Lecture #5:

◎ Review of Previous Lectures:

作業一：國道中山高速公路之卡車因子(TF)為何? (因路段、時間而不同)

參考文獻："高速公路年報"

＊小型車 、大貨車、客聯車之比例與方向分佈因素

＊大貨車標準軸重當量

＊聯結車標準軸重當量

◎ Introduction (Shahin, Chapter 1)

※Pavement Management Process (Fig. 1-3)
(Shahin's Textbook Organization)

- Pavement Network Definition
- Pavement Condition Measurement (i.e., Distress Survey and Rating Procedures, NDT, Roughness, Skid Resistance)
- Pavement Condition Prediction
- Network Level Management
- Project Level Management

※M & R Selection Alternatives
(ad hoc, present condition, life cycle approaches)

※EMS vs. conventional MMS
("MMS might not include engineering tools for condition prediction")
台灣區高速公路路面養護管理系統?
※Automated Mapping / Facility Management (AM/FM) System
※Project vs. Network-Level Management

◎ Pavement Network Definition (Shahin, Chapter 2)
※Referencing Method (Hass, page 71)
Route-Milepost / Node-Link / Branch-Section / GIS (==> Effective Database)
※Branch-Section Method used in PAVER
※Section: defined by
Pavement Structure, Traffic, Construction History, Pavement Rank, Drainage Facilities & Shoulders, Condition, Others (e.g. Zone, Section Category)

◎ Pavement Condition Survey & Rating Procedure (Shahin, Chapter 3)
※See Lecture #3 (Fig 3-17)
※Automated PCI Calculation (PAVER)

◎ Pavement Management Process
(Haas, Chapter 1-3)

- Introduction

※Figure 1.3 Major Components of a PMS

- Application of Systems Concepts to Pavement Management
- Basic Components of a PMS

※Three Basic Organizational or User Levels: Legislative, Administrative, Technical (page 28-30)

※PMS Does Not Make Decisions - The People Who Use It Do!!!

※Network & Project Levels of PMS

◎ Demo of S-PLUS Program

- Data Manipulation
- Graphics
- Statistical & Mathematical Analysis

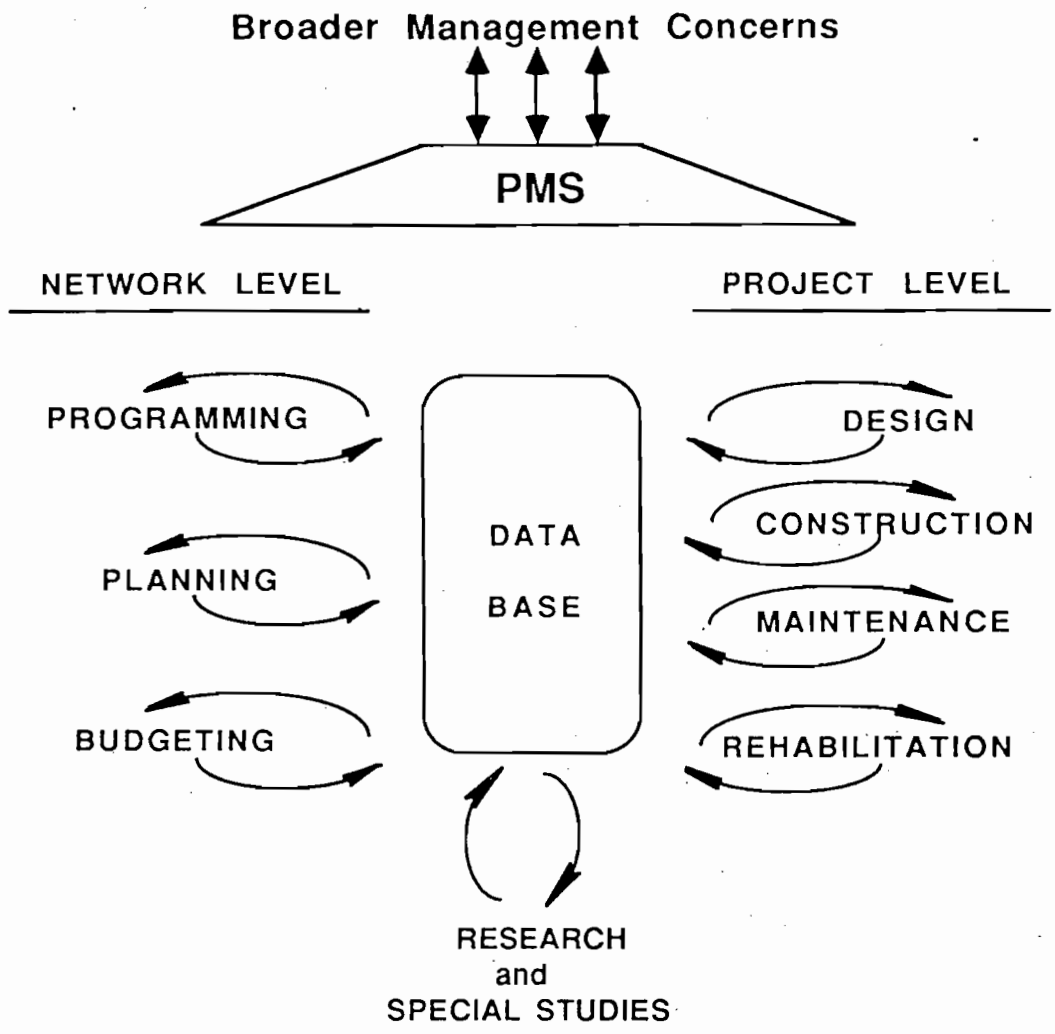

Figure 1.3 Major components of a pavement management system.

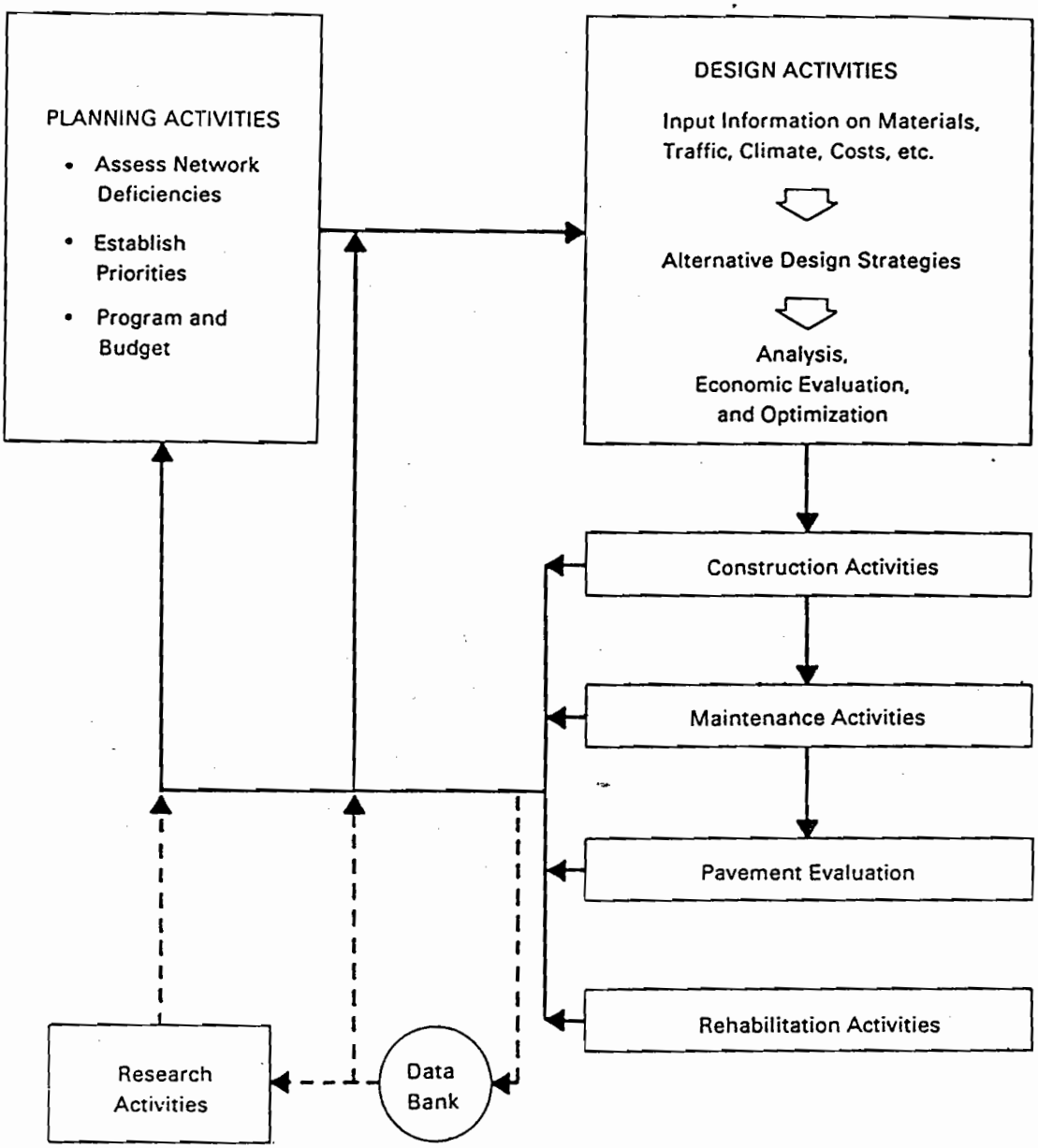

Figure 1-3.1. Major Classes of Activities in a Pavement Management System. (1)

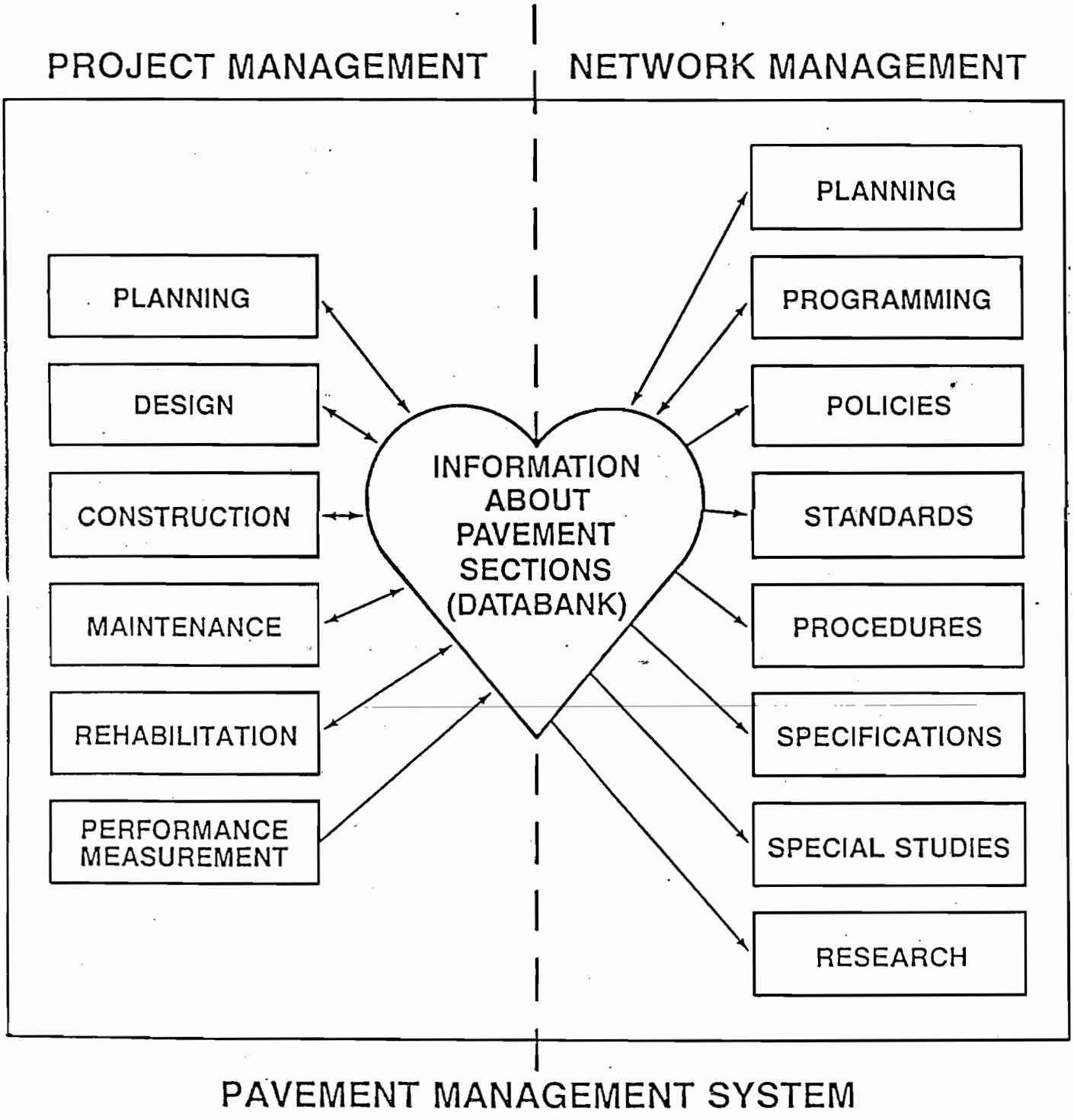

Figure 1-3.5. The Database Becomes the "Heart" of the Overall Pavement Management System (3).

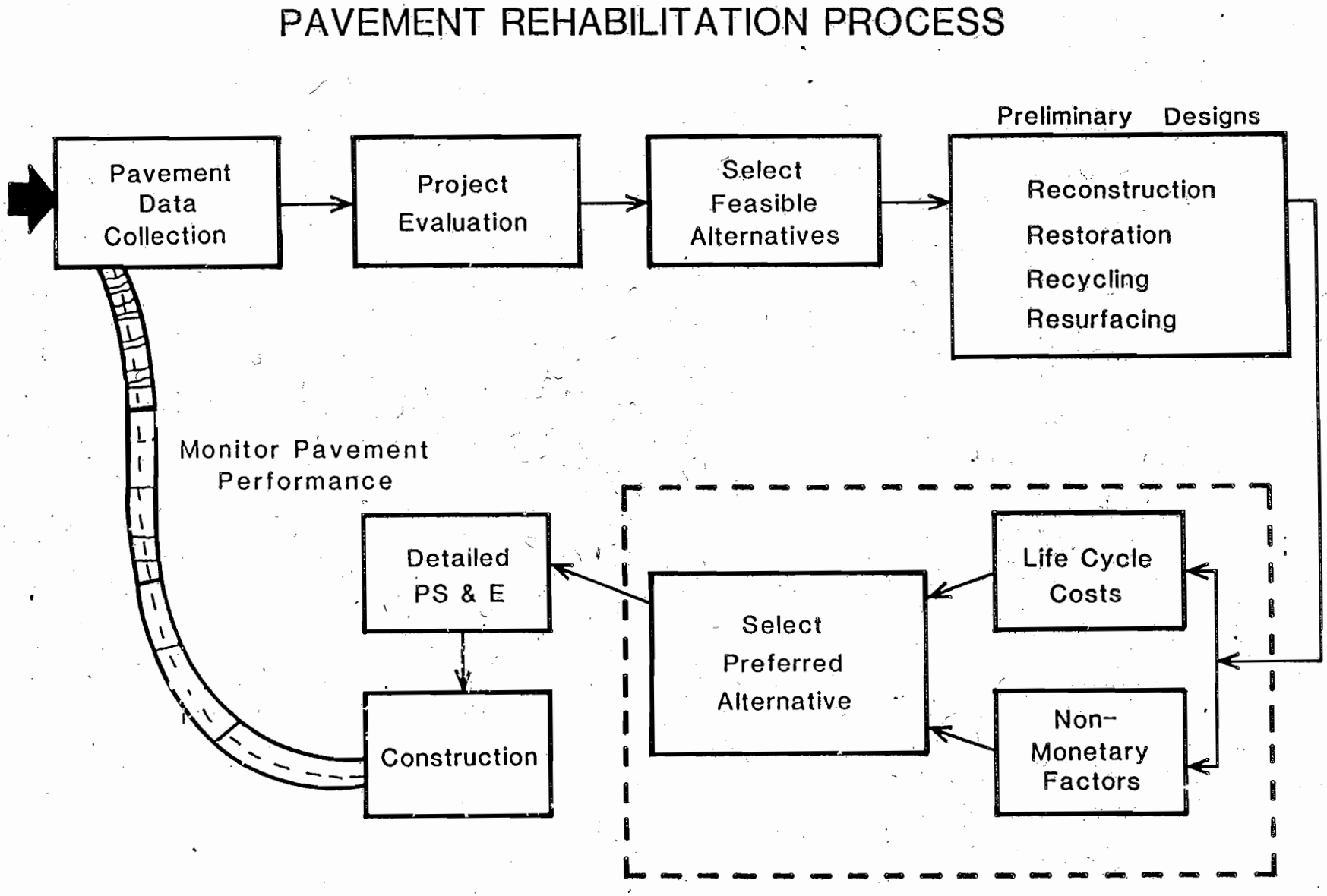

Figure 2. Steps in the Pavement Rehabilitation Process.

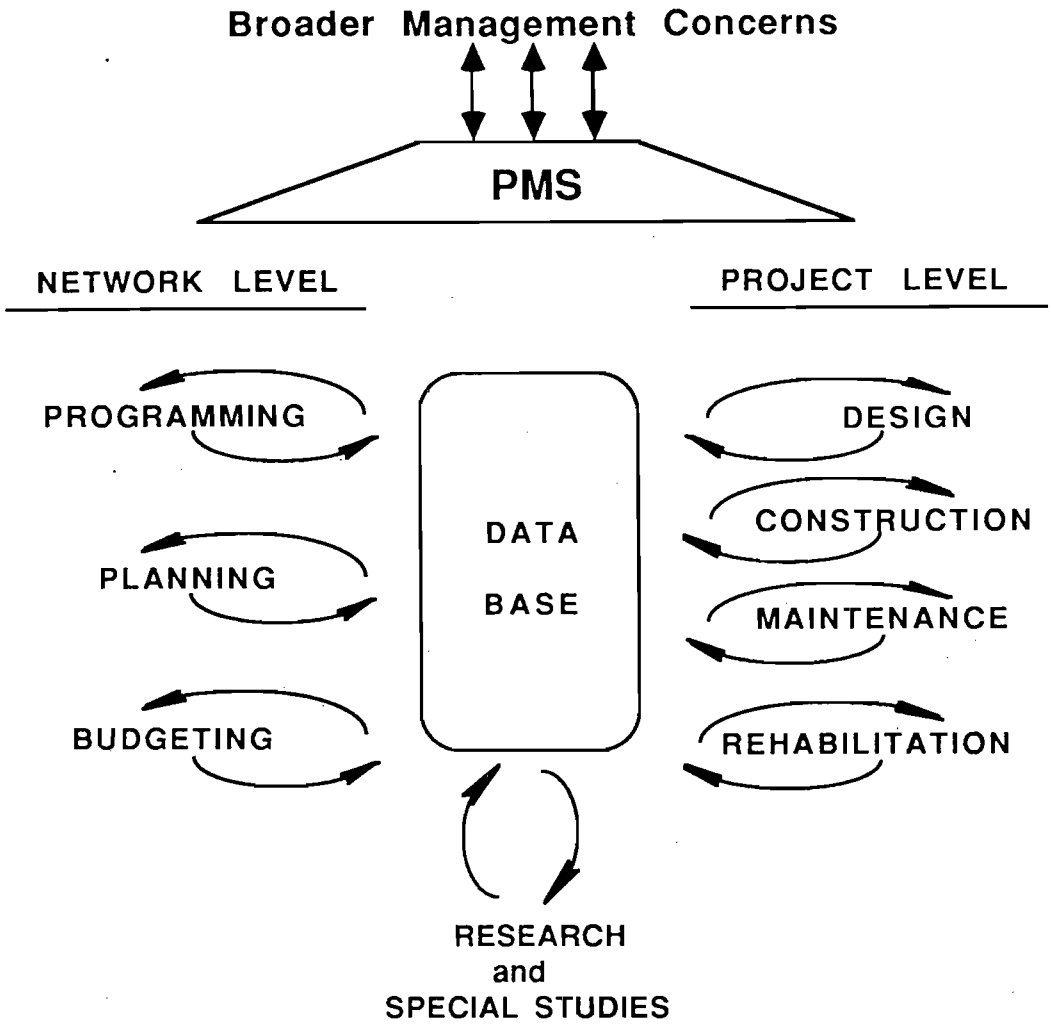

Figure 1.3 Major components of a pavement management system.

- Capability of being easily updated and/or modified as new information and better models become available
- Capability of considering alternative strategies
- Capability of identifying the optimum alternative or strategy
- Capability to base decisions on rational procedures with quantified attributes, criteria, and constraints
- Capability to use feedback information regarding the consequences of decisions

Pavements are complex structures involving many variables, e.g., combinations load, environment, performance, construction, maintenance, materials, and economics. In order to design, build, and maintain better pavements, it is important that the various technical and economic factors be well understood. Pavements are not inexpensive parts of the transportation infrastructure. An investment of approximately $30 billion has been made in pavements for the U.S. Interstate Highway System alone, and billions more will be spent annually on maintenance and upgrading. Thus, even marginal improvements in the component technologies of pavement management, and

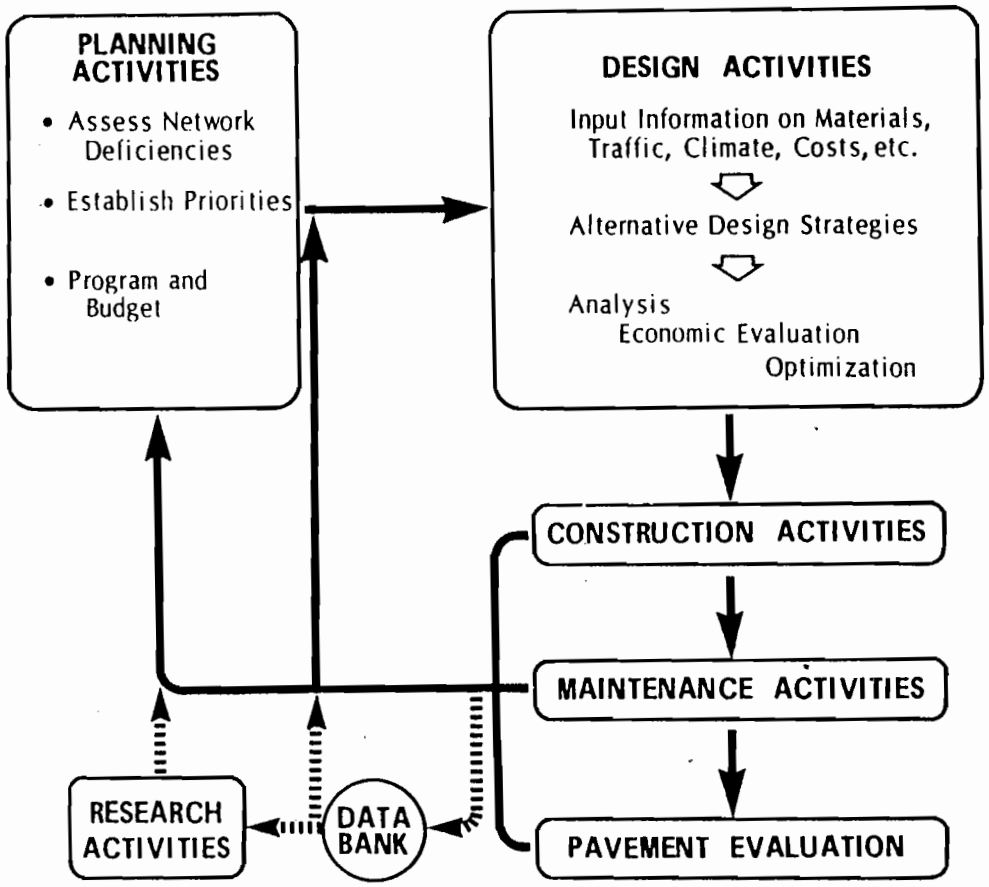

Figure 3.1 Major classes of activities in a pavement management system.

subsystem incorporates a variety of major and minor problems that are amenable to being structured and solved using the general approach of Fig. 2.1. The following paragraphs outline the basic functions of the subsystems.

The planning subsystem involves an assessment of deficiencies or improvement needs on a network basis, the establishment of priorities for eliminating or minimizing these deficiencies, and the development of a scheduled programme and budget for carrying out the needed work.

The design subsystem involves the acquisition or specification of a variety of input information, the generation of alternative design strategies, the analysis of these alternatives, their economic evaluation, and finally optimization to select the best strategy. Although the usual operational extent of the designer can be represented by the box in Fig. 3.1, the overall diagram shows how design activities are directly related to all the other activities of the pavement management system.

Construction translates a design recommendation into a physical reality. Its major component activities include the detailing of specifications and contract documents, scheduling, construction operations, quality control, and the acquisition and processing of data for transmittal to the data bank.

The maintenance phase includes the establishment of a program and schedule of repair work, the actual operations of crack filling, patching, and so forth, and the acquisition and processing of data for transmittal to the data bank.

Pavement evaluation is a phase of the pavement management system that has