

DEVELOPMENT OF PERFORMANCE WARRANTIES FOR PERFORMANCE-BASED ROAD MAINTENANCE CONTRACTS

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OUTLINE

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- DEFINITION OF TERMS
- PROBLEM DEFINITION AND THE PROPOSED SOLUTION
- RATIONALE BEHIND THE WARRANTY CONCEPT
- OBJECTIVES
- DEVELOPED WARRANTY CLAUSE TEMPLATE
- ISSUES AT LARGE
- CONCLUSIONS
- REFERENCES FOR FURTHER INFORMATION

BACKGROUND

July 1995: Public-Private Transportation Act of Virginia was passed

✓ "...acquire, construct, improve, maintain, and/or operate one or more transportation facilities..." (PPTA 1995)

December 1996: Virginia Department of Transportation (VDOT) has initiated the first performance-based asset management project in Virginia

✓ Fence to fence maintenance

✓ Incident management

✓ Snow removal

"A **performance-based highway maintenance contract** is a contract under which the contractor undertakes to plan, program, design, and implement maintenance activities in order to achieve specified short and **long term road condition standards...**" (*Frost and Lithgow 1998, p. 2*)

"**Asset management** is a systematic process of maintaining, **upgrading**, and operating physical assets..." (*Falls et al. 2001, p. 2*)

DEFINITION OF TERMS

➤ **Performance Criteria:** Measures established for each asset item to assess their condition

➤ Example for Paved Ditches:

➤ Paved Ditches may have a maximum of 1 inch settlement

➤ A maximum of 25% of the entire area of the paved ditch within a sample unit may be spalled

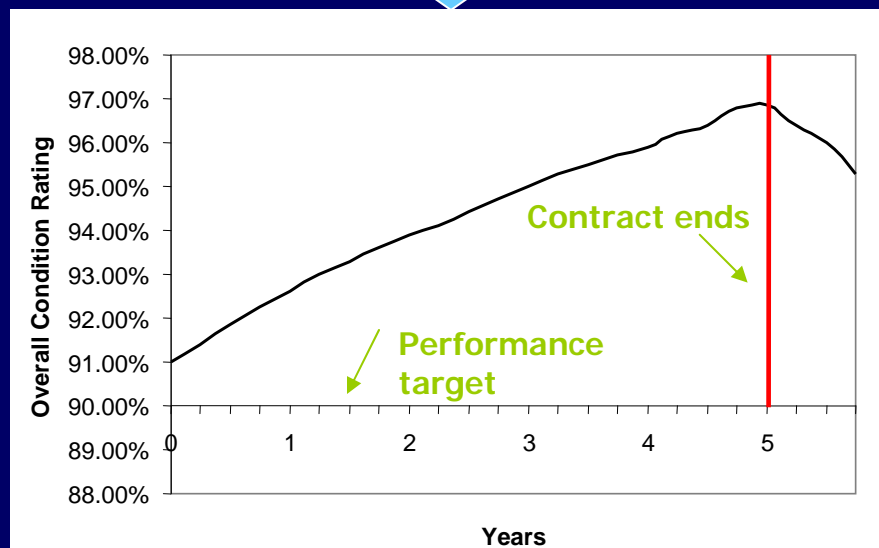
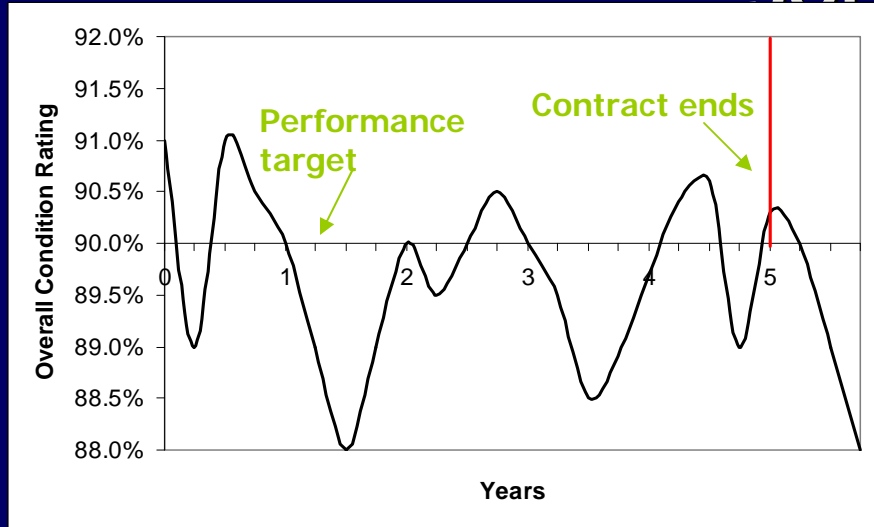
➤ **Performance Target:** The percentage that defines the ratio of the minimum amount of the asset item that is required to meet the performance criteria, to the total amount of that asset item

➤ Example for Paved Ditches: 90%

➤ **Asset Item's Overall Condition Rating:** The ratio (in percentage) of the number of the asset item meeting the performance criteria, to the total number of that asset item

➤ Example for Paved Ditches: 82%

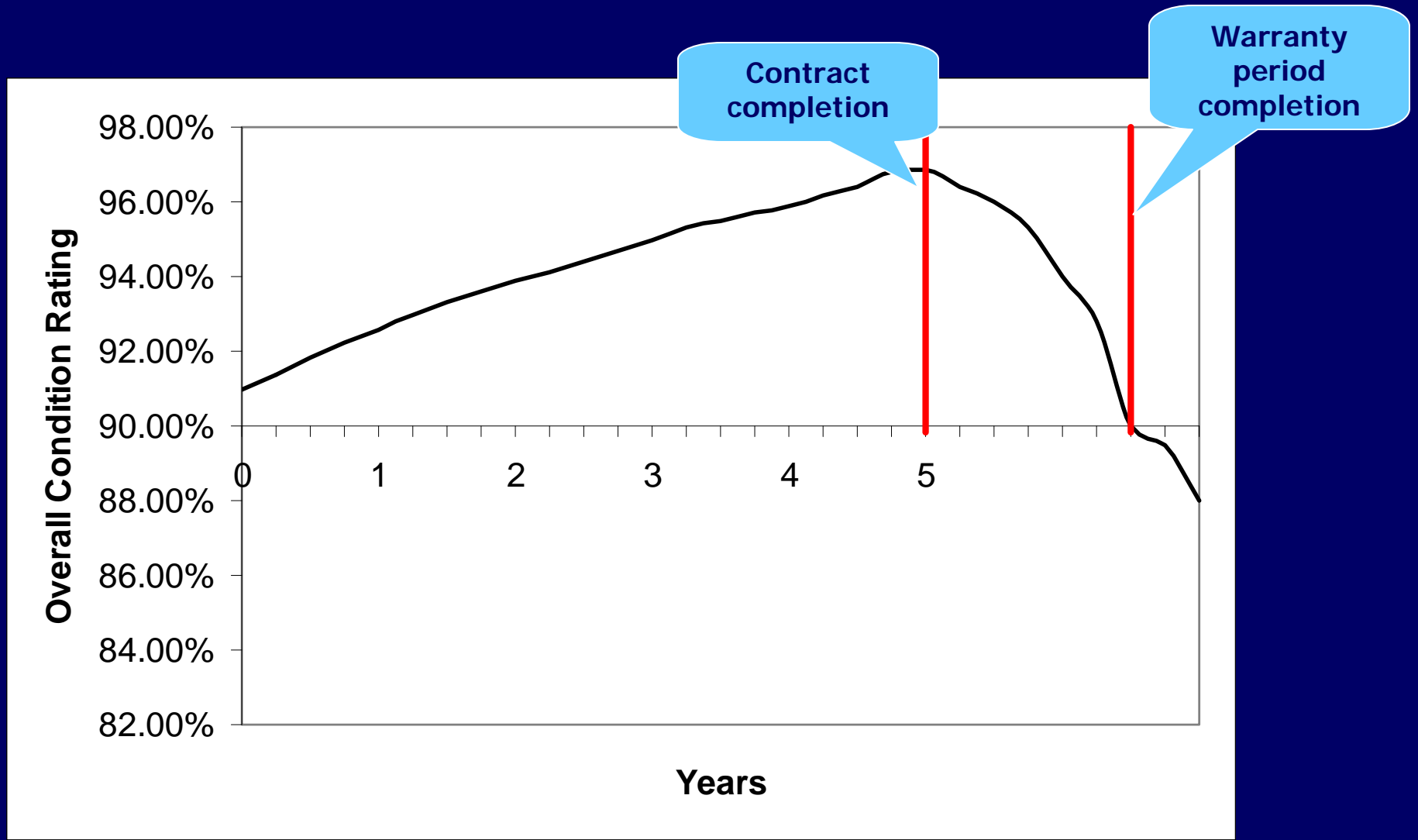
PROBLEM DEFINITION AND THE PROPOSED SOLUTION



- "Band-aid" maintenance
- Poor future performance

- Better maintenance practices
- Improvement of the asset item's overall condition
- Long term performance

RATIONALE BEHIND THE WARRANTY CONCEPT



OBJECTIVES

- 1) To define “**Defect**” in the context of road maintenance
- 2) To identify the **length** of the warranty period
- 3) To identify other **components** of a warranty clause
- 4) To make **distinction** between various asset items
- 5) To **develop** a template warranty clause to be used in the development of warranty clauses for **each asset item**

Objective 1: Defining Defect

Definition of DEFECT is:

➤ **Characterized** in terms of:

- Performance criteria
- Performance target



Already established in the contract

➤ **Different** for each asset item

➤ Used in establishing the **warranty criterion**

Objective 2: Identifying The Length Of The Warranty Period

- 3 alternatives are developed
- To be chosen by the transportation agency

Objective 3: Identifying Other Components Of a Warranty Clause

- Identified **components** are:
 - **Exclusions** and **waivers** within the warranty period
 - Warranty compliance **evaluations**
 - **Remedial** actions
 - **Conflict resolution procedures** for the warranty period
 - Contractor's **default** within the warranty period
 - **Bonding** requirements for the warranty period
 - **Preventive maintenance** during the warranty period
 - **Responsibilities of the transportation agency** during the warranty period

Objective 4: Making Distinctions Between The Asset Items

- **Different** warranty clause for **each asset item:**
 - **30+** asset items
 - Different **properties**
 - **Exposure** to different conditions
 - Different **deteriorations**
 - Different **importance** as deemed by the transportation agency

Objective 5: Developing The Warranty Clause Template

- **First version is developed**
 - Extensive literature review on
 - Highway construction warranties in the USA and Europe
 - Examples of performance-based road maintenance contracts with warranties
 - Performance-based road maintenance contracts used in the USA
 - Standard forms of traditional design-bid-build contracts
 - Highway and bridge specifications prepared by the state DOTs
 - Examples of performance-based contracts other than road maintenance contracts issued in the USA

- **Reviewed by the panel of experts**
 - State DOT representatives, contractors, and academicians involved in highway construction/maintenance and warranty research
 - A lawyer to check the integrity of the language used in the warranty clause

- **Final version is developed**

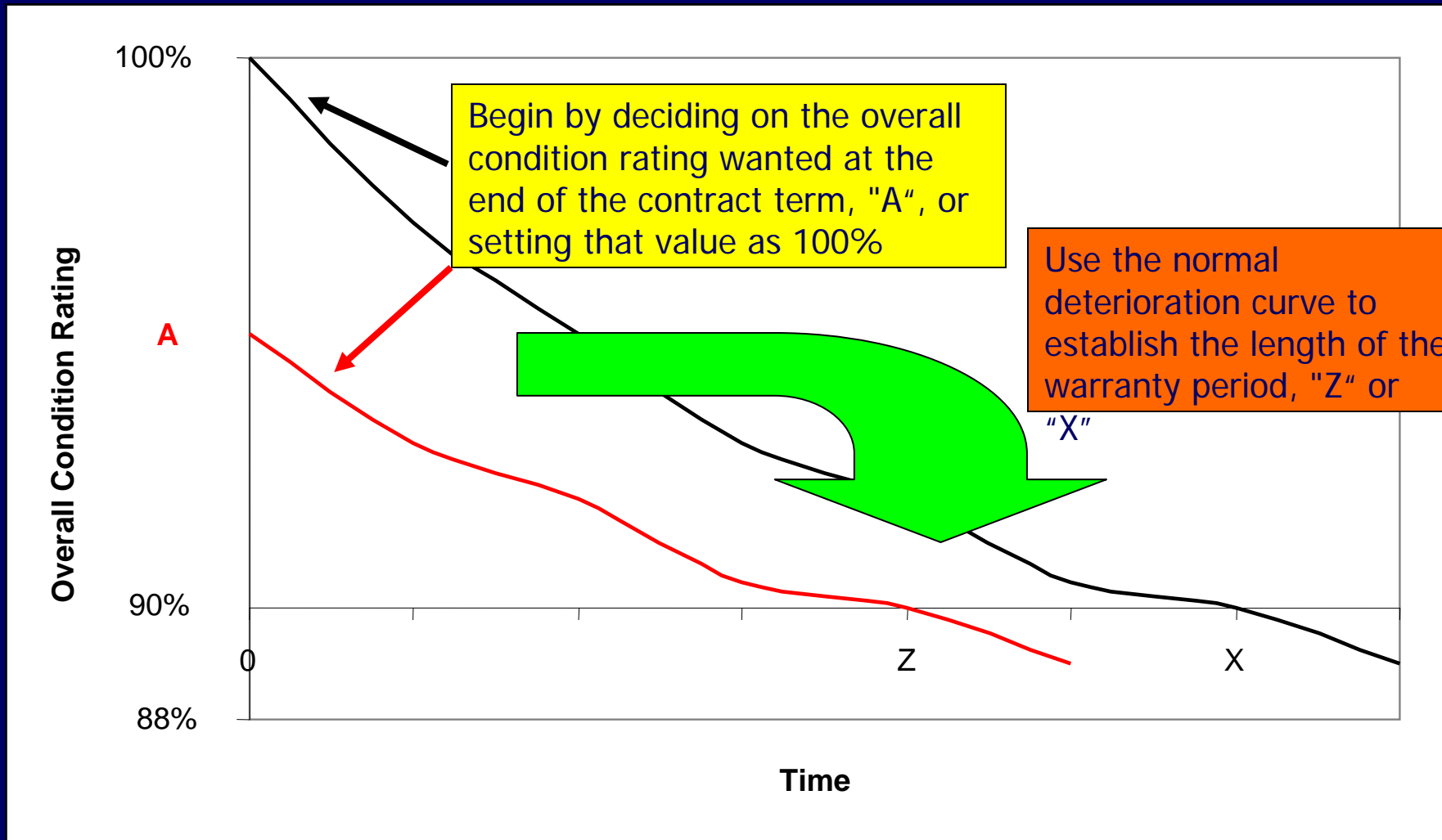
DEVELOPED WARRANTY CLAUSE TEMPLATE

- **Section 16.1: General Description**
- **Section 16.2: Warranty Bond**
- **Section 16.3: Warranty Coverage and Warranty Criterion**
- **Section 16.4: Warranty Compliance Evaluations**
- **Section 16.5: Remedial Actions**
- **Section 16.6: Conflict Resolution Procedures**
- **Section 16.7: Default on the Contractor**
- **Section 16.8: Exclusions and Waivers**
- **Section 16.9: Preventive Maintenance**
- **Section 16.10: Department's Responsibilities**
- **Section 16.11: Subcontractor's Responsibilities**

Section 16.1: General Description

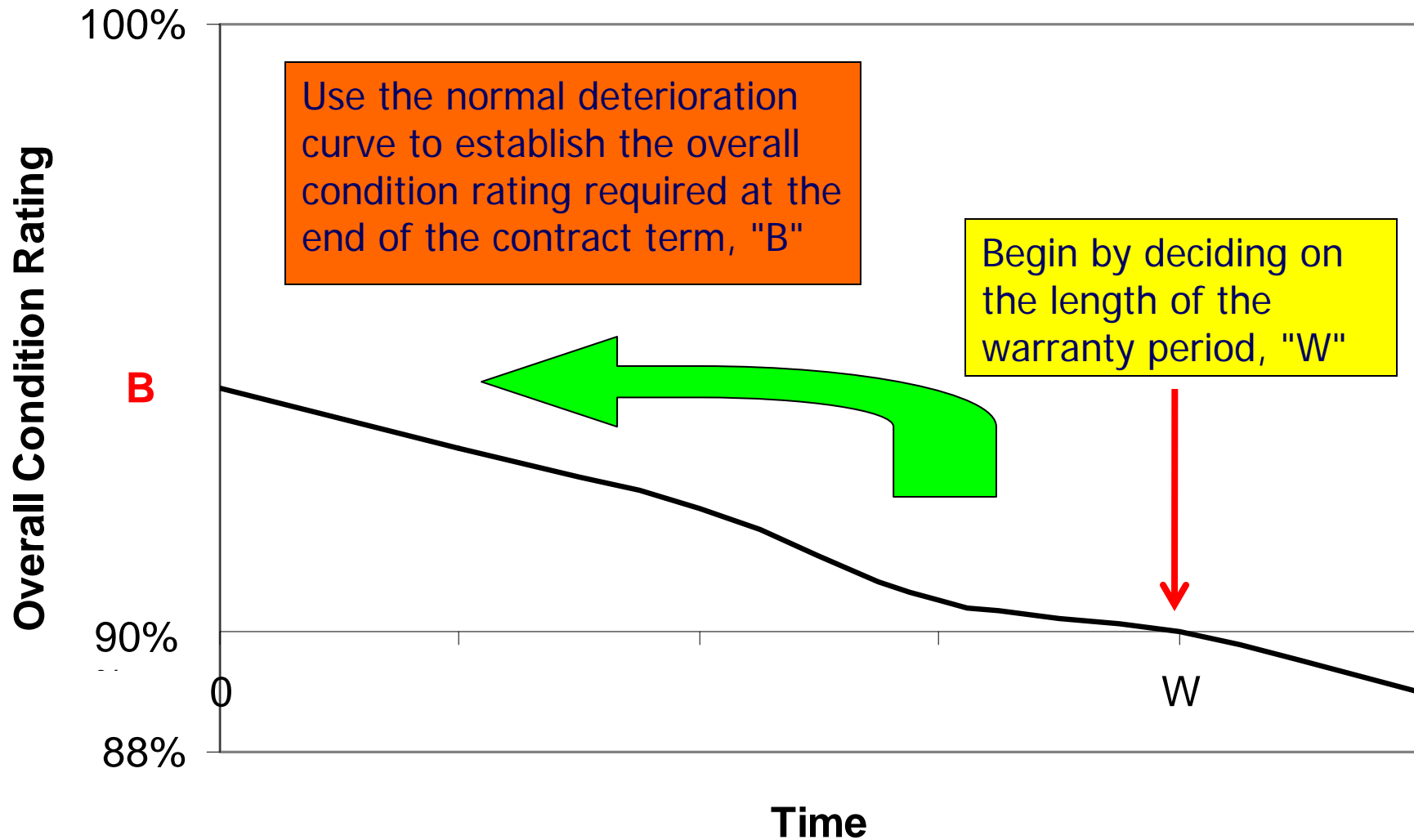
- Length of the warranty period: 3 Alternatives

Alternative 1 and Alternative 2



Section 16.1: General Description

Alternative 3



Section 16.3: Warranty Coverage and Warranty Criterion

- Performance criteria
- Performance target

Asset	Performance Target	Performance Criteria
Paved Ditches	90%	<ul style="list-style-type: none">• < 1" settlement• no undermining or undercut requiring action• < 25% spalled• no obstruction to flow of water that requires action

Section 16.3: Warranty Coverage and Warranty Criterion

➤ **Definition of Defect for Paved Ditches:**

(a) having less than 1 inch of settlement or (b) having no undermining or undercut that requires action or (c) having less than 25% of the area spalled or (d) having no obstruction to flow of water that requires action or (e) any combination of (a), (b), (c) and (d); for less than 90% of the total amount of paved ditches present in the interstate system maintained by the contractor.

➤ **Definition of Warranty Criterion for Paved Ditches:**

(a) having less than 1 inch of settlement and (b) having no undermining or undercut that requires action and (c) having less than 25% of the area spalled and (d) having no obstruction to flow of water that requires action; for at least equal or more than 90% of the total amount of paved ditches present in the interstate system maintained by the contractor.

ISSUES AT LARGE

1. **Type of projects** appropriate for warranty implementation
2. **Evaluation of proposals** and award of the contract
3. Evaluating **warranty compliance**
4. **Bonding** issues
5. **Cost** issues
6. **Quality** issues
7. **Disputes** and **litigation**
8. **Quality assurance/quality** control

CONCLUSIONS

- ✓ The **main rationale** behind developing the warranty clause template:
 - ✓ To make the contractor implement a maintenance philosophy which would provide **improvement in the overall condition of the asset items** maintained during the contract term
- ✓ Although the focus of this research is **on VDOT-issued contracts**, some of the **principles** and **approaches** used during the development of the warranty clause template can also be referred to by the **other state DOTs**
- ✓ The warranty concept in highway maintenance contracting is a rather new concept which still needs a **substantial amount of evaluation** and which deserves **much attention** from interested parties

REFERENCES FOR FURTHER INFORMATION

For **further information** and the **warranty clause template**:

- Ozbek, M. E. (2006). "Development of Performance Warranties for Performance Based Road Maintenance Contracts." *Resource Guide: Performance-based Contracting for Preservation and Improvement of Road Assets*, N. Stankevich, N. Qureshi, and C. Queiroz., eds., The World Bank, Washington D.C.
- Ozbek, M. E., and de la Garza, J. M. (2007). "Development of Performance Warranties for Performance-Based Road Maintenance Contracts." *Alternative Project Delivery, Procurement, and Contracting Methods for Highways*, K. R. Molenaar and G. Yakowenko, eds., American Society of Civil Engineers, Reston, 20-45.



Special Experimental Projects 14 Task Force (FHWA 2002) :

- *"A nationwide effort should be initiated to transition from method specifications to **performance related specifications**..."*
- *"The potential for use of **warranties** or **guarantees** and the design-build contracting should be investigated."*



QUESTIONS?



Methodology- Research Methodologies in General

■ Nomothetic methodology:

- Focuses on highly systematic procedures and techniques
- A very scientific strictness and standard is present in the process of testing the validity of the hypothesis of the research
- This methodology is common for the research conducted in natural sciences

Quantitative
Research

■ Ideographic methodology:

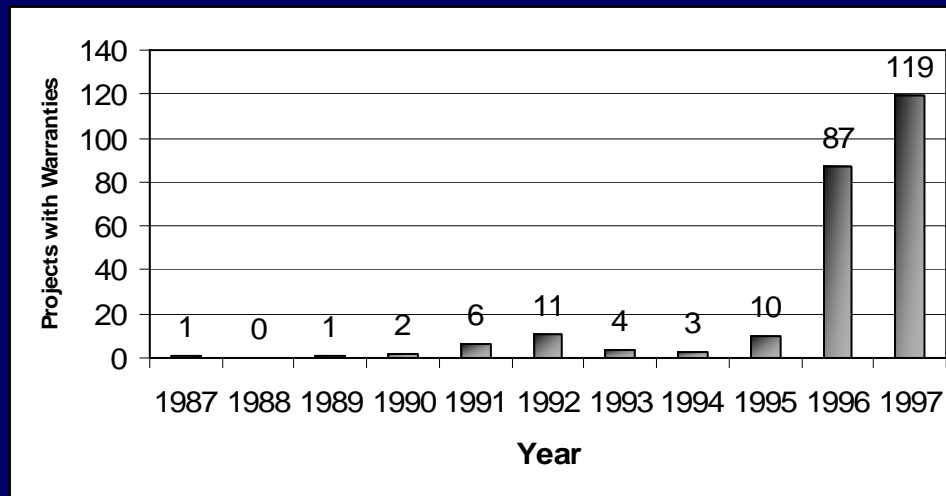
- Emphasizes the analysis of subjective ideas which the researcher proposes
- The researcher, observing the situations and involving her/himself in the everyday flow of life, generates these ideas

Qualitative
Research

LITERATURE REVIEW

➤ INTRODUCTION AND DEVELOPMENT OF HIGHWAY WARRANTIES IN THE USA

- SEP-14, 1991
- ISTEA, 1991
- CATQEST, 1993
- FHWA Warranty Interim Rule, 1995
- FHWA Warranty Final Rule, 1996
- European Asphalt Pavement Warranties Scan, 2002



Number of highway projects with warranties completed by year in USA
(Source: Russell et al 1999, pp 15)

LITERATURE REVIEW

- **EXAMINATION OF HIGHWAY WARRANTIES IN THE USA**
 - **Type of warranties**
 - **Type of projects**
 - **Length of the warranty period**
 - **Warranty criteria**
 - **Evaluation and award of the contract**
 - **Evaluating warranty compliance and implementation of remedies**
 - **Warranty bonds**
 - **Cost issues**
 - **Quality issues**
 - **Disputes and litigation**

LITERATURE REVIEW

- **WARRANTY PRACTICES IN STATE DOTs**
 - **Michigan DOT**
 - Since 1995 over 300 projects
 - Majority are for Capital Preventive Maintenance projects
 - Materials and Workmanship warranties
 - Warranty as a separate legal document
 - **Ohio DOT**
 - Since 1999
 - Significant bid price increases
 - Better quality
 - **Wisconsin DOT**
 - Since 1995, Pavement warranties
 - Cost savings, p:70
 - Better quality and long term performance, p:71
 - Non-cumulative renewed warranty bonds

LITERATURE REVIEW

- **WARRANTY EXPERIENCES OF SOME OTHER STATES**
 - **Florida:** Significant disincentives for contractor's default
 - **Missouri and New Mexico:** 15 year warranties
 - **South Carolina:** Re-warrant the remedial work
 - **California and Indiana:** Used historical data and PMS data to establish the warranty criteria
 - **Montana:** Collaborated with the contracting and surety industry

LITERATURE REVIEW

➤ FHWA'S PERSPECTIVE ON HIGHWAY WARRANTIES

- Issued the Warranty Final Rule in 1996
- Supports the warranty concept

➤ ADVANTAGES AND DISADVANTAGES

- Quality, Cost ??
- Disadvantages can be converted into advantages

➤ HIGHWAY WARRANTY PRACTICES IN EUROPE

- Very common
- Better relationships between the contractor and the owner

LITERATURE REVIEW

- **PERFORMANCE BASED ROAD MAINTENANCE CONTRACTS WITH WARRANTIES**
 - New Zealand
 - World Bank
- **PERFORMANCE BASED ROAD MAINTENANCE CONTRACTS IN USA**
 - Florida DOT, Texas DOT
- **OTHER PERFORMANCE BASED CONTRACTS**
 - PENREN

LITERATURE REVIEW

- **STANDARD FORMS FOR DESIGN-BID-BUILD CONTRACTS**
 - **AIA, EJCDC, FIDIC**
- **HIGHWAY AND BRIDGE SPECIFICATIONS OF DOTs**
 - **Texas, Florida, Pennsylvania, Virginia, D.C**
- **WORKSHOPS AND INTERVIEWS**
 - **Performance Based Contracting Workshop**
 - **Evaluating and Managing Performance Based Contracts**
 - **Interview with Nancy Gunderson, Contracting Officer of PENREN**

DEVELOPED TEMPLATE WARRANTY CLAUSE

- **Section 16.2: Warranty Bond**
 - Surety rating (VDOT)
 - Single vs. Renewable Bond (WisDOT)
 - Bond amount- Most likely case scenario (WisDOT)
 - No subcontractor bond needed

DEVELOPED TEMPLATE WARRANTY CLAUSE

- **Section 16.3: Warranty Coverage and Warranty Criterion (p: 157)**
 - Performance criteria
 - Performance target

Asset	Outcome	Performance Target	Performance Criteria



Exhibit B of the current contract

DEVELOPED TEMPLATE WARRANTY CLAUSE

- **Section 16.4: Warranty compliance evaluations (p: 157)**
 - **Inspection procedure similar to the contract term**
 - **"Evaluation Program", Section 2.18 and Exhibit G of the current contract**
 - **VDOT to complete inspections and notify the contractor in a certain time**
 - **Frequent evaluations for emergency remedial needs (MDOT)**
 - **VDOT to notify the contractor in a certain time**

DEVELOPED TEMPLATE WARRANTY CLAUSE

- **Section 16.6: Conflict Resolution Procedures (p: 161)**
 - Composition of the CRT (WisDOT)
 - The time frame for CRP (ODOT)

DEVELOPED TEMPLATE WARRANTY CLAUSE

- **Section 16.7: Default on the Contractor (p: 162)**
 - Disincentive clause (FDOT)

- **Section 16.8: Exclusions and waivers (p: 163)**
 - Beyond the control of the contractor
 - List of external factors for the asset item
 - Factors due to pre-construction, and post construction

- **Section 16.9: Preventive (routine maintenance) (p: 163)**
 - Not allowed

DEVELOPED TEMPLATE WARRANTY CLAUSE

- **Section 16.10: Department's Responsibilities (p: 164)**
 - Remedial work for defects not attributable to the contractor
 - Incident management and winter weather maintenance
 - Emergency remedial work
 - Performing inspections and notifying the contractor

This research has also developed certain **principles** that can be used by other state DOTs

- Principles used in establishing **Section 16.1-Warranty Period**
 - Use of deterioration curves
 - Fair for the contractor
 - Optimum for the DOT

- Principles used in establishing **Section 16.2-Warranty Bond**
 - Flexible for the contractor
 - "Reasonable remedy- Most likely case scenario "
 - Release of the warranty bond

- Principles used in establishing **Section 16.3-Warranty criterion**
 - Fair, measurable, and attainable warranty criterion

This research has also developed certain **principles** that can be used by other state DOTs

- Principles used in establishing **Section 16.4- Inspections**
 - Time frame should be minimized
 - Inspection scheme should be elaborated
 - The need for visual inspections

- Principles used in establishing **Section 16.5-Remedial actions**
 - Contractor is free to choose the remedial actions
 - Time frames should be minimized
 - Remedial actions vs. Emergency remedial actions

- Principles used in establishing **Section 16.6-Warranty dispute resolution procedures**
 - Time frames should be minimized
 - Composition of the “Warranty Dispute Resolution Board”

This research has also developed certain **principles** that can be used by other state DOTs

- Principles used in establishing **Section 16.7- Contractor's default**
 - List of items that can be deemed as default

- Principles used in establishing **Section 16.8- Exclusions and waivers**
 - List of external factors beyond the control of the contractor
 - Factors that may take place before and after the contractor's maintenance work

- Principles used in establishing **Section 16.9-Contractor's option of maintenance**
 - Maintenance-free highway during the warranty period
 - Minimal amount of maintenance activities during the warranty period
 - VDOT approval to prevent major/capital maintenance work

This research has also developed certain **principles** that can be used by other state DOTs

- Principles used in establishing **Section 16.10-VDOT's responsibilities**
 - Incident management and winter weather maintenance activities
 - Day to day activities

- Principles used in establishing **Section 16.11-Subcontractor's responsibilities**
 - Contractor is responsible for performing or enforcing the required remedial work

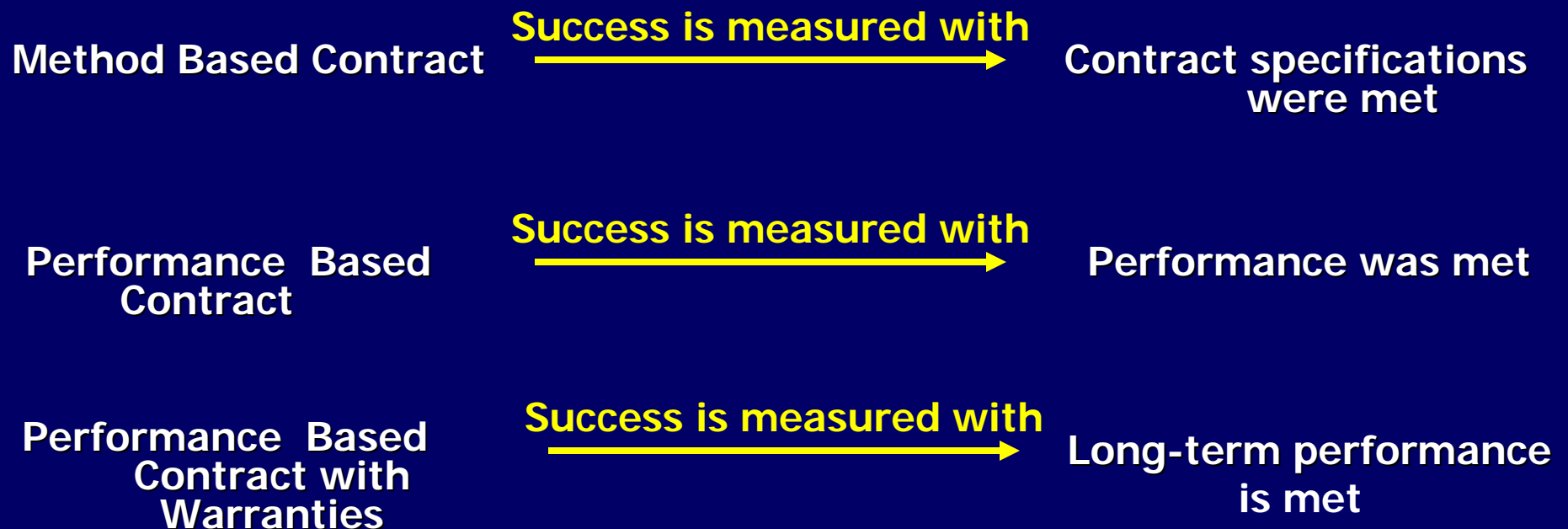
OTHER ADVANTAGES OF THE WARRANTIES

- **Increased control** of the contractor
- Possible **innovative construction techniques** implemented by the contractor

- Greater assumption of liability by the contractor



Summary- Bottom line



(UTAH Technology Transfer Center 1995)