H Looking Ahead (LTPP) LTPP 簡介

Introduction of Long-Term Pavement Performance Program



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Introduction

- LTPP program is a 20-year study of inservice pavements across North America
- · Its goal is to extend the life of highway pavements
 - through investigation of the long-term performance of various designs of new and rehabilitated pavement
 - using different materials and under different loads, environments, subgrade soil and maintenance practices
- Strategic Highway Research Program (SHRP)
- Federal Highway Administration (FHWA)





Background

- The first 5 years of studies by SHRP
 - ▶ 1987-1992, 150 Millions
 - ► World's largest pavement performance database (over 6,000 variables in 400 tables)
 - ► asphalt, pavement performance, concrete and structures, and highway operations
- · An FHWA-managed effort
 - ▶ After July 1992, 15 years
 - ► Turner-Fairbank Highway Research Center





Objectives of the LTPP Program

- Evaluate existing design methods
- Develop improved design methodologies and strategies for the rehabilitation of existing pavements
- Develop improved design equations for new and reconstructed pavements
- Determine the effects of loading, environment, material properties and variability, construction quality, and maintenance levels on pavement distress and performance
- Determine the effects of specific design features on pavement performance
- Establish a national long-term pavement database





Type of Data Collected

- Inventory
- · SPS Construction
- · Material Testing
- · Climatic & Seasonal
- Traffic
- Maintenance & Rehabilitation
- Monitoring
 - automated distress, manual distress, friction, longitudinal profile, cross profile, deflection (FWD)





LTPP Experiments (GPS)

- GPS-1 Asphalt Concrete (AC) on Granular Base
- GPS-2 AC on Bound Base
- GPS-3 Jointed Plain Concrete
- GPS-4 Jointed Reinforced Concrete
- GPS-5 Continuously Reinforced Concrete
- GPS-6A Existing AC Overlay on AC Pavements
- GPS-6B Existing AC Overlay on AC Pavements
 GPS-7A Existing AC Overlay on PCC Pavements
- GPS-7A Existing AC Overlay on PCC Pavements
 GPS-7B New AC Overlay on PCC Pavements
- GPS-9 Unbonded PCC Overlays on PCC Pavements



(about 1,100 pavement test sections)



LTPP Experiments (SPS)

- SPS-1 Strategic Study of Structural Factors for AC Pavements
- SPS-2 Strategic Study of Structural Factors for Rigid Pavements
- SPS-3 Preventive Maintenance Effectiveness of AC Pavements
- SPS-4 Preventive Maintenance Effectiveness of Rigid Pavements
- SPS-5 Rebabilitation of Asphalt Concrete Pavements
- SPS-6 Rehabilitation of Jointed PCC Pavements
- SPS-7 Bonded PCC Overlays on Concrete Pavements
- SPS-8 Environmental Effects in the Absence of Heavy Loads
- SPS-9 Validation of SHRP Asphalt Specification and Mix Design (Superpaye)



(Original experimental design: about 1,600 sections at 200 locations, not all available)



Seasonal Monitoring Program (SMP)

- Primary Objective: variations in temperature and moisture content
- sixty-four sites (GPS & SPS)
- · intensively monitored in alternate years
 - ▶ Climatic data throughout that year
 - ▶ Pavement strength conducted monthly
 - ▶ Surface characteristics obtained seasonally
 - ► A minimum of 3 monitoring cycles over six years is expected





Requesting Data

- Data Sampler and Data Request (1994)
- DataPave 97
- Additional Data (Omitted Tables)
 - ► Very large tables (MON_Profile_Data, and MON_Rut_X_Y)
 - ▶ Deflection data (MON_Dynatest_Drop_Data)
 - ► Climatic data (ENV_Monthly_Parameter)
 - ► Axle load distributions (daily traffic summaries, raw classification, weight records, 80MB/yr)





DataPave 97 Program

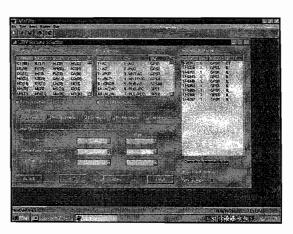
- · Scope of DataPave
 - ▶ Section Selection module: by Criteria or Map
 - ▶ Map module
 - ▶ Section Presentation module
 - ► Chart/Trend module
 - ▶ LTPP Database Exploration & Extraction module
- Data Structure
 - ► IMS Modules

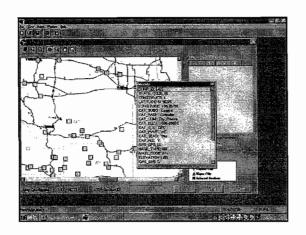


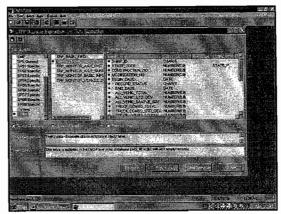
- Data Elements











How to use DataPave 97

- Selecting Pavement Types or Sections
 - ▶ Then cycled the IMS modules
 - Then cycled data elements
 - ▶ May use "Keyword Search"
- Searching Data
 - ► IMS_80.mdb (146MB)
 - ► FWD_80.mdb (434MB)
- · Saving Data to Files

Access, Excel, ASCII



Keyword Search

- Table
 - ▶ Name
 - ▶ Description
- Field

LTPP

- ▶ Name
- ▶ Description







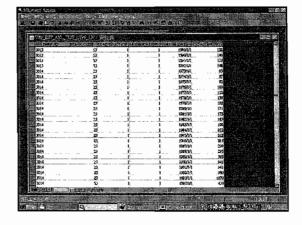
- Selecting All LTPP Sections
- Selecting GPS-3 (JPCP)
- IMS Modules : Traffic

Lipi

- ▶ Tables :TRF_EST_ANL_TOT_LTPP_I
 - Data Elements :
 - » SHRP_ID**
 - » STATE_CODE**
 - » CONSTRUCTIONNS_NO**
 - » MODIFICATION_NO**
 - » BEGIN_DATE **
 - » KESAL_18K_TOTAL





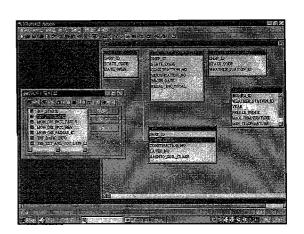


Microsoft Access Program

- 資料表
 - ▶記錄/篩選/進階篩選/排序
 - ▶插入/表單/表單精靈
 - ▶工具/資料表關聯圖
- 杏站
 - ▶設計檢視/簡單查詢/交叉資料表查詢/
 - ▶尋找重複資料查詢/尋找不吻合資料查詢
- 其他自動表單與報表功能







International Participation

- 30 countries participate in the LTPP study
- Many countries have adopted the LTPP IMS for data entry and processing
- Each country has customized their database for the software, data types & testing methods
- How about Taiwan, R.O.C. ?





THANKS FOR YOUR ATTENTION!

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