruding from the structure by not more than 3 metres; and (c) Either: (i) colour-matched to its background; or (ii) in a colour agreed in writing between the carrier and the relevant local authority	Residential Commercial Industrial Rural

Panel antenna coloured to match the structure to which it is attached.

A good example of how both the cabin and antennas can be integrated with an existing building or structure.

Antenna matched to the stone background.

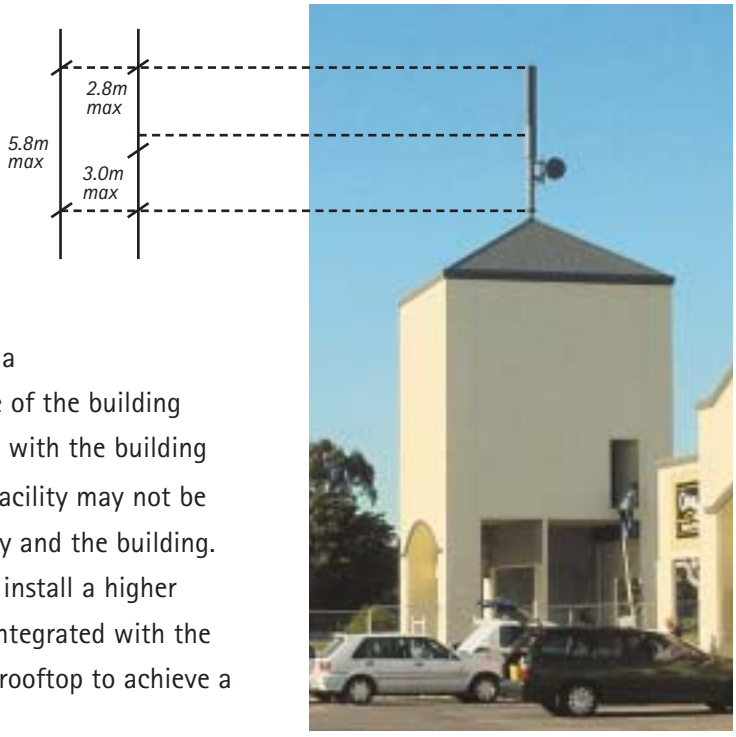
Chapter 4
The Low-impact Determination – guidelines relating to mobile facilities

Guidelines

Protrusion

- The ACA has published a guide called *Telecommunications Facilities – Information for local government.* In this guide, the ACA advises that a facility that is 5.8 metres high is low-impact. This is based on an antenna which is 2.8 metres high, and is attached to an antenna mount which is 3 metres high.
- Industry recognises that a 5.8 metre high facility may cause undesirable visual outcomes, particularly when mounted close to the edge of a low height building, or in a visually prominent position. Carriers are encouraged to minimise protrusion in order to achieve better visual solutions
- Visual impact is largely determined by the scale of the facility relative to firstly, the scale of the building or other structure to which it is attached and secondly, the visual prominence of that building or structure

  This relationship influences
  - the actual visibility of the facility
  - the perception of size (and height) of the facility in its context, and also
  - the distance from which the facility is viewed
- It is also important to consider the scale of the facility in relation to the scale of surrounding development, and to the land uses surrounding the facility
- For example, on a low-rise building, an antenna mounted to a height of 5.8 metres at the edge of the building will probably be highly visible and out of scale with the building
- On a taller building, the visibility of a mobile facility may not be so great because of the relative scale of facility and the building. In this case there may be more opportunity to install a higher facility. However, the facility may need to be integrated with the building, or located towards the centre of the rooftop to achieve a better visual outcome.



5.8m protrusion

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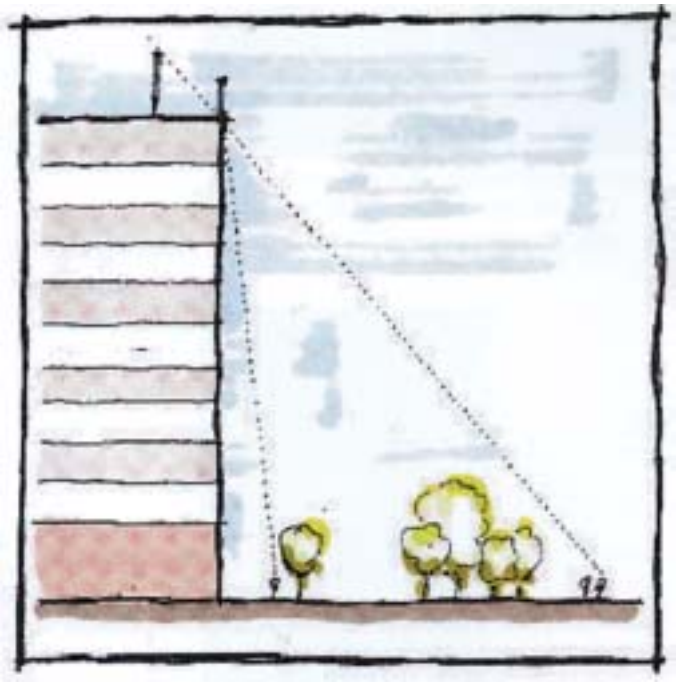
Many facilities on the same site

- Careful design and planning is required to minimise the cumulative visual impact where there are several facilities on the one site. One means to reduce visibility may be to use screening. Another may be to arrange and mount in an ordered way, all at the same height for example



Carriers are encouraged to minimise the height of a facility where possible, or use other methods such as screening, integration with the building, or setbacks to achieve better visual outcomes.

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Item No.	Facility	Areas
4	An omnidirectional antenna or an array of omnidirectional antennas (a) Not more than 4.5 metres long; and (b) Not more than 5 metres apart; and (c) if the array is attached to a structure – protruding from the structure by not more than 2 metres	Industrial Rural

Guidelines

- Omnidirectional antennas generally have lesser visual impact than panel and other antennas because of their reduced visual bulk
- However, note that an omnidirectional antenna or array of omnidirectional antennas is not low-impact in residential or commercial areas
- In the ACA guide, *Telecommunications Facilities – Information for local government*, the ACA advises that a facility that is 6.5 metres high is low-impact. This is based on an omnidirectional antenna which is 4.5 metres high (long), and is attached to an antenna mount which is 2 metres high
- As with panel antennas however (part 1, item 3 of the Schedule) the industry recognises that a 6.5 metre high facility may be visually obtrusive. Carriers are encouraged to minimise protrusion to achieve better visual outcomes

Examples of roof mounted omni directional antennas

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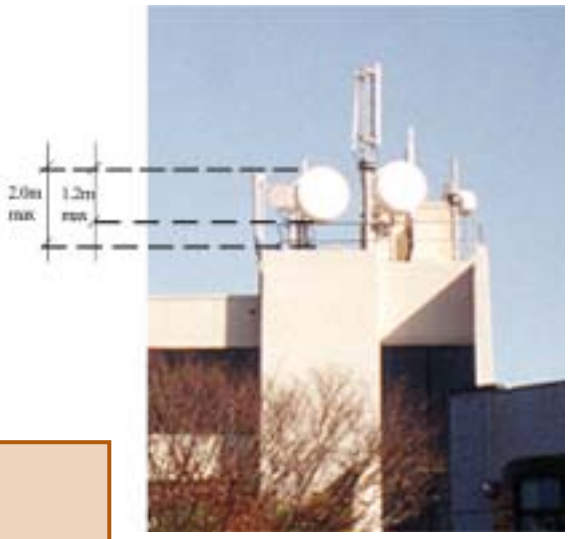

A 1.2 m dish which is low-impact in residential, commercial, industrial and rural areas.

Item No.	Facility	Areas
5	Radiocommunications dish (a) Not more than 1.2 metres in diameter; and (b) Either: (i) colour-matched to its background; or (ii) in a colour agreed in writing between the carrier and the relevant local government authority; and (iii) if attached to a supporting structure, the total protrusion from the structure is not more than 2 metres	Residential Commercial Industrial Rural

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5A	Radiocommunications dish (c) Not more than 1.8 metres in diameter; and (d) Either: (i) colour-matched to its background; or (ii) in a colour agreed in writing between the carrier and the relevant local government authority	Industrial Rural

Guidelines

- The total protrusion from the structure to which the dish is attached can be no more than 2 metres

A 1.8m dish, which is low-impact in industrial and rural areas.

Item No.	Facility	Areas
6	Microcell installation with (a) A cabinet not more than 1 cubic metre in volume; and (b) A separate antenna not more than 1 metre long	Residential Commercial Industrial Rural

Guidelines

- Microcells located above typical awning height generally have lesser visual impact
- If facilities are flush mounted, colour matching to the background often has a better visual outcome
- In sensitive locations, the equipment cabinet may be located within existing structures

Microcell on a CBD "smartpole".

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A colour matched "extension" to the traffic lights.

An awning mounted colour matched whip antenna.

A colour matched patch antenna. Here is an example of how an antenna has been well placed and designed, in the context of an important view.

Typical microcell equipment box.

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Item No.	Facility	Areas
7	In-building coverage installation (a) to improve cellular coverage to mobile phone users operating inside a building; and (b) wholly contained and concealed in a building	Residential Commercial Industrial Rural

Guidelines

- In-building coverage installations are generally in tall office buildings, airports and function centres where external facilities do not provide coverage or capacity. (Often this is because the external facilities are designed to provide coverage at street level.)
- They generally have no visual impact outside the building
- Internal antennas could be coloured to match the ceiling

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Item No.	Facility	Areas
8	Equipment installed inside a structure, including an antenna concealed in an existing structure	Residential Commercial Industrial Rural

Guidelines

- Structure means "existing structure", within the envelope of a building for example
- There is no restriction on the size of the equipment cabin as long as it is fully contained within an existing structure
- Note that this does not apply in residential areas

Item No.	Facility	Areas
9	An extension to a tower if (a) the height of the extension does not exceed 5 metres; and (b) there have been no previous extensions to the tower	Industrial Rural

Guidelines

- A tower extension cannot be low-impact in a commercial or residential area
- Note that there can be no previous extension to that tower

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Part 3 – Above Ground Housing

Item No.	Facility	Areas
5	Equipment shelter (a) used solely to house equipment used to assist in providing a service by means of a facility mentioned in Part 1; and (b) not more than 3 metres high; and (c) with a base area of not more than 7.5 square metres; and (e) either (i) colour-matched to its background; or (ii) in a colour agreed in writing between the carrier and the relevant local authority	Residential Commercial Industrial Rural

Guidelines

- The dimensions apply only to those shelters accommodating equipment used to assist in providing a service by means of a facility mentioned in Part 1 of the Low-impact Determination (ie a low-impact radio facility)
- Equipment shelters can be designed and coloured to integrate with existing elements, such as other cabins or buildings on the site
- Rooftop equipment shelters should be located and designed to integrate with the existing roof form. However, it may be appropriate to use prefabricated equipment shelters on rooftops in many instances, particularly when those shelters are not visible from the street
- Community facilities could be provided as part of or alongside the shelters. For example, a shelter at the edge of an oval could have a roof overhang to provide cover for spectators, and public seating if appropriate.

Brick equipment shelter on a rooftop, integrated with the building form.

Rooftop cabins integrated with the colour and form of the building. Note also the colour matched antenna.

Examples of co-location of a street light.

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Part 7 – Co-located Facilities

Item No.	Facility	Areas
1	Facility mentioned in (a) Part 1, 5 or 6; or (b) item 3 of Part 4; installed on or within (c) an original facility; or (d) a public utility structure	Industrial Rural

Guidelines

- "Original facility" includes any facility in place at 19 August 1999 (when the variation to the Low-impact Determination took effect) and any facility installed after this date for which planning approval was given
- "Public utility" means a body that provides to the public reticulated products or services (such as electricity, gas, water, sewerage or drainage), carriage services (other than carriage services supplied by a carriage service provider), transport services or similar product or service. "'Public utility structures'" include bridges, road signs, electricity transmission towers, water tanks, traffic light poles and street light poles
- Carriers have a statutory obligation before engaging in a low-impact facility to consider co-locating on a public utility structure which meets their needs and to make reasonable efforts to enter into an agreement with the relevant public utility in certain circumstances

Panel antennas flush mounted on a water tank.

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- The design of the new co-locating facility should be sensitive to the design of the original facility

Panel antennas flush mounted to a road sign.

- Flush mounting on an existing pole generally has less impact than attaching an additional headframe. However, flush mounting is not always possible for technical and safety reasons. For example, if antennas are flush mounted below an existing headframe, the lower facility may have to be switched off to allow access for the maintenance of antennas above. Antennas co-located on a pole may be offset to allow people to climb behind for maintenance purposes.

The co-located antennas repeat the form and pattern of the original pole.

Flush mounted antennas co-located beneath a triangular headframe.

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Item No.	Facility	Areas
2	Facility mentioned in (a) Part 1, 5 or 6; or (b) item 3 of Part 4; installed on or within (c) an original facility; or (d) a public utility structure where (e) the total volume of the co-located facilities is no more than 25 percent greater than the volume of the original facility or the original infrastructure; and (f) the levels of noise that are likely to result from the operation of the co-located facilities are less than or equal to the levels of noise that resulted from the operation of the original facility or public utility structure	Residential Commercial

Guidelines

- Note that there are additional volume and noise constraints for facilities in residential and commercial areas
- Volume refers to the physical volume of all visible parts on or within a facility, not the implied volume. For clarity, the volume of an original facility only includes its apparent or visible parts and associated supporting structures, and not the total area occupied by that facility. For example, when calculating the volume of a lattice tower and associated infrastructure, the total volume would be the sum of the volume of the actual latticing of the tower. The foundations of the tower would not be considered in the volume calculation
- The 25% volume rule can not be used to achieve a low-impact tower extension in a residential or commercial area
- The volume rule also applies to co-location on public utility structures including electricity poles, traffic light poles, street light poles, water reservoirs and road signage

Volume of an original facility only includes its apparent or visible parts and associated supporting structures.

Chapter 5
Contacts

This document has been prepared to assist and inform those using the Low-impact Determination, and to provide a guide for the siting and design of new low-impact mobile facilities.

Should you require further information, the following is a list of contact details for those groups referred to in this document, and those involved in preparing it.

This document can be found on the following web site:
www.mcf.amta.org.au

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Phone: 02 6271 1000
www.dcita.gov.au

Minister for Communications, Information Technology and the Arts
Parliament House
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Australian Communications Authority
Central Office
Purple Building, Benjamin Offices
Chan Street Belconnen ACT 2616
02 6219 5555
www.aca.gov.au

Australian Communications Industry Forum
Nokia House
Level 9, 32 Walker Street North Sydney NSW 2060
02 9959 9111
www.acif.org.au

Telecommunications Industry Ombudsman
PO Box 276
Collins Street West Melbourne VIC 8007
03 8600 8700
www.tio.com.au

Contact details for the carriers

Vodafone	www.vodafone.com.au
Telstra	www.telstra.com
Optus	www.optus.com.au
Hutchison Telecoms	www.orange.net.au

Thank you to NGA Marketing (NSW) Pty. Ltd. for development of this document on behalf of the Mobile Carriers Forum.

Question:

56. *Reference: section 3, p. 21*

Ms. Lemay states that "DAS can also provide a speedier deployment, compared to the development of large macro antenna sites, especially when access to existing infrastructure such as utility poles or lampposts is provided as part of the build-out. These deployments can be accomplished in a matter of months (for example 9 months) versus delays of more than 1 year that are increasingly becoming the norm to deploy macro wireless sites."

(a) Please support the statement about the ability of DAS to be deployed in 9 months, by providing evidence of the average pole replacement time for those locations where it was necessary to replace the electricity pole to accommodate the DAS equipment.

Response:

(a) Ms Lemay has no information regarding timelines for deployment of a hypothetical DAS network where it is assumed that the electricity pole must be replaced.

Refer to page 22 and footnote 22 of the LYA Report for the reference to the ability of DAS to be deployed in nine months, as was the case of NextG Networks' DAS deployment in San Diego.

Questions:

57. *Reference: section 4, p. 26*

Ms. Lemay states that DAScom "contemplated the deployment of 730 DAS nodes throughout the city of which approximately 90% would be on hydro poles."

(a) Please provide the relevant particulars in support, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents regarding the specific infrastructure (non-hydro poles or otherwise) to which the remaining 10% of DAS nodes were to be attached.

(b) Regarding the response to (a), please include the location and elevation of the attachments.

Responses:

(a) The remaining 10 per cent or less of DAS nodes in the proposed Toronto DAS Network were to be attached to existing streetlight or other utility poles.

See the City of Toronto Staff Report dated 19 May 2009 re Municipal Access Agreement for Telecommunication Installations – DAScom Inc., page 3 (online: http://www.toronto.ca/legdocs/mmis/2009/pw/bgrd/backgroundfile-21474.pdf), referred to at page 26, footnote 32 of the LYA Report.

(b) This information is not available to Ms. Lemay.

Questions:

58. *Reference: section 4, p. 27*

Ms. Lemay states that "based on our analysis of Industry Canada's Spectrum Direct database, many of these antenna sites support mobile communications. In addition, although the information available does not indicate the type of support infrastructure that is being used for these antennas, roughly 300 of these antennas are located at heights compatible with installations on utility poles (from 5 to 7.5 meters)."

(a) Please indicate whether CANDAS has placed, caused to be placed, owns, operates or maintains outdoor DAS with antenna heights measuring between 5 and 7.5 meters.

(b) Regarding the response to (a), please identify the total number of installations considered when responding to this inquiry as well as the total number of installations where antenna heights measure between 5 and 7.5 meters.

Responses:

(a) Ms. Lemay understands that DASCom Inc. has installed DAS nodes at elevations of between 5 and 7.5 metres.

(b) Ms Lemay has no information regarding the total number of installations considered by CANDAS.