1) Temporary trolley wire Phasing

Metro will be the only entity allowed to de-energize or energize the wire for all phasing and final work. In order to accomplish this, Metro will need to install sectionalizers or temporary breakers into the trolley overhead power system. This work, both administrative and field, shall be requested by the Design-Builder and paid for as part of the Metro Allowance.

Once Metro installs sectionalizers and disconnects for isolating the construction zone, the Design-Builder may start the project phasing requirements. Upon completion of the project, Metro shall remove same to restore the line back to full service as part of the final configuration. If construction activities require de-activation for movement of the trolley overhead infrastructure, Metro crews shall perform the de-energizing and energizing work at the Design-Builder’s expense.

Temporary relocations of trolley wire shall be by the design builder. Metro King County standards for temporary and final trolley wire configurations can be found online at the following address:

http://your.kingcounty.gov/kcdot/transit/dcs/standards/

If the Design-Builder needs or requests assistance, Metro KC hourly crew rates can be provided.

2) Bridge height.

The Design-Builder must take into account the requirements for trolley wire being placed under the structure before establishing the final bridge clearance elevation. It is strongly suggested that the Design-Builder secure a written code variance from the governing jurisdiction on trolley wire clearance issues early during the design phase, if the standard design parameters can not be met.

As part of the final installation by the Design-Builder, the trolley overhead wires shall not be supported by the bridge structure. Clearance from the contact wire and supporting spans to the structure shall meet NESC (National Electrical Safety Code, latest edition, and local code requirements).

Some of the Requirements:

If overhead switch gear assembly or curve segment has to be placed underneath or within 5 ft. of the bridge structure, the vertical clearance shall be 25 ft. at the minimum. The approach of the overhead switch gear assembly shall align with the beginning of the approach section of the layover space and the departure overhead switch and within 5 ft. of the end of a layover taper. In general, the overhead alignment including angled switch
gear assemblies for the layover facilities shall follow the geometrics of the layover on the ground. At the departure section of the layover, the departure switch gear shall be within 5 ft of the head of each layover bay.

Insulation/Protection and grounding of the bridge will meet NESC requirements to prevent shorting between the 700V trolley bus wire and the structure shall be installed. The criteria apply as long as the width of the bridge is less than 50 ft. Metro trolley overhead contact wire is 700V DC, bare copper and designed to clear the crown of the roadway by 18 ft. 9 inches at its support and maintain 18 ft 3 inches clear at 60 degrees Fahrenheit.

3) New Trolley Wire Layout

The trolley wire design will have overhead switch gear assemblies to provided two layover bays; design for two 60 ft. busses in each bay; and design to operate independently, i.e. an angled approach and departure switch gear assemblies shall be provided for each layover bay. Equipment can be purchased from Impulse. Note that the hardware could take between 8 and 12 months to be delivered.

Some of the Requirements:

Five foot long segments of PVC half rounds shall be suspended on the wire to protect the overhead wires beyond both sides of the bridge structure.

Drawings must be submitted to Metro Transit detailing that all the trolley wire design criteria was met and stamped by a registered Electrical engineer.

4) Final Trolley poles and attachments.

Design of the overhead system for the pass through wires and the layover wire assemblies shall be provided by the Design-Builder and reviewed by Metro Transit’s trolley overhead engineers. The Design-Builder shall provide all engineering drawings to Metro Transit. Locations of poles shall be determined by Metro Trolley Overhead engineers and the Design-Builder shall select the foundation design based on its geotechnical data and Metro Transit’s trolley overhead foundation standards. The anticipated design, with both passing and layover tracks and the required switching, will preclude the use of pole mast arms.

Placement of concrete shall meet City of Seattle Standard plans for municipal construction. Submittals will be required for anchor bolts and steel re-enforcing.

Poles vary from about 10 inches to 16 inches diameter at the base. Poles shall be furnished and installed by Design-Builder and all shop drawings approved by Metro transit and the City of Seattle prior to order. Typically poles are about 110 ft. apart on straight sections and the beginning, middle and end of any curve.
March 8, 2010

The Design-Builder is fully responsible for the design, materials, installation, permits, and variances required to install trolley wire between the sectionalizers installed by Metro Transit. Metro Transit will not connect the trolley wires without all conditions being satisfied.

5) Lighting.

Due to the higher level of activity at the bus zone/passenger loading areas in the morning and evening hours, the “High” level of lighting has been chosen (0.9 foot-candles, Minimum on Pavement). This level was then boosted to 1 foot-candle (Minimum on Pavement), per a recent study on safety and pedestrian security at bus zones (published in the Journal of the Illuminating Engineering Society (IES)). The 1 foot-candle is to be maintained for 60 feet on either side of the bus stop, while maintaining the 4:1 Uniformity Ratio.

The area under the land bridge should be treated like a covered parking facility, therefore subject to IES RP-20.

Lighting shall maintain a 5 ft. clearance from the contact wire. Note that only qualified workers are allowed within 10 ft. of the live wire.

6) Power and Facilities wire work.

Note that dead ending the trolley wire for various transfers requires the Design-Builder to provide a means to keep the wire taught. Essentially the trolley wire is under a constant tension (4000 lbs or more). To maintain the tension, Metro Transit requires the Design-Builder to provide this attachment. Typically it could be accomplished by guying and steel or wood poles at specific locations. This will also be required for the Design-Builder’s side of the trolley wire installation. Metro will work with you to minimize this impact.

7) Surplus Materials

Poles removed as a result of the construction shall be delivered to Metro Transit for re-use in other locations, at the following address:

Metro South Construction

11911 East Marginal Way South, Building B

Tukwila, Washington