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MEMORANDUM

To: Bill McNamara and Ralph Roam

From: Jeremy Owens and Terry Boyle

Date: July 10, 2008

Re: Lamoille County Project Structure Configuration and Landscape Mitigation Revisions

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We have reviewed the latest plan and profile drawings from VELCO. This Plan and Profile set was prepared in response to a comprehensive final line design review of the Lamoille County Project 115kV transmission line, an endeavor in which T. J. Boyle Associates provided aesthetic mitigation. As a result of the final design review, this latest plan and profile set incorporates a variety of pole configuration revisions and limited right-of-way alignment changes, which in some areas has altered the visual appearance of the project. As such, this memo is intended to serve as a review of the aesthetic implications relating to these configuration changes, including the effects on historic sites in the accompanying Historical Analysis Addendum. This memo also includes a summary of subsequent revisions to the landscape mitigation sheets, most of which have changed in varying degrees since the last filing. Additionally, we are providing updated landscape mitigation sheets for the entire project. It is important to note that many of the changes reflected in the updated landscape mitigation sheets were requested by landowners during ROW acquisition negotiations.

These design revisions result in several proposed changes that affect the visual aesthetics of the project:

- A revised location and configuration of the Duxbury Tap Switching Station
- The replacement of steel structures with round wood or laminated wood structures wherever possible on both the 115 kV and 34.5 kV lines, and the removal of any structures deemed unnecessary
- 115 kV structure configuration changes through two major areas – structures at the south end of the Gregg Hill Reroute (LCP-59 through LCP-61) and the Stowe town line to the Moscow Substation (LCP-94 through LCP-114) – to allow for more suitable structure types and sizes

Duxbury Tap ROW Corridor and Switching Center

In order to relocate the Duxbury Switch Area, a short section of the Tap right-of-way corridor has been realigned. This corridor is now proposed to follow the entire length of the western Harvey property boundary from the existing 115 kV K-24 corridor to River Road. There is no longer an angle in the proposed ROW, resulting in fewer guy wires, and the H-frames have been replaced with single-pole structures, resulting in fewer poles.

The Duxbury Switching Station has been relocated to the western corner of the Harvey property, immediately south of River Road and out of view from the historic Atherton-Harvey farmhouse. The configuration of the switching yard has also been changed. The previous layout involved four total structures consisting of seven steel poles ranging in height from 50' to 61' above ground. The new design utilizes only two structures, one 95' weathered steel switch pole and one 92.5' conventional guyed round wood pole, set back from River Road approximately 100' and 130' respectively.

Although the two newly proposed poles in the switching yard are above 90' tall, relocating the yard to the flat area near the western Harvey property line ensures that these poles are generally more concealed from view than the previous design. The increased height of the poles is offset by this relocation as well as a significant reduction in the number of poles required in the switching yard. This is especially true when considering that the elevation at the base of the new structures is as much as 25' lower than previous structure elevations, and the new poles are able to be placed further from the road. Existing roadside vegetation and topographic

features will limit the relatively oblique views from River Road, Route 2, and I-89. However, we have proposed additional landscape mitigation between the new switching yard and River Road to replace cleared vegetation and mitigate views of the new corridor arrangement.

This new switch location and structure configuration, coupled with landscape mitigation near River Road, ultimately results in a net reduction in visibility from surrounding areas, and is an improvement over the previous design.

Miscellaneous Structure Changes and Removal

Along the entire length of the line, any structures previously proposed as steel were evaluated for a possible switch to conventional round wood or laminated wood pole structures, with round wood poles preferred. While the shape of the laminated wood poles is generally rectangular (i.e. the horizontal cross-section), the overall texture and aging characteristics are very similar to round wood poles, especially as seen from a distance. Therefore, using laminated wood poles in place of large weathered steel poles is desirable from an aesthetic standpoint, and is warranted in the overall context of the Duxbury, Waterbury, and Stowe areas.

Moving south to north, the 115 kV structures previously filed as steel that are now proposed as round wood are LCP-8, 61, 94, 97, 98, 103, 104, 113, and 114. The 115 kV structures previously filed as steel that are now proposed as laminated wood are LCP-2, 6, 18, 59, 108, 112, 119, and 123. Additionally, double-circuit 34.5 kV structures through the Cady Hill Road area now proposed as laminated wood are GMP-20, 18, 14, 13, 11, 10, 6, 5, 2, and 1. In all, twenty structures are proposed as laminated wood and only seven are steel in the new design. This is in contrast to zero laminated wood structures and approximately three dozen steel structures in the previous design.

In addition to the change of pole types, each structure was also studied to determine if its presence was absolutely necessary. As part of the revised design, a total of six 115 kV structures were removed, including two 115 kV steel structures from the Duxbury Switching Station (232.4 and 232.5), and four from the line as it continues north to the Stowe Substation (LCP-4, LCP-21, LCP-111, and LCP-120). The elimination of some of the structures required slight changes in pole locations, and these have been reflected on the mitigation plans.

Our office regards the reduction of nearly thirty steel structures which were replaced with round wood or laminated wood pole structures, and the removal of six 115 kV structures entirely, to be aesthetically favorable revisions and an overall improvement compared to the 2006 line design plans.

Configuration Changes - Gregg Hill Road

Much like the approved single-pole, double-circuit "underbuild" configuration south of the Waterbury Reservoir (structures LCP-48 through LCP-50), which involves the 115 kV line located above a 34.5 kV cross-arm, an underbuild configuration is now proposed north of the reservoir at structures LCP-59 and LCP-60. Located on the Magdamo-Abraham property directly adjacent to Gregg Hill Road, these two structures are at the south end of the so-called Gregg Hill Reroute.

In the previous design, LCP-59 was indicated as a 95' steel angle structure that carried both the 115 kV and 34.5 kV lines in a vertical configuration on either side of the pole. With a base diameter in excess of 6' and eight davit arms that extend as much as 14' to either side, this steel pole would indeed be massive, and is located north of a prominent knoll that is visible while traveling in both directions along Gregg Hill Road.

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Coming from the north, this structure would be highly visible during a head-on approach of approximately 400'. In the photograph at left below, LCP-59 will be located just to the left of the centerline of the road, and will become more visible as one approaches the structure. As a height comparison, the light-grey vertical line at the vanishing point of the road is a distribution pole that is approximately 45' in height.

View Headed Southbound on Gregg Hill Road

View Headed Northbound on Gregg Hill Road

Coming from the south, the base of LCP-59 will be roughly 10' to 20' above the road and will be highly visible during a head-on approach of approximately 800' in length. In the right photograph above, LCP-59 will be approximately 125' beyond the most distant pole, and becomes more visible as one travels north. Because of the high level of visibility, such a large and imposing steel structure on an otherwise relatively rural road is not considered the best available configuration for this LCP-59 location.

In the newly proposed design, utilizing the underbuild configuration at this structure (placing the 34.5 kV line on horizontal cross-arms below the 115 kV line) lowers the overall visual impact of this pole in both directions. Additionally, because of this configuration, using steel is no longer necessary and a laminated pole with an above-ground height of 90' can be substituted. This laminated pole will require limited guying (4 guys), and the associated yellow warning covers can be mitigated with plantings. The lowered height, wooden texture of the laminated pole and the absence of davit arms will make this a more appropriate structure compared to the previously designed steel version. Example laminated poles with underbuild configurations are shown in the two images below (these structures are from projects not associated with the Lamoille County Project, and likely use a different voltage and pole spacing than those proposed for this project).

In order for this change in configuration to take place, LCP-60 will also need to be an underbuild structure, and is now planned as a 79' round wood structure with the 115 kV line on davit arms above the horizontal 34.5 kV line. Lastly, because of the above changes, the large double-circuit steel angle structure with arms originally shown at LCP-61 can be substituted for simpler, separately guyed round wood poles, one for each circuit, that are significantly lower in pole top elevation and that have no large top davit arms.

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Above: A rough simulation of the 95' tall steel LCP-59, provided by T. J. Boyle Associates, LLC (TJB). The eight davit arms that extend as much as 14' to either side of the steel pole are not visible from this direction, though they would be visible from the south. **Below:** A rough simulation of the 90' tall underbuild laminated wood LCP-59, provided by Laminated Wood Systems, Inc (LWS). Note that neither simulation takes into account cleared vegetation that would be associated with the new right-of-way. The foreground pole is a roadside distribution pole.

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Configuration Changes – Black Bear Run, South Marshall Road and the Little River Area

A second, longer line section was also identified as a candidate for the underbuild configuration. As the 115 kV and 34.5 kV lines leave their separate pole alignments and join onto common structures at LCP-94, just south of the Stowe town boundary, they cross through the Black Bear Run community, South Marshall Road community, and over the Little River to LCP-114 just north of River Road. As part of the CPG it was determined that single poles through this area would create less of a visual presence in these communities and open fields, and thus that all structures be "single-pole/double-circuit" as the lines proceed through these areas.

As re-filed in 2006 in response to the CPG, ten of the twenty-one structures in this stretch were steel poles with varying length davit arms, and pole heights ranged from 70' to 95' (an 11th steel pole was subsequently determined to be necessary in this stretch). Each of these poles would carry a 34.5 kV line on the west side of the pole and a 115 kV line on the east side of the pole, both in a vertical phase configuration. The 2006 design filing includes ten round wood poles and eleven weathered steel poles. Since the 2006 design filing it was determined that this design is not necessarily the best solution, especially in the context of Black Bear Run, South Marshall Road, and the Little River area.

The new proposal to utilize an underbuild configuration through this area again involves placing the 34.5 kV line on a cross-arm below the 115 kV line on davit arms above. Doing so avoids the use of steel in all but one of the previous eleven steel pole locations (LCP-109), and this one pole would not require any davit arms. All other poles in this area would become round wood or laminated wood, for a total of seventeen round wood poles, two laminated wood poles, and one steel pole. This in turn decreases the average diameters, large davit arms, and overall visual profile of the structures through these areas. Additionally, LCP-111 is now proposed to be removed.

Above: Rough simulation of LCP-94 as previously designed (prepared by LWS). Note that the top two arms would actually extend out as far as the arms that are second from bottom (see lower left image on page 6 for a more accurate example of the steel pole arm configuration).

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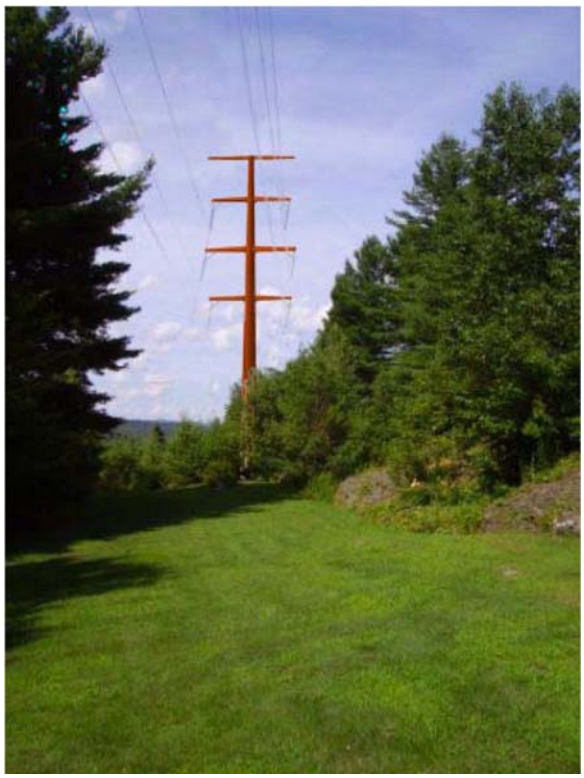
Above: Rough simulation of LCP-94 in an underbuild configuration (prepared by TJB). Below Left: Rough simulation of LCP-97 as previously designed (prepared by LWS). Below Right: LCP-97 in the underbuild configuration (by TJB).



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Above: Simulated view of the previous design in the Little River area looking north from Moscow Road. LCP-108 is at left. **Below:** Simulated view of the same area with the underbuild configuration. The weathered steel pole at right (LCP-109) is the only steel structure required in this section. (Both simulated views prepared by TJB. The base photo used in these simulations was also used in the original simulation of this view, which was filed with the Public Service Board on December 6, 2004.)

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The 34.5 kV crossarms are at a height similar to the 34.5kV line that runs through this area now. The 34.5 kV now becomes more easily screened by adjacent vegetation, and will incorporate less visible non-specular conductors. The top portion of the pole would carry only the 115 kV line, and thus there will be half as many conductors, davit arms and insulators high above the ground as the line proceeds north. Moreover, there is only one shield wire required for the underbuild scenario, as opposed to two shield wires on extended davit arms in the original design plans.

These configuration changes, combined with the increased use of wooden poles rather than steel, create less of a visual presence in the communities and open landscape and are still in accordance with the CPG order to use a single-pole/double-circuit configuration while keeping poles as low as possible.

Overall Assessment

The revised line design plans, taken in part or as a whole, are visually less intrusive in terms of structure size, configuration, and texture than the previous design plans. The relocation and decrease in size of the Duxbury Switching Station is a simpler and less visible solution. Eliminating unnecessary structures and utilizing laminated wood or round wood rather than steel wherever possible improves the visual consistency and suitability of the line. The expanded use of the underbuild configuration and the substitution of laminated wood for the steel double-circuit 34.5 kV structures through the Cady Hill Road area will successfully reduce the overall visual impact of the line, especially as it proceeds through sensitive residential and rural areas. The 34.5 kV will now be at a lower elevation than the 115 kV circuit, the high number of overly large and out of place steel structures is avoided, and the majority of structures instead become regular round wooden poles. The proposed pole placements, landscape mitigation, and use of non-specular conductors will prevent the project from having an undue adverse affect on the surrounding area, including the various historic structures. Ultimately, the use of laminated wood and the underbuild configuration are more typical of transmission structures found elsewhere in Vermont, especially when compared with the previous design, which incorporated approximately five times as many steel structures.

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Summary of Landscape Mitigation Sheet Revisions

The following is a summary of the mitigation sheet revisions that have occurred since the previous filing. These have been influenced not only by negotiations with private landowners, but a change in the existing conditions in the years since the original set was released. Additionally, these revisions include changes associated with the new design.

Sheet L2.1 –
Removed thuja occidentalis because of extensive deer browsing damage noticed on other VELCO projects. Adjusted plantings to match the new pole and ROW corridor locations.

Sheet L2.2 –
Revised plantings for new switching station design and location

Sheet L2.3 –
The total number of structures on the Harvey property was decreased. Vegetation alongside River Road has grown since the original evaluation in 2004, eliminating the need for some of the previously proposed roadside vegetation. The location of the ROW as it crosses River Road has also changed, which required revisions.

Sheet L3.1 –
Removed most of the plantings north of Route 2. VTrans did not approve planting within the historic Route 2 right-of-way, which extends further north from the existing road than is typical.

Sheet L3.2 –
Plantings changed based on landowner negotiations.

Sheet L3.3 –
Planting locations changed based on pole location changes, the removal of LCP-21, and negotiations with the landowners and the Town of Waterbury.

Sheet L3.4 –
Revised plantings along the roadside to match existing conditions that were not included in the original survey.

Sheet L3.5 –
Revised plantings based on a detailed wetland survey.

Sheet L3.6 –
Revised plantings based on landowner negotiations.

Sheet L3.7 –
Revised based on line design changes.

Sheet L3.8 –
Revised plantings based on minor line design changes and landowner negotiations.

Sheet L3.9 –
Revised plant sizes and material based on discussions with the DPS and revisions to guy wire locations.

Sheet L3.10 –
Revised plantings based on line configuration changes and discussions with the Town of Waterbury Road Foreman.

Sheet L3.11 –
Revised plantings based on line design changes, landowner negotiations, and discussions with the DPS.

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Sheet L3.12 –
Revised plantings based on landowner negotiations.

Sheet L3.13 –
Revised plantings based on landowner negotiations.

Sheet L4.1 –
Revised plantings based on landowner negotiations.

Sheet L4.2 –
Revised plantings based on line configuration changes and landowner negotiations.

Sheet L4.3 –
Revised plantings based on landowner negotiations.

Sheet L4.4 –
Revised plantings based on landowner negotiations and discussions with the Town of Stowe Road Foreman.

Sheet L4.5 –
Revised plantings based line design and ROW changes, the removal of LCP-111, landowner negotiations and discussions with the Town of Stowe Road Foreman.

Sheet L4.6 –
Revised plantings based on landowner negotiations

Sheet L4.7 –
Revised plantings based on line design and pole location changes.

Sheet L4.8 –
Revised plantings based on landowner negotiations.

Sheet L4.9 –
Minor plant location revisions.

Sheet L4.10 –
Removed. VTrans did not approve planting street trees along the west side of Route 100.

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