FPL Metrorail Transmission Line – Some considerations

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There is no doubt that from a safety and aesthetic perspective, an underground transmission line along the Metrorail corridor would be the choice of preference.

If an above-ground alternative is considered, installing the line as a system attached to the Metrorail may offer a valid alternative. A feasibility study has been conducted to assess the impact of suspending the transmission line from the side of the double tee girders. My personal opinion is that this choice may not be the wisest. The primary reasons are related to capacity, safety, operation and maintenance of the Metrorail. Additionally, a very significant number of holes would need to be drilled into the web of the girders to support the transmission line brackets. These holes and the associated anchors would pose a non-trivial durability/maintenance challenge for the Metrorail.

Perhaps more efficient would be to run the transmission line on a system that is directly supported by the Metrorail piers. This choice would make the transmission line almost independent from the operation of the Metrorail and would not impact its service or maintenance.

The centerline of the reinforced concrete piers (3 by 6 ft. in cross-section) varies from a minimum of about 19 ft. to a maximum of 41 ft. The former is typical for the case shown in Figure 1, whereas the latter is the situation encountered in stations (see Figure 2).

Two possible solutions are sketched as part of Figure 3. For this example an **Extren DWB** manufactured by **Strongwell** was selected. This is a 36 by 18 in. hybrid FRP[1] structural shape that offers the advantage of insulation of the cable lines. The additional advantage of FRP is that it is practically maintenance free and can be made in any color.

The DWB core is subdivided into three cells with approximate dimensions of 11 by 11 in. (see insert of Figure 3). FPL may find that a single shape be able to carry the “six plus two” lines of the original design.

A preliminary calculation based on a simply-supported configuration shows that the DWB can carry 275 lb. per foot over a span of 78 ft. with a deflection limit of L/180. The selected span is the typical distance between piers and the load corresponds to 75 lb/ft. of self-weight plus the estimated weight of an 8-cable transmission line (i.e., 100 + 100 lb.ft.).

[1] Hybrid means that the primary fiber system is glass and some carbon roving are used in the top and bottom flange for adding stiffness.

a) Looking North

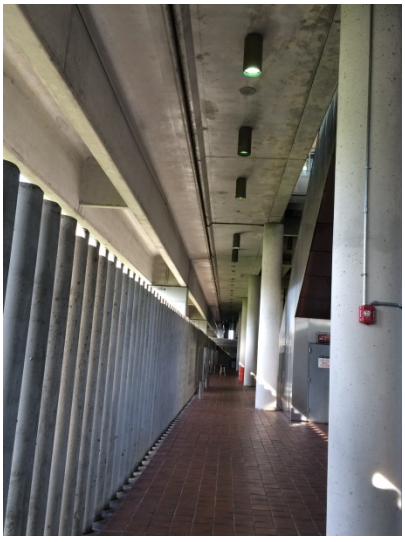
b) Looking South

c) Detail of girder support

d) Close up pier at girder-support

Figure 1 : Metrorail immediately North of 57th Avenue

a) Inside station facing South on West side



b) Inside station facing South on East side

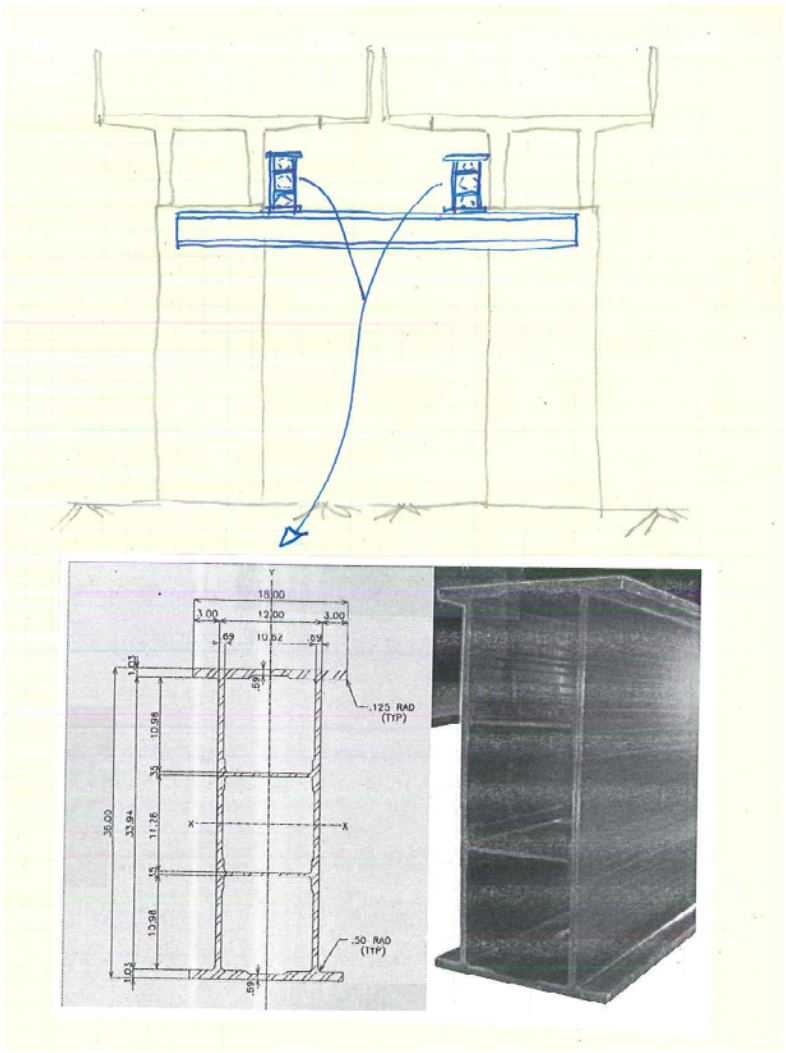
c) Inside station facing North on West side

d) Outside station facing North on West side

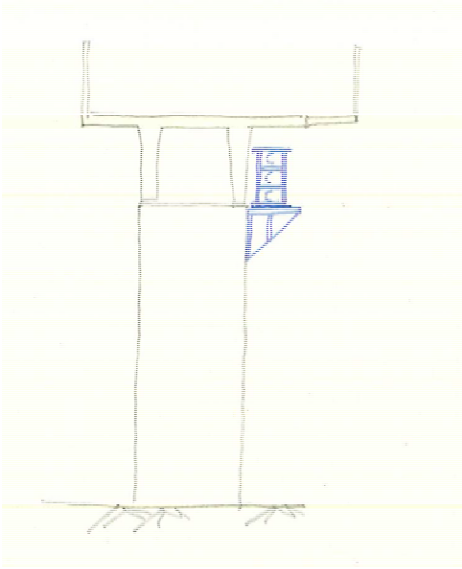
e) Outside station facing South

f) Outside station facing North on East side

Figure 2: Metrorail University Station



a) Two Extren DWB shapes supported by beam connected to twin piers



b) Single Extren DWB shape supported by corbel connected to single pier

Figure 3: One possible solution using Extren DWB structural shape