12. ELECTRICAL DESIGN CRITERIA AND STANDARDS

Electrical work on the sbX system may potential include street and pedestrian lighting, traffic signal power and controls, fiber optic lines and twisted pairs for communications, station power and lighting, and existing information kiosks. All electrical work beyond the electrical meter will be in accordance with the following:

- NFPA 70;
- NEMA (National Electrical Manufacturers Association)
- IES (Illuminating Engineering Society);
- IEEE (Institute of Electrical and Electronics Engineers);
- ANSI (American National Standards Institute);
- California MUTCD;
- California Building Code; and
- Building Code for local jurisdictions.

All electrical work for street lighting as well as for traffic signals shall follow standard practices, local electrical utility and local municipalities' traffic engineering requirements.

12.1 Power Source

Power shall be supplied through the local grid by the local electrical utility as required. During the design stage, the local electrical utility should be contacted to determine the location and type of service available. Separate metering may be needed for various usages (shelters, informational kiosks, signals, lighting, etc.) due to rate differentials. Low voltage requirements will be added on an as-need basis for Systems related items including but not limited to CCTV, TVM/SAV, network equipment, etc.

All shelters shall provide solar illumination in two formats, one to provide solar illumination for Omnitrans bus shelter interior security lighting and two to provide stand-alone solar security illumination on bus stop poles for individual bus stop locations.

12.2 Shelter Electrical Requirements

Local bus stops require a 1-inch conduit to junction box at rear corner of shelter pad (circuit breaker). Connect to building power (if possible) or nearest signal control box or electric power junction box. Electricity (120 volts/20 amp circuits) and communications to support ticket vending machines, real-time passenger information, lighting of stops, security cameras, and emergency call boxes are required. For cleaning purposes and landscape maintenance, an electrical outlet should be provided. The shelter shall be grounded by installation of a grounding rod or similar acceptable method, and outlets shall utilize Ground Fault Interrupter.

Shelters shall also require solar illumination, per the following design criteria:

- Solar units must be capable of mounting to Tolar Lexan dome roof shelters of either 13' or 17' in length. Solar panels to be of low profile design for aesthetic and vandal resistant purposes and use security hardware to fasten to the shelter roof. Each solar unit will have a serial number assigned and visible from the interior of the shelter;
- Solar units to be designed to include vandal resistant hardware and designed to withstand abuse from potentially damaging individuals. Security fasteners will be used for any exposed points;
- Solar illumination for shelters is to be for the interior seating area of the shelter only;
- Illumination is to be provided for a period of no less than 6 hours after dusk and 2 hours before dawn;

- Minimum illumination level will be 3 foot candles to be measured at 3' above the concrete shelter pad at or near the shelter bench area and illuminate approximately 40 square feet. Greater illumination levels may be provided as options;
- Solar units must be of modular design to allow for independent replacement of solar collector, light bar, light fixtures/bulbs, batteries and lighting control module. Replacement part numbers to be provided;
- Light source to be high intensity, white light emitting diodes (LED); and
- Solar unit must be capable of providing 5 days of full brightness, from a full charge, with no additional charging.

sbX stations require seven 2" SCHD 40 PVC conduit for electrical and communication. Traffic signals conduit shall be a minimum 2" rigid steel conduit; no PVC conduit shall be allowed unless otherwise noted for traffic signal interconnect.

12.3 Solar Bus Pole Security Lighting Requirements

Stand-alone security solar illumination on bus poles shall be installed by Omnitrans at individual bus stop locations. The design criteria are as follows:

- Solar unit to mount on 1.75" standard square sign pole. Solar unit casing should be low profile and theft resistant. All exposed hardware must use security fasteners. Mounting to pole must use security fastener hardware;
- Solar unit to have serial number attached to the exterior surface and visible from the sidewalk;
- Solar illumination must activate at dusk and remain illuminated for 6 hours and must activate for 2 hours prior to dawn;
- Solar illumination to be activated automatically (no push button activation);
- Solar illumination must provide a minimum of 4.0 foot candles at the sidewalk from an elevation of 10' and provide a minimum of 6 square feet of illumination at sidewalk level. Greater illumination levels may be provided as options;
- Illumination must be provided by white Light Emitting Diode (LED);
- Solar lighting must be able to be adjusted in 90 degree increments to allow for optimal area of illumination;
- Battery capability to hold charge for 5 days minimum from full charge without re-charging;
- Solar unit to be of modular design to allow for component part replacement; and
- Solar unit component parts to be warranted for 5 years, excluding batteries.

12.4 Street and Pedestrian Lighting

Along the sbX dedicated lanes, where widening is required, any existing lighting standards shall be removed and reset/replaced laterally to the alignment at the prescribed setback from the face of curb as required by the local Jurisdictions. Design of lighting at the sbX stations shall work in concert with existing lighting design so as to provide the minimum required lighting levels set forth by local municipalities. Any additional lighting required by the project's design, outside the limits of stations, including

parking areas, shall also follow the local jurisdictions' standard specifications.

For passenger comfort and convenience, lighting levels on sbX station platforms shall be 5-20 foot candles and lighting external to stations shall be 2-5 foot candles. For local bus stops, a lighting level of 3 foot candles at 3' above ground is required throughout the shelter.

Parking areas shall have lighting capable of providing adequate illumination for security and safety. The minimum requirement is 1 foot candle, maintained across the surface of the parking area.

12.5 Transit Facility Lighting

Facility lighting should consider the following:

- Inside public areas, provide light levels to support operations and to provide deterrence against criminal activity;
- In all spaces, provide lighting according to its operational use and corresponding visual tasks and to support the closed-circuit television system, where CCTV is required;
- In above-ground maintenance and storage areas, provide complete perimeter and area lighting. At a minimum, access points, entrances, the perimeter and restricted areas must be illuminated from sunset to sunrise. Where appropriate, use auto-sensing day/night cameras to enhance video coverage;
- Controls, switches and distribution panels for security lighting must be located in areas to prevent unauthorized access and tampering. Wiring for security lighting must be in rigid conduits and embedded (if feasible);
- Vehicle and pedestrian entrances must have a minimum illuminance level of 10 Lux (1 foot-candle); and
- All other interior or exterior areas where CCTV coverage is required must have a minimum illuminance level of 2 Lux (0.2 foot-candle) measured 6" above finished floor or grade, unless infrared cameras and infrared lighting are provided.

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