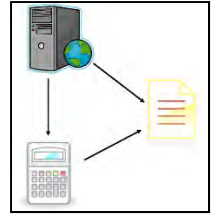




# **Inventory, Work History, and Condition**

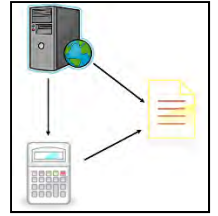
## **Section 3**

# Typical Inventory Data

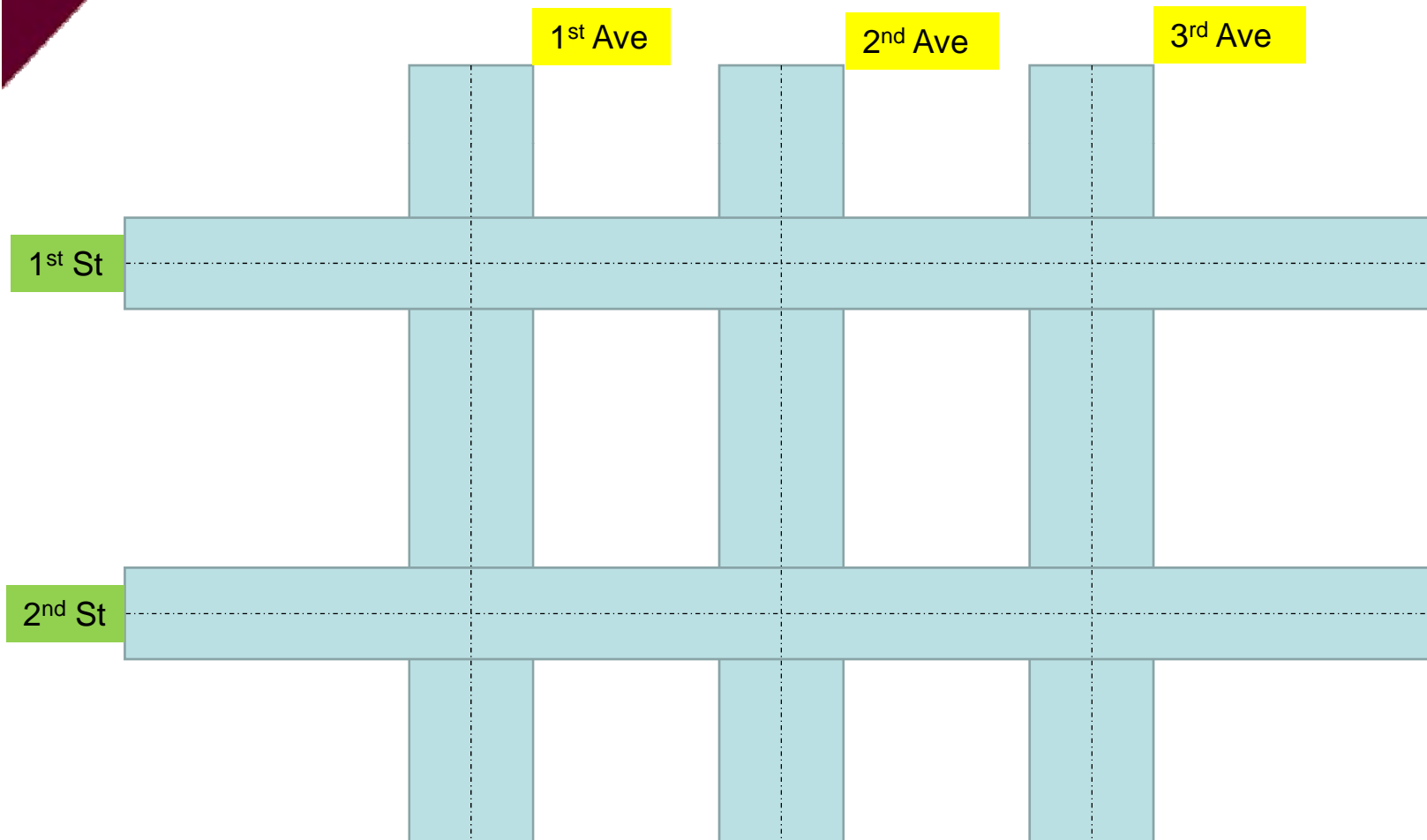


- Unique section identification
- Location (from-to, GPS...)
- Functional classification
- Pavement surface type
- Length/width/area
- Pavement structure and layers
- Other??

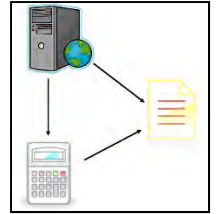
# Street Segmentation



- How many street segments are there?

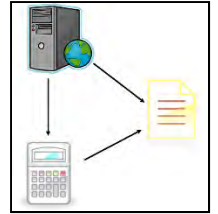


# Street Segmentation



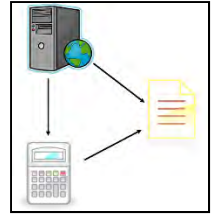
- The general rules for segmentation are
  - Adjacent surfaces
  - Same surface type
  - Homogenous condition category
  - Share maintenance and traffic characteristics
  - Think of them as management units
    - Those that are managed together get segmented together

# Treatment and Work History



- Items typically needed
  - Original construction dates and work types
  - Maintenance, rehabilitation & reconstruction activities – dates, treatment types, unit cost
- Very critical to establish a meaningful PMS

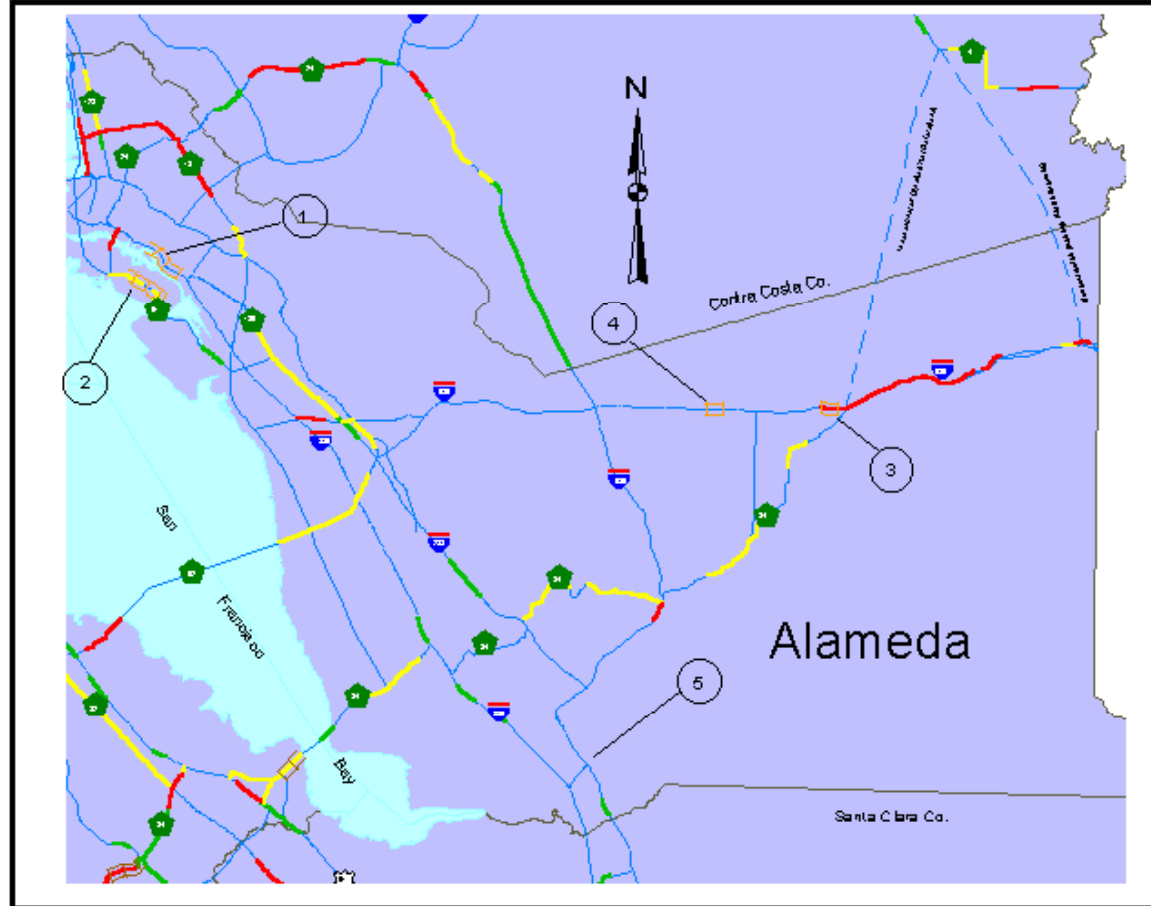
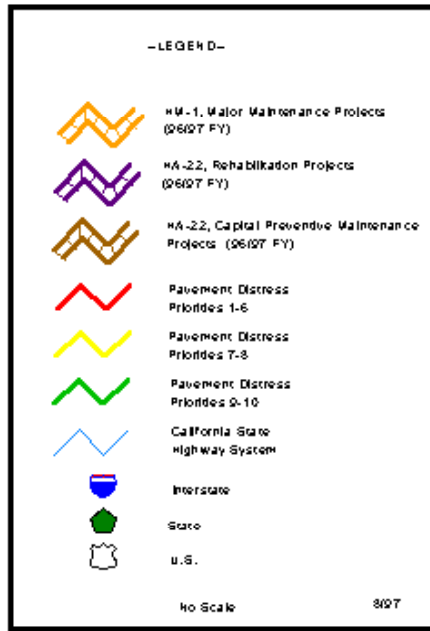
# Use of GIS to Support Pavement Management



- Visually display commonly requested information
  - Current conditions
  - Predicted conditions
  - Expected projects
- Great tool for sharing of information internally and externally

# District 4

## Alameda County



### Major Maintenance Projects (HM-1)

Mo	Ea	Rtc	Fm1	Fm2	Fegm	Description	Award_date	Compl_date
1	DR2204	220	28.200	30.000	HM1E	PCC SLAB REPLAC		
2	DR4504	61	19.300	21.300	HM1A	OGAC, PLAGE AC		
3	DR4204	580	11.000	11.700	HM1A	REPL PCC PAVEMENT		
4	194264	580	15.600	16.400	HM1A	REPL PCC PAVEMENT		

### Rehabilitation Projects (HA-22)

Mo	Ea	Rtc	Fpm1	Fm1	Spm1	Fpm2	Fm2	Spm2	Worktype	Comments	Award_date
5	125124	680	M	2.300		M	2.400		REHAB	ROADWAY REHAB	10/29/96

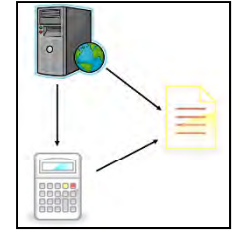




# **Pavement Condition**

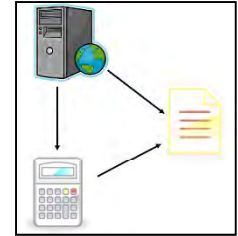


# Pavement Condition Data

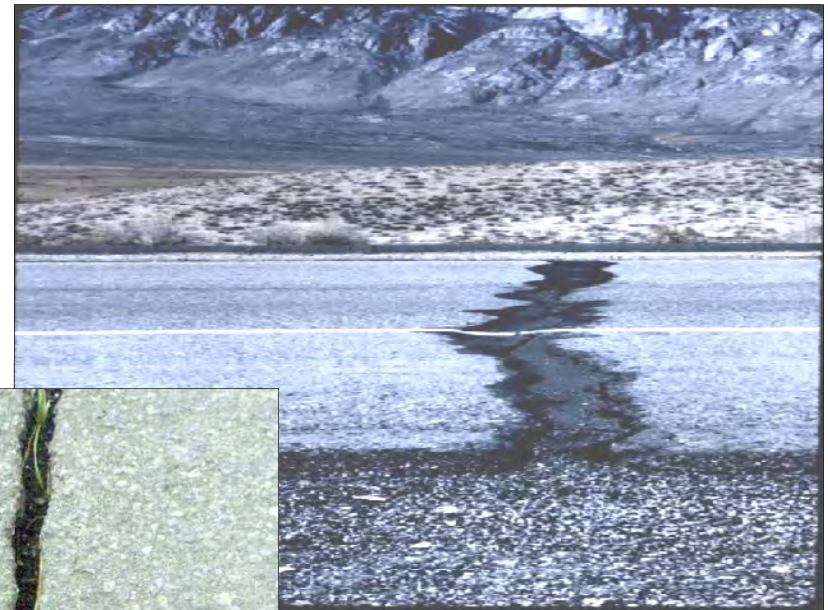


- Pavement distress
- Ride quality or smoothness
- Structural capacity
- Surface friction

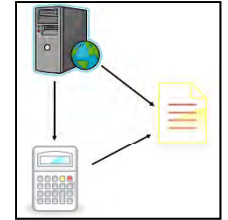
# Pavement Distress



- Type – what kind?
- Severity – how bad?
- Quantity – how much?



# Methods of Distress Data Collection



Manual Collection



Windshield Surveys



Automated Collection

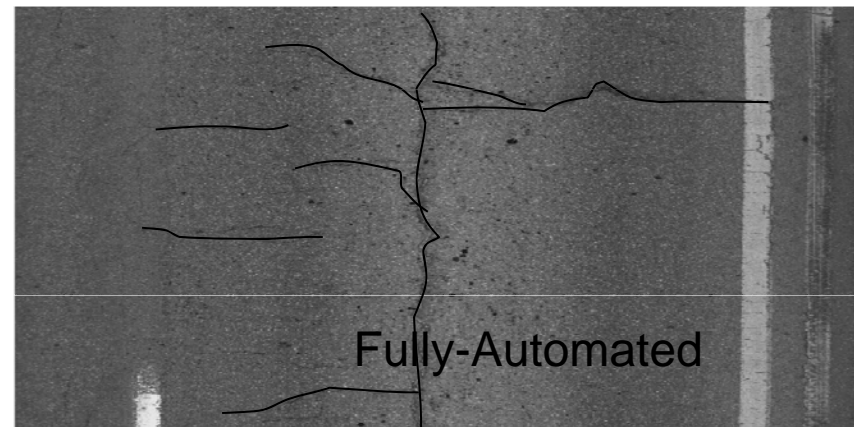
# Methods of Processing Data



City of Philadelphia Pavement Management System									
Flexible Pavement Condition Survey									
Street:					<b>C Longitudinal/Transverse Cracking</b>				
Block:					NONE Extent				
Section No.:					100 Low Med High				
From:					Severity 1-10% 11-30% 31+%				
To:					Low 90 77 72				
Length:					Med 78 60 55				
Width:					High 56 20 14				
No. Lanes:									
Surface Type: HMA HMA/PCC Surf. Treat									
(Circle one) HMA/Brick HMA/Granite Block									
Other:									
<b>A Patching/Potholes Utility Cuts</b>					<b>D Block Cracking</b>				
NONE Extent					NONE Extent				
100 Low Med High					100 Low Med High				
Severity 1-10% 11-30% 31+%					Severity 1-10% 11-30% 31+%				
Low 90 77 66					Low 96 88 80				
Med 78 58 42					Med 90 78 67				
High 63 32 20					High 80 60 42				
No. of patches									
Patch Type AC PCC									
<b>B Alligator Cracking</b>					<b>E Weathering/Raveling</b>				
NONE Extent					NONE Extent				
100 Low Med High					100 Low Med High				
Severity 1-10% 11-30% 31+%					Severity 1-10% 11-30% 31+%				
Low 75 60 48					Low 97 92 88				
Med 62 45 33					Med 95 89 77				
High 47 30 18					High 91 83 68				
<b>F Transverse Distortions</b>					<b>G Rutting/Depressions</b>				
Check Road for Presence of the					NONE Extent				
Following:					100 Low Med High				
-Uneven Surface Severity 1-10% 11-30% 31+%					Severity 1-10% 11-30% 31+%				
-Corrugation Low 92 80 69					Low 79 65 54				
-Sags Med 68 51 38					Med 65 46 37				
-Humps High 48 28 15					High 52 27 15				
-Frost Heaves									
Utility Patching Index (Value from A):									
Structural Index (Value from B):									
Environmental Index (Smallest of C, D & E):									
Rutting & Distortion Index (Smallest of F & G):									



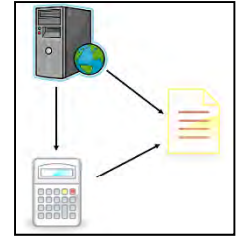
Semi-Automated



Fully-Automated

Manual

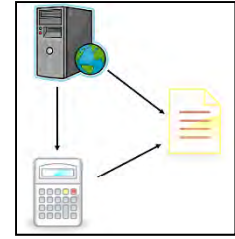
# Ride Quality/Smoothness



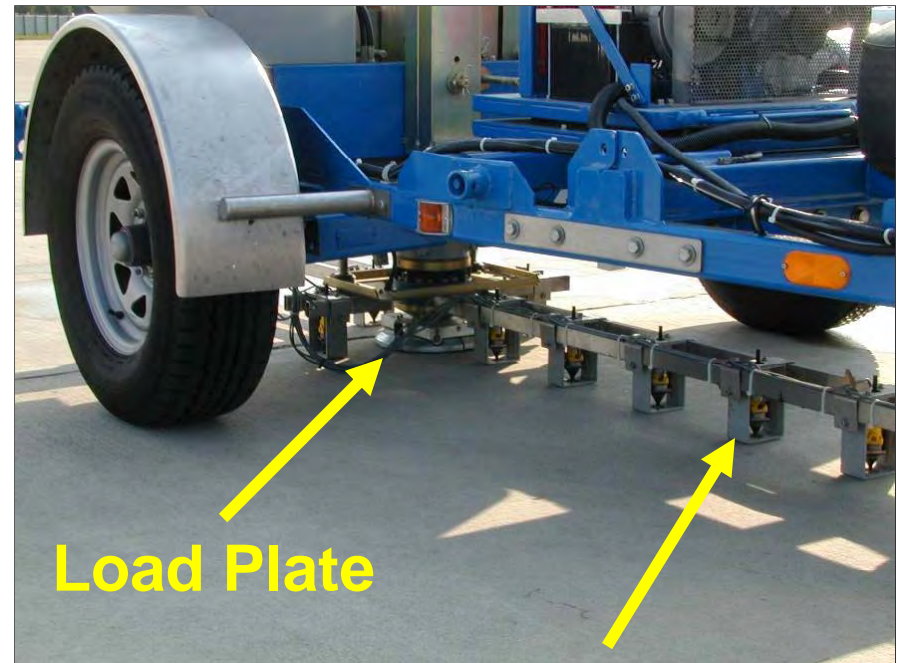
- Represents functional condition
- Direct measure of public's perceived riding comfort
- Profile data often converted to IRI



# Structural Capacity

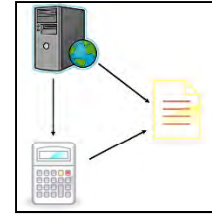


- Mainly used for selecting/designing M&R strategies
- Can reduce M&R costs
- Not routinely collected at network level
- RWD & TSD are newer technologies for measuring capacity in traffic



**Geophones**

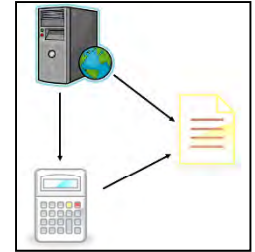
# Surface Friction



- Typically conducted on sites with a high number of accidents
- Locked wheel skid trailer



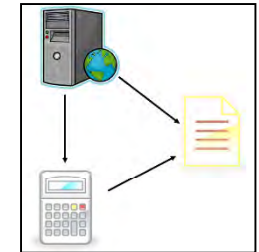
# QC/QA Plans



- Very critical to ensure collected data reflects field condition
- Establish calibration sites before data collection
- Establish acceptance criteria e.g. *longitudinal cracking  $\pm 10$  m/100m*
- Use blind test sites during data collection



# Who is Responsible for QC/QA?

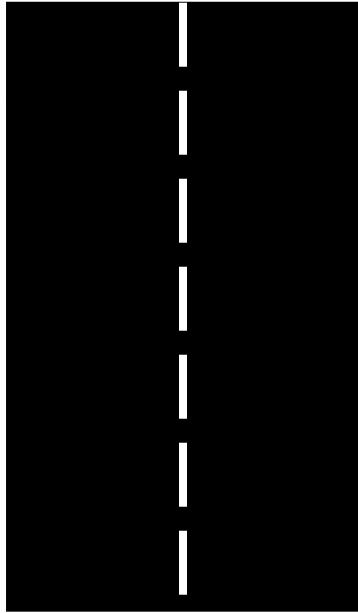
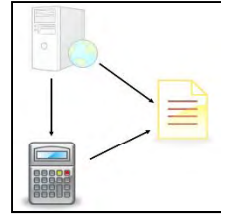


<b>Data Collection</b>	<b>QC</b>	<b>QA</b>
<b>Contractor</b>	<b>Contractor</b>	<b>Agency</b>
<b>Agency</b>	<b>Agency</b>	<b>Agency</b>

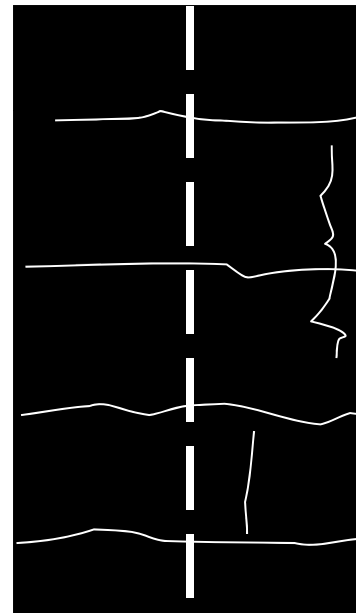


# **Pavement Condition Indexes**

# Condition Index Development

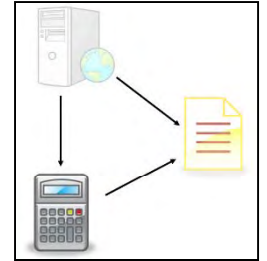


Perfect pavement -  
highest condition index



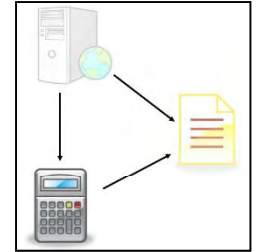
As distress  
appears, points  
are deducted  
from the highest  
condition index

# Pavement Condition Index



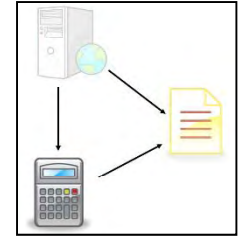
- Combines the pavement distress data into an index e.g. PCI
- Used to evaluate network condition or compare roads with different distresses
- Also used to trigger treatments

# Types of Indexes Used



- Individual Indexes
  - Roughness
  - Rutting
  - Fatigue Cracking
  - Block Cracking
  - Longitudinal Cracking
  - Transverse Cracking
  - Corner Breaks
- Composite Index

# Condition Index vs. Individual Distress



- Condition Index
  - Allows comparisons of condition
  - Generally easier to develop deterioration models
  - Provides a means of reporting conditions
- Individual Distress
  - Can use more sophisticated models to predict conditions
  - Agencies are more familiar with distress quantities than index values



# Data Requirements - Summary

- Consider the questions that need to be answered, and collect data supporting those answers.
- Consider constraints – staffing and budget, to decide who will collect.
- Consider agency goals, and collect data supporting attainment of those goals.
- Start with the end in mind...