



5.5.1 Contractor Supplied Materials

Following specifications 651.2 and 670.2, all products supplied by the contractor should conform to specification requirements on the department's approved product list. For materials not on the approved list, refer to Standard Specification 670.3.3.1.

5.5.2 Ramp Meter Controller Equipment

For ramp metering installation, a Ramp Meter Processor Assembly is used, consisting of the following devices:

- Type 334 Cabinet
 - Model 200 switch packs
 - Model 208 monitor unit
 - Model 222 dual vehicle detector modules (for loop detector inputs) and rack
 - Model 242 DC dual isolation modules (for microwave detector or video image detector inputs or loops shared from a different cabinet)
 - HOV Programmable Logic Controller (for ramp meters with HOV lane only)
- Type 2070 controller unit
 - CPU
 - Input/output interface
 - Unit chassis
 - Unit power supply with external power connection
 - Unit standby power supply
 - Front panel assembly
 - Internal system interface
 - Connectors
 - Communications system interface
 - Model 412C program module
 - Model 400 modem module

5.5.3 Communication Requirements

Ramp meter controllers (i.e. Model 2070 processor assemblies), contain 1200 to 14,400 baud (bits per second) modems internal to the processor unit. The communication medium selected for ramp meter design can include spread spectrum radio, Ethernet over fiber (with an Ethernet to serial converter), dedicated twisted pair copper, or leased telephone circuit. Contact the State Traffic Operations Center to discuss communication requirements.

5.5.4 Electrical Service Requirements

Consistent with the design practice recommended in the National Electric Code, the electrical service and power distribution system should be designed for a maximum of a 3% voltage drop between the electrical service location, which may be a utility connection point or a dedicated circuit in an adjacent installation such as a lighting distribution cabinet, and the Ramp Meter or other field cabinet. When calculating the voltage drop, it is important that the ultimate potential power draw is considered. Good design practice dictates that the sum of the size of the circuit breakers within the cabinet be used as the potential draw. In most cases for ITS design this will mean a 50-Amp power draw should be used as most ITS cabinets come with 2-25-Amp circuit breakers.

A 100 Amp, 2-Circuit, 120/240 volt, single phase, three wire underground electrical service is the most commonly used and preferred electrical service for Ramp Meter cabinets, or any ITS field cabinet; however, other systems must be considered in instances where the electrical service location is of such a distance from the field cabinet that maintaining the above described 3% maximum voltage drop is not possible.

Power distribution conductors must be sized appropriately to design for the above-mentioned 3% maximum voltage loss with a maximum conductor size of 1/0 AWG.

Due to WisDOT safety regulations, voltage in excess of 120V must not be brought into ITS field cabinets. Rather, step-down transformers must be installed adjacent to the field cabinets with only the 120V conductors installed into the cabinet. For further clarification, it is not acceptable to “split” the 240V service into two 120V circuits in the field cabinet.

The electrical service will be furnished and installed by the local power company up to a demarcation point, typically an electrical service (meter) pedestal. The electrical service must conform to the requirements of the local power company. **The location of the electrical service pedestal must receive approval from the utility company.** The electrical service will include two 50-amp circuit breakers rated at 22,000 AIC. The requirements for power cable between the electrical service and controller cabinet can be found in 5.3.7 *Cable Routing*.

At locations which require a remotely located electrical service or which require an adjacent step-down transformer, a 100 Amp outside rated breaker box with space for 6 circuits, but no main breaker, will be attached to the side of the cabinet so that the cabinet may be shut down without entry into the higher voltage step-down transformer. Also, a 50 Amp single circuit breaker rated at 22,000 AIC will be installed within the breaker box to serve as a local electrical service disconnect point. Remote service should be labeled in the field as ITS with State Traffic Operations Center’s phone number.

5.5.5 Ramp Metering Construction Standards

Construction details, Standard Special Provisions, and Special Provisions can be found in Appendix 70.