MODULE 4

INVENTORY AND HISTORY

Instructional Objectives

- Types of inventory and historical data
- Different methods of collecting data
- GPR
- Drainage
- Strip maps
- Quality Control

Inventory Plan

- Inventory process is foundation of a PMS
- Data must be:
  - Relevant
  - Reliable
  - Cost effective to collect
  - Cost effective to maintain

Inventory Plan Factors

- What decisions are to be made?
- What data is necessary to make decisions?
- Size of pavement network
- Type and characteristics of agency

Inventory Plan Factors

- Type and cost of data acquisition and processing
- Required accuracy of data
- Required frequency of data collection
- Database capabilities

Two Important Rules

- Collect only the data you need!
- Collect the data only when you need it!

Typical Data Elements

- Identification
- Location
- Geometry
- Cost
- Pavement Structure & History
- Traffic

Additional Data Elements

- Drainage information
- Geographical/environmental classification
- Proposed work / work-in-progress
- Other information

Data Sources

- Pavement structure/historical data
- Geometric data
- Other inventory data

Field Data Collection

- Photographic/Video logs
  - Fast
  - Less expensive
  - Limited viewing area
  - Requires more post processing
- Field survey teams
  - Slower
  - More expensive
  - Better reporting of field conditions
  - Requires more preparation

Drainage

- Drainage affects pavement performance
- How does drainage impact the maintenance and rehabilitation policy?
- Can drainage data be used in decision making?
- What information should be collected?
  - Drainage type
  - Drainage system condition

Drainage Inventory Data

- Drains & roadside ditches
  - Depth
  - Width
- Drainage structures
  - Culverts
  - Curb & Gutter
  - Drainage inlets

Drainage Condition Data

- ε Difficult to assess all drainage systems
- ε Adequate cross-slope
- ε Capacity of drainage structures
- ε Debris in drains / culverts / inlets

Defining Sections

- ε The length or size of sections will determine volume of data to be collected
- ε Large sections
- ε Small sections
- ε Section requirements

Homogeneous Sections

- ε Change in pavement type
- ε Change in pavement structure
- ε Change in traffic
- ε Boundary between previous construction
- ε Change in subgrade
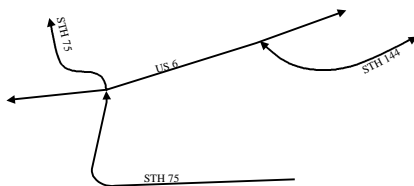- ε Geographical of political boundaries
- ε Change in pavement condition

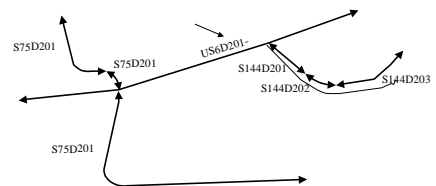## Section Identification

- ε Purpose
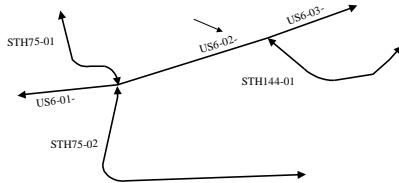- ε Requirements
- ε Methods

Route Designation

Special Codes

Link Node System

STH75-01

US6-02-

US6-03-

US6-01-

STH144-01

STH75-02

Collecting Inventory Data

- **Office data**
- **Field data**
- **Time consuming**
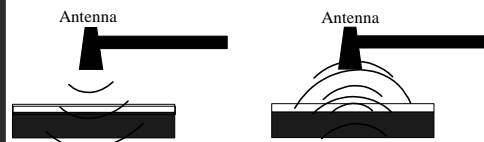- **Expensive**
- **MANDATORY**
- **Gathering process**

Ground Penetrating Radar

- **Used to determine the depth of pavement layers and other items**
  - **Reinforcing steel in PCC pavements**
  - **Voids**
- **Uses the same technology as aircraft and marine radar**
- **Energy is reflected from the interface between two materials**

GPR Basics

Antenna

Antenna

Ground Penetrating Radar

- **NCHRP Synthesis 255 on** *"Ground Penetrating Radar for Evaluating Subsurface Conditions for Transportation Facilities"*

Ground Penetrating Radar

- **NCHRP Synthesis 255**
  - **Asphalt layer thickness determination: GPR results are used to estimate thickness to within 10 percent and thicknesses of up to 0.5 m are accurately measured**

Ground Penetrating Radar

ϵ **NCHRP Synthesis 255 on**

– <u>Base thickness determination</u>: thicknesses are estimated, provided that there is a dielectric contrast between the base and subgrade

– The best results occur when subgrade is made up of clay soils which are highly conductive compared to sands or gravels

Ground Penetrating Radar

ϵ **NCHRP Synthesis 255**

– <u>Concrete thickness determination</u>: depth constraints and accuracy are not yet well defined. This is because portland cement concrete attenuates GPR signals more than asphalt, PCC conductivity changes as the cement hydrates, slabs that contain steel make interpretation more difficult

Ground Penetrating Radar

ϵ **NCHRP Synthesis 255**

– <u>Void detection</u>: GPR has detected air-filled voids as thin as 6 mm, while the detection of water-filled voids is more problematic

Quality Control of Data

ϵ **Integrity**

ϵ **Accuracy**
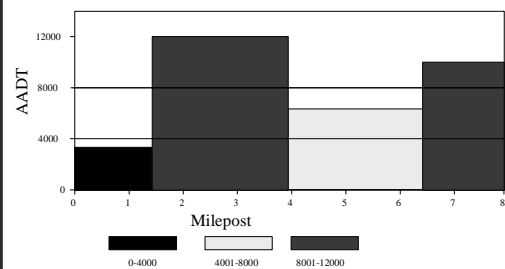
ϵ **Validity**

ϵ **Security**

Strip Maps

ϵ **Profiles of inventory data**

ϵ **Requires a well developed linear referencing system**

ϵ **Must be able to perform dynamic segmentation**

ϵ **Common uses**
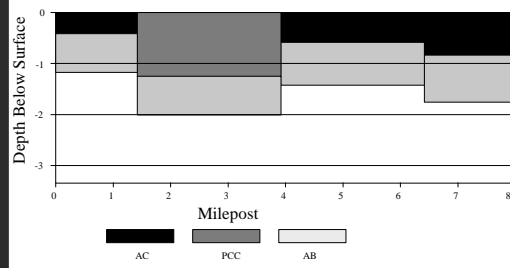
– traffic data
– pavement structure
– section boundaries

Traffic Strip Map

**Pavement Structure
Strip Map**

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