APPENDIX I EVALUATION OF TECHNOLOGICAL CHANGE

It has been said that the rate of technological innovation in ITS devices is such that one often replaces devices before one repairs them. The pace and degree of technological change will have significant bearing on ODOT's ITS maintenance needs over the next twenty years.

This maintenance plan analyzes resource requirements over three different years, with their respective technological assumptions, as shown in Table I-1. This table shows that the plan assumes a significant amount of technological change will likely occur between the completion of the current STIP and the conclusion of the Strategic Plan. While it is impossible to forecast the exact effects of technological change on maintenance needs, there are guidelines that may be observed from looking at how technology has progressed in the past several years which should affect devices into the future.

- Increased networking capability of field devices. It is anticipated that future field deployments will be designed to be more amenable to remote network communications. There will likely be improvements in solid-state equipment such as modems and routers that will improve the stability of these devices under poor power or environmental conditions.

- Self-diagnostic capability. Related to the improvements in networking capability, it is anticipated that future field deployments will improve in their ability to perform self-diagnostic activities. Field-based microprocessors will become more sophisticated and powerful, allowing devices to identify components that have failed, and perhaps also the type of repair necessary, providing information on who should be called and what parts are required.

- "Push" technology. Related to self-diagnostic capability is the ability of the device to communicate to a TOC or dispatching office that a failure of some sort has occurred. This is known as "push" technology in contrast to "pull" technology, where an operator must conduct a polling operation to identify which devices are not

Forecast Year	Technological Assumptions
Current / Immediate	▪ Keep all existing deployments ▪ Repair everything in the field
Short-Term (includes STIP)	▪ Keep all existing deployments ▪ Repair everything in the field ▪ New deployments would employ similar technology as existing deployments
Long-Term (includes Strategic Plan)	▪ Large-scale standardization of devices ▪ Non-standard devices would no longer be in the field ▪ New field devices would have to be based on scalable standards (common parts and repair procedures)

Table I-1: Technological Assumptions.

performing adequately. A combination of "push" technology and greater self-diagnostic capability should improve response time and repair efficiency.

- Modular design. As the technology being utilized in ITS devices gets increasingly sophisticated with microprocessors, field technicians will be less likely to spend time repairing device components. Instead, they will be able to swap out the bad "module" (such as a processor card) and swap in a good "module". This is currently done for traffic signal controllers: "bad" controllers are swapped out and sent to TSSU in Salem, who then send "good" controllers back to the regions. This swapping would be encouraged, as the cost of modules is likely to decline relative to the cost of labor into the future.

- Environmental protection. Many maintenance problems with earlier generations of ITS devices have occurred because of poor environmental protection, which allows water damage to key electronic components. Better manufacturing techniques and environmental protection will eliminate many of these problems, reducing the frequency of repair maintenance activities.

- Standardization. It is assumed that all devices included in the Strategic Plan will have a scalable standard in use by 2017. The effect of this is to improve ODOT familiarity with devices, and to reduce training and spare parts requirements.

- Easier access. For some devices, such as closed-circuit television (CCTV) cameras and road and weather information systems (RWIS), maintenance is made difficult by the need to use bucket trucks, lane closures or other time-consuming procedures to access the device. In the future, devices may be able to be lowered to the ground by a switch (124).