1. PURPOSE OF THE HANDBOOK

The purpose of the *States' Successful Practices Weigh-in-Motion Handbook* is to provide an overview of weigh-in-motion (WIM) technology, systems, sites, and states' "Successful Practices" using WIM systems. WIM is described as "the process of measuring the dynamic tire forces of a moving vehicle and estimating the corresponding tire loads of the static vehicle" in the American Society for Testing and Materials (ASTM) Standard Specification E 1318-94 (*1*). States with successful WIM systems were selected using information from the Long Term Pavement Performance (LTPP) Program. The states selected for each WIM system discussed in this Handbook are: California for bending plate, Missouri for piezoelectric sensors, and Oregon for load cell. The discussion will not be limited to these three states, where applicable successful practices and procedures from other states will be introduced.

The purpose will be accomplished by discussing the principles behind WIM usage and documenting "Tricks of the Trade" for installation and operation of WIM systems. The principles of WIM usage are developed from the successful practices of states using the various WIM technologies. The "Tricks of the Trade" have been developed by state experts and vendors when working with WIM systems and sites. They deal with important aspects of accuracy, quality assurance, sites, installation, and calibration. The Handbook attempts to discuss successful practices that state experts have found over the years to work well.

States have found that the intended use of WIM data determines the approach the state should choose in developing the WIM data collection site and the resources required to maintain the site over the expected "site design life." The following general guiding principle checklist has been developed by state experts that are successfully meeting their end users' data requirements. The guiding principles are addressed in greater detail in the later sections of this handbook. The values in the Handbook are given in metric units when possible. The figures and tables that were obtained from outside sources were not converted to metric units.

Table 1.1
General Guiding Principles Checklist

	Guiding Principles
1.1	Decide on "site design life" and accuracy necessary to support the end user.
1.2	Budget the resources necessary to support the selected "site design life" and accuracy requirements.
1.3	Develop and maintain a thorough quality assurance program.
1.4	Purchase the WIM equipment with a warranty.
1.5	Manage the equipment installation.
1.6	Conduct preventative and corrective maintenance on the site.

1.1 ESTABLISH SYSTEM REQUIREMENTS

States have found that the intended use of the WIM data should determine the approach the state chooses in developing the WIM data collection "site design life." The state should decide on the number of years that the WIM site will collect data. The established "site design life" and intended use of the data should influence decisions concerning the type of equipment, location and condition of the site, installation of equipment, and analyses performed on the collected data.

1.2 BUDGET FOR THE RESOURCES NECESSARY TO SUPPORT SITE DESIGN LIFE AND ACCURACY REQUIREMENTS

The intended use of the WIM data determines the resources required to maintain the site over the expected "site design life." For a longer "site design life" additional financial and staff resources will be needed to maintain and replace the WIM equipment. The required financial and staff resources increase as the required accuracy level increases. Additional analysis and quality assurance is needed for higher levels of accuracy.

1.3 DEVELOP AND MAINTAIN A QUALITY ASSURANCE PROGRAM

An adequate quality assurance procedure should be developed and implemented to ensure that the gathered data are valid. The extent of this procedure should be based on the intended use of the data and the required accuracy level.

1.4 ESTABLISH WEIGH-IN-MOTION EQUIPMENT WARRANTY

The WIM equipment should have a warranty period that is specified by the state that should be reasonable in regards to the equipment and its intended use. For example, a five year warranty on weighpads may be deemed reasonable.

1.5 MANAGE SYSTEM INSTALLATION

The installation process should be monitored to ensure that the installation requirements are met. This process should be overseen by a state official and a vendor representative, ensuring that both the state's and vendor's requirements are met during the installation process.

1.6 CONDUCT PREVENTIVE AND CORRECTIVE MAINTENANCE

A thorough preventive and corrective maintenance program should be established for the site to help to ensure that the expected "site design life" is attained.