

**APPENDIX A**  
**SURVEY QUESTIONNAIRE**

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1. Please identify which GIS/CAD packages are used by your agency/firm. Recognizing that different packages may be used for different aspects of spatial data administration, please identify the specific versions used for each aspect, including initial development or creation (e.g., creating a new edge-of-pavement map), altering or manipulating existing data (e.g., adding a new feature to an existing map), and viewing or analyzing data (e.g., preparation of a color-coded condition map). If a consultant is retained for any tasks, please provide the name of the consultant and software package if known. If more than one package is used, please fill out all that apply. If hardcopy spatial data are used, please provide some description of the format, such as "D-size 1:2400 aerial photograph." A sample response is provided on the first line.

<b>Name of GIS Package</b>	<b>Creation</b>	<b>Manipulation</b>	<b>Viewing/Analysis</b>
<b>ESRI Arc</b>	<b>ArcInfo 9.1 w/ Spatial Analyst</b>	<b>ArcInfo 9.1 w/ Spatial Analyst</b>	<b>ArcView 9.1</b>
AutoDesk AutoCAD			
ESRI Arc			
Bentley Microstation			
Intergraph			
MapInfo			
Consultant			
Hardcopy			
Custom/Other			

2. Do you have plans to migrate to another GIS software within the next 2 years? (Yes/No)  
If yes, please explain. Do you have candidate software/systems in mind?
  
3. Are you satisfied that your current GIS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.
  
4. Which pavement management system (PMS) software packages are used for the tasks listed below? If a Pavement Management consultant is retained, please indicate which tasks they perform. If multiple packages have been used, please indicate the time frame each was in use. A sample response is provided on the first line.

Package	Creation	Updates/Data Entry	Viewing/Analysis
MicroPAVER	ABC Engineering, Version 5.1	Condition data: MicroPAVER M & R data: import from custom work order management system.	Version 5.1
MicroPAVER			
AirPAV			
Custom Software			
Manual (card file or Excel spreadsheet)			
Other			

5. How are PMS data collected?
  - A. Manually (paper forms)
  - B. Electronically (laptop, tablet PC, PDA)
  - C. Automated/Image based (video, van, or similar)
  
6. Are data collected in-house or by consultant/contractor?
  
7. Are you satisfied that your current PMS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.
  
8. Do you have plans to migrate to another PMS software within the next 2 years? (Yes/No)  
If yes, do you have candidate software/systems in mind?
  
9. Do you use Metric or English units? (Metric/English/Both) If both, please explain.
  
10. Which projection or coordinate system(s) do you use?
  
11. Are PMS condition data linked to spatial data? (Yes/No) If yes, check all data that are linked.
  - ☐ Distress
  - ☐ Slab or smaller
  - ☐ Sample unit
  - ☐ Section
  - ☐ Branch
  - ☐ Other
  
12. What method is used to integrate the PMS data with the spatial data? Check all that apply. If more than one method is used, please provide an explanation.
  - A. GIS
    - ☐ Primary Key/Foreign Key Link (PMS Primary key is GIS Foreign key)
    - ☐ Primary Key/Foreign Key Link (GIS Primary key is PMS Foreign key)
    - ☐ PMS data is stored within the GIS Database
    - ☐ Other (specify)

B. CAD

- \_\_\_\_\_ Primary Key/Foreign Key Link (PMS Primary is GIS Foreign key)
- \_\_\_\_\_ Primary Key/Foreign Key Link (GIS Primary is PMS Foreign key)
- \_\_\_\_\_ Other (specify)
- \_\_\_\_\_ Manual/None

C. Other

- \_\_\_\_\_ Watermarks (e.g., GPS coordinates added to a photograph)
- \_\_\_\_\_ Embedded in the data stream (e.g., GPS coordinates stored in a JPEG photograph header)

13. Do you currently use or plan to use dynamic segmentation/linear referencing within your PMS spatial reference data or to relate tabular PMS data to the spatial reference data? (Yes/No) If yes, which data?
14. Are these data integrated into a larger system, such as a citywide GIS or an airfield database showing utilities, buildings, or other data? (Yes/No) If yes, are there specifications or minimum standards required to integrate the data? How may we obtain a copy?
15. Are there any formal policies regarding spatial data collection or PMS data collection? This includes types of data to collect, how often to collect it, and the reason(s) for collecting the data. (Yes/No) If yes, may we receive a copy of the policy document? How may we obtain a copy?

If a policy document is not available, please respond to the following, including the office title.

Who decides which data to collect?

Who decides when to collect data?

How are these decisions made?

Who has final responsibility for the data, i.e., who pays for it?

Who has technical responsibility, i.e., who identifies the need and lobbies for funding?

What Quality Assurance processes are applied to the data? By whom? Is this a general process adapted for spatial data?

16. If you have a standard specification for data acquisition, how may we obtain a copy? If not, how may we obtain a copy of the specification used in the last round of data collection? If no specification was used, how may we obtain a copy of the scope of work, metadata, or data.

17. Where are the data stored (who maintains physical custody of the data)?

\_\_\_\_\_ IT Department  
\_\_\_\_\_ Engineering Department  
\_\_\_\_\_ Other

18. What database platform(s) is/are utilized to warehouse your PMS and/or PMS Spatial reference data?

_____ MS Access/Jet	_____ Oracle
_____ MS SQL Server	_____ DB2
_____ Informix	_____ Proprietary
_____ Stored in PMS	_____ Stored in GIS
_____ Other (specify)	_____ Don't Know

19. Please complete the attached tables. Several data types are listed in the tables, along with blank lines for you to include any other data you feel is relevant. Explanations of the columns in the tables are provided below.

Tables 1 and 2. Spatial Data.

- Pavement Specific, i.e., are the data useful only for pavement applications, or can they be used for other assets, such as buildings or property lines?

- Format, i.e., what format are the data stored in, e.g., aerial photography may be in tiff or MrSID , while digitized edge-of-pavement may be stored in DWG or personal Geodatabase feature class format.
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- What applications are the data used in? Please provide comments or explanation where you feel it is appropriate. Several applications have been listed, including:
  - Planning: developing M&R plans or capital improvement plans.
  - Condition monitoring: determining and tracking asset serviceability.
  - Reports to executives: preparation of technical reports, financial reports, or other documents for the use of senior management.
  - Mapping: development of maps and other spatial data.
  - Funding requests: preparation of budget documents or project financial documents.
  - Compliance: planning or documentation of compliance with FAA, EPA, or other regulations.
  - Not used: data that have been collected but are not currently used, such as obsolete data, data “piggybacked” onto another data set, or data that have been collected in anticipation of a need.
- How the data were collected: what technique(s) was (were) used to collect the data.
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Why were the data collected? If unsure, please provide the title of the project the data were collected for.
- Who is responsible for the data? Responsibility for the data is often shared; therefore, please indicate the person or office that oversees each of the following aspects of data management. If a consultant is retained, please provide the company name. If more than one consultant has been used in the past, please indicate the most recent.
  - Collection: Who performs the initial data collection or development of a new dataset?
  - Updates: Who performs incremental updates on the data, such as adding a new pavement section to a map?
  - Stewardship: Who is responsible to store the data and control access to it? A good indicator of stewardship is the ownership of the server or file cabinet where datasets reside



- Funding and Policy: Who sets policy regarding the type of data to be collected and the frequency of collection? This is often the person that pays for the data.
- Use: Who analyzes the data to prepare reports and maps to guide policy and decisions?

Table 3. PMS Data.

- Are the data georeferenced or otherwise linked to spatial data?
- If the data are georeferenced, how are they represented on a map? (points, lines, polygons)
- What spatial data source is used to georeference the data? (GPS, overlay on existing maps/photography, survey data, dead reckoning)
- How are the PMS data linked with the spatial data?
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Who is responsible for the data? Please provide a response for each aspect of data management as for spatial data.

Table 1. Spatial data formats and use.

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
<b>SAMPLE Aerial Photography/ Raster imagery</b>	<b>Yes/No</b>	<b>MrSID</b>	<b>Daily</b>	<b>Irregular</b>	<b><u>Yes</u>/No</b>	✓			✓		✓		
<b>SAMPLE Pavement Sections</b>	<b><u>Yes</u>/No</b>	<b>ESRI Shapefile</b>	<b>Yearly</b>	<b>Every three years</b>	<b><u>Yes</u>/No</b>	✓	✓	✓	✓	✓	✓		
Aerial Photography/Raster imagery	Yes/No				Yes/No								
Elevation	Yes/No				Yes/No								
Edge of Pavement	Yes/No				Yes/No								
Pavement Branches/Facilities	Yes/No				Yes/No								
Pavement Sections	Yes/No				Yes/No								
PCC Slabs	Yes/No				Yes/No								
Condition Survey Samples (PCI, etc)	Yes/No				Yes/No								
Distress locations (ASR/spalls/Cracking/Patching)	Yes/No				Yes/No								
Maintenance Locations	Yes/No				Yes/No								
Lighting	Yes/No				Yes/No								
Utilities	Yes/No				Yes/No								
Runway/Taxiway/ Roadway Centerlines	Yes/No				Yes/No								
Taxi Routes	Yes/No				Yes/No								
Parking Spots	Yes/No				Yes/No								

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
Airfield Markings/Paint Location	Yes/No				Yes/No								
Obstructions	Yes/No				Yes/No								
Photographs w/ Location Data	Yes/No				Yes/No								
Building Locations	Yes/No				Yes/No								
Runway safety areas/protection zones/imagery surfaces	Yes/No				Yes/No								

Table 2. Spatial data collection and maintenance.

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
<b>SAMPLE Aerial Photography/ Raster imagery</b>	<b>Aerial photography</b>	<b>Develop ALP</b>	<b>Consultant (ABC Surveying)</b>	<b>None</b>	<b>IT (GIS Manager)</b>	<b>City Council</b>	<b>Engineering (GIS Specialist)</b>
<b>SAMPLE Pavement Sections</b>	<b>Aerial Photography/ Surveying</b>	<b>Develop CIP and M&amp;R plan</b>	<b>Consultant (ABC Engineering)</b>	<b>Engineering Operations and Maintenance</b>	<b>IT (GIS Manager)</b>	<b>O&amp;M budget</b>	<b>Airport Engineer</b>
Aerial Photography/Raster imagery							
Elevation							
Edge of Pavement							
Pavement Branches/Facilities							
Pavement Sections (Airfield/Roads)							
PCC Slabs							
Condition Survey Samples (PCI, etc)							
Distress locations (ASR/Cracking/Patching)							
Maintenance Locations							
Lighting							
Utilities							
Runway/Taxiway/ Roadway Centerlines							
Taxi Routes							
Parking Spots							

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
Airfield Markings/Paint Location							
Obstructions							
Photographs w/ Location Data							
Building Locations							

Table 3. Pavement Management System data.

Data	Georeferenced	Representation	Spatial Data Source	Link Method	How often are the data used?	Would you collect the data again?	How often are the data collected?	RESPONSIBLE PERSONNEL					Comments
								Collection/Creation	Updates/Maintenance	Storage/Stewardship	Funding/Policy	Use	
Area Condition Indices (PCI, FOD)	<u>Yes</u> /No	Polygon	Aerial Photography	Foreign key	Yearly	Yes/No	Every 4 years	Consultant (ABC Engineering)	None	IT (GIS Manager)	City Council	Consultant/Engineering	PCI- consultant collects and analyzes data, provides report and data to XYZ Airport every three years
Photographs	<u>Yes</u> /No	Point	GPS tag	Arc View Hotlink	Monthly	Yes/No	As needed/continuously	Ops/Consultant/Engineering	None	IT (GIS Manager)	None	Engineering/Staff Engineer	Photos taken on as needed basis. Not all are georeferenced.
Area Condition Indices (PCI, FOD)	Yes/No					Yes/No							
Pavement Thickness/Voids (GPR results)	Yes/No					Yes/No							
Test points (DCP/Borings/Corings/FWD/HWD)	Yes/No					Yes/No							
Photographs	Yes/No					Yes/No							
Distresses	Yes/No					Yes/No							
Friction Data	Yes/No					Yes/No							
Structural Data	Yes/No					Yes/No							

**APPENDIX B**  
**QUESTIONNAIRE RESPONSES**

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**HOUSTON AIRPORT SYSTEM**

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10 January 2007

Adil Godiwalla  
Civil Projects  
16930 John F Kennedy Blvd  
Houston, TX 77032  
(281) 233 1934

Dear Mr. Godiwalla:

Applied Research Associates, Inc., under the Airport Cooperative Research Program (ACRP), is conducting Project 09-01, "Guidelines for the Collection and Use of Geospatially Referenced Data for Airfield Pavement Management." The objective of this research is to develop guidelines for the collection and use of geospatially referenced pavement-related data for the management of airfield pavements.

Task 1 of this project includes the preparation of a summary of the current state of practice of the collection and use of pavement management data and pavement-related spatial data. The enclosed questionnaire is intended to identify the policies and practices used by the industry to collect, store, and analyze spatial and non-spatial pavement data.

This questionnaire has been sent to various airport operators, including state agencies, military organizations, and commercial airports. We respectfully request that you complete the questionnaire for your organization.

We sincerely appreciate your efforts in sharing your experience with others who can benefit from it. If you have any questions regarding the questionnaire, please contact me at (601) 629-6165.

Sincerely,

Timothy Parsons  
Principal Investigator

1. Please identify which GIS/CAD packages are used by your agency/firm. Recognizing that different packages may be used for different aspects of spatial data administration, please identify the specific versions used for each aspect, including initial development or creation (e.g., creating a new edge-of-pavement map), altering or manipulating existing data (e.g., adding a new feature to an existing map), and viewing or analyzing data (e.g., preparation of a color-coded condition map). If a consultant is retained for any tasks, please provide the name of the consultant and software package if known. If more than one package is used, please fill out all that apply. If hardcopy spatial data are used, please provide some description of the format, such as "D-size 1:2400 aerial photograph." A sample response is provided on the first line.

<b>Name of GIS Package</b>	<b>Creation</b>	<b>Manipulation</b>	<b>Viewing/Analysis</b>
<b>ESRI Arc</b>	<b>ArcInfo 9.1 w/ Spatial Analyst</b>	<b>ArcInfo 9.1 w/ Spatial Analyst</b>	<b>ArcView 9.1</b>
AutoDesk AutoCAD	Autodesk Map 3D 2007	Autodesk Map 3D 2007	Autodesk Map 3D 2007
ESRI Arc	ESRI ArcInfo 9.2 ESRI ArcGIS server 9.2 ESRI ArcSDE 9.0	ESRI ArcInfo 9.2 ESRI ArcGIS server 9.2 ESRI ArcSDE 9.0	ESRI ArcInfo 9.2 ESRI ArcGIS server 9.2 ESRI ArcSDE 9.0
Bentley Microstation			
Intergraph			
MapInfo			
Consultant	Consultant uses AutoCAD to develop maps for PMS	Consultant uses AutoCAD to develop maps for PMS	Maps are provided as hardcopies but are available in AutoCAD if requested
Hardcopy			
Custom/Other			

2. Do you have plans to migrate to another GIS software within the next 2 years? (Yes/No)  
If yes, please explain. Do you have candidate software/systems in mind?

3. Are you satisfied that your current GIS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.
4. Which pavement management system (PMS) software packages are used for the tasks listed below? If a Pavement Management consultant is retained, please indicate which tasks they perform. If multiple packages have been used, please indicate the time frame each was in use. A sample response is provided on the first line.

Package	Creation	Updates/Data Entry	Viewing/Analysis
MicroPAVER	ABC Engineering, Version 5.1	Condition data: MicroPAVER M & R data: import from custom work order management system.	Version 5.1
MicroPAVER			
AirPAV	Version 3.2	ARA updates PCI data by surveying a part of the airport system annually and updating the AirPAV software.	Version 3.2
Custom Software			
Manual (card file or Excel spreadsheet)			
Other			

5. How are PMS data collected?
- A. Manually (paper forms)
- B. Electronically (laptop, tablet PC, PDA)

C. Automated/Image based (video, van, or similar)

6. Are data collected in-house or by consultant/contractor?

**Data are collected by consultant (ARA)**

7. Are you satisfied that your current PMS software/system meets your agency needs to a high degree? (**Yes**/No) If not, please explain what you would like to improve.

8. Do you have plans to migrate to another PMS software within the next 2 years? (Yes/**No**)  
If yes, do you have candidate software/systems in mind?

9. Do you use Metric or English units? (Metric/**English**/Both) If both, please explain.

10. Which projection or coordinate system(s) do you use?

11. Are PMS condition data linked to spatial data? (**Yes**/No) If yes, check all data that are linked.

\_\_\_\_\_ Distress  
\_\_\_\_\_ Slab or smaller  
\_\_\_\_\_ Sample unit  
\_\_\_\_\_ **X** \_\_\_\_\_ Section  
\_\_\_\_\_ Branch  
\_\_\_\_\_ Other

12. What method is used to integrate the PMS data with the spatial data? Check all that apply. If more than one method is used, please provide an explanation.

A. GIS

\_\_\_\_\_ Primary Key/Foreign Key Link (PMS Primary key is GIS Foreign key)  
\_\_\_\_\_ Primary Key/Foreign Key Link (GIS Primary key is PMS Foreign key)  
\_\_\_\_\_ PMS data is stored within the GIS Database  
\_\_\_\_\_ Other (specify)

B. CAD

\_\_\_\_\_ Primary Key/Foreign Key Link (PMS Primary is GIS Foreign key)  
\_\_\_\_\_ Primary Key/Foreign Key Link (GIS Primary is PMS Foreign key)

\_\_\_\_\_ Other (specify)

\_\_\_X\_\_\_ Manual/None

C. Other

\_\_\_\_\_ Watermarks (e.g., GPS coordinates added to a photograph)

\_\_\_\_\_ Embedded in the data stream (e.g., GPS coordinates stored in a JPEG photograph header)

13. Do you currently use or plan to use dynamic segmentation/linear referencing within your PMS spatial reference data or to relate tabular PMS data to the spatial reference data? (Yes/No) If yes, which data?

**NA**

14. Are these data integrated into a larger system, such as a citywide GIS or an airfield database showing utilities, buildings, or other data? (Yes/No) If yes, are there specifications or minimum standards required to integrate the data? How may we obtain a copy?

15. Are there any formal policies regarding spatial data collection or PMS data collection? This includes types of data to collect, how often to collect it, and the reason(s) for collecting the data. (Yes/No) If yes, may we receive a copy of the policy document? How may we obtain a copy?

**PMS data are collected annually, with a portion of the airfield surveyed every year. A multi-year contract is issued for this service.**

If a policy document is not available, please respond to the following, including the office title.

Who decides which data to collect?

Who decides when to collect data?

**PMS data collection is specified in a multi-year contract.**

How are these decisions made?

Who has final responsibility for the data, i.e., who pays for it?

**The City of Houston**

Who has technical responsibility, i.e., who identifies the need and lobbies for funding?

**Mr. Godiwalla, the Assistant Director of Aviation, has technical responsibility for the PMS data.**

What Quality Assurance processes are applied to the data? By whom? Is this a general process adapted for spatial data?

**Consultant conducts QC checks on a percentage of inspected sample units used in determining the PCI.**

16. If you have a standard specification for data acquisition, how may we obtain a copy? If not, how may we obtain a copy of the specification used in the last round of data collection? If no specification was used, how may we obtain a copy of the scope of work, metadata, or data.

17. Where are the data stored (who maintains physical custody of the data)?

**The IT department maintains the GIS data. The Engineering department (Mr. Godiwalla) maintains the PMS data. ARA also maintains a copy of the PMS data.**

18. What database platform(s) is/are utilized to warehouse your PMS and/or PMS Spatial reference data? Data is stored in the PMS software in ASCII format and is also stored in MS Access.

<input checked="" type="checkbox"/> MS Access/Jet	<input type="checkbox"/> Oracle
<input type="checkbox"/> MS SQL Server	<input type="checkbox"/> DB2
<input type="checkbox"/> Informix	<input type="checkbox"/> Proprietary
<input checked="" type="checkbox"/> Stored in PMS	<input type="checkbox"/> Stored in GIS
<input type="checkbox"/> Other (specify)	<input type="checkbox"/> Don't Know

19. Please complete the attached tables. Several data types are listed in the tables, along with blank lines for you to include any other data you feel is relevant. Explanations of the columns in the tables are provided below.

Tables 1 and 2. Spatial Data.

- Pavement Specific, i.e., are the data useful only for pavement applications, or can they be used for other assets, such as buildings or property lines?
- Format, i.e., what format are the data stored in, e.g., aerial photography may be in tiff or MrSID, while digitized edge-of-pavement may be stored in DWG or personal Geodatabase feature class format.
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- What applications are the data used in? Please provide comments or explanation where you feel it is appropriate. Several applications have been listed, including:



- Planning: developing M&R plans or capital improvement plans.
- Condition monitoring: determining and tracking asset serviceability.
- Reports to executives: preparation of technical reports, financial reports, or other documents for the use of senior management.
- Mapping: development of maps and other spatial data.
- Funding requests: preparation of budget documents or project financial documents.
- Compliance: planning or documentation of compliance with FAA, EPA, or other regulations.
- Not used: data that have been collected but are not currently used, such as obsolete data, data “piggybacked” onto another data set, or data that have been collected in anticipation of a need.
- How the data were collected: what technique(s) was (were) used to collect the data.
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Why were the data collected? If unsure, please provide the title of the project the data were collected for.
- Who is responsible for the data? Responsibility for the data is often shared; therefore, please indicate the person or office that oversees each of the following aspects of data management. If a consultant is retained, please provide the company name. If more than one consultant has been used in the past, please indicate the most recent.
  - Collection: Who performs the initial data collection or development of a new dataset?
  - Updates: Who performs incremental updates on the data, such as adding a new pavement section to a map?
  - Stewardship: Who is responsible to store the data and control access to it? A good indicator of stewardship is the ownership of the server or file cabinet where datasets reside
  - Funding and Policy: Who sets policy regarding the type of data to be collected and the frequency of collection? This is often the person that pays for the data.
  - Use: Who analyzes the data to prepare reports and maps to guide policy and decisions?

Table 3. PMS Data.

- Are the data georeferenced or otherwise linked to spatial data?
- If the data are georeferenced, how are they represented on a map? (points, lines, polygons)

- What spatial data source is used to georeference the data? (GPS, overlay on existing maps/photography, survey data, dead reckoning)
- How are the PMS data linked with the spatial data?
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Who is responsible for the data? Please provide a response for each aspect of data management as for spatial data.

Table 1. Spatial data formats and use.

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
<b>SAMPLE Aerial Photography/ Raster imagery</b>	<b>Yes/No</b>	<b>MrSID</b>	<b>Daily</b>	<b>Irregular</b>	<b><u>Yes/No</u></b>	✓			✓		✓		
<b>SAMPLE Pavement Sections</b>	<b><u>Yes/No</u></b>	<b>ESRI Shapefile</b>	<b>Yearly</b>	<b>Every three years</b>	<b><u>Yes/No</u></b>	✓	✓	✓	✓	✓	✓		
Aerial Photography/Raster imagery	Yes/No				Yes/No	✓	✓	✓	✓	✓			
Elevation	Yes/No				Yes/No								
Edge of Pavement	Yes/No			Annually	<b><u>Yes/No</u></b>	✓	✓	✓		✓			
Pavement Branches/Facilities	Yes/No	Hardcopies AutoCAD	Annually	Annually	<b><u>Yes/No</u></b>	✓	✓	✓		✓			
Pavement Sections	Yes/No	Hardcopies AutoCAD	Annually	Annually	<b><u>Yes/No</u></b>	✓	✓	✓		✓			
PCC Slabs	Yes/No	Hardcopies AutoCAD	Annually	Annually	<b><u>Yes/No</u></b>		✓						Collected only to aid in field surveys.
Condition Survey Samples (PCI, etc)	Yes/No	Hardcopies AutoCAD	Annually	Annually	<b><u>Yes/No</u></b>		✓						
Distress locations (ASR/spalls/Cracking/Patching)	Yes/No	Field survey sheets only	Annually	Annually	<b><u>Yes/No</u></b>		✓						
Maintenance Locations	Yes/No	Hardcopy AutoCAD (CIP Blueprints)		With CIP projects	<b><u>Yes/No</u></b>		✓						
Lighting	Yes/No				Yes/No								
Utilities	Yes/No				Yes/No								
Runway/Taxiway/Roadway Centerlines	Yes/No				Yes/No								
Taxi Routes	Yes/No	AirPAV data	Annually		Yes/No	✓				✓			
Parking Spots	Yes/No				Yes/No								

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
Airfield Markings/Paint Location	Yes/No				Yes/No								
Obstructions	Yes/No				Yes/No								
Photographs w/ Location Data	Yes/No				Yes/No								
Building Locations	Yes/No				Yes/No								
Runway safety areas/protection zones/imagery surfaces	Yes/No				Yes/No								

Table 2. Spatial data collection and maintenance.

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
<b>SAMPLE Aerial Photography/ Raster imagery</b>	<b>Aerial photography</b>	<b>Develop ALP</b>	<b>Consultant (ABC Surveying)</b>	<b>None</b>	<b>IT (GIS Manager)</b>	<b>City Council</b>	<b>Engineering (GIS Specialist)</b>
<b>SAMPLE Pavement Sections</b>	<b>Aerial Photography/ Surveying</b>	<b>Develop CIP and M&amp;R plan</b>	<b>Consultant (ABC Engineering)</b>	<b>Engineering Operations and Maintenance</b>	<b>IT (GIS Manager)</b>	<b>O&amp;M budget</b>	<b>Airport Engineer</b>
Aerial Photography/Raster imagery							
Elevation							
Edge of Pavement	Existing/previous EOP drawings	PMS	ARA	ARA	ARA/Engineering	City of Houston/Engineering	ARA/Engineering (ARA aids in development of the HAS capital improvement plan)
Pavement Branches/Facilities		PMS	ARA	ARA	ARA/Engineering	City of Houston/Engineering	ARA/Engineering (ARA aids in development of the HAS capital improvement plan)
Pavement Sections (Airfield/Roads)		PMS	ARA	ARA	ARA/Engineering	City of Houston/Engineering	ARA/Engineering (ARA aids in development of the HAS capital improvement plan)
PCC Slabs		PMS	ARA	ARA	ARA	City of Houston/Engineering	ARA uses slab maps during PCI surveys
Condition Survey Samples (PCI, etc)		PMS	ARA	ARA	ARA	City of Houston/Engineering	ARA uses sample unit maps during PCI surveys
Distress locations (ASR/Cracking/Patching)		PMS	ARA	ARA	ARA/Engineering	City of Houston/Engineering	ARA uses to calculated pavement condition index
Maintenance Locations	Varies by maintenance project/CIP	PMS Engineering records	AE firm for each capital project; Engineering for smaller projects/maintenance	None	Engineering	City of Houston/Engineering	Reference, development of construction history to be considered during CIP planning
Lighting							
Utilities							
Runway/Taxiway/ Roadway Centerlines							
Taxi Routes	Manual route analysis	PMS	ARA	ARA	ARA/Engineering	City of Houston/Engineering	ARA/Engineering (ARA aids in development of the HAS capital improvement plan)
Parking Spots							

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
Airfield Markings/Paint Location							
Obstructions							
Photographs w/ Location Data							
Building Locations							

Table 3. Pavement Management System data.

Data	Georeferenced	Representation	Spatial Data Source	Link Method	How often are the data used?	Would you collect the data again?	How often are the data collected?	RESPONSIBLE PERSONNEL					Comments
								Collection/Creation	Updates/Maintenance	Storage/Stewardship	Funding/Policy	Use	
Area Condition Indices (PCI, FOD)	<u>Yes</u> /No	Polygon	Aerial Photography	Foreign key	Yearly	Yes/No	Every 4 years	Consultant (ABC Engineering)	None	IT (GIS Manager)	City Council	Consultant/Engineering	PCI- consultant collects and analyzes data, provides report and data to XYZ Airport every three years
Photographs	<u>Yes</u> /No	Point	GPS tag	Arc View Hotlink	Monthly	Yes/No	As needed/continuously	Ops/ Consultant/Engineering	None	IT (GIS Manager)	None	Engineering/ Staff Engineer	Photos taken on as needed basis. Not all are georeferenced.
Area Condition Indices (PCI, FOD)	<u>Yes</u> /No	Polygon	Existing PMS section maps	Manual	Often	Yes/No	Partial survey every year	ARA	ARA	Engineering	City of Houston	Consultant/Assistant Director of Aviation	Part of CIP planning/PMS process/stored in AirPAV
Pavement Thickness/Voids (GPR results)	Yes/ <u>No</u>	None			During CIP planning	Yes/No	When projects are completed	ARA/Engineering	ARA/Engineering	ARA/Engineering	City of Houston	Consultant/Assistant Director of Aviation	Part of CIP planning/PMS process/stored in AirPAV
Test points (DCP/Borings/Corings/ FWD/HWD)	<u>Yes</u> /No	Linear (Test lines)	DMI on HWD, measured locations	None	During CIP planning	Yes/No	Partial every year	ARA	ARA	ARA (Unprocessed) Engineering (processed)	City of Houston	Consultant/Assistant Director of Aviation	Part of CIP planning/PMS process/stored in AirPAV
Photographs	Yes/ <u>No</u>					Yes/No							
Distresses	Yes/ <u>No</u>					Yes/No							
Friction Data	Yes/ <u>No</u>					Yes/No							Part of CIP planning/PMS process
Structural Data	<u>Yes</u> /No	Polygon	Existing PMS section maps	Manual	During CIP planning	Yes/No	When projects are completed	ARA	ARA	ARA/Engineering	City of Houston	Consultant/Assistant Director of Aviation	Part of CIP planning/PMS process/stored in AirPAV





# **NORTH DAKOTA AERONAUTICS COMMISSION**

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10 January 2007

Mark J. Holzer  
Aviation Planner  
North Dakota Aeronautics Commission  
PO Box 5020  
Bismarck, ND 58502-5020

RECEIVED  
JAN 15 2007  
ND Aeronautics Commission

Dear Mr. Holzer:

Applied Research Associates, Inc., under the Airport Cooperative Research Program (ACRP), is conducting Project 09-01, "Guidelines for the Collection and Use of Geospatially Referenced Data for Airfield Pavement Management." The objective of this research is to develop guidelines for the collection and use of geospatially referenced pavement-related data for the management of airfield pavements.

Task 1 of this project includes the preparation of a summary of the current state of practice of the collection and use of pavement management data and pavement-related spatial data. The enclosed questionnaire is intended to identify the policies and practices used by the industry to collect, store, and analyze spatial and non-spatial pavement data.

This questionnaire has been sent to various airport operators, including state agencies, military organizations, and commercial airports. We respectfully request that you complete the questionnaire for your organization.

We sincerely appreciate your efforts in sharing your experience with others who can benefit from it. If you have any questions regarding the questionnaire, please contact me at (601) 629-6165.

Sincerely,

A handwritten signature in cursive script that reads "Timothy A. Parsons".

Timothy Parsons

Principal Investigator

**TRANSPORTATION SECTOR**

112 MONUMENT PLACE ■ VICKSBURG, MS 39180-5160

(601) 629-6165 ■ FAX: (601) 629-6169 ■ [WWW.ARA.COM/TRANSPORTATION](http://WWW.ARA.COM/TRANSPORTATION)

1. Please identify which GIS/CAD packages are used by your agency/firm. Recognizing that different packages may be used for different aspects of spatial data administration, please identify the specific versions used for each aspect, including initial development or creation (e.g., creating a new edge-of-pavement map), altering or manipulating existing data (e.g., adding a new feature to an existing map), and viewing or analyzing data (e.g., preparation of a color-coded condition map). If a consultant is retained for any tasks, please provide the name of the consultant and software package if known. If more than one package is used, please fill out all that apply. If hardcopy spatial data are used, please provide some description of the format, such as "D-size 1:2400 aerial photograph." A sample response is provided on the first line.

Name of GIS Package	Creation	Manipulation	Viewing/Analysis
ESRI Arc	ArcInfo 9.1 w/ Spatial Analyst	ArcInfo 9.1 w/ Spatial Analyst	ArcView 9.1
AutoDesk AutoCAD			
ESRI Arc 3.2 <i>version</i> ✓	<i>arcview</i> 3.1	?	?
Bentley Microstation			
Intergraph			
MapInfo			
Consultant			
Hardcopy			
Custom/Other			

2. Do you have plans to migrate to another GIS software within the next 2 years? (Yes/No)  
If yes, please explain. Do you have candidate software/systems in mind?

*upgrade Arc View*

3. Are you satisfied that your current GIS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.

*Yes*

4. Which pavement management system (PMS) software packages are used for the tasks listed below? If a Pavement Management consultant is retained, please indicate which tasks they perform. If multiple packages have been used, please indicate the time frame each was in use. A sample response is provided on the first line.

Package	Creation	Updates/Data Entry	Viewing/Analysis
MicroPAVER	ABC Engineering, Version 5.1	Condition data: MicroPAVER M & R data: import from custom work order management system.	Version 5.1
MicroPAVER			
AirPAV	<i>Eck/Green</i>		<i>Microsoft Access</i>
Custom Software			
Manual (card file or Excel spreadsheet)			
Other			

5. How are PMS data collected?

A. Manually (paper forms)

B. Electronically (laptop, tablet PC, PDA)

☒ C. Automated/Image based (video, van, or similar)

6. Are data collected in-house or by consultant/contractor?

*Consultant*

7. Are you satisfied that your current PMS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.

8. Do you have plans to migrate to another PMS software within the next 2 years? (Yes/No) If yes, do you have candidate software/systems in mind?

9. Do you use Metric or English units? (Metric/English/Both) If both, please explain.

10. Which projection or coordinate system(s) do you use?

*State plane*

11. Are PMS condition data linked to spatial data? (Yes/No) If yes, check all data that are linked.

- ☐ Distress
- ☐ Slab or smaller
- ☒ Sample unit
- ☐ Section
- ☐ Branch
- ☐ Other

12. What method is used to integrate the PMS data with the spatial data? Check all that apply. If more than one method is used, please provide an explanation.

*??*

A. GIS

- ☐ Primary Key/Foreign Key Link (PMS Primary key is GIS Foreign key)
- ☐ Primary Key/Foreign Key Link (GIS Primary key is PMS Foreign key)
- ☐ PMS data is stored within the GIS Database
- ☐ Other (specify)

B. CAD

- \_\_\_\_\_ Primary Key/Foreign Key Link (PMS Primary is GIS Foreign key)
- \_\_\_\_\_ Primary Key/Foreign Key Link (GIS Primary is PMS Foreign key)
- \_\_\_\_\_ Other (specify)
- \_\_\_\_\_ Manual/None

C. Other

- \_\_\_\_\_ Watermarks (e.g., GPS coordinates added to a photograph)
- \_\_\_\_\_ Embedded in the data stream (e.g., GPS coordinates stored in a JPEG photograph header)

13. Do you currently use or plan to use dynamic segmentation/linear referencing within your PMS spatial reference data or to relate tabular PMS data to the spatial reference data? (Yes/No) If yes, which data? ?
14. Are these data integrated into a larger system, such as a citywide GIS or an airfield database showing utilities, buildings, or other data? (Yes/No) If yes, are there specifications or minimum standards required to integrate the data? How may we obtain a copy?
15. Are there any formal policies regarding spatial data collection or PMS data collection? This includes types of data to collect, how often to collect it, and the reason(s) for collecting the data. (Yes/No) If yes, may we receive a copy of the policy document? How may we obtain a copy?

If a policy document is not available, please respond to the following, including the office title.

Who decides which data to collect?

FAA AC

Who decides when to collect data?

FAA

How are these decisions made?

State & FAA meeting

Who has final responsibility for the data, i.e., who pays for it? *State Aero Comm.*

Who has technical responsibility, i.e., who identifies the need and lobbies for funding?

*State Aero Comm.*

What Quality Assurance processes are applied to the data? By whom? Is this a general process adapted for spatial data?

*plan reviews - comparisons.*

16. If you have a standard specification for data acquisition, how may we obtain a copy? If not, how may we obtain a copy of the specification used in the last round of data collection? If no specification was used, how may we obtain a copy of the scope of work, metadata, or data.

*Ask Joe Bischoff of ARA staff for copy.*

17. Where are the data stored (who maintains physical custody of the data)?

☐ IT Department

☐ Engineering Department

☒ Other *Aero Comm Computer*

18. What database platform(s) is/are utilized to warehouse your PMS and/or PMS Spatial reference data?

☒ MS Access/Jet

☐ Oracle

☐ MS SQL Server

☐ DB2

☐ Informix

☐ Proprietary

☐ Stored in PMS

☒ Stored in GIS

☐ Other (specify)

☐ Don't Know

19. Please complete the attached tables. Several data types are listed in the tables, along with blank lines for you to include any other data you feel is relevant. Explanations of the columns in the tables are provided below.

Tables 1 and 2. Spatial Data.

- Pavement Specific, i.e., are the data useful only for pavement applications, or can they be used for other assets, such as buildings or property lines?



- Format, i.e., what format are the data stored in, e.g., aerial photography may be in tiff or MrSID, while digitized edge-of-pavement may be stored in DWG or personal Geodatabase feature class format.
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data). *Daily*
- Are the data of sufficient value that you would collect them again? *yes*
- What applications are the data used in? Please provide comments or explanation where you feel it is appropriate. Several applications have been listed, including:
  - ☒ Planning: developing M&R plans or capital improvement plans.
  - ☒ Condition monitoring: determining and tracking asset serviceability.
  - ☒ Reports to executives: preparation of technical reports, financial reports, or other documents for the use of senior management.
  - ☒ Mapping: development of maps and other spatial data.
  - ☒ Funding requests: preparation of budget documents or project financial documents.
  - ☒ Compliance: planning or documentation of compliance with FAA, EPA, or other regulations.
    - Not used: data that have been collected but are not currently used, such as obsolete data, data "piggybacked" onto another data set, or data that have been collected in anticipation of a need.
- How the data were collected: what technique(s) was (were) used to collect the data. *field survey & air video imagery*
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected? *3 years intervals*
- Why were the data collected? If unsure, please provide the title of the project the data were collected for. *for FAA grant assurances*
- Who is responsible for the data? Responsibility for the data is often shared; *State* therefore, please indicate the person or office that oversees each of the following aspects of data management. If a consultant is retained, please provide the company name. If more than one consultant has been used in the past, please indicate the most recent.
  - Collection: Who performs the initial data collection or development of a new dataset? *KLJ/APA*
  - Updates: Who performs incremental updates on the data, such as adding a new pavement section to a map? *KLJ/APA*
  - Stewardship: Who is responsible to store the data and control access to it? A good indicator of stewardship is the ownership of the server or file cabinet where datasets reside *State*

- Funding and Policy: Who sets policy regarding the type of data to be collected and the frequency of collection? This is often the person that pays for the data. *State*

- Use: Who analyzes the data to prepare reports and maps to guide policy and decisions? *State, airports, engineers.*

Table 3. PMS Data.

- Are the data georeferenced or otherwise linked to spatial data? *Yes*
- If the data are georeferenced, how are they represented on a map? (points, lines, polygons) *?*
- What spatial data source is used to georeference the data? (GPS, overlay on existing maps/photography, survey data, dead reckoning) *(GPS, overlay on existing maps/photography, survey data, dead reckoning)*
- How are the PMS data linked with the spatial data? *?*
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data). *Daily*
- Are the data of sufficient value that you would collect them again? *Yes*
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected? *3 years*
- Who is responsible for the data? Please provide a response for each aspect of data management as for spatial data. *State*

Table 1. Spatial data formats and use.

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
SAMPLE Aerial Photography/Raster imagery	Yes/No	MrSID	Daily	Irregular	Yes/No	✓			✓		✓		
SAMPLE Pavement Sections	Yes/No	ESRI Shapefile	Yearly	Every three years	Yes/No	✓	✓	✓	✓	✓	✓		
Aerial Photography/Raster imagery	Yes/No	TIF	Daily	Annually	Yes/No	✓	✓	✓	✓	✓	✓		
Elevation	Yes/No				Yes/No								
Edge of Pavement	Yes/No				Yes/No								
Pavement Branches/Facilities	Yes/No				Yes/No								
Pavement Sections	Yes/No				Yes/No								
PCC Slabs	Yes/No				Yes/No								
Condition Survey Samples (PCI, etc)	Yes/No	GIS	Daily	3 years	Yes/No	✓	✓	✓	✓	✓	✓		
Distress locations (ASR/spalls/Cracking/Patching)	Yes/No				Yes/No								
Maintenance Locations	Yes/No				Yes/No								
Lighting	Yes/No				Yes/No								
Utilities	Yes/No				Yes/No								
Runway/Taxiway/Roadway Centerlines	Yes/No				Yes/No								
Taxi Routes	Yes/No				Yes/No								
Parking Spots	Yes/No				Yes/No								

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
Airfield Markings/Paint Location	Yes/No				Yes/No								
Obstructions	Yes/No				Yes/No								
Photographs w/ Location Data	Yes/No				Yes/No								
Building Locations	Yes/No				Yes/No								
Runway safety areas/protection zones/imagery surfaces	Yes/No				Yes/No								

Table 2. Spatial data collection and maintenance.

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
SAMPLE Aerial Photography/ Raster imagery	Aerial photography	Develop ALP	Consultant (ABC Surveying)	None	IT (GIS Manager)	City Council	Engineering (GIS Specialist)
SAMPLE Pavement Sections	Aerial Photography/ Surveying	Develop CIP and M&R plan	Consultant (ABC Engineering)	Engineering Operations and Maintenance	IT (GIS Manager)	O&M budget	Airport Engineer
Aerial Photography/Raster imagery	Aerial	CIP, APT Directory PCI - Induse	WDDOT	WDDOT	IT Server	FAA - APTB. State Aero	APTB & FAA Engineers.
Elevation							
Edge of Pavement							
Pavement Branches/Facilities							
Pavement Sections (Airfield/Roads)							
PCC Slabs							
Condition Survey Samples (PCI, etc)	surveys in field	PCI, maps	KLJ/ARA	KLJ/ARA	State Aero	State Aero - FAA	FAA - state Aero - Airports - engineers
Distress locations (ASR/Cracking/Patching)							
Maintenance Locations							
Lighting							
Utilities							
Runway/Taxiway/ Roadway Centerlines							
Taxi Routes							
Parking Spots							

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
Airfield Markings/Paint Location							
Obstructions							
Photographs w/ Location Data							
Building Locations							

Table 3. Pavement Management System data.

Data	Georeferenced	Representation	Spatial Data Source	Link Method	How often are the data used?	Would you collect the data again?	How often are the data collected?	RESPONSIBLE PERSONNEL					Comments
								Collection/Creation	Updates/Maintenance	Storage/Stewardship	Funding/Policy	Use	
Area Condition Indices (PCI, FOD)	Yes/No	Polygon	Aerial Photography	Foreign key	Yearly	Yes/No	Every 4 years	Consultant (ABC Engineering)	None	IT (GIS Manager)	City Council	Consultant/Engineering	PCI- consultant collects and analyzes data, provides report and data to XYZ Airport every three years
Photographs	Yes/No	Point	GPS tag	Arc View Hotlink	Monthly	Yes/No	As needed/continuously	Ops/Consultant/Engineering	None	IT (GIS Manager)	None	Engineering/Staff Engineer	Photos taken on as needed basis. Not all are georeferenced.
Area Condition Indices (PCI, FOD)	Yes/No	Polygons	Aerials/ Aerial CD	Arc View 3.2	July	Yes/No	3 years	KLJ	KLJ	IT	State PAA	engineer - State Ants - FAA	
Pavement Thickness/Voids (GPR results)	Yes/No					Yes/No							
Test points (DCP/Borings/Corings/ FWD/HWD)	Yes/No					Yes/No							
Photographs	Yes/No					Yes/No							
Distresses	Yes/No					Yes/No							
Friction Data	Yes/No					Yes/No							
Structural Data	Yes/No					Yes/No							





# **OKLAHOMA AERONAUTICS COMMISSION**

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## OKLAHOMA AERONAUTICS COMMISSION

March 06, 2007

Mr. Timothy Parsons,  
Principal Investigator  
Applied Research Associates, Inc.  
112 Monument Place  
Vicksburge, MS 39180-5160

Mr. Parsons:

The enclosed documents have been completed as requested in your January 10, 2007, letter. Thank you for incorporating our agency in your efforts.

If you have inquiries regarding the enclosed documents feel free to contact me at (405) 604-6900.

Sincerely,

---

Vivek Khanna,  
Airport Engineer

ajl



10 January 2007

Vivek Khanna  
Airport Engineer  
Oklahoma Aeronautics Commission  
3700 Classen Blvd  
Oklahoma City, OK 73118

Dear Mr. Khanna:

Applied Research Associates, Inc., under the Airport Cooperative Research Program (ACRP), is conducting Project 09-01, "Guidelines for the Collection and Use of Geospatially Referenced Data for Airfield Pavement Management." The objective of this research is to develop guidelines for the collection and use of geospatially referenced pavement-related data for the management of airfield pavements.

Task 1 of this project includes the preparation of a summary of the current state of practice of the collection and use of pavement management data and pavement-related spatial data. The enclosed questionnaire is intended to identify the policies and practices used by the industry to collect, store, and analyze spatial and non-spatial pavement data.

This questionnaire has been sent to various airport operators, including state agencies, military organizations, and commercial airports. We respectfully request that you complete the questionnaire for your organization.

We sincerely appreciate your efforts in sharing your experience with others who can benefit from it. If you have any questions regarding the questionnaire, please contact me at (601) 629-6165.

Sincerely,

A handwritten signature in cursive script that reads "Timothy A. Parsons".

Timothy Parsons

Principal Investigator

RECEIVED

JAN 17 2007



**TRANSPORTATION SECTOR**

112 MONUMENT PLACE ■ VICKSBURG, MS 39180-5160

(601) 629-6165 ■ FAX: (601) 629-6169 ■ [WWW.ARA.COM/TRANSPORTATION](http://WWW.ARA.COM/TRANSPORTATION)

1. Please identify which GIS/CAD packages are used by your agency/firm. Recognizing that different packages may be used for different aspects of spatial data administration, please identify the specific versions used for each aspect, including initial development or creation (e.g., creating a new edge-of-pavement map), altering or manipulating existing data (e.g., adding a new feature to an existing map), and viewing or analyzing data (e.g., preparation of a color-coded condition map). If a consultant is retained for any tasks, please provide the name of the consultant and software package if known. If more than one package is used, please fill out all that apply. If hardcopy spatial data are used, please provide some description of the format, such as "D-size 1:2400 aerial photograph." A sample response is provided on the first line.

Name of GIS Package	Creation	Manipulation	Viewing/Analysis
ESRI Arc	ArcInfo 9.1 w/ Spatial Analyst	ArcInfo 9.1 w/ Spatial Analyst	ArcView 9.1
AutoDesk AutoCAD			
ESRI Arc			
Bentley Microstation			
Intergraph			
MapInfo			
Consultant			
Hardcopy			
Custom/Other	Web-based tool develops/creates Maps based on co-ordinates of origin of each section	Custom scripts written using PHP Language are used to alter existing data.	Analysis is performed using custom PHP language scripts.

2. Do you have plans to migrate to another GIS software within the next 2 years? (Yes/No)  
If yes, please explain. Do you have candidate software/systems in mind?

*NO.*

3. Are you satisfied that your current GIS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.

*YES. OUR SOFTWARE HAS BEEN RECEIVED QUITE WELL BY THE STAKEHOLDERS.*

4. Which pavement management system (PMS) software packages are used for the tasks listed below? If a Pavement Management consultant is retained, please indicate which tasks they perform. If multiple packages have been used, please indicate the time frame each was in use. A sample response is provided on the first line.

Package	Creation	Updates/Data Entry	Viewing/Analysis
MicroPAVER	ABC Engineering, Version 5.1	Condition data: MicroPAVER M & R data: import from custom work order management system.	Version 5.1
MicroPAVER			
AirPAV			
Custom Software	<i>UNIVERSITY OF OKLAHOMA</i>	<i>ACCOMPLISHED USING CUSTOM WEB SCRIPTS</i>	<i>PERFORMED USING THE ANALYSIS ENGINE (APACHE WEB SERVER, PHP PROGRAMMING LANGUAGE AND MYSQL DATABASE).</i>
Manual (card file or Excel spreadsheet)			
Other			

5. How are PMS data collected?

- A. Manually (paper forms)
- B. Electronically (laptop, tablet PC, PDA) *TABLET PC*
- C. Automated/Image based (video, van, or similar)

6. Are data collected in-house or by consultant/contractor?

*IN-HOUSE.*

7. Are you satisfied that your current PMS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.

*YES.*

8. Do you have plans to migrate to another PMS software within the next 2 years? (Yes/No) If yes, do you have candidate software/systems in mind?

*NO.*

9. Do you use Metric or English units? (Metric/English/Both) If both, please explain.

*ENGLISH.*

10. Which projection or coordinate system(s) do you use?

*A LOCAL SYSTEM FOR EACH AIRPORT WITH ORIGIN AT LOW-NUMBER  
END OF PRIMARY NORTH-SOUTH OR PRIMARY RUNWAY.*

11. Are PMS condition data linked to spatial data? (Yes/No) If yes, check all data that are linked.

- ☒ Distress
- ☐ Slab or smaller
- ☒ Sample unit
- ☒ Section
- ☒ Branch
- ☐ Other *AIRP.*

12. What method is used to integrate the PMS data with the spatial data? Check all that apply. If more than one method is used, please provide an explanation.

A. GIS

- ☐ Primary Key/Foreign Key Link (PMS Primary key is GIS Foreign key)
- ☐ Primary Key/Foreign Key Link (GIS Primary key is PMS Foreign key)
- ☐ PMS data is stored within the GIS Database
- ☒ Other (specify) *ALL LOCATION DATA STORED IN  
DATABASE. USED TO DRAW MAPS AND SHOW  
INFORMATION.*

B. CAD

- ☐ Primary Key/Foreign Key Link (PMS Primary is GIS Foreign key)
- ☐ Primary Key/Foreign Key Link (GIS Primary is PMS Foreign key)
- ☐ Other (specify)
- ☐ Manual/None

C. Other

- ☐ Watermarks (e.g., GPS coordinates added to a photograph)
- ☒ Embedded in the data stream (e.g., GPS coordinates stored in a JPEG photograph header)

13. Do you currently use or plan to use dynamic segmentation/linear referencing within your PMS spatial reference data or to relate tabular PMS data to the spatial reference data? (Yes/No) If yes, which data?

*ALREADY USE DYNAMIC MAPS. SO YES.*

14. Are these data integrated into a larger system, such as a citywide GIS or an airfield database showing utilities, buildings, or other data? (Yes/No) If yes, are there specifications or minimum standards required to integrate the data? How may we obtain a copy?

*NO.*

15. Are there any formal policies regarding spatial data collection or PMS data collection? This includes types of data to collect, how often to collect it, and the reason(s) for collecting the data. (Yes/No) If yes, may we receive a copy of the policy document? How may we obtain a copy?

*NO. HOWEVER A THIRD OF THE NETWORK IS INSPECTED ANNUALLY.*

If a policy document is not available, please respond to the following, including the office title.

Who decides which data to collect?

*AIRPORT ENGINEER.*

Who decides when to collect data?

*AIRPORT DEVELOPMENT DIVISION MANAGER.*

How are these decisions made?

*BASED ON WHEN AIRPORTS WERE LAST INSPECTED.*



Who has final responsibility for the data, i.e., who pays for it?

*OKLAHOMA AERONAUTICS COMMISSION AND F.A.A.*

Who has technical responsibility, i.e., who identifies the need and lobbies for funding?

*THE COMMISSION'S AIRPORT DIVISION.*

What Quality Assurance processes are applied to the data? By whom? Is this a general process adapted for spatial data?

*LIFE-CYCLE ANALYSIS USING COLLECTED & HISTORICAL DATA WITH UPDATED MAINTENANCE HISTORY. CUSTOM SCRIPTS MATCH FORECASTED PCI WITH INSPECTION DATA.*

16. If you have a standard specification for data acquisition, how may we obtain a copy? If not, how may we obtain a copy of the specification used in the last round of data collection? If no specification was used, how may we obtain a copy of the scope of work, metadata, or data.

*ASTM D5340 GUIDES DATA COLLECTION.*

17. Where are the data stored (who maintains physical custody of the data)?

☐ IT Department

☐ Engineering Department

☒ Other *OKLAHOMA STATE (WWW.OK.GOV) .*

18. What database platform(s) is/are utilized to warehouse your PMS and/or PMS Spatial reference data?

☐ MS Access/Jet

☐ Oracle

☐ MS SQL Server

☐ DB2

☐ Informix

☐ Proprietary

☐ Stored in PMS

☐ Stored in GIS

☒ Other (specify) *MySQL SERVER*

☐ Don't Know

19. Please complete the attached tables. Several data types are listed in the tables, along with blank lines for you to include any other data you feel is relevant. Explanations of the columns in the tables are provided below.

Tables 1 and 2. Spatial Data.

- Pavement Specific, i.e., are the data useful only for pavement applications, or can they be used for other assets, such as buildings or property lines?

- Format, i.e., what format are the data stored in, e.g., aerial photography may be in tiff or MrSID , while digitized edge-of-pavement may be stored in DWG or personal Geodatabase feature class format.
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- What applications are the data used in? Please provide comments or explanation where you feel it is appropriate. Several applications have been listed, including:
  - Planning: developing M&R plans or capital improvement plans.
  - Condition monitoring: determining and tracking asset serviceability.
  - Reports to executives: preparation of technical reports, financial reports, or other documents for the use of senior management.
  - Mapping: development of maps and other spatial data.
  - Funding requests: preparation of budget documents or project financial documents.
  - Compliance: planning or documentation of compliance with FAA, EPA, or other regulations.
  - Not used: data that have been collected but are not currently used, such as obsolete data, data “piggybacked” onto another data set, or data that have been collected in anticipation of a need.
- How the data were collected: what technique(s) was (were) used to collect the data.
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Why were the data collected? If unsure, please provide the title of the project the data were collected for.
- Who is responsible for the data? Responsibility for the data is often shared; therefore, please indicate the person or office that oversees each of the following aspects of data management. If a consultant is retained, please provide the company name. If more than one consultant has been used in the past, please indicate the most recent.
  - Collection: Who performs the initial data collection or development of a new dataset?
  - Updates: Who performs incremental updates on the data, such as adding a new pavement section to a map?
  - Stewardship: Who is responsible to store the data and control access to it? A good indicator of stewardship is the ownership of the server or file cabinet where datasets reside

- Funding and Policy: Who sets policy regarding the type of data to be collected and the frequency of collection? This is often the person that pays for the data.
- Use: Who analyzes the data to prepare reports and maps to guide policy and decisions?

Table 3. PMS Data.

- Are the data georeferenced or otherwise linked to spatial data?
- If the data are georeferenced, how are they represented on a map? (points, lines, polygons)
- What spatial data source is used to georeference the data? (GPS, overlay on existing maps/photography, survey data, dead reckoning)
- How are the PMS data linked with the spatial data?
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Who is responsible for the data? Please provide a response for each aspect of data management as for spatial data.

Table 1. Spatial data formats and use.

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
SAMPLE Aerial Photography/Raster imagery	Yes/No	MrSID	Daily	Irregular	Yes/No	✓			✓		✓		
SAMPLE Pavement Sections	Yes/No	ESRI Shapefile	Yearly	Every three years	Yes/No	✓	✓	✓	✓	✓	✓		
Aerial Photography/Raster imagery	Yes/No	JPEG	DAILY	IRREGULAR	Yes/No	✓		✓					
Elevation	Yes/No				Yes/No								
Edge of Pavement	Yes/No				Yes/No								
Pavement Branches/Facilities	Yes/No	MYSQL DATABASE TABLE	OFTEN	IRREGULAR	Yes/No	✓	✓		✓				
Pavement Sections	Yes/No	MYSQL DATA-BASE TABLE	OFTEN	IRREGULAR	Yes/No	✓	✓			✓	✓		
PCC Slabs	Yes/No	MYSQL DATA-BASE TABLE	OFTEN	YEARLY	Yes/No	✓	✓						
Condition Survey Samples (PCI, etc)	Yes/No	MYSQL DATA-BASE TABLE	OFTEN	YEARLY	Yes/No	✓	✓	✓	✓	✓			
Distress locations (ASR/spalls/Cracking/Patching)	Yes/No				Yes/No								
Maintenance Locations	Yes/No	MYSQL DATABASE	YEARLY	YEARLY	Yes/No	✓		✓	✓	✓			
Lighting	Yes/No	MYSQL DATA-BASE	RARELY	IRREGULAR	Yes/No	✓		✓	✓	✓			
Utilities	Yes/No				Yes/No								
Runway/Taxiway/Roadway Centerlines	Yes/No				Yes/No								
Taxi Routes	Yes/No				Yes/No								
Parking Spots	Yes/No				Yes/No								

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
Airfield Markings/Paint Location	Yes/No				Yes/No								
Obstructions	Yes/No	MYSQL DATABASE	RARELY	YEARLY	Yes/No	✓	✓			✓	✓		
Photographs w/ Location Data	Yes/No				Yes/No								
Building Locations	Yes/No	CAD DRAWING	RARELY	YEARLY	Yes/No	✓		✓			✓		
Runway safety areas/protection zones/imagery surfaces	Yes/No				Yes/No								

Table 2. Spatial data collection and maintenance.

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
SAMPLE Aerial Photography/ Raster imagery	Aerial photography	Develop ALP	Consultant (ABC Surveying)	None	IT (GIS Manager)	City Council	Engineering (GIS Specialist)
SAMPLE Pavement Sections	Aerial Photography/ Surveying	Develop CIP and M&R plan	Consultant (ABC Engineering)	Engineering Operations and Maintenance	IT (GIS Manager)	O&M budget	Airport Engineer
Aerial Photography/Raster imagery	AERIAL PHOTOGRAPHY	DEVELOP AIRPORT GUIDE	CONSULTANT	NONE	WEB-SERVER	STATE	FLYING PUBLIC
Elevation	SURVEYS BY AIRPORT SPONSORS	REQUIRED FOR ALPS AFD & AIRPORT GUIDE	VARIOUS CONSULTANTS	IRREGULAR (BY SPONSORS)	MYSQL DATA BASE	SPONSORS (CITY COUNCILS).	FLYING PUBLIC
Edge of Pavement	—	—	—	—	—	—	—
Pavement Branches/Facilities	VISUAL DISTRESS SURVEYS	FOR PMS	CONSULTANT (UNIV. OF OKLAHOMA).	IRREGULAR (DURING PMS).	MYSQL DATABASE	STATE & FAA	ENGINEERING & PLANNING.
Pavement Sections (Airfield/Roads)	CORING & BORING	FOR PMS	CONSULTANT (UNIV. OF OKLAHOMA).	IRREGULAR			
PCC Slabs	VISUAL DISTRESS SURVEYS	PMS	CONSULTANT (UNIV. OF OKLAHOMA).	YEARLY	MYSQL DATABASE	STATE & FAA	ENGINEERING & PLANNING.
Condition Survey Samples (PCI, etc)	ASTM D5340	PCI	CONSULTANT (O.U.)	YEARLY	MYSQL DATABASE	STATE & FAA	ENGINEERING & CIP DEVELOPMENT
Distress locations (ASR/Cracking/Patching)	IN ACCORDANCE WITH ASTM D5340 (NOT GEO-REFERENCED)	PCI	"	"	"	"	"
Maintenance Locations	INTERVIEW AIRPORT MANAGEMENT DURING SITE VISIT, FAA GRANT HISTORIES	UPDATE PCI	IN-HOUSE	YEARLY	"	STATE	PLANNING - i.e. CIP DEVELOPMENT.
Lighting	5010 INSPECTIONS	ASSET INVENTORY FOR AIRPORT GUIDE	IN-HOUSE	YEARLY	"	STATE & FAA	PLANNING FOR CIP.
Utilities	—	—	—	—	—	—	—
Runway/Taxiway/ Roadway Centerlines	—	—	—	—	—	—	—
Taxi Routes	—	—	—	—	—	—	—
Parking Spots	—	—	—	—	—	—	—

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
Airfield Markings/Paint Location	—	—	—	—	—	—	—
Obstructions	5010 INSPECTIONS	SAFETY INSPECTIONS	IN-HOUSE	YEARLY	FAA & STATE	FAA	CIP PROJECTS.
Photographs w/ Location Data	—	—	—	—	—	—	—
Building Locations	5010 INSPECTIONS	SAFETY	IN-HOUSE	YEARLY	FAA & STATE	FAA	AIRPORT FACILITIES INVENTORY

Table 3. Pavement Management System data.

Data	Georeferenced	Representation	Spatial Data Source	Link Method	How often are the data used?	Would you collect the data again?	How often are the data collected?	RESPONSIBLE PERSONNEL					Comments
								Collection/Creation	Updates/Maintenance	Storage/Stewardship	Funding/Policy	Use	
Area Condition Indices (PCI, FOD)	<u>Yes/No</u>	Polygon	Aerial Photography	Foreign key	Yearly	Yes/No	Every 4 years	Consultant (ABC Engineering)	None	IT (GIS Manager)	City Council	Consultant/Engineering	PCI- consultant collects and analyzes data, provides report and data to XYZ Airport every three years
Photographs	<u>Yes/No</u>	Point	GPS tag	Arc View Hotlink	Monthly	Yes/No	As needed/continuously	Ops/Consultant/Engineering	None	IT (GIS Manager)	None	Engineering/Staff Engineer	Photos taken on as needed basis. Not all are georeferenced.
Area Condition Indices (PCI, FOD)	<u>Yes/No</u>	POLYGON	AERIAL PHOTOGRAPHY, ALP	FOREIGN KEY	MONTHLY	Yes/No	EVERY 3 YEARS	IN-HOUSE	AIRPORT ENGINEER	AIRPORT ENGINEER	STATE & FAA	CONSULTANTS/ENGINEERING	
Pavement Thickness/Voids (GPR results)	<u>Yes/No</u>	POINT	AERIAL PHOTO & MEASURED DISTANCES	"	"	Yes/No	IRREGULAR	IN-HOUSE	AIRPORT ENGR.	AIRPORT ENGR.	STATE & FAA	ENGINEERING	- PRELIMINARY DESIGNS.
Test points (DCP/Borings/Corings/FWD/HWD)	<u>Yes/No</u>	POINT	"	"	"	Yes/No	"	"	"	"	1/	STATE	ENGINEERING
Photographs	<u>Yes/No</u>					Yes/No							
Distresses	<u>Yes/No</u>					Yes/No							
Friction Data	<u>Yes/No</u>					Yes/No							
Structural Data	<u>Yes/No</u>	POINT	AERIAL, MEASURED	FOREIGN KEY	YEARLY	Yes/No	EVERY 3 YRS.	IN-HOUSE	AIRPORT ENGR.	AIRPORT ENGR.	STATE, FAA	ENGINEERING, CAPACITY.	



# **UNITED STATES AIR FORCE**

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**FAIRCHILD AFB's REPLY TO  
PAVEMENT MANAGEMENT SYSTEM (PMS) SURVEY, 8 FEB 2007  
(Prepared by 92 CES/CEOG & 92 CES/CEOE)**

Question 1: Please identify which GIS/CAD packages are used by your agency/firm. Recognizing that different packages may be used for different aspects of spatial data administration, please identify the specific versions used for each aspect, including initial development or creation (e.g., creating a new edge-of-pavement map), altering or manipulating existing data (e.g., adding a new feature to an existing map), and viewing or analyzing data (e.g., preparation of a color-coded condition map). If a consultant is retained for any tasks, please provide the name of the consultant and software package if known. If more than one package is used, please fill out all that apply. If hardcopy spatial data are used, please provide some description of the format, such as "D-size 1:2400 aerial photograph." A sample response is provided on the first line.

Answer 1:

<b>Name of GIS Package</b>	<b>Creation</b>	<b>Manipulation</b>	<b>Viewing/Analysis</b>
<i>[Example] ESRI Arc</i>	<i>ArcInfo 9.1 w/ Spatial Analyst</i>	<i>ArcInfo 9.1 w/ Spatial Analyst</i>	<i>ArcView 9.1</i>
AutoDesk AutoCAD			
ESRI Arc	ArcInfo 9.2 w/ Spatial Analyst	ArcInfo 9.2 w/ Spatial Analyst	Viewing/Analysis: ArcView 9.2
Bentley Microstation			
Intergraph			
MapInfo			
Consultant			
Hardcopy			
Custom/Other			

Q2: Do you have plans to migrate to another GIS software within the next 2 years? (Yes/No). If yes, please explain. Do you have candidate software/systems in mind?

A2: We have no plans to migrate to other GIS software.

Q3: Are you satisfied that your current GIS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve.

A3: Yes, we are satisfied with the GIS software.

Q4: Which pavement management system (PMS) software packages are used for the tasks listed below? If a Pavement Management consultant is retained, please indicate

which tasks they perform. If multiple packages have been used, please indicate the time frame each was in use. A sample response is provided on the first line.

Answer 4:

Package	Creation	Updates/Data Entry	Viewing/Analysis
<i>[Example] MicroPAVER</i>	<i>ABC Engineering, Version 5.1</i>	<i>Condition data: MicroPAVER M &amp; R data: import from custom work order management system.</i>	<i>Version 5.1</i>
MicroPAVER	AFCESA provides data in MicroPAVER v5.3.4	Maintenance Engineer updates directly in MicroPAVER	MicroPAVER, v5.3.4
AirPAV			
Custom Software			
Manual (card file or Excel spreadsheet)			
Other			

Q5: How are PMS data collected?

- A. Manually (paper forms)
- B. Electronically (laptop, tablet PC, PDA)
- C. Automated/Image based (video, van, or similar)

A5: ARA Inc. (under contract with HQ AMC and AFCESA) collected data electronically. 92 CES/CEOE Maintenance Engineer manually collects data on paper forms.

Q6: Are data collected in-house or by consultant/contractor?

A6: Data are collected in-house by the Maintenance Engineer, in between the contract PCI surveys done by ARA, Inc. every 3 years or so.

Q7: Are you satisfied that your current PMS software/system meets your agency needs to a high degree? (Yes/No). If not, please explain what you would like to improve.

A7: Yes, we are satisfied with the PMS software. We would like it to integrate more with the GIS software. It would be especially useful if it were able to share a single database.

Q8: Do you have plans to migrate to another PMS software within the next 2 years? (Yes/No). If yes, do you have candidate software/systems in mind?

A8: No, we don't have any plans to migrate to other PMS software. We will upgrade to MicroPAVER v6 when it is available in Spring 2007.

Q9: Do you use Metric or English units? (Metric/English/Both) If both, please explain.

A9: We use both Metric and English units. The data in the GIS are stored in the Metric-based UTM coordinate system. Lengths and other measurements in the tables are recorded in both Metric and English units.

Q10: Which projection or coordinate system(s) do you use?

A10: We use the UTM, Zone 11N coordinate system with the WGS84 Datum and Spheroid.

Q11: Are PMS condition data linked to spatial data? (Yes/No). If yes, check all data that are linked.

A11:        ☐ Distress  
              ☒ Slab or smaller  
              ☒ Sample unit  
              ☒ Section  
              ☒ Branch  
              ☒ Other [NETWORK]

Q12: What method is used to integrate the PMS data with the spatial data? Check all that apply. If more than one method is used, please provide an explanation.

Answer 12:

A. GIS

☒ Primary Key/Foreign Key Link (PMS Primary key is GIS Foreign key)  
              ☐ Primary Key/Foreign Key Link (GIS Primary key is PMS Foreign key)  
              ☐ PMS data is stored within the GIS Database  
              ☒ Other (specify)

Network, Branch, Section and Slab information from the PMS are also stored in the GIS for verification and mapping.

B. CAD

☐ Primary Key/Foreign Key Link (PMS Primary is GIS Foreign key)

- \_\_\_\_\_ Primary Key/Foreign Key Link (GIS Primary is PMS Foreign key)
- \_\_\_\_\_ Other (specify)
- \_\_\_\_\_ Manual/None

C. Other

- \_\_\_\_\_ Watermarks (e.g., GPS coordinates added to a photograph)
- \_\_\_\_\_ Embedded in the data stream (e.g., GPS coordinates stored in a JPEG photograph header)

Q13: Do you currently use or plan to use dynamic segmentation/linear referencing within your PMS spatial reference data or to relate tabular PMS data to the spatial reference data? (Yes/No). If yes, which data?

A13: We don't have, or plan to have, dynamic segmentation or linear referencing. However, we have related PMS data to the ArcGIS spatial database.

Q14: Are these data integrated into a larger system, such as a citywide GIS or an airfield database showing utilities, buildings, or other data? (Yes/No). If yes, are there specifications or minimum standards required to integrate the data? How may we obtain a copy?

A14: Yes, the data are integrated into the basewide GIS database. This integration was done by the 92 CES/CEOG GeoBase Program Manager, but there are no written standards for this integration yet. The data were developed so as to be similar to the Spatial Data Standard (SDS) developed by the US Army Corps of Engineers. AFCESA already has a copy of the GIS-integrated MicroPAVER database that contains individual airfield pavement branches, sections, sample units, and concrete slabs.

Q15: Are there any formal policies regarding spatial data collection or PMS data collection? This includes types of data to collect, how often to collect it, and the reason(s) for collecting the data. (Yes/No). If yes, may we receive a copy of the policy document? How may we obtain a copy?

A15: There is no formal policy within 92 CES for PMS data collection, but there is a formal policy for spatial data collection. It's in the Fairchild AFB Base Design Standards. The standard basically stipulates that the data should be in correct projection system and be SDS compliant.

**If a [PMS] policy document is not available, please respond to the following, including the office title.**

Q15a: Who decides which data to collect?

A15a: HQ AMC/A7OI (Infrastructure Branch) and AFCESA.

Q15b: Who decides when to collect data?

A15b: HQ AMC/A7OI.

Q15c: How are these decisions made?

A15c: Budgetary.

Q15d: Who has final responsibility for the data, i.e., who pays for it?

A15d: 92 CES/CEOE (Maintenance Engineering) has responsibility for data, but HQ AMC/A7OI pays for it.

Q15e: Who has technical responsibility, i.e., who identifies the need and lobbies for funding?

A15e: 92 CES/CEOE.

Q15f: What Quality Assurance processes are applied to the data? By whom? Is this a general process adapted for spatial data?

A15f: QA is done by the 92 CES/CEOE Maintenance Engineer.

Q16: If you have a standard specification for data acquisition, how may we obtain a copy? If not, how may we obtain a copy of the specification used in the last round of data collection? If no specification was used, how may we obtain a copy of the scope of work, metadata, or data.

A16: AFCESA wrote the contract for ARA, Inc.'s PCI survey of Fairchild AFB in 2005. The contract language did not contain a requirement for GIS integration with the PMS data.

Q17: Where are the data stored (who maintains physical custody of the data)?

A17: ☒ IT Department  
☐ Engineering Department  
☐ Other

Q18: What database platform(s) is/are utilized to warehouse your PMS and/or PMS Spatial reference data?

A18: <input checked="" type="checkbox"/> PMS MS Access/Jet	<input type="checkbox"/> Oracle
<input type="checkbox"/> MS SQL Server	<input type="checkbox"/> DB2
<input type="checkbox"/> Informix	<input type="checkbox"/> Proprietary
<input type="checkbox"/> Stored in PMS	<input checked="" type="checkbox"/> Spatial Stored in GIS
<input type="checkbox"/> Other (specify)	<input type="checkbox"/> Don't Know

Q19: Please complete the attached tables. Several data types are listed in the tables, along with blank lines for you to include any other data you feel is relevant. Explanations of the columns in the tables are provided below.

Tables 1 and 2. Spatial Data.

- Pavement Specific, i.e., are the data useful only for pavement applications, or can they be used for other assets, such as buildings or property lines?
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  - Reports to executives: preparation of technical reports, financial reports, or other documents for the use of senior management.
  - Mapping: development of maps and other spatial data.
  - Funding requests: preparation of budget documents or project financial documents.
  - Compliance: planning or documentation of compliance with FAA, EPA, or other regulations.
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  - Updates: Who performs incremental updates on the data, such as adding a new pavement section to a map?
  - Stewardship: Who is responsible to store the data and control access to it? A good indicator of stewardship is the ownership of the server or file cabinet where datasets reside
  - Funding and Policy: Who sets policy regarding the type of data to be collected and the frequency of collection? This is often the person that pays for the data.



- Use: Who analyzes the data to prepare reports and maps to guide policy and decisions?

Table 3. PMS Data.

- Are the data georeferenced or otherwise linked to spatial data?
- If the data are georeferenced, how are they represented on a map? (points, lines, polygons)
- What spatial data source is used to georeference the data? (GPS, overlay on existing maps/photography, survey data, dead reckoning)
- How are the PMS data linked with the spatial data?
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Who is responsible for the data? Please provide a response for each aspect of data management as for spatial data.

A19: See following pages for answers in each table.

Table 1. Spatial data formats and use.

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
<i>SAMPLE Aerial Photography/ Raster imagery</i>	<i>Yes/No</i>	<i>MrSID</i>	<i>Daily</i>	<i>Irregular</i>	<i>Yes/No</i>	✓			✓		✓		
<i>SAMPLE Pavement Sections</i>	<i>Yes/No</i>	<i>ESRI Shapefile</i>	<i>Yearly</i>	<i>Every three years</i>	<i>Yes/No</i>	✓	✓	✓	✓	✓	✓		
Aerial Photography/Raster Imagery	NO	MrSID	Daily	2 years	YES	✓	✓	✓	✓	✓	✓		
Elevation	NO	ESRI ArcSDE/Oracle Feature Class	Monthly	5 years	YES	✓		✓	✓	✓	✓		
Edge of Pavement	NO	ESRI ArcSDE/Oracle Feature Class	Daily	Updated as Required	YES	✓	✓	✓	✓	✓	✓		
Pavement Branches/Facilities	YES	ESRI Shapefiles	Semi-annually	Updated as Required	YES	✓	✓	✓	✓	✓	✓		
Pavement Sections	YES	ESRI Shapefiles	Semi-annually	Updated as Required	YES	✓	✓		✓	✓	✓		
PCC Slabs	YES	ESRI Shapefiles	Semi-annually	Updated as Required	YES	✓	✓		✓	✓	✓		
Condition Survey Samples (PCI, etc.)	YES	ESRI Shapefiles	Semi-annually	Updated as Required	YES	✓	✓	✓	✓	✓	✓		
Distress Locations (ASR/spalls/ Cracking/patching)	YES	ESRI Shapefiles	Semi-annually	Updated as Required	YES	✓	✓	✓	✓	✓	✓		
Maintenance Locations	NO	MicroPAVER DB	Semi-annually	Updated as Required	YES	✓	✓	✓	✓	✓	✓		
Lighting	NO	ESRI ArcSDE/Oracle Feature Class	Monthly	Updated as Required	YES	✓		✓	✓	✓	✓		
Utilities	NO	ESRI ArcSDE/Oracle Feature Class	Daily	Updated as Required	YES	✓	✓	✓	✓	✓	✓		
Runway/Taxiway/ Roadway Centerlines	NO	ESRI ArcSDE/Oracle Feature Class	Daily	Updated as Required	YES	✓		✓	✓	✓	✓		
Taxi Routes	NO	ESRI ArcSDE/Oracle Feature Class	Daily	Updated as Required	YES	✓		✓	✓	✓	✓		
Parking Spots	NO	ESRI ArcSDE/Oracle Feature Class	Daily	Updated as Required	YES	✓		✓	✓	✓	✓		

[illegible]

Table 2. Spatial data collection and maintenance.

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
<i>SAMPLE Aerial Photography/ Raster imagery</i>	<i>Aerial photography</i>	<i>Develop ALP</i>	<i>Consultant (ABC Surveying)</i>	<i>None</i>	<i>IT (GIS Manager)</i>	<i>City Council</i>	<i>Engineering (GIS Specialist)</i>
<i>SAMPLE Pavement Sections</i>	<i>Aerial Photography/ Surveying</i>	<i>Develop CIP and M&amp;R plan</i>	<i>Consultant (ABC Engineering)</i>	<i>Engineering Operations and Maintenance</i>	<i>IT (GIS Manager)</i>	<i>O&amp;M budget</i>	<i>Airport Engineer</i>
<b>Aerial Photography/Raster Imagery</b>	Aerial Photography	Develop base data	AVISTA Utilities Company	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Elevation</b>	Calculated from aerial photography	Develop base data	AVISTA Utilities Company	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Edge of Pavement</b>	Digitized from aerial photography	Develop base data	GeoBase (GIS) Office	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Pavement Branches/Facilities</b>	Digitized from aerial photography & existing pavement survey	Pavement Management	GeoBase (GIS) Office	GeoBase (GIS) Office	Maintenance Engineer / GeoBase PM	Civil Engineering	Pavement Management
<b>Pavement Sections (Airfield/Roads)</b>	Digitized from aerial photography & existing pavement survey	Pavement Management	GeoBase (GIS) Office	GeoBase (GIS) Office	Maintenance Engineer / GeoBase PM	Civil Engineering	Pavement Management
<b>PCC Slabs</b>	Digitized from aerial photography & existing pavement survey	Pavement Management	GeoBase (GIS) Office	GeoBase (GIS) Office	Maintenance Engineer / GeoBase PM	Civil Engineering	Pavement Management
<b>Condition Survey Samples (PCI, etc.)</b>	Digitized from aerial photography & existing pavement survey	Pavement Management	GeoBase (GIS) Office	GeoBase (GIS) Office	Maintenance Engineer / GeoBase PM	Civil Engineering	Pavement Management
<b>Distress Locations (ASR/Cracking/ patching)</b>	Digitized from aerial photography & existing pavement survey	Pavement Management	Maintenance Engineer / GeoBase Office	Maintenance Engineer / GeoBase Office	Maintenance Engineer / GeoBase PM	Civil Engineering	Pavement Management
<b>Maintenance Locations</b>	Digitized from aerial photography & existing pavement survey	Pavement Management	Maintenance Engineer / GeoBase Office	Maintenance Engineer / GeoBase Office	Maintenance Engineer / GeoBase PM	Civil Engineering	Pavement Management
<b>Lighting</b>	Digitized from aerial photography	Develop base data	GeoBase (GIS) Office	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Utilities</b>	Digitized from aerial photography	Develop base data	GeoBase (GIS) Office	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Runway/Taxiway/ Roadway Centerlines</b>	Digitized from aerial photography	Develop base data	GeoBase (GIS) Office	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Taxi Routes</b>	Digitized from aerial photography	Develop base data	GeoBase (GIS) Office	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Parking Spots</b>	Digitized from aerial photography	Develop base data	GeoBase (GIS) Office	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping
<b>Airfield Markings/ Paint Location</b>	Digitized from aerial photography	Develop base data	GeoBase (GIS) Office	GeoBase (GIS) Office	GeoBase Program Manager	Civil Engineering	Base mapping

[illegible]



## **DENVER INTERNATIONAL AIRPORT**

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## **INTERVIEW CONDUCTED WITH:**

Rudy Amiscaray  
Project Manger, Airfields Pavements  
8500 Pena Blvd, AOB 7th Floor  
Denver, CO 80249

Mark E. Kelley, PE  
DMJM Aviation  
8500 Pena Blvd, AOB 7th Floor  
Denver, CO 80249

1. Please identify which GIS/CAD packages are used by your agency/firm. Recognizing that different packages may be used for different aspects of spatial data administration, please identify the specific versions used for each aspect, including initial development or creation (e.g., creating a new edge-of-pavement map), altering or manipulating existing data (e.g., adding a new feature to an existing map), and viewing or analyzing data (e.g., preparation of a color-coded condition map). If a consultant is retained for any tasks, please provide the name of the consultant and software package if known. If more than one package is used, please fill out all that apply. If hardcopy spatial data are used, please provide some description of the format, such as "D-size 1:2400 aerial photograph." A sample response is provided on the first line.

<b>Name of GIS Package</b>	<b>Creation</b>	<b>Manipulation</b>	<b>Viewing/Analysis</b>
<b>ESRI Arc</b>	<b>ArcInfo 9.1 w/ Spatial Analyst</b>	<b>ArcInfo 9.1 w/ Spatial Analyst</b>	<b>ArcView 9.1</b>
AutoDesk AutoCAD			
ESRI Arc	<b>ArcGIS Desktop</b>	<b>ArcGIS Desktop and ArcGIS Server</b>	<b>ArcGIS Desktop and ArcGIS Server</b>
Bentley Microstation			
Intergraph			
MapInfo			
Consultant			
Hardcopy			
Custom/Other			

2. Do you have plans to migrate to another GIS software within the next 2 years? (Yes/No)  
If yes, please explain. Do you have candidate software/systems in mind? **No.**
3. Are you satisfied that your current GIS software/system meets your agency needs to a high degree? (Yes/No) If not, please explain what you would like to improve. **Yes.**
4. Which pavement management system (PMS) software packages are used for the tasks listed below? If a Pavement Management consultant is retained, please indicate which tasks they perform. If multiple packages have been used, please indicate the time frame each was in use. A sample response is provided on the first line.

<b>Package</b>	<b>Creation</b>	<b>Updates/Data Entry</b>	<b>Viewing/Analysis</b>
<b>MicroPAVER</b>	<b>ABC Engineering, Version 5.1</b>	<b>Condition data: MicroPAVER M &amp; R data: import from custom work order management system.</b>	<b>Version 5.1</b>
MicroPAVER			
AirPAV			
Custom Software	ESRI ArcPad (field data collection) ; ArcGIS + "GAPGEMS"	ESRI ArcPad (field data collection) ; ArcGIS + "GAPGEMS"	Geospatial Airfield Pavement Evaluation and Pavement Management System (GAPEMS) – Custom developed, ArcGIS Server Based
Manual (card file or Excel spreadsheet)			
Other			

5. How are PMS data collected?

A. Manually (paper forms)

**B. Electronically (laptop, tablet PC, PDA)**

C. Automated/Image based (video, van, or similar)

6. Are data collected in-house or by consultant/contractor?

**Data are collected by consultant (DMJM Aviation)**

7. Are you satisfied that your current PMS software/system meets your agency needs to a high degree? (**Yes**/No) If not, please explain what you would like to improve.

8. Do you have plans to migrate to another PMS software within the next 2 years? (Yes/**No**) If yes, do you have candidate software/systems in mind?

9. Do you use Metric or English units? (Metric/**English**/Both) If both, please explain.

10. Which projection or coordinate system(s) do you use? Colorado State Plane

11. Are PMS condition data linked to spatial data? (**Yes**/No) If yes, check all data that are linked.

☒ Distress  
☒ Slab or smaller  
☒ Sample unit  
☒ Section  
☒ Branch  
☐ Other

12. What method is used to integrate the PMS data with the spatial data? Check all that apply. If more than one method is used, please provide an explanation.

A. GIS

☐ Primary Key/Foreign Key Link (PMS Primary key is GIS Foreign key)  
☐ Primary Key/Foreign Key Link (GIS Primary key is PMS Foreign key)  
☒ PMS data is stored within the GIS Database

\_\_\_\_\_ Other (specify)

B. CAD

\_\_\_\_\_ Primary Key/Foreign Key Link (PMS Primary is GIS Foreign key)

\_\_\_\_\_ Primary Key/Foreign Key Link (GIS Primary is PMS Foreign key)

\_\_\_\_\_ Other (specify)

\_\_\_\_\_ Manual/None

C. Other

  X   Watermarks (e.g., GPS coordinates added to a photograph)

\_\_\_\_\_ Embedded in the data stream (e.g., GPS coordinates stored in a JPEG photograph header)

13. Do you currently use or plan to use dynamic segmentation/linear referencing within your PMS spatial reference data or to relate tabular PMS data to the spatial reference data? (Yes/**No**) If yes, which data?

**NA**

14. Are these data integrated into a larger system, such as a citywide GIS or an airfield database showing utilities, buildings, or other data? (Yes/**No**) If yes, are there specifications or minimum standards required to integrate the data? How may we obtain a copy?

15. Are there any formal policies regarding spatial data collection or PMS data collection? This includes types of data to collect, how often to collect it, and the reason(s) for collecting the data. (**Yes**/No) If yes, may we receive a copy of the policy document? How may we obtain a copy?

**PMS data are collected annually.**

If a policy document is not available, please respond to the following, including the office title.

Who decides which data to collect?

Who decides when to collect data?

How are these decisions made?

Who has final responsibility for the data, i.e., who pays for it?

**The City & County of Denver Department of Aviation**

Who has technical responsibility, i.e., who identifies the need and lobbies for funding?

What Quality Assurance processes are applied to the data? By whom? Is this a general process adapted for spatial data?

16. If you have a standard specification for data acquisition, how may we obtain a copy? If not, how may we obtain a copy of the specification used in the last round of data collection? If no specification was used, how may we obtain a copy of the scope of work, metadata, or data.

17. Where are the data stored (who maintains physical custody of the data)?

**Engineering Records Division**

18. What database platform(s) is/are utilized to warehouse your PMS and/or PMS Spatial reference data?

_____ MS Access/Jet	<u>  X  </u> Oracle
_____ MS SQL Server	_____ DB2
_____ Informix	_____ Proprietary
_____ Stored in PMS	<u>  X  </u> Stored in GIS
_____ Other (specify)	_____ Don't Know

19. Please complete the attached tables. Several data types are listed in the tables, along with blank lines for you to include any other data you feel is relevant. Explanations of the columns in the tables are provided below.

Tables 1 and 2. Spatial Data.

- Pavement Specific, i.e., are the data useful only for pavement applications, or can they be used for other assets, such as buildings or property lines?
- Format, i.e., what format are the data stored in, e.g., aerial photography may be in tiff or MrSID, while digitized edge-of-pavement may be stored in DWG or personal Geodatabase feature class format.

- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- What applications are the data used in? Please provide comments or explanation where you feel it is appropriate. Several applications have been listed, including:
  - Planning: developing M&R plans or capital improvement plans.
  - Condition monitoring: determining and tracking asset serviceability.
  - Reports to executives: preparation of technical reports, financial reports, or other documents for the use of senior management.
  - Mapping: development of maps and other spatial data.
  - Funding requests: preparation of budget documents or project financial documents.
  - Compliance: planning or documentation of compliance with FAA, EPA, or other regulations.
  - Not used: data that have been collected but are not currently used, such as obsolete data, data “piggybacked” onto another data set, or data that have been collected in anticipation of a need.
- How the data were collected: what technique(s) was (were) used to collect the data.
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Why were the data collected? If unsure, please provide the title of the project the data were collected for.
- Who is responsible for the data? Responsibility for the data is often shared; therefore, please indicate the person or office that oversees each of the following aspects of data management. If a consultant is retained, please provide the company name. If more than one consultant has been used in the past, please indicate the most recent.
  - Collection: Who performs the initial data collection or development of a new dataset?
  - Updates: Who performs incremental updates on the data, such as adding a new pavement section to a map?
  - Stewardship: Who is responsible to store the data and control access to it? A good indicator of stewardship is the ownership of the server or file cabinet where datasets reside
  - Funding and Policy: Who sets policy regarding the type of data to be collected and the frequency of collection? This is often the person that pays for the data.

- Use: Who analyzes the data to prepare reports and maps to guide policy and decisions?

Table 3. PMS Data.

- Are the data georeferenced or otherwise linked to spatial data?
- If the data are georeferenced, how are they represented on a map? (points, lines, polygons)
- What spatial data source is used to georeference the data? (GPS, overlay on existing maps/photography, survey data, dead reckoning)
- How are the PMS data linked with the spatial data?
- How often are the data used, e.g., viewed or used in an analysis (including hardcopy printouts of the data).
- Are the data of sufficient value that you would collect them again?
- How often are the data collected? If the data have only been collected once, or are collected at irregular intervals, when were they last collected?
- Who is responsible for the data? Please provide a response for each aspect of data management as for spatial data.



Table 1. Spatial data formats and use.

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
<b>SAMPLE Aerial Photography/ Raster imagery</b>	<b>Yes/No</b>	<b>MrSID</b>	<b>Daily</b>	<b>Irregular</b>	<b>Yes/No</b>						✓		
<b>SAMPLE Pavement Sections</b>	<b>Yes/No</b>	<b>ESRI Shapefile</b>	<b>Yearly</b>	<b>Every three years</b>	<b>Yes/No</b>						✓		
Aerial Photography/Raster imagery	Yes/No				Yes/No								
Elevation	Yes/No				Yes/No								
Edge of Pavement	Yes/No				Yes/No								
Pavement Branches/Facilities	Yes/No				Yes/No								
Pavement Sections	Yes/No				Yes/No								
PCC Slabs	Yes/No				Yes/No								Collected only to aid in field surveys.
Condition Survey Samples (PCI, etc)	Yes/No				Yes/No								
Distress locations (ASR/spalls/Cracking/ Patching)	Yes/No				Yes/No								
Maintenance Locations	Yes/No				Yes/No								
Lighting	Yes/No				Yes/No								
Utilities	Yes/No				Yes/No								
Runway/Taxiway/ Roadway Centerlines	Yes/No				Yes/No								
Taxi Routes	Yes/No		Annually		Yes/No								
Parking Spots	Yes/No				Yes/No								

Data	Pavement Specific	Format	How often are the data used?	How often are the data collected?	Would you collect the data again?	DATA USE							
						Planning	Condition monitoring	Reports to executives	Mapping	Funding Requests	Compliance	Not Used	Other
Airfield Markings/Paint Location	Yes/No				Yes/No								
Obstructions	Yes/No				Yes/No								
Photographs w/ Location Data	Yes/No				Yes/No								
Building Locations	Yes/No				Yes/No								
Runway safety areas/protection zones/imagery surfaces	Yes/No				Yes/No								

Table 2. Spatial data collection and maintenance.

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
<b>SAMPLE Aerial Photography/ Raster imagery</b>	<b>Aerial photography</b>	<b>Develop ALP</b>	<b>Consultant (ABC Surveying)</b>	<b>None</b>	<b>IT (GIS Manager)</b>	<b>City Council</b>	<b>Engineering (GIS Specialist)</b>
<b>SAMPLE Pavement Sections</b>	<b>Aerial Photography/ Surveying</b>	<b>Develop CIP and M&amp;R plan</b>	<b>Consultant (ABC Engineering)</b>	<b>Engineering Operations and Maintenance</b>	<b>IT (GIS Manager)</b>	<b>O&amp;M budget</b>	<b>Airport Engineer</b>
Aerial Photography/Raster imagery							
Elevation							
Edge of Pavement							
Pavement Branches/Facilities							
Pavement Sections (Airfield/Roads)							
PCC Slabs							
Condition Survey Samples (PCI, etc)							
Distress locations (ASR/Cracking/Patching)							
Maintenance Locations							
Lighting							
Utilities							
Runway/Taxiway/ Roadway Centerlines							
Taxi Routes							
Parking Spots							

Data	How were the data collected?	Comments/ Why collected?	RESPONSIBLE PERSONNEL				
			Collection/ Creation	Updates/ Maintenance	Storage/ Stewardship	Funding/ Policy	Use
Airfield Markings/Paint Location							
Obstructions							
Photographs w/ Location Data							
Building Locations							

Table 3. Pavement Management System data.

Data	Georeferenced	Representation	Spatial Data Source	Link Method	How often are the data used?	Would you collect the data again?	How often are the data collected?	RESPONSIBLE PERSONNEL					Comments
								Collection/Creation	Updates/Maintenance	Storage/Stewardship	Funding/Policy	Use	
Area Condition Indices (PCI, FOD)	<u>Yes</u> /No	Polygon	Aerial Photography	Foreign key	Yearly	Yes/No	Every 4 years	Consultant (ABC Engineering)	None	IT (GIS Manager)	City Council	Consultant/Engineering	PCI- consultant collects and analyzes data, provides report and data to XYZ Airport every three years
Photographs	<u>Yes</u> /No	Point	GPS tag	Arc View Hotlink	Monthly	Yes/No	As needed/continuously	Ops/Consultant/Engineering	None	IT (GIS Manager)	None	Engineering/Staff Engineer	Photos taken on as needed basis. Not all are georeferenced.
Area Condition Indices (PCI, FOD)	Yes/No					Yes/No							
Pavement Thickness/Voids (GPR results)	Yes/No					Yes/No							
Test points (DCP/Borings/Corings/FWD/HWD)	Yes/No					Yes/No							
Photographs	Yes/No					Yes/No							
Distresses	Yes/No					Yes/No							
Friction Data	Yes/No					Yes/No							
Structural Data	Yes/No					Yes/No							

**APPENDIX C**  
**PMS SOFTWARE DATA ELEMENTS**

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## **MICROPAVER DATABASE SCHEMA**



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### Properties

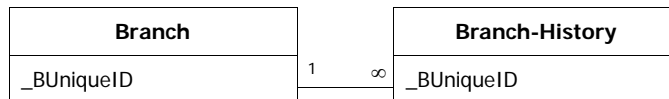
DateCreated:	2/10/1994 9:54:47 AM	LastUpdated:	11/7/2006 2:16:46 PM
OrderByOn:	False	Orientation:	Left-to-Right
RecordCount:	297	Updatable:	True

### Columns

Name	Type	Size
BranchID	Text	10
Name	Text	35
Use	Text	20
Sections	Integer	2
_Area	Double	8
Bsort1	Text	10
Bsort2	Text	10
Bsort3	Text	10
Comments	Text	70
_NUNIQUEID	Text	20
_BUNIQUEID	Text	20
_Branch_Area_Units	Text	20
_Area Adjustment	Double	8

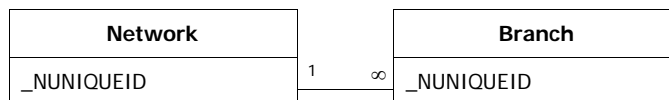
### Relationships

#### BranchBranch-History



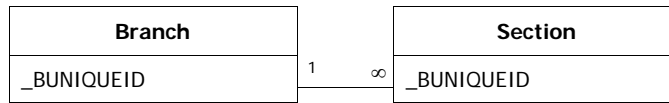
Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### NetworkBranch



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

**BranchSection**



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

**Table Indexes**

Name	Number of Fields
_NUNIQUEID	1
Fields:	
_NUNIQUEID	Ascending
BranchID	1
Fields:	
BranchID	Ascending
Bsort1	1
Fields:	
Bsort1	Ascending
Bsort2	1
Fields:	
Bsort2	Ascending
Bsort3	1
Fields:	
Bsort3	Ascending
Name	1
Fields:	
Name	Ascending
PrimaryKey	1
Fields:	
_BUNIQUEID	Ascending
Reference	1
Fields:	
_NUNIQUEID	Ascending
Use	1
Fields:	
Use	Ascending

### **Properties**

DateCreated:	11/7/2006 2:16:45 PM	LastUpdated:	11/7/2006 4:47:40 PM
RecordCount:	846	Updatable:	True

### **Columns**

Name	Type	Size
_BUNIQUEID	Text	20
UFLD%;6#;O63_n/,&#5:	Text	255
UFLD_GL,19\$:\VT2W0X(	Text	255
UFLD2)S\$J#2MY0RB^W:	Replication ID	16
_UFLDsV9Q71UJ(n%40SEO	Text	1
_UFLD<*M2=7?^>_FJJXRU	Text	255
_UFLD,?04Q24)BFMs-D2,	Text	255
_UFLDsIKnC98=RW>H^2H<	Text	255
_UFLDN>S6@@VZPXD?7D<C	Text	255
_UFLDB5RX+(M>H5?3)OMN	Text	255

### **Table Indexes**

Name	Number of Fields
PrimaryKey	1
Fields:	
_BUNIQUEID	Ascending

### Properties

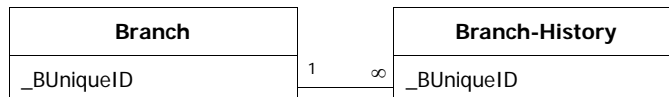
DateCreated:	9/6/2001 8:59:43 AM	LastUpdated:	11/7/2006 2:16:46 PM
OrderByOn:	False	Orientation:	Left-to-Right
RecordCount:	326	Updatable:	True

### Columns

Name	Type	Size
_TimeStamp	Date/Time	8
_Branch-HistoryID	Text	20
BranchID	Text	10
Name	Text	35
Use	Text	20
Sections	Integer	2
_Area	Double	8
Bsort1	Text	10
Bsort2	Text	10
Bsort3	Text	10
Comments	Text	70
_NUNIQUEID	Text	20
_BUNIQUEID	Text	20
_Branch_Area_Units	Text	20
_Area Adjustment	Double	8
_BNetworkHistoryUID	Text	20

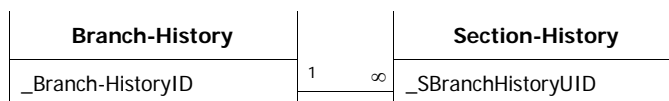
### Relationships

#### BranchBranch-History

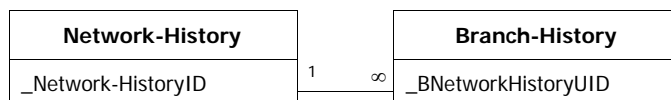


Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### Branch-HistorySection-History



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

**Network-HistoryBranch-History**

Attributes:

Enforced, Cascade Updates, Cascade Deletes

RelationshipType:

One-To-Many

**Table Indexes**

<u>Name</u>	<u>Number of Fields</u>
Branch-Branch-History	1
Fields:	
_BUNIQUEID	Ascending
Network-History-Branch-History	1
Fields:	
_BNetworkHistoryUID	Ascending
PrimaryKey	1
Fields:	
_Branch-HistoryID	Ascending

**Properties**

DateCreated: 1/11/1995 5:51:04 PM

LastUpdated: 10/16/2001 1:58:12 PM

RecordCount: 41

Updatable: True

**Columns**

Name	Type	Size
Name	Text	30
IsNumeric	Yes/No	1
UserEditable	Yes/No	1
Description	Text	50
_Selected	Yes/No	1

**Table Indexes**

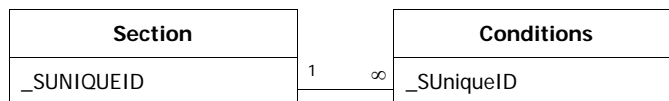
Name	Number of Fields
PrimaryKey	1
Fields:	
Name	Ascending

**Properties**

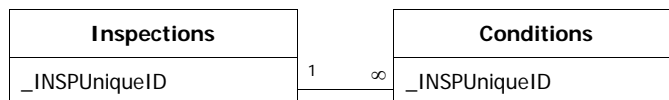
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OrderByOn:	False	RecordCount:	2504
Updatable:	True		

**Columns**

Name	Type	Size
Condition	Single	4
_Latest	Yes/No	1
TextValue	Text	20
Method	Text	30
Pct Load	Single	4
Climate/Durability	Single	4
Other	Single	4
_SUniqueID	Text	20
_MUniqueID	Text	20
_CUniqueID	Text	20
_INSPUniqueID	Text	20
Source	Text	70

**Relationships****SectionConditions**

Attributes: Enforced, Cascade Updates, Cascade Deletes  
 RelationshipType: One-To-Many

**InspectionsConditions**

Attributes: Enforced, Cascade Updates, Cascade Deletes  
 RelationshipType: One-To-Many

**Table Indexes**

Name	Number of Fields
_INSPUniqueID	1
Fields:	
_INSPUniqueID	Ascending
_Latest	1



---

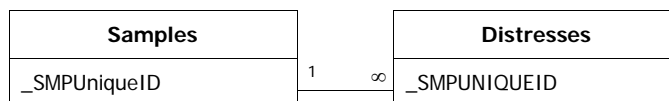
Fields:	
_Latest	Ascending
_MUniqueID	1
Fields:	
_MUniqueID	Ascending
_SUniqueID	1
Fields:	
_SUniqueID	Ascending
Method	1
Fields:	
Method	Ascending
PrimaryKey	1
Fields:	
_CUniqueID	Ascending
Reference16	1
Fields:	
_SUniqueID	Ascending
Reference5	1
Fields:	
_INSPUniqueID	Ascending

**Properties**

DateCreated: 2/10/1994 9:54:53 AM      LastUpdated: 5/25/2001 10:23:53 AM  
 OrderByOn: False      RecordCount: 9372  
 Updatable: True

**Columns**

Name	Type	Size
Distress	Double	8
Description	Text	40
SEVERITY	Text	3
Units	Text	10
Comments	Text	254
_QUANTITY	Double	8
_QuantityUnits	Text	60
_SMPUNIQUEID	Text	20

**Relationships****SamplesDistresses**

Attributes: Enforced, Cascade Updates, Cascade Deletes  
 RelationshipType: One-To-Many

**Table Indexes**

Name	Number of Fields
_SMPUNIQUEID	1
Fields:	
_SMPUNIQUEID	Ascending
Distress	1
Fields:	
Distress	Ascending
Reference4	1
Fields:	
_SMPUNIQUEID	Ascending
SEVERITY	1
Fields:	
SEVERITY	Ascending

**Properties**

DateCreated: 2/7/1995 1:02:16 PM

LastUpdated: 2/29/1996 10:53:21 AM

RecordCount: 11

Updatable: True

**Columns**

Name	Type	Size
FieldName	Text	60
Units	Text	20
_LinearSquareVolume	Text	20

**Table Indexes**

Name	Number of Fields
PrimaryKey	1
Fields:	
FieldName	Ascending

### Properties

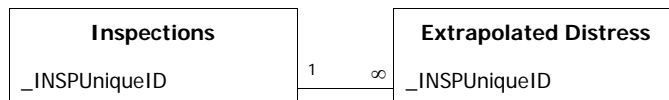
DateCreated:	3/9/1994 2:49:41 PM	LastUpdated:	5/12/1998 8:26:01 AM
RecordCount:	3108	Updatable:	True

### Columns

Name	Type	Size
Distress	Double	8
Severity	Text	1
_Quantity	Double	8
AuxReal1	Double	8
AuxReal2	Double	8
AuxReal3	Double	8
AuxReal4	Double	8
AuxInt1	Long Integer	4
AuxInt2	Long Integer	4
AuxStr	Text	50
_QuantityUnits	Text	60
_INSPUniqueID	Text	20

### Relationships

#### InspectionsExtrapolated Distress



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

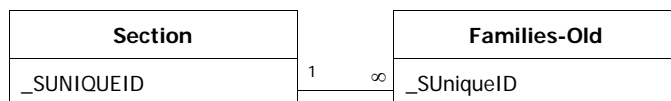
Name	Number of Fields
_INSPUniqueID	1
Fields:	
_INSPUniqueID	Ascending
Distress	1
Fields:	
Distress	Ascending
Reference6	1
Fields:	
_INSPUniqueID	Ascending
Severity	1
Fields:	
Severity	Ascending

**Properties**

DateCreated: 2/20/1994 11:40:53 AM LastUpdated: 9/7/2001 6:19:15 AM  
 RecordCount: 0 Updatable: True

**Columns**

Name	Type	Size
_SUniqueID	Text	20
_MUniqueID	Text	20
_CTUniqueID	Text	30

**Relationships****SectionFamilies-Old**

Attributes: Enforced, Cascade Deletes  
 RelationshipType: One-To-Many

**Table Indexes**

Name	Number of Fields
_CTUniqueID	1
Fields:	
_CTUniqueID	Ascending
_MUniqueID	1
Fields:	
_MUniqueID	Ascending
_SUniqueID	1
Fields:	
_SUniqueID	Ascending
PrimaryKey	3
Fields:	
_MUniqueID	Ascending
_CTUniqueID	Ascending
_SUniqueID	Ascending
Reference7	1
Fields:	
_SUniqueID	Ascending

**Properties**

DateCreated:	9/6/2001 8:59:43 AM	LastUpdated:	9/6/2001 8:59:43 AM
RecordCount:	457	Updatable:	True

**Columns**

Name	Type	Size
_SUniqueID	Text	20
_FAMUniqueID	Text	20
_FTUniqueID	Text	20

**Table Indexes**

Name	Number of Fields
PrimaryKey	3
Fields:	
_SUniqueID	Ascending
_FAMUniqueID	Ascending
_FTUniqueID	Ascending

### **Properties**

DateCreated:	9/6/2001 8:59:43 AM	LastUpdated:	9/6/2001 8:59:43 AM
RecordCount:	0	Updatable:	True

### **Columns**

Name	Type	Size
Condition	Single	4
_Latest	Yes/No	1
TextValue	Text	20
Method	Text	30
Pct Load	Single	4
Climate/Durability	Single	4
Other	Single	4
_SUniqueID	Text	20
_MUniqueID	Text	20
_CUniqueID	Text	20
_INSPUniqueID	Text	20
Source	Text	70

### **Table Indexes**

Name	Number of Fields
_INSPUniqueID	1
Fields:	
_INSPUniqueID	Ascending
_Latest	1
Fields:	
_Latest	Ascending
_MUniqueID	1
Fields:	
_MUniqueID	Ascending
_SUniqueID	1
Fields:	
_SUniqueID	Ascending
Method	1
Fields:	
Method	Ascending
PrimaryKey	1
Fields:	
_CUniqueID	Ascending
Reference16	1
Fields:	
_SUniqueID	Ascending
Reference5	1
Fields:	
_INSPUniqueID	Ascending
Reference9	1

Fields:  
Method                      Ascending



**Properties**

DateCreated:	9/6/2001 8:59:43 AM	LastUpdated:	9/6/2001 8:59:43 AM
RecordCount:	0	Updatable:	True

**Columns**

Name	Type	Size
Distress	Double	8
Description	Text	40
SEVERITY	Text	3
Units	Text	10
Comments	Text	254
_QUANTITY	Double	8
_QuantityUnits	Text	60
_SMPUNIQUEID	Text	20

**Table Indexes**

Name	Number of Fields
_SMPUNIQUEID	1
Fields:	
_SMPUNIQUEID	Ascending
Distress	1
Fields:	
Distress	Ascending
Reference4	1
Fields:	
_SMPUNIQUEID	Ascending
SEVERITY	1
Fields:	
SEVERITY	Ascending

**Properties**

DateCreated:	9/6/2001 8:59:43 AM	LastUpdated:	9/6/2001 8:59:43 AM
RecordCount:	0	Updatable:	True

**Columns**

Name	Type	Size
_FRMUniqueID	Text	20
_FRMSMPUniqueID	Text	20
FRMSize	Double	8
FRMUnits	Text	20
FRStartDist	Text	20
FREndDist	Text	20
FRLatitude	Text	20
FRLongitude	Text	20
FRMSource	Text	70

**Table Indexes**

Name	Number of Fields
_FRMUniqueID	1
Fields:	
_FRMUniqueID	Ascending

**Properties**

DateCreated:	2/21/1994 9:00:12 AM	LastUpdated:	12/19/1994 11:04:35 AM
RecordCount:	1	Updatable:	True

**Columns**

Name	Type	Size
Agency ID	Text	5
Agency Name	Text	61
Password	Text	23
Units	Text	15
Name	Text	25
Phone	Text	21
Address	Text	52
CityState	Text	30
Zip	Text	10
_DBUniqueID	Text	10
_DBSourceType	Text	10

### **Properties**

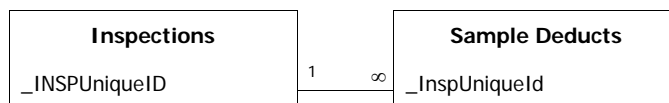
DateCreated:	2/10/1994 9:55:13 AM	LastUpdated:	10/19/2001 8:23:18 AM
OrderByOn:	False	RecordCount:	1100
Updatable:	True		

### **Columns**

Name	Type	Size
DATE	Date/Time	8
SAMPLES	Double	8
_SURVEYED	Double	8
Comments	Text	254
Inspected Surface	Text	10
_SUNIQUEID	Text	20
_INSPUniqueID	Text	20
_Dirty	Yes/No	1
Source	Text	70
Inspected Use	Text	10
_HistoryUniqueID	Text	20
Inspected Area	Double	8
Inspected Slabs	Double	8
_Surface Category	Text	20
_Use Category	Text	20
Inspected Const Date	Date/Time	8
Details	Memo	-
_ConstructionInspection	Yes/No	1
_DistressInspection	Yes/No	1
_OtherCondInspection	Yes/No	1
_DataIsMissing	Yes/No	1
_Flag1	Yes/No	1
_Flag2	Yes/No	1
_Flag3	Yes/No	1
_Flag4	Yes/No	1

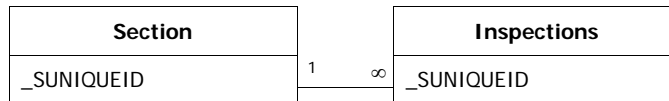
### **Relationships**

#### **InspectionsSample Deducts**



Attributes:	Enforced, Cascade Updates, Cascade Deletes
RelationshipType:	One-To-Many

### SectionInspections



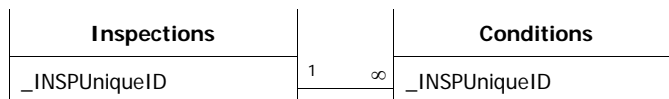
Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### InspectionsSamples



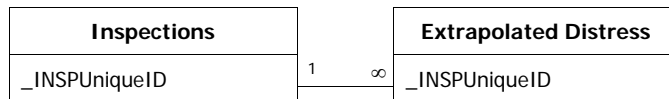
Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### InspectionsConditions



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### InspectionsExtrapolated Distress



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_Dirty	1
Fields:	
_Dirty	Ascending
_HistoryUniqueID	1
Fields:	
_HistoryUniqueID	Ascending
_SUNIQUEID	1
Fields:	
_SUNIQUEID	Ascending
DATE	1

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Fields:	
DATE	Ascending
Inspected Surface	1
Fields:	
Inspected Surface	Ascending
PrimaryKey	1
Fields:	
_INSPUniqueID	Ascending
Reference15	1
Fields:	
_SUNIQUEID	Ascending

### Properties

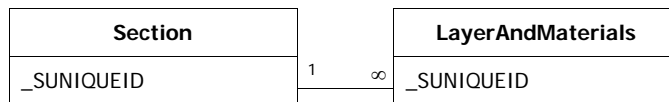
DateCreated: 2/10/1994 9:55:18 AM LastUpdated: 5/12/1998 8:28:01 AM  
RecordCount: 0 Updatable: True

### Columns

Name	Type	Size
LAYER	Text	10
TEST_TYPE	Text	50
TEST_DATE	Date/Time	8
LOCATION	Text	10
VALUE	Text	10
UNITS	Text	10
DEPTH	Text	10
DEPTH_UNIT	Text	10
Comments	Text	70
_SUNIQUEID	Text	20
_LMTUniqueID	Text	20

### Relationships

#### SectionLayerAndMaterials



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_SUNIQUEID	1
Fields:	
_SUNIQUEID	Ascending
LAYER	1
Fields:	
LAYER	Ascending
PrimaryKey	1
Fields:	
_LMTUniqueID	Ascending
Reference11	1
Fields:	
_SUNIQUEID	Ascending

**Properties**

DateCreated: 3/6/1995 10:05:30 AM

LastUpdated: 2/29/1996 10:56:15 AM

RecordCount: 11

Updatable: True

**Columns**

Name	Type	Size
FieldName	Text	60
Units	Text	20
_LinearSquareVolume	Text	20

**Table Indexes**

Name	Number of Fields
PrimaryKey	1
Fields:	
FieldName	Ascending



### Properties

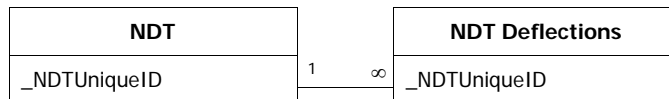
DateCreated:	2/10/1994 9:55:28 AM	LastUpdated:	5/4/2001 1:37:51 PM
OrderByOn:	False	RecordCount:	0
Updatable:	True		

### Columns

Name	Type	Size
Location	Text	25
Station	Text	10
Date	Date/Time	8
Pavement Temperature	Single	4
Surface Temperature	Single	4
Plate Radius	Single	4
Applied Load	Double	8
Max Deflection	Single	4
Load Transfer	Single	4
NDT Type	Text	10
Comments	Memo	-
_SUNIQUEID	Text	20
_NDTUniqueID	Text	20

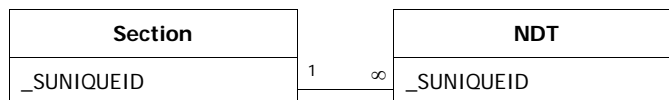
### Relationships

#### NDTNDT Deflections



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### SectionNDT



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_SUNIQUEID	1
Fields:	
_SUNIQUEID	Ascending

---

Location	1
Fields:	
Location	Ascending
PrimaryKey	1
Fields:	
_NDTUniqueID	Ascending
Reference13	1
Fields:	
_SUNIQUEID	Ascending

### Properties

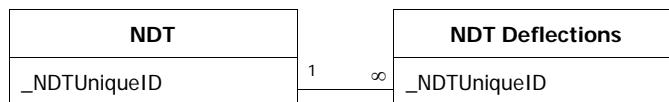
DateCreated: 11/30/1994 11:05:24 AM LastUpdated: 5/4/2001 1:38:13 PM  
OrderByOn: False RecordCount: 0  
Updatable: True

### Columns

Name	Type	Size
Sensor Number	Integer	2
Sensor Distance	Single	4
Sensor Position	Text	10
Sensor Deflection	Single	4
_SENSORUNIQUEID	Text	20
_NDTUniqueID	Text	20

### Relationships

#### NDTNDT Deflections



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

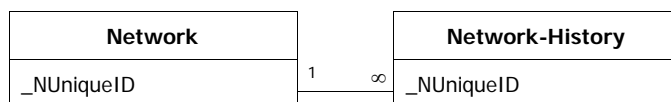
Name	Number of Fields
_NDTUniqueID	1
Fields:	
_NDTUniqueID	Ascending
PrimaryKey	1
Fields:	
_SENSORUNIQUEID	Ascending
Reference1	1
Fields:	
_NDTUniqueID	Ascending
Sensor Number	1
Fields:	
Sensor Number	Ascending

**Properties**

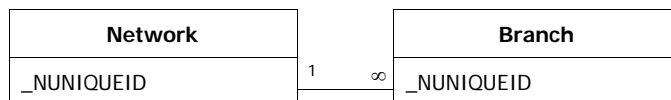
DateCreated: 2/10/1994 9:55:35 AM LastUpdated: 11/7/2006 2:16:46 PM  
 RecordCount: 3 Updatable: True

**Columns**

Name	Type	Size
NetworkID	Text	10
Name	Text	61
Nsort1	Text	10
Nsort2	Text	10
Nsort3	Text	10
Comments	Text	70
_NUNIQUEID	Text	20

**Relationships****NetworkNetwork-History**

Attributes: Enforced, Cascade Updates, Cascade Deletes  
 RelationshipType: One-To-Many

**NetworkBranch**

Attributes: Enforced, Cascade Updates, Cascade Deletes  
 RelationshipType: One-To-Many

**Table Indexes**

Name	Number of Fields
Name	1
Fields:	
Name	Ascending
NetworkID	1
Fields:	
NetworkID	Ascending
Nsort1	1
Fields:	
Nsort1	Ascending
Nsort2	1

---

	Fields:	
	Nsort2	Ascending
Nsort3		1
	Fields:	
	Nsort3	Ascending
PrimaryKey		1
	Fields:	
	_NUNIQUEID	Ascending

### Properties

DateCreated: 11/7/2006 2:16:45 PM LastUpdated: 11/7/2006 4:47:40 PM  
RecordCount: 7 Updatable: True

### Columns

Name	Type	Size
_NUNIQUEID	Text	20
UFLD)<KY^8@Mn9S#E2sX	Text	4
_UFLD/W-Y=E#KB@/G;YV-	Text	8
_UFLD%X_??7IN>=5s0nC	Text	1
_UFLD-*Y(HNHQ@Mp8h#D^	Text	8
_UFLD,07D#1VDD)#(*-R(	Text	4
_UFLDK<FNH=sR#U?)OM&)	Text	15
_UFLDsKL@#>\$OO(U;Q\$*;	Text	255
_UFLD-WRsWYI&2\^P3UNG	Text	16
_UFLD#^WCEA\As6POOn?-	Text	1
_UFLDU\$sV_O)IS\$4(LXF_	Text	1
_UFLDs\$L56GnT49UU7,YJ	Text	255
_UFLD29X#*_B6:R\$:LHB	Text	255
_UFLDBQ_,*#=FR;5\$HO*<	Yes/No	1
_UFLD/XHXJSBDQ;sXnJ84	Yes/No	1
_UFLDisP-<>NS*Z\H;)@Q	Yes/No	1
_UFLD=I\$s@s@5p/IE6W=n8	Yes/No	1
_UFLDQ%)HI\%sJWHHDXJD	Text	10
_UFLDCsUXK^N@:>H#71>&	Text	255
_UFLD@_X<U>*sH)C_&@=6	Text	10

### Table Indexes

Name	Number of Fields
PrimaryKey	1
Fields:	
_NUNIQUEID	Ascending

### Properties

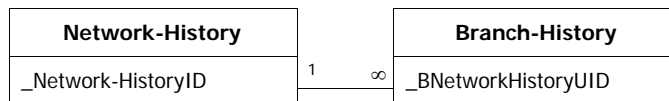
DateCreated: 9/6/2001 8:59:43 AM LastUpdated: 11/7/2006 2:16:46 PM  
RecordCount: 3 Updatable: True

### Columns

Name	Type	Size
_TimeStamp	Date/Time	8
_Network-HistoryID	Text	20
NetworkID	Text	10
Name	Text	61
Nsort1	Text	10
Nsort2	Text	10
Nsort3	Text	10
Comments	Text	70
_NUNIQUEID	Text	20

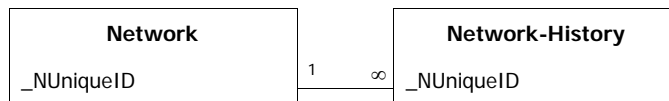
### Relationships

#### Network-HistoryBranch-History



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### NetworkNetwork-History



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
Network-Network-History	1
Fields:	
_NUNIQUEID	Ascending
PrimaryKey	1
Fields:	
_Network-HistoryID	Ascending

**Properties**

DateCreated:	10/4/2001 10:38:14 AM	LastUpdated:	10/4/2001 10:38:14 AM
OrderByOn:	False	RecordCount:	0
Updatable:	True		

**Columns**

Name	Type	Size
Report	Text	50
_SUniqueID	Text	20

**Table Indexes**

Name	Number of Fields
_SUniqueID	1
Fields:	
_SUniqueID	Ascending
PrimaryKey	2
Fields:	
Report	Ascending
_SUniqueID	Ascending



### Properties

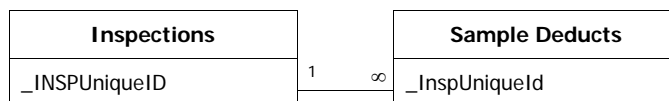
DateCreated: 3/6/1995 3:35:28 PM LastUpdated: 5/12/1998 8:29:43 AM  
RecordCount: 4013 Updatable: True

### Columns

Name	Type	Size
_InspUniqueId	Text	20
SampleNr	Text	10
Distress	Integer	2
Description	Text	40
Severity	Text	1
_Quantity	Double	8
_QuantityUnits	Text	60
Density	Single	4
Deduct	Single	4

### Relationships

#### InspectionsSample Deducts



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_InspUniqueId	1
Fields:	
_InspUniqueId	Ascending
Deduct	1
Fields:	
Deduct	Ascending
Distress	1
Fields:	
Distress	Ascending
Index1	2
Fields:	
_InspUniqueId	Ascending
SampleNr	Ascending
Reference10	1
Fields:	
_InspUniqueId	Ascending
SampleNr	1

Fields:

SampleNr

Ascending

### Properties

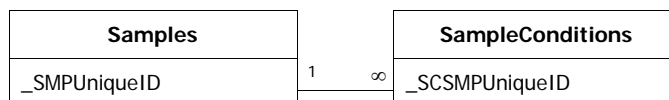
DateCreated:	9/6/2001 8:59:43 AM	LastUpdated:	10/16/2001 2:15:22 PM
OrderByOn:	False	RecordCount:	8523
Updatable:	True		

### Columns

Name	Type	Size
_SCUniqueID	Text	20
_SCCMUniqueID	Text	30
_SCSMPUniqueID	Text	20
Condition	Single	4
TextValue	Text	20
Pct Load	Single	4
Climate/Durability	Single	4
Other	Single	4
Source	Text	70
Flag0	Yes/No	1
Flag1	Yes/No	1
Flag2	Yes/No	1
Flag3	Yes/No	1
Flag4	Yes/No	1
Flag5	Yes/No	1
Flag6	Yes/No	1
Flag7	Yes/No	1

### Relationships

#### SamplesSampleConditions



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_SUniqueID	1
Fields:	
_SCSMPUniqueID	Ascending
Method	1
Fields:	
_SCCMUniqueID	Ascending
PrimaryKey	1
Fields:	
_SCUniqueID	Ascending

---

Reference16	1
Fields:	
_SCSMPUniqueID	Ascending
Reference9	1
Fields:	
_SCCMUniqueID	Ascending
SamplesSampleConditions	1
Fields:	
_SCSMPUniqueID	Ascending

### Properties

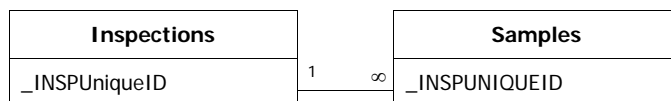
DateCreated:	2/10/1994 9:55:49 AM	LastUpdated:	10/16/2001 1:57:41 PM
OrderByOn:	False	RecordCount:	4308
Updatable:	True		

### Columns

Name	Type	Size
SAMPLENR	Text	5
SAMPLETYPE	Text	10
_SampleSize	Double	8
Comments	Text	254
_INSPUNIQUEID	Text	20
_SMPUniqueID	Text	20
_SampleSizeUnits	Text	60
NoDistresses	Yes/No	1

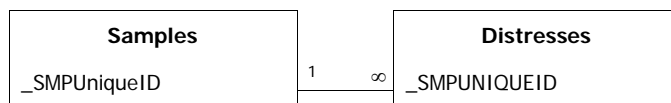
### Relationships

#### InspectionsSamples



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### SamplesDistresses



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### SamplesSampleConditions



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
<u>_INSPUNIQUEID</u>	1
Fields:	
_INSPUNIQUEID	Ascending
PrimaryKey	1
Fields:	
_SMPUniqueID	Ascending
Reference3	1
Fields:	
_INSPUNIQUEID	Ascending
SAMPLENR	1
Fields:	
SAMPLENR	Ascending

**Properties**

DateCreated: 2/10/1994 9:55:54 AM

LastUpdated: 11/8/2006 3:45:03 PM

OrderByOn: True

RecordCount: 451

DefaultView:

Datasheet

OrderBy:

Section.SectionID

Orientation:

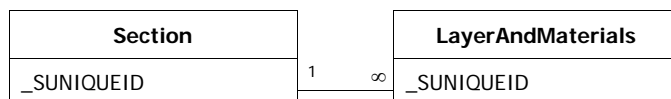
Left-to-Right

Updatable:

True

**Columns**

Name	Type	Size
SectionID	Text	10
From	Text	35
To	Text	35
Zone	Text	4
Category	Text	1
Rank	Text	20
Surface	Text	20
_Length	Double	8
_Width	Double	8
Const_Date	Date/Time	8
_Slab_Width	Double	8
_Slab_Leng	Double	8
Slabs	Double	8
_Joint_Len	Double	8
Shoulder	Text	3
Street_Type	Text	3
Grade	Double	8
Lanes	Byte	1
Ssort1	Text	10
Ssort2	Text	10
Ssort3	Text	10
Comments	Text	70
_SUNIQUEID	Text	20
_BUNIQUEID	Text	20
_Section_Area_Units	Text	20
_Section_Linear_Units	Text	20
_Area Adjustment	Double	8

**Relationships****SectionLayerAndMaterials**

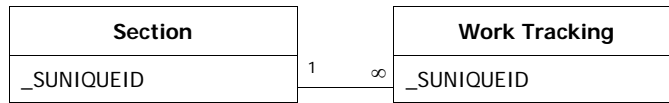
Attributes:

Enforced, Cascade Updates, Cascade Deletes

RelationshipType:

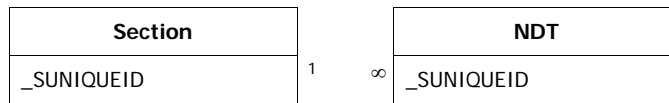
One-To-Many

#### SectionWork Tracking



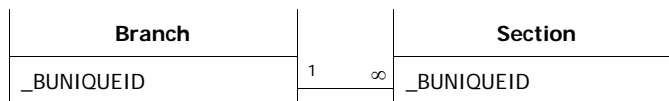
Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### SectionNDT



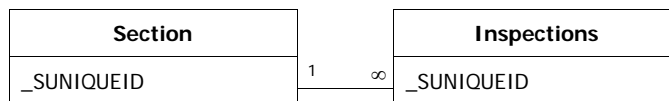
Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### BranchSection



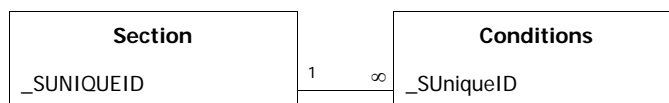
Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

#### SectionInspections



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

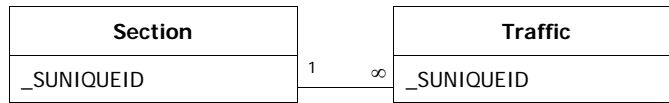
#### SectionConditions



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

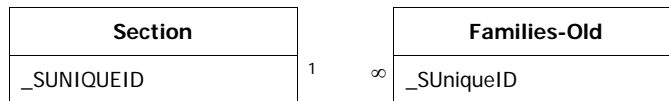


### SectionTraffic



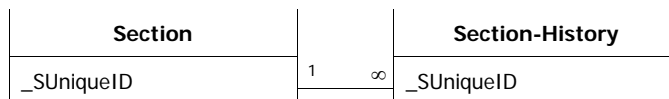
Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### SectionFamilies-Old



Attributes: Enforced, Cascade Deletes  
RelationshipType: One-To-Many

### SectionSection-History



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_BUNIQUEID	1
Fields:	
_BUNIQUEID	Ascending
Category	1
Fields:	
Category	Ascending
From	1
Fields:	
From	Ascending
Grade	1
Fields:	
Grade	Ascending
Lanes	1
Fields:	
Lanes	Ascending
PrimaryKey	1
Fields:	
_SUNIQUEID	Ascending
Rank	1

---

	Fields:	
	Rank	Ascending
Reference14		1
	Fields:	
	_BUNIQUEID	Ascending
SectionID		1
	Fields:	
	SectionID	Ascending
Shoulder		1
	Fields:	
	Shoulder	Ascending
Ssort1		1
	Fields:	
	Ssort1	Ascending
Ssort2		1
	Fields:	
	Ssort2	Ascending
Ssort3		1
	Fields:	
	Ssort3	Ascending
Street_Type		1
	Fields:	
	Street_Type	Ascending
Surface		1
	Fields:	
	Surface	Ascending
To		1
	Fields:	
	To	Ascending
Zone		1
	Fields:	
	Zone	Ascending

### Properties

DateCreated:	11/7/2006 2:16:45 PM	LastUpdated:	4/17/2007 2:50:31 PM
RecordCount:	1369	Updatable:	True

### Columns

Name	Type	Size
_SUNIQUEID	Text	20
UFLDsnpQ;^YHQ8G3SBN>	Text	1
UFLDO_FsU@\$<UNX8RWRZ	Text	15
UFLDU3nY:24,p\DH%81s	Text	255
UFLDG3sM3MJ#D=Z^D_WL	Yes/No	1
_UFLDZI**:P>=Y/<Q<6*L	Text	1
_UFLD^(PL6>M%p^:7(CVY	Text	255
_UFLD_:SPBPh;4AXH%5EH	Text	255
_UFLD_8YQ:O2?+/\9S:,L	Text	255
_UFLD5(TT\$NX+OVsnMX3P	Text	255
_UFLD5GsN%(Un71;CM/KE	Text	255
_UFLD8,Z%M#nCT1S=U/s:	Text	255
_UFLD/,5:15Bn?_A*<\$^6	Text	255
_UFLD<6@Q4H(P/?V%E\$_	Text	255
_UFLDJGOVF(J*sQM^I+:L	Text	255
_UFLDS3;R#-2SC(0X=+&O	Text	255
_UFLD9\$HLLpW_P_hGSBKN	Text	255
_UFLDK#(\TYP5&9SYnA-V	Text	255
_UFLDP+J>ORhLRKMUR=3T	Text	255
_UFLDPJ@VX4OWP-Y+\RK8	Text	255
_UFLDs*_A9@,CZ0)>*^#D	Text	255
_UFLDKM&#NRSJ_N?QXA\+	Text	1
_UFLD/V<^=R\Is%*9,5U)	Text	1
UFLDY)WZF#C%#An03JsD	Long Integer	4
_UFLD+USS-N+L)<VS=QU	Text	255
UFLD-*Pnps7,>7G9&^D8	Text	20
_UFLD*;G;?T9;VS5(AnSs	Long Integer	4
UFLDM&A#I4s<8GY9@<_G	Yes/No	1
UFLDAYs8=:;?2I@B;L,1	Text	50
UFLD2+YW_?FsR(nXWFK*	Yes/No	1
UFLDLV\4^P*3NRJsMSZN	Text	100
_UFLDJ%#)FS<*K,s1@Q;	Long Integer	4

### Table Indexes

Name	Number of Fields
PrimaryKey	1
Fields:	
_SUNIQUEID	Ascending

### Properties

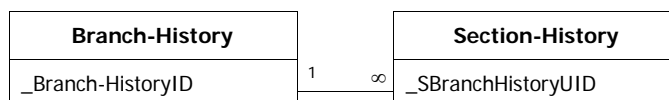
DateCreated:	9/6/2001 8:59:44 AM	LastUpdated:	11/7/2006 2:16:46 PM
OrderByOn:	False	Orientation:	Left-to-Right
RecordCount:	529	Updatable:	True

### Columns

Name	Type	Size
_TimeStamp	Date/Time	8
_Section-HistoryID	Text	20
SectionID	Text	10
From	Text	35
To	Text	35
Zone	Text	4
Category	Text	1
Rank	Text	20
Surface	Text	20
_Length	Double	8
_Width	Double	8
Const_Date	Date/Time	8
_Slab_Width	Double	8
_Slab_Leng	Double	8
Slabs	Double	8
_Joint_Len	Double	8
Shoulder	Text	3
Street_Type	Text	3
Grade	Double	8
Lanes	Byte	1
Ssort1	Text	10
Ssort2	Text	10
Ssort3	Text	10
Comments	Text	70
_SUNIQUEID	Text	20
_BUNIQUEID	Text	20
_Section_Area_Units	Text	20
_Section_Linear_Units	Text	20
_Area Adjustment	Double	8
_SBranchHistoryUID	Text	20

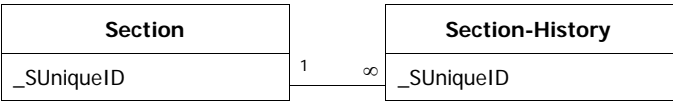
### Relationships

#### Branch-HistorySection-History



Attributes:	Enforced, Cascade Updates, Cascade Deletes
RelationshipType:	One-To-Many

SectionSection-History



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

Table Indexes

Name	Number of Fields
Branch-History-Section-History	1
Fields:	
_SBranchHistoryUID	Ascending
PrimaryKey	1
Fields:	
_Section-HistoryID	Ascending
Section-Section-History	1
Fields:	
_SUNIQUEID	Ascending

**Properties**

DateCreated:	12/22/1997 2:29:33 PM	LastUpdated:	12/22/1997 2:29:33 PM
RecordCount:	0	Updatable:	True

**Columns**

Name	Type	Size
FormID	Text	2
InspDate	Text	6
BranchID	Text	10
SectionID	Text	10
AddChangeDelete	Text	1
Ride	Text	3
Safety	Text	3
Drainage	Text	3
Shoulder	Text	3
Overall	Text	3
FOD	Text	3
NumSamples	Text	3
SampleUnit	Text	3
SampleType	Text	1
SampleArea	Text	8
DistressCode1	Text	2
Severity1	Text	1
Quantity1	Text	8
DistressCode2	Text	2
Severity2	Text	1
Quantity2	Text	8
DistressCode3	Text	2
Severity3	Text	1
Quantity3	Text	8
DistressCode4	Text	2
Severity4	Text	1
Quantity4	Text	8
ErrorCategory	Text	15
Misc	Text	255

**Properties**

DateCreated:	12/22/1997 2:29:35 PM	LastUpdated:	12/22/1997 2:29:36 PM
RecordCount:	0	Updatable:	True

**Columns**

Name	Type	Size
ErrorCategory	Text	15
FormID	Text	2
InspDate	Text	6
BranchID	Text	10
SectionID	Text	10
AddChangeDelete	Text	1
Ride	Text	3
Safety	Text	3
Drainage	Text	3
Shoulder	Text	3
Overall	Text	3
FOD	Text	3
NumSamples	Text	3
SampleUnit	Text	3
SampleType	Text	1
SampleArea	Text	8
DistressCode1	Text	2
Severity1	Text	1
Quantity1	Text	8
DistressCode2	Text	2
Severity2	Text	1
Quantity2	Text	8
DistressCode3	Text	2
Severity3	Text	1
Quantity3	Text	8
DistressCode4	Text	2
Severity4	Text	1
Quantity4	Text	8
BadRecText	Text	255

### Properties

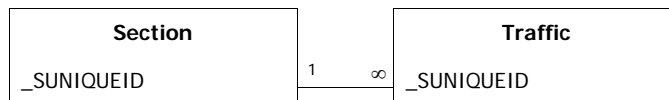
DateCreated: 11/30/1994 11:15:42 AM LastUpdated: 5/4/2001 1:40:08 PM  
OrderByOn: False RecordCount: 0  
Updatable: True

### Columns

Name	Type	Size
FROM	Date/Time	8
TO	Date/Time	8
ADT	Double	8
2 AXLE	Double	8
3 AXLE	Double	8
ANNUAL ESAL	Double	8
TYPE	Text	15
GROUP	Text	10
ID	Text	20
LOAD	Double	8
ANNUAL DEPART	Double	8
TOTAL DEPART	Double	8
CRITICAL TYPE	Yes/No	1
GROWTH	Double	8
Comments	Memo	-
_SUNIQUEID	Text	20
_TUniqueID	Text	20
_TrafficType	Text	3

### Relationships

#### SectionTraffic



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_SUNIQUEID	1
Fields:	
_SUNIQUEID	Ascending
_TrafficType	1
Fields:	
_TrafficType	Ascending
FROM	1



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Fields:	
FROM	Ascending
PrimaryKey	1
Fields:	
_TUniqueID	Ascending
Reference2	1
Fields:	
_SUNIQUEID	Ascending
TO	1
Fields:	
TO	Ascending

**Properties**

DateCreated:	8/14/1996 2:41:27 PM	LastUpdated:	8/14/1996 2:41:27 PM
RecordCount:	10	Updatable:	True

**Columns**

Name	Type	Size
Units	Text	20
_UnitMultiplier	Double	8
_UnitDivisor	Double	8

**Table Indexes**

Name	Number of Fields
PrimaryKey	1
Fields:	
Units	Ascending

**Properties**

DateCreated:	3/1/1996 6:03:05 PM	LastUpdated:	5/4/2001 1:40:31 PM
OrderByOn:	False	RecordCount:	11
Updatable:	True		

**Columns**

Name	Type	Size
FieldName	Text	60
Units	Text	20
_LinearSquareVolume	Text	20
_UnitMultiplier	Double	8
_UnitDivisor	Double	8

**Table Indexes**

Name	Number of Fields
PrimaryKey	1
Fields:	
FieldName	Ascending

**Properties**

DateCreated:	7/25/1996 1:32:36 PM	LastUpdated:	9/6/2001 2:09:12 PM
OrderByOn:	False	RecordCount:	1
Updatable:	True		

**Columns**

Name	Type	Size
Paver Version	Text	50
Schema Version	Text	50

### Properties

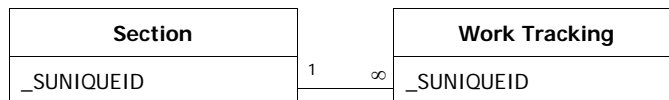
DateCreated: 2/10/1994 9:55:59 AM LastUpdated: 9/6/2001 8:59:48 AM  
OrderByOn: False RecordCount: 723  
Updatable: True

### Columns

Name	Type	Size
DATE	Date/Time	8
PROJECT	Text	12
PHASE	Text	2
Work	Text	60
TYPE	Text	10
_QUANTITY	Double	8
COST	Double	8
MATTYPE	Text	60
MATERIAL	Text	10
_THICKNESS	Double	8
Comments	Text	70
_SUNIQUEID	Text	20
_WHUniqueID	Text	20
Work Completed	Yes/No	1
Major MR	Yes/No	1
_Work_Area_Units	Text	20
_Work_Linear_Units	Text	20
_THICKNESS_UNITS	Text	20
Thickness Units	Text	20
_QUANTITY_UNITS	Text	20
Quantity Units	Text	20

### Relationships

#### SectionWork Tracking



Attributes: Enforced, Cascade Updates, Cascade Deletes  
RelationshipType: One-To-Many

### Table Indexes

Name	Number of Fields
_SUNIQUEID	1
Fields:	
_SUNIQUEID	Ascending
DATE	1

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Fields:	
DATE	Ascending
Major MR	1
Fields:	
Major MR	Ascending
PrimaryKey	1
Fields:	
_WHUniqueID	Ascending
Reference12	1
Fields:	
_SUNIQUEID	Ascending
Typical	2
Fields:	
_SUNIQUEID	Ascending
DATE	Ascending
Work Completed	1
Fields:	
Work Completed	Ascending

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## **MICROPAVER GIS INVENTORY REPORT SCHEMA**



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### Properties

Attributes:	Linked	Connect:	dBase 5.0;HDR=NO;IMEX=2;DATAB ASE=C:\EMS Program Files\User Data\holloman\GISView - Inventory
DateCreated:	5/16/2007 1:26:45 PM	LastUpdated:	5/16/2007 1:26:45 PM
RecordCount:	-1	SourceTableName:	holl06.DBF
Updatable:	False		

### Columns

Name	Type	Size
UNIQUEID	Text	20
ORDERED	Double	8
NETWORKID	Text	10
NNAME	Text	61
NCOMMENTS	Text	70
NSORT1	Text	10
NSORT2	Text	10
NSORT3	Text	10
BRANCHID	Text	10
BNAME	Text	35
USE	Text	10
SECTIONS	Double	8
BAREA	Double	8
BAREAUNIT	Text	50
BAREAADJ	Double	8
BCOMMENTS	Text	70
BSORT1	Text	10
BSORT2	Text	10
BSORT3	Text	10
SECTIONID	Text	10
FROM	Text	35
TO	Text	35
CONST_DATE	Date/Time	8
LENGTH	Double	8
WIDTH	Double	8
LXW	Double	8
SAREAADJ	Double	8
STRUEAREA	Double	8
ZONE	Text	4
ZONEDESC	Text	30
CATEGORY	Text	1
CATDESC	Text	30
RANK	Text	1
SURFACE	Text	3
SLABS	Double	8
SLAB_WIDTH	Double	8
SLAB LENGT	Double	8
JOINT LENG	Double	8

STREET_TYP	Text	3
GRADE	Double	8
LANES	Double	8
SSORT1	Text	10
SSORT2	Text	10
SSORT3	Text	10
SCOMMENTS	Text	70
SLINUNITS	Text	50
SAREAUNITS	Text	50
LASTINSP	Date/Time	8
GIS_INVENT	Text	254
LASTMAJOR	Date/Time	8
LASTGLMAJ	Date/Time	8
LASTGLOBAL	Date/Time	8
LASTLOCMAJ	Date/Time	8
LASTLOCAL	Date/Time	8
PCI_FAMILY	Text	254
GIS_DISTRE	Text	20
SAMPLES	Double	8
PCT_LOAD	Double	8
CLIMATE_DU	Double	8
OTHER	Double	8
DC01	Double	8
DC02	Double	8
DC03	Double	8
DC04	Double	8
DC05	Double	8
DC06	Double	8
DC07	Double	8
DC08	Double	8
DC09	Double	8
DC10	Double	8
DC11	Double	8
DC12	Double	8
DC13	Double	8
DC14	Double	8
DC15	Double	8
DC16	Double	8
DC17	Double	8
DC18	Double	8
DC19	Double	8
DC21	Double	8
DC22	Double	8
DC23	Double	8
DC24	Double	8
DC25	Double	8
DC26	Double	8
DC27	Double	8
DC28	Double	8
DC29	Double	8
DC30	Double	8
DC31	Double	8
DC32	Double	8
DC33	Double	8

DC34	Double	8
DC35	Double	8
DC36	Double	8
DC37	Double	8
DC38	Double	8
DC39	Double	8
DC41	Double	8
DC42	Double	8
DC43	Double	8
DC44	Double	8
DC45	Double	8
DC46	Double	8
DC47	Double	8
DC48	Double	8
DC49	Double	8
DC50	Double	8
DC51	Double	8
DC52	Double	8
DC53	Double	8
DC54	Double	8
DC55	Double	8
DC56	Double	8
DC61	Double	8
DC62	Double	8
DC63	Double	8
DC64	Double	8
DC65	Double	8
DC66	Double	8
DC67	Double	8
DC68	Double	8
DC69	Double	8
DC70	Double	8
DC71	Double	8
DC72	Double	8
DC73	Double	8
DC74	Double	8
DC75	Double	8
DC81	Double	8
DC82	Double	8
DC83	Double	8
DC84	Double	8
DC85	Double	8
DC86	Double	8
DC87	Double	8
GIS_LATEST	Text	20
FOD	Double	8
PCI	Double	8
SCI	Double	8
XSUNIQUEID	Text	20

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## **MICROPAVER GIS CONDITION REPORT SCHEMA**

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### **Properties**

Attributes:	Linked	Connect:	dBase 5.0;HDR=NO;IMEX=2;DATAB ASE=C:\EMS Program Files\User Data\holloman\GISView - Cond00007
DateCreated:	5/16/2007 1:28:48 PM	LastUpdated:	5/16/2007 1:28:48 PM
RecordCount:	-1	SourceTableName:	holl06.DBF
Updatable:	False		

### **Columns**

Name	Type	Size
UNIQUEID	Text	20
ORDERED	Double	8
CONDITION	Double	8
TEXTVALUE	Text	20
METHOD	Text	30
PCT_LOAD	Double	8
CLIMATE_DU	Double	8
OTHER	Double	8
SOURCE	Text	70
XSUNIQUEID	Text	20



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**AFID DATABASE SCHEMA**

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## AFID DATABASE SCHEMA, FROM PARSONS, 2001.

Database table: Airport

Field	Type	Description
id	char(4)	FAA identifier code
name	char(60)	official name of the airport
city	char(30)	city where the airport is located
type	enum	classification of airport

Database table: Branch

Field	Type	Description
id	int	internal branch reference
airport_id	char(4)	FAA identifier code
type	enum	branch use
name	char(5)	branch designation
xref	int(11)	X-coordinate of branch origin
yref	int(11)	Y-coordinate of branch origin
orientation	int(3)	orientation of longitudinal branch axis

Database table: Sections

Field	Type	Description
id	int	section reference (auto_increment, unsigned)
branch_number	int	branch reference (unsigned)
name	char(30)	common section name
size	float(12,1)	section size
type	enum	construction material
remarks	text	comments
x1	float(6,1)	transverse coordinate of first section corner
y1	float(7,1)	longitudinal coordinate of first section corner
x2	float(6,1)	transverse coordinate of second section corner
y2	float(7,1)	longitudinal coordinate of second section corner
slab_x	float(4,1)	slab width
slab_y	float(4,1)	slab length

Database table: Locations

Field	Type	Description
loc_id	int	internal location reference
branch_number	int	internal branch reference
trans	float(5,1)	transverse location on branch
longitude	float(7,1)	longitudinal location on branch date
date	date	location was tested

Database table: Layer

Field	Type	Description
layer_id	int	internal layer reference

loc_id	int	internal location reference
type	enum	material type
remarks	text	field comments
bond	boolean	bonded to layer below?
disp	boolean	show this layer in analyses?
pos	int(4)	layer position
thickness	float(4,1)	layer thickness

Database table: Inspection History

Field	Type	Description
insp_id	int	internal reference
sxn_id	int	internal section reference
insp_date	date	inspection date
inspector	char(10)	inspector
remarks	text	comments

Database table: Project History

Field	Type	Description
record_id	int	internal reference
sxn_id	int	internal section reference
const_date	date	construction date
const_type	enum	construction type
cost	float(12,2)	project cost
details	text	details of construction

Database table: Sample Unit

Field	Type	Description
su_id	int	internal sample unit reference
insp_id	int	internal reference
name	char(10)	common sample unit name
extra	boolean	additional sample unit?
x1	float(7,1)	transverse coordinate of first corner
y1	float(7,1)	longitudinal coordinate of first corner
x2	float(7,1)	transverse coordinate of second corner
y2	float(7,1)	longitudinal coordinate of second corner

Database table: Distress Details

Field	Type	Description
dist_id	int	internal reference
su_id	int	internal sample unit reference
distress	int	distress code
severity	enum	distress severity
size	float(6,1)	size of distress

Database table: Atterberg Limits

Field	Type	Description
al_id	int	internal Atterberg test reference
layer_id	int	internal layer reference
np	boolean	non-plastic soil?
tester	char(10)	test personel
al_date	date	test date
pl	float(6,2)	plastic limit
ll	float(6,2)	liquid limit

Database table: Soil Moisture Content

Field	Type	Description
id	int	internal reference
loc_id	int	internal location reference
wet	float(6,2)	wet weight of sample dry
dry	float(6,2)	weight of sample
tare	float(6,2)	tare weight of sample
depth	float(4,1)	depth of sample (inches)

Database table: Hydrometer Tests

Field	Type	Description
hydro_id	int	internal hydrometer test reference
layer_id	int	internal layer reference
start	timestamp	start date and time of test
operator	char(10)	test personnel
spec_grav	float(4,2)	specific gravity
correction	int	meniscus correction value
wmass	float(5,2)	wet weight of soil sample in jar
temp	int	temperature of solution
wet	float(5,2)	moisture content sample wet weight
dry	float(5,2)	moisture content sample dry weight
tare	float(5,2)	moisture content sample weight of tare
control	int(4)	control jar reading
tare_200	float(6,1)	tare weight of fraction retained on #200 sieve
dry_200	float(6,1)	dry weight of fraction retained on #200 sieve
dry_40	float(5,1)	dry weight of fraction retained on #40 sieve

Database table: Hydrometer Readings

Field	Type	Description
hr_id	autonumber	internal hydrometer reading reference
hydro_id	integer	internal hydrometer test reference
e_time	time	elapsed time
time	timestamp	time and date of reading
reading	integer	hydrometer reading

Database table: Sieve Tests

Field	Type	Description
sieve_id	int	internal sieve test reference
layer_id	int	internal layer reference
date	date	date of test
operator	char(10)	test personnel
wet_10	float(7,2)	mass initially passing #10 sieve
wet	float(5,2)	moisture content sample wet weight
dry	float(5,2)	moisture content sample dry weight
tare	float(5,2)	moisture content sample tare weight

Database table: Sieve Readings

Field	Type	Description
sr_id	int	internal reference
sieve_id	int	internal sieve test reference
s_num	char(4)	standard sieve number weight
weight	float(7,2)	retained on sieve tare weight of
tare	float(7,2)	sieve

Database table: Modulus

Field	Type	Description
mod_id	autonumber	internal modulus test reference
layer_id	integer	internal layer reference
type	enum	type of modulus test
modulus	int	modulus value
units	enum	units of modulus

Database table: Dynamic Cone Penetrometer Tests

Field	Type	Description
dcp_id	int	internal DCP test reference
loc_id	int	internal location reference
reading	int	reading height of DCP test
date	date	date of test
operator	char(10)	test operator(s)
refusal	boolean	DCP refused?
remarks	text	comments

Database table: Dynamic Cone Penetrometer Readings

Field	Type	Description
dcpr_id	int	internal DCP reading reference
dcp_id	int	internal DCP test reference
reading	int	DCP reading
num_blows	int	number of blows since last reading

Database table: Sieve Size Conversion Table

Field	Type	Description
number	char(4)	standard sieve number
size	int	corresponding sieve size

Database table: Deduct Value Tables

Field	Type	Description
distress	autonumber	internal reference
severity	integer	distress code
density	float	density of distress
dv	integer	deduct value

Database table: Distress Definition Table

Field	Type	Description
distress	integer	distress code
name	text	name of distress
cause	enum	cause of distress
units	text	unit distress is measured in
material	enum	distress found in PCC or AC



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## **AIRPAV GIS EXPORT SCHEMA**

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**Properties**

DateCreated:	8/13/2004 1:50:30 PM	LastUpdated:	12/21/2005 4:00:56 PM
OrderByOn:	False	RecordCount:	0
Updatable:	True		

**Columns**

Name	Type	Size
AddID	Long Integer	4
APTID	Text	5
Feature_ID	Long Integer	4
AC_Allig_H	Long Integer	4
AC_Allig_M	Long Integer	4
AC_Allig_L	Long Integer	4
AC_Bleed_H	Long Integer	4
AC_Bleed_M	Long Integer	4
AC_Bleed_L	Long Integer	4
AC_Block_H	Long Integer	4
AC_Block_M	Long Integer	4
AC_Block_L	Long Integer	4
AC_Corrug_H	Long Integer	4
AC_Corrug_M	Long Integer	4
AC_Corrug_L	Long Integer	4
AC_Depr_H	Long Integer	4
AC_Depr_M	Long Integer	4
AC_Depr_L	Long Integer	4
AC_Blast_H	Long Integer	4
AC_Blast_M	Long Integer	4
AC_Blast_L	Long Integer	4
AC_Long_H	Long Integer	4
AC_Long_M	Long Integer	4
AC_Long_L	Long Integer	4
AC_JointRef_H	Long Integer	4
AC_JointRef_M	Long Integer	4
AC_JointRef_L	Long Integer	4
AC_OilSpill_H	Long Integer	4
AC_OilSpill_M	Long Integer	4
AC_OilSpill_L	Long Integer	4
AC_Patch_H	Long Integer	4
AC_Patch_M	Long Integer	4
AC_Patch_L	Long Integer	4
AC_Polished_H	Long Integer	4
AC_Polished_M	Long Integer	4
AC_Polished_L	Long Integer	4
AC_Weather_H	Long Integer	4
AC_Weather_M	Long Integer	4
AC_Weather_L	Long Integer	4
AC_Rutting_H	Long Integer	4
AC_Rutting_M	Long Integer	4
AC_Rutting_L	Long Integer	4
AC_Shoving_H	Long Integer	4

AC_Shoving_M	Long Integer	4
AC_Shoving_L	Long Integer	4
AC_Slippage_H	Long Integer	4
AC_Slippage_M	Long Integer	4
AC_Slippage_L	Long Integer	4
AC_Swell_H	Long Integer	4
AC_Swell_M	Long Integer	4
AC_Swell_L	Long Integer	4
PCC_Blowup_H	Long Integer	4
PCC_Blowup_M	Long Integer	4
PCC_Blowup_L	Long Integer	4
PCC_Corner_H	Long Integer	4
PCC_Corner_M	Long Integer	4
PCC_Corner_L	Long Integer	4
PCC_Crack_H	Long Integer	4
PCC_Crack_M	Long Integer	4
PCC_Crack_L	Long Integer	4
PCC_DCrack_H	Long Integer	4
PCC_DCrack_M	Long Integer	4
PCC_DCrack_L	Long Integer	4
PCC_Seal_H	Long Integer	4
PCC_Seal_M	Long Integer	4
PCC_Seal_L	Long Integer	4
PCC_SmPatch_H	Long Integer	4
PCC_SmPatch_M	Long Integer	4
PCC_SmPatch_L	Long Integer	4
PCC_LgPatch_H	Long Integer	4
PCC_LgPatch_M	Long Integer	4
PCC_LgPatch_L	Long Integer	4
PCC_Popout_H	Long Integer	4
PCC_Popout_M	Long Integer	4
PCC_Popout_L	Long Integer	4
PCC_Pumping_H	Long Integer	4
PCC_Pumping_M	Long Integer	4
PCC_Pumping_L	Long Integer	4
PCC_Scale_H	Long Integer	4
PCC_Scale_M	Long Integer	4
PCC_Scale_L	Long Integer	4
PCC_Fault_H	Long Integer	4
PCC_Fault_M	Long Integer	4
PCC_Fault_L	Long Integer	4
PCC_Divided_H	Long Integer	4
PCC_Divided_M	Long Integer	4
PCC_Divided_L	Long Integer	4
PCC_Shrink_H	Long Integer	4
PCC_Shrink_M	Long Integer	4
PCC_Shrink_L	Long Integer	4
PCC_JointSpall_H	Long Integer	4
PCC_JointSpall_M	Long Integer	4
PCC_JointSpall_L	Long Integer	4
PCC_CornerSpall_H	Long Integer	4
PCC_CornerSpall_M	Long Integer	4
PCC_CornerSpall_L	Long Integer	4

**Properties**

DateCreated:	8/13/2004 1:50:30 PM	LastUpdated:	12/21/2005 4:01:12 PM
OrderByOn:	False	RecordCount:	12
Updatable:	True		

**Columns**

Name	Type	Size
APTID	Text	5
Feature_ID	Long Integer	4
Desc	Text	50
Area	Long Integer	4
PaveType	Integer	2
PaveClass	Double	8
History1	Text	100
History2	Text	100
History3	Text	100
History4	Text	100
History5	Text	100
History6	Text	100
History7	Text	100
History8	Text	100
History9	Text	100
History10	Text	100
InspDate	Text	10
InspPCI	Integer	2
InspArea	Long Integer	4
MinLev	Integer	2
InspSlabs	Long Integer	4
CONYEAR	Integer	2
FEATUSED	Integer	2
TOTOPS	Long Integer	4
CBR	Double	8
kValue	Double	8
DesACFT	Text	50
DesOPS	Long Integer	4
ThickDeficiency	Double	8
AC_Allig_H	Long Integer	4
AC_Allig_M	Long Integer	4
AC_Allig_L	Long Integer	4
AC_Bleed_H	Long Integer	4
AC_Bleed_M	Long Integer	4
AC_Bleed_L	Long Integer	4
AC_Block_H	Long Integer	4
AC_Block_M	Long Integer	4
AC_Block_L	Long Integer	4
AC_Corrug_H	Long Integer	4
AC_Corrug_M	Long Integer	4
AC_Corrug_L	Long Integer	4
AC_Depr_H	Long Integer	4
AC_Depr_M	Long Integer	4

AC_Depr_L	Long Integer	4
AC_Blast_H	Long Integer	4
AC_Blast_M	Long Integer	4
AC_Blast_L	Long Integer	4
AC_Long_H	Long Integer	4
AC_Long_M	Long Integer	4
AC_Long_L	Long Integer	4
AC_JointRef_H	Long Integer	4
AC_JointRef_M	Long Integer	4
AC_JointRef_L	Long Integer	4
AC_OilSpill_H	Long Integer	4
AC_OilSpill_M	Long Integer	4
AC_OilSpill_L	Long Integer	4
AC_Patch_H	Long Integer	4
AC_Patch_M	Long Integer	4
AC_Patch_L	Long Integer	4
AC_Polished_H	Long Integer	4
AC_Polished_M	Long Integer	4
AC_Polished_L	Long Integer	4
AC_Weather_H	Long Integer	4
AC_Weather_M	Long Integer	4
AC_Weather_L	Long Integer	4
AC_Rutting_H	Long Integer	4
AC_Rutting_M	Long Integer	4
AC_Rutting_L	Long Integer	4
AC_Shoving_H	Long Integer	4
AC_Shoving_M	Long Integer	4
AC_Shoving_L	Long Integer	4
AC_Slippage_H	Long Integer	4
AC_Slippage_M	Long Integer	4
AC_Slippage_L	Long Integer	4
AC_Swell_H	Long Integer	4
AC_Swell_M	Long Integer	4
AC_Swell_L	Long Integer	4
PCC_Blowup_H	Long Integer	4
PCC_Blowup_M	Long Integer	4
PCC_Blowup_L	Long Integer	4
PCC_Corner_H	Long Integer	4
PCC_Corner_M	Long Integer	4
PCC_Corner_L	Long Integer	4
PCC_Crack_H	Long Integer	4
PCC_Crack_M	Long Integer	4
PCC_Crack_L	Long Integer	4
PCC_DCrack_H	Long Integer	4
PCC_DCrack_M	Long Integer	4
PCC_DCrack_L	Long Integer	4
PCC_Seal_H	Long Integer	4
PCC_Seal_M	Long Integer	4
PCC_Seal_L	Long Integer	4
PCC_SmPatch_H	Long Integer	4
PCC_SmPatch_M	Long Integer	4
PCC_SmPatch_L	Long Integer	4
PCC_LgPatch_H	Long Integer	4
PCC_LgPatch_M	Long Integer	4

PCC_LgPatch_L	Long Integer	4
PCC_Popout_H	Long Integer	4
PCC_Popout_M	Long Integer	4
PCC_Popout_L	Long Integer	4
PCC_Pumping_H	Long Integer	4
PCC_Pumping_M	Long Integer	4
PCC_Pumping_L	Long Integer	4
PCC_Scale_H	Long Integer	4
PCC_Scale_M	Long Integer	4
PCC_Scale_L	Long Integer	4
PCC_Fault_H	Long Integer	4
PCC_Fault_M	Long Integer	4
PCC_Fault_L	Long Integer	4
PCC_Divided_H	Long Integer	4
PCC_Divided_M	Long Integer	4
PCC_Divided_L	Long Integer	4
PCC_Shrink_H	Long Integer	4
PCC_Shrink_M	Long Integer	4
PCC_Shrink_L	Long Integer	4
PCC_JointSpall_H	Long Integer	4
PCC_JointSpall_M	Long Integer	4
PCC_JointSpall_L	Long Integer	4
PCC_CornerSpall_H	Long Integer	4
PCC_CornerSpall_M	Long Integer	4
PCC_CornerSpall_L	Long Integer	4
ACRest	Long Integer	4
ACSust	Long Integer	4
PCCRest	Long Integer	4
PCCSust	Long Integer	4
PCCPatch	Long Integer	4
PCCReplace	Long Integer	4
ACPATCH	Long Integer	4
ACRestDone	Long Integer	4
ACSustDone	Long Integer	4
PCCRestDone	Long Integer	4
PCCSustDone	Long Integer	4
PCCPatchDone	Long Integer	4
PCCReplaceDone	Long Integer	4
ACPatchDone	Long Integer	4



**Properties**

DateCreated:	8/13/2004 1:50:30 PM	LastUpdated:	12/21/2005 4:01:32 PM
OrderByOn:	False	RecordCount:	12
Updatable:	True		

**Columns**

Name	Type	Size
APTID	Text	5
Feature_ID	Long Integer	4
ACTYEAR	Integer	2
INPYEAR	Integer	2
NOPA	Integer	2
SELPA	Integer	2
NoAct0	Integer	2
NoAct5	Integer	2
NoAct10	Integer	2
NoAct20	Integer	2
ACTIONa1	Integer	2
ACTIONa2	Integer	2
ACTIONa3	Integer	2
ACTIONa4	Integer	2
ACTIONa5	Integer	2
ACTIONa6	Integer	2
ACTIONa7	Integer	2
ACTIONa8	Integer	2
ACTIONa9	Integer	2
ACTIONa10	Integer	2
PCI_0YR1	Integer	2
PCI_0YR2	Integer	2
PCI_0YR3	Integer	2
PCI_0YR4	Integer	2
PCI_0YR5	Integer	2
PCI_0YR6	Integer	2
PCI_0YR7	Integer	2
PCI_0YR8	Integer	2
PCI_0YR9	Integer	2
PCI_0YR10	Integer	2
PCI_5YR1	Integer	2
PCI_5YR2	Integer	2
PCI_5YR3	Integer	2
PCI_5YR4	Integer	2
PCI_5YR5	Integer	2
PCI_5YR6	Integer	2
PCI_5YR7	Integer	2
PCI_5YR8	Integer	2
PCI_5YR9	Integer	2
PCI_5YR10	Integer	2
PCI_10YR1	Integer	2
PCI_10YR2	Integer	2
PCI_10YR3	Integer	2

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PCI_10YR4	Integer	2
PCI_10YR5	Integer	2
PCI_10YR6	Integer	2
PCI_10YR7	Integer	2
PCI_10YR8	Integer	2
PCI_10YR9	Integer	2
PCI_10YR10	Integer	2
PCI_20YR1	Integer	2
PCI_20YR2	Integer	2
PCI_20YR3	Integer	2
PCI_20YR4	Integer	2
PCI_20YR5	Integer	2
PCI_20YR6	Integer	2
PCI_20YR7	Integer	2
PCI_20YR8	Integer	2
PCI_20YR9	Integer	2
PCI_20YR10	Integer	2

**Properties**

DateCreated:	4/8/2005 5:44:59 PM	LastUpdated:	12/21/2005 4:01:46 PM
OrderByOn:	False	RecordCount:	12
Updatable:	True		

**Columns**

Name	Type	Size
APTID	Text	5
Feature_ID	Long Integer	4
Option	Text	50
PCI_Current	Integer	2
ACTYEAR	Integer	2
SELPA	Integer	2
PCI_0	Integer	2
PCI_5	Integer	2
PCI_10	Integer	2
PCI_20	Integer	2
PCI_NoAct_0	Integer	2
PCI_NoAct_5	Integer	2
PCI_NoAct_10	Integer	2
PCI_NoAct_20	Integer	2

**Table Indexes**

Name	Number of Fields
APTID	1
Fields:	
APTID	Ascending
Feature_ID	1
Fields:	
Feature_ID	Ascending
PrimaryKey	2
Fields:	
APTID	Ascending
Feature_ID	Ascending