Testimony of Mr. Arthur Gruhn, PE
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Northeast Utilities 345kV Proposals

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1. Would you state your name, title, duties and responsibilities with the Connecticut Department of Transportation (ConnDOT)?

- My name is Mr. Arthur Gruhn, and I am the Transportation Chief Engineer for the ConnDOT. I am a registered Professional Engineer in the state of Connecticut. My duties and responsibilities include the administration of staff and operations for the design, construction, reconstruction and maintenance of state highway network and engineering projects; develop, implement and evaluate bureau policies, goals and objectives; design and develop bureau programs and activities; implement new procedures and procedural revisions; direct testing of highway materials and execution of transportation contracts; determine appropriate staffing levels and direct management and coordination of staff; design and implement performance review standards for bureau staff; prepare bureau budget; maintain contacts with individuals within and outside of bureau who impact on policy or program activities, such as bureau heads, the Governor's Office, the Legislature, town officials, construction organizations, the general public, and answer questions regarding scope, funding, priority, scheduling and status of transportation program projects; act as engineering consultant to the Deputy Commissioner and other bureaus of the Department as needed; and serve as a chairman or member of various committees.

2. Do you have any concerns about Northeast Utilities (NU) underground 345 kV proposals?

- Yes. The ConnDOT has numerous concerns about the installation of high voltage transmission lines longitudinally within the right-of-way of State maintained highways. Let me summarize these as follows:

    A. Underground transmission lines are extremely costly to install, and future relocation or readjustment of these lines will likely be even more expensive than the original installation.

    B. The ConnDOT's infrastructure improvement program routinely impacts the various utilities that are present within the highway right-of-way. The ConnDOT typically reimburses the utility companies for engineering and relocation costs at a rate of 50% for unlimited access highways and 100% for "limited access" highways. The extremely

high cost of underground transmission line relocations or adjustments would add significant costs to the ConnDOT's capital program.

C. The potential financial burden that relocation or readjustment to underground transmission lines would add to the ConnDOT's infrastructure improvement program is of monumental concern. As such, the ConnDOT desires to enter into a formal agreement with NU, to ensure that the cost for future relocation or adjustments would not be eligible for reimbursement and the total cost would be NU's.

D. The high costs associated with transmission line relocations or adjustments would, in and of themselves, cause certain ConnDOT projects to be canceled. In other words, if a relatively small transportation improvement project requires an adjustment to an underground transmission line, the high costs of the utility relocation may not be justified due to the high cost involved, especially when compared to comparable locations elsewhere, where no underground transmission line exists. Certain roadways in this state will be saddled with a physical feature that will limit feasible and prudent improvements that would normally be easily accomplished and funded.

E. The high costs associated with transmission line relocations or adjustments would, in and of themselves, cause certain ConnDOT projects to be delayed for several years.

F. The ConnDOT's engineers view the presence of any existing utility as an obstacle that must be overcome or properly addressed during design. History has shown that very expensive utility infrastructure often becomes a major design control, and, as such, the actual design is significantly influenced by the presence of utilities. For example, the presence of an underground transmission facility could very easily limit changes made to the roadway profile. The resultant profile may not even meet design minimums, but may be the best that can be achieved when utility relocation costs are taken into account.

G. State-maintained roadways quite often handle high volumes of traffic. As such, the ConnDOT has routinely resorted to night construction, since the traffic volumes are typically much lower then. Any work

that occurs within the State highway right-of-way that has an adverse effect on traffic flow would be subject to the same limitations and restrictions.

H. Underground transmission lines are spliced together at strategically placed junction chambers. Splicing operations can last for several continuous days. As such, the placement of these junction chambers is critical in terms of their effect on traffic flow.

I. Desirably, it is better from the ConnDOT's viewpoint to locate any underground transmission line outside the limits of the paved traveled way. Cutting the pavement to install or maintain a transmission line can measurably decrease the life expectancy of the pavement.

J. The depth of any transmission line is an issue that needs to be addressed. A review of certain Route 7 improvement projects reveals that an 8' installation depth (measured from the ground surface to the top of the utility conduit) would likely place the utility line in a position to avoid the majority of impacts associated with roadway cuts and drainage installations. It is difficult, if not impossible, to predict the scope of future roadway improvements. The deeper the installation, the less likely a future impact will occur from a transportation improvement project.

K. The ConnDOT may have projects within the limits of NU's underground transmission line proposals. Depending upon the level of design completion, NU should be subject to the following requirements:

   a. For projects that are in the planning phase or in preliminary design, NU should coordinate with the prime designer to minimize any potential conflicts.

   b. For projects that are in final design, NU should design their facilities to avoid improvements proposed by the ConnDOT.

   c. Any work that takes place within the ConnDOT's right-of-way will need an Encroachment Permit from the ConnDOT.

3. Would you define "limited access" highway?

- "Limited access" highways are defined as those that the Commissioner of Transportation, with the advice and consent of the Governor and the Attorney General, designates as limited access highways to allow access only at highway intersections or at designated points. This is provided by Section 13b-27 of the Connecticut General Statutes (CGS).

4. Can you provide an example of limited access highways?

- Yes. Interstate 95 and the Merritt Parkway (Route 15) are two examples of limited access highways. In both cases, access onto and off of these highways only occurs at selected locations or interchanges. This is done to exert a high level of control on vehicles entering or exiting the facility in order to improve safety, while accommodating a high volume of traffic flow.

5. Does the ConnDOT have a list of "limited access" highways?

- Yes. The ConnDOT has a list of all "limited access" highways. The information is contained in the report titled "2003 Limited Access State Numbered Highways," dated December 31, 2002. This report is updated annually and published by the ConnDOT. DOT Exhibit 1.

6. Does the ConnDOT have any established criteria concerning the installation of utilities with the ROW of "limited access" highways?

- Yes. The ConnDOT has a publication titled "A Policy on the Accommodation of Utilities on Highway Rights-of-Way," dated April 1, 1977 (DOT Exhibit 2), which is incorporated by reference into the Regulations of Connecticut State Agencies, Section 13b-17-17. This document contains definitive restrictions concerning the installation of utilities within "limited access" highways. A summary of these restrictions follows:

A. Except for special cases, under strictly controlled conditions, new utilities will not be permitted to be installed longitudinally within the non-access lines.

B. It is desirable that public service facility crossings shall be made at grade separation structures and not across the limited access highway.

C. It is desirable that no poles or other aerial facilities shall be located within the right-of-way of the limited access highway or within traffic interchange areas.

D. Utilities crossing between highway grade separation structures shall be placed underground on a line generally perpendicular to the highway alignment, with manholes, other access points and appurtenances preferably located outside the non-access line.

E. All facilities passing under a limited access highway shall be constructed of durable materials, installed in such a manner as to virtually preclude the necessity of disturbing the roadways for the performance of utility maintenance or expansion operations.

F. Reasonable consideration shall be given for further expansion of utilities in the design of structures crossing limited access highways.

G. Access for normal servicing of a utility on or across a limited access highway shall be limited to (a) frontage roads where provided, (b) nearby or adjacent public roads or streets, (c) trails along or near the highway right-of-way lines connecting only to an intersecting road.

H. Emergency maintenance procedures and special maintenance which may be required within the non-access lines shall be allowed by permit only and under the terms of the agreement for the maintenance of public utility facilities crossing or located within the right-of-way of limited access highways.

7. Why are the restrictions for "limited access" highways more stringent than for other State-maintained highways?

- Safety and congestion are the primary concerns. Limited access highways typically carry high volumes of traffic at high speed. Access to these highways is tightly controlled and only allowed at specific points. Any construction or maintenance activity on roads of this type has the potential of disrupting the free flow of traffic and possibly compromising safety.

8. On March 25, 2004, an event occurred on Interstate 95 in the City of Bridgeport that affected the I-95 bridge over Howard Avenue. Can you briefly describe the event and then offer your opinion on what would have occurred if a 345kV transmission line were physically attached to the underside of the Howard Avenue structure?

- Basically, a vehicular accident occurred that resulted in the release of home heating oil. This oil ignited and burned for a long period of time. The heat from the fire destroyed the structural carrying capacity of the I-95 bridge over Howard Avenue. The bridge sagged 3-4 feet since the steel beams softened due to the high heat that was produced by the fire. In fact, an overhead transmission line was damaged during the fire. Replacement of the line involved two days of work by a UI subcontractor. If a high pressure fluid filled 345 kV line had been involved, the replacement of this line would have taken a significantly longer period of time, possibly affecting the ability of the Department to re-open I-95 to traffic in a timely manner. Such a delay would have had a disasterous affect on the economy of the Bridgeport region and the northeast region due to the disruption of the vital I-95 transportation corridor.

- Now, if a 345kV line had been attached to the underside of this structure, one can only speculate how much worse it would have been. Would the high voltage present any undue safety hazard to the traveling public or to the emergency workers who responded to the emergency? Would the high pressure fluid be flammable and thus have added to the fire? We really don't know the answer to these questions. However, we can speculate that the

already difficult situation would have been more complicated and probably worse had a 345kV line been present.

We should learn from history, and this event has added a new dimension to the prospect of installing a 345kV transmission line within any transportation corridor.

9. If you had the choice of installing an underground transmission line longitudinally within the right-of-way of a State maintained highway versus a town road, which choice would you make?

- Generally speaking, State-maintained highways carry high volumes of traffic at higher speed, and are the most likely to be widened, improved or reconstructed. On the other hand, local roads are quite often lower volume roadways, carrying traffic at lower speeds, and are less likely to see major changes due to reconstruction. Therefore, my choice would be to use a local road whenever possible.

10. Is there any existing longitudinal underground transmission line facilities within the State highway right-of-way? Can you briefly describe these installations?

- Yes, currently there is a 115 kV underground transmission facility owned by the United Illuminating Company (UI) in the City of New Haven on Water Street (U.S. Route 1).

11. Did this 115 kV underground transmission facility pose any substantial issues (hardships) to its State highway project?

- Initially, the answer was yes. The preliminary drainage design created a situation in which all utility facilities were going to see substantial utility conflicts. However, ConnDOT's greatest concern was the impact to the 115kV underground transmission facility, and the primary concern was the cost. The initial cost estimate from UI for the relocation of this transmission facility was between $2,000,000 and $2,500,000 (approx. 1,300 feet). This translates to a cost of approximately $1,300 per foot! This portion of U.S. 1 is a "not limited access" highway, However, UI would have been reimbursed 100% of its engineering and construction costs since the State highway project was initiated under I-95 which is a "limited access highway". In essence, this had

the potential of escalating the net total cost of the State highway project significantly. After many weeks of review, analysis and design, a drainage design was developed that eliminated the need to relocate the 115kV underground transmission facility. In this case, a tremendous financial burden to the State and its taxpayers was averted. However, one must be acutely aware that the installation of miles of underground transmission lines will inevitably be a financial issue for the ConnDOT to contend with.