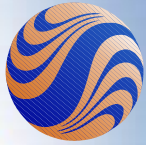


**Stantec**

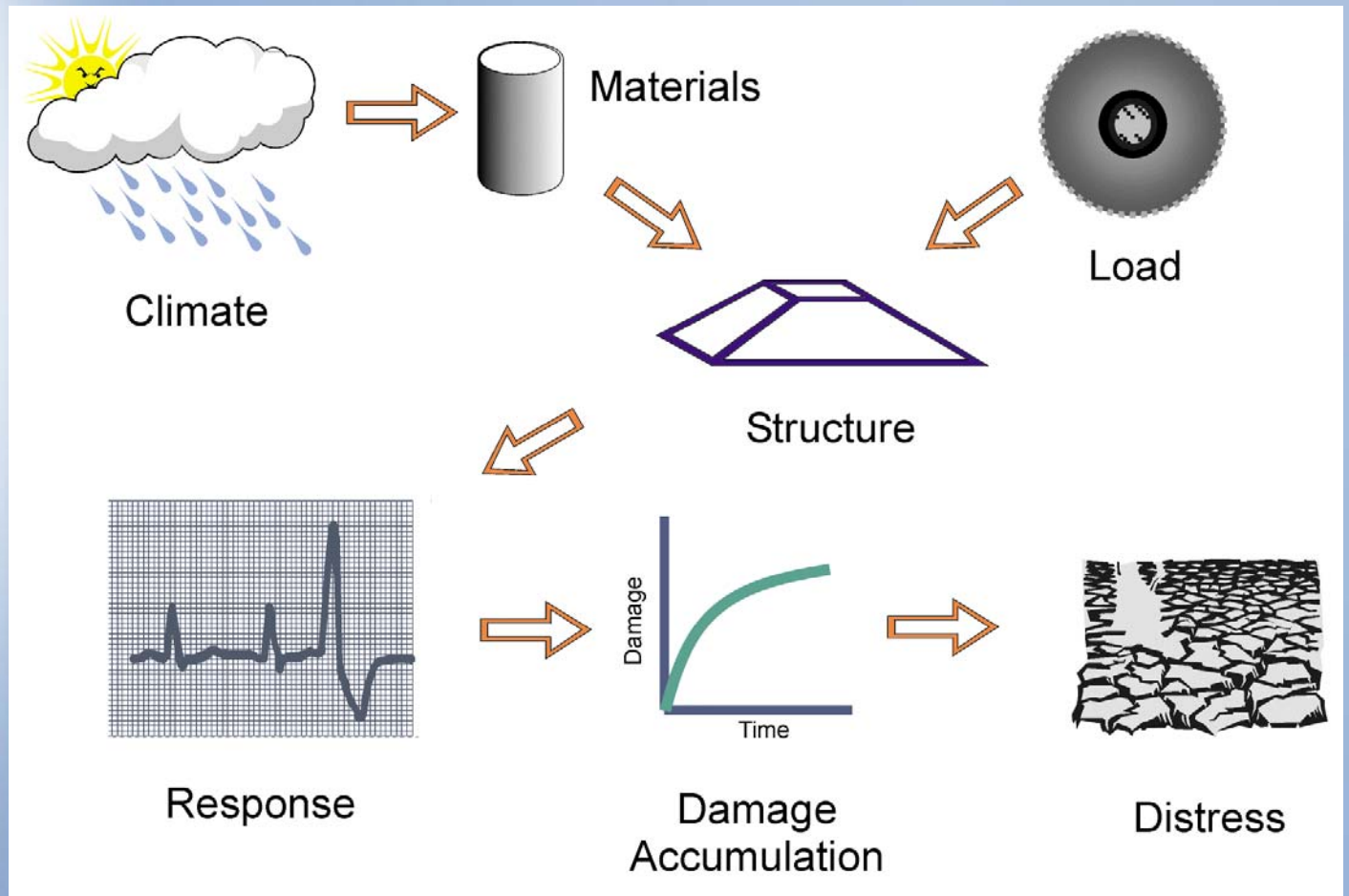
# **Integration of AASHTO 2002 and NJDOT PMS**

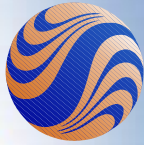
**February 2003**



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# AASHTO 2002 Guide (Mechanistic-Empirical)

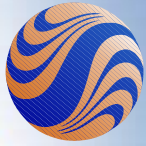




Stantec

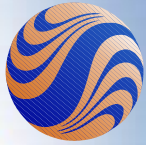
# Design Input Levels

- **Allows different levels of confidence in the design procedure**
- **Allows for different levels of design budgets**
- **The levels are:**
  - ◆ **Level 1 (Most Accurate) – Uses primarily measured data**
  - ◆ **Level 2 – Uses primarily estimated input data**
  - ◆ **Level 3 (Least Accurate) – Uses assumed input data**



**Stantec**

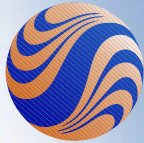
# **Overview of NJDOT PMS**



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# NJDOT PMS Modules

- Highway Database
- Dynamic Sectioning
- Section Data Reporting
- M&R Analysis & Optimization
- Project Design Analysis
- Engineering Feedback Analysis



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# HPMA Data Attributes

**Highway Data Browse / Edit** [X] 4-1

? [Help icon]

**Data Subset:**

Route Type: [Dropdown] Interstate

Route #: [Text] 0

Route Aux ID: [Dropdown] Undefined

Direction: [Dropdown]

Interchange #: [Text] 0     Ramp ID: [Text]

From: [Text] 0.000 [Text]

To: [Text] 0.000 [Text]

Lane: [Text]

County: [Dropdown] [Text]

Mun: [Text] 0     Year: [Text] 0

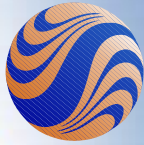
[Select...] [Clear]

**Data to Browse:**

- Highway Definitions
- Landmarks / Events
- Administrative
- Jurisdictions
- Environment
- Geometric
- Shoulders
- Sufficiency
- Traffic History
- Accidents
- Roughness / Rut
- Distress
- Deflection
- Friction
- Project Segments
- Project Details
- GPS Coordinates
- GPR Data
- Cores

[Browse...]  White Background

[Close]



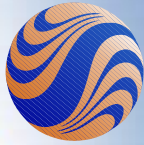
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# Highway Data Browse

Roughness Data 4-1-12

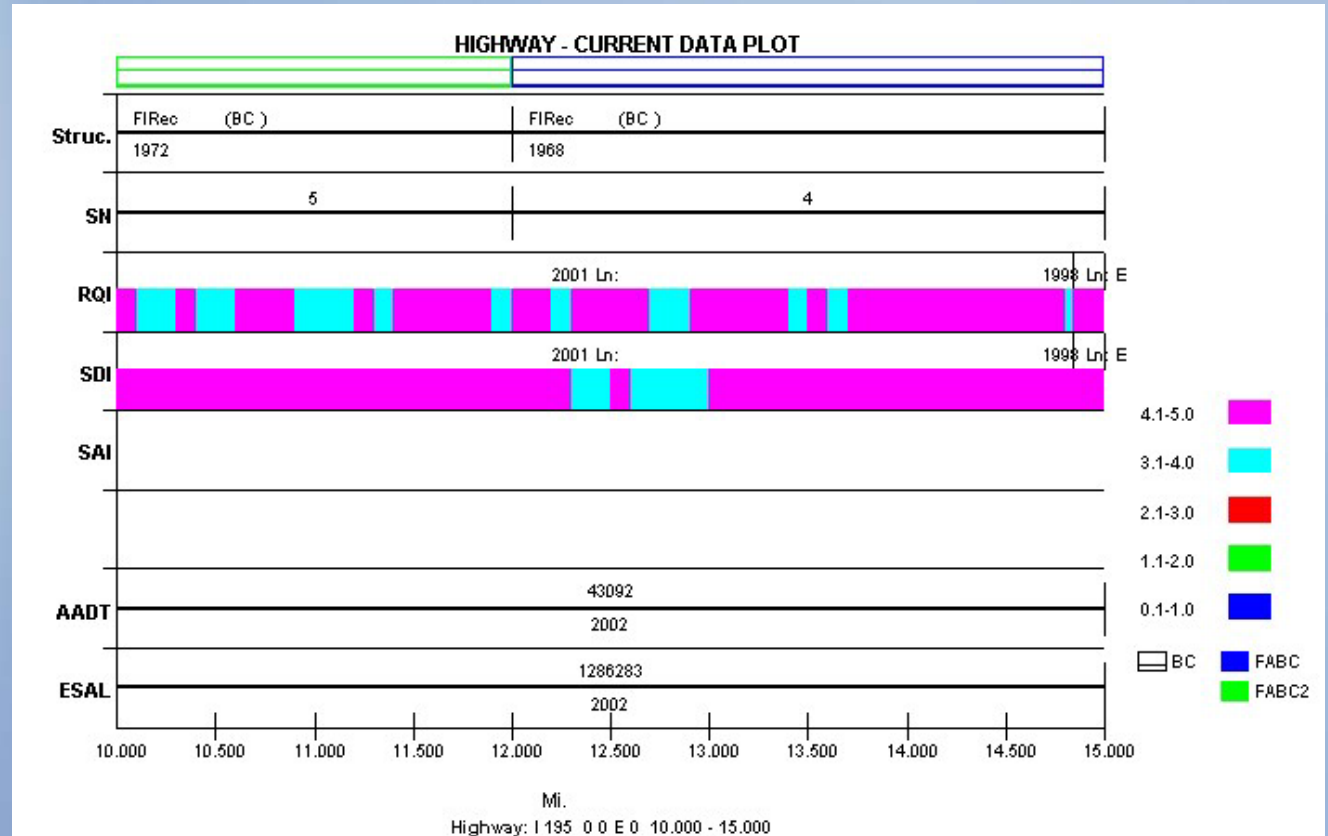
RT #	Aux	Dir	Ln	Cnty	Seq	From	To	Year	PSI	Ovd	IRI-L	IRI-R	Rut-L	Rut-R	Dual	Slope	Date
I 24		M	1	16	1	0.000	0.100	2000	3.0	<input type="checkbox"/>	97.00	84.80	0.24	0.08	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.100	0.200	2000	2.5	<input type="checkbox"/>	118.70	121.00	0.17	0.10	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.200	0.300	2000	3.1	<input type="checkbox"/>	93.00	77.50	0.13	0.13	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.300	0.400	2000	3.1	<input type="checkbox"/>	83.10	86.20	0.23	0.07	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.400	0.500	2000	4.0	<input type="checkbox"/>	36.10	37.30	0.20	0.05	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.500	0.600	2000	4.0	<input type="checkbox"/>	37.60	40.20	0.22	0.07	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.600	0.700	2000	4.0	<input type="checkbox"/>	41.10	34.20	0.21	0.13	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.700	0.800	2000	4.3	<input type="checkbox"/>	26.80	28.30	0.19	0.08	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.800	0.900	2000	4.3	<input type="checkbox"/>	27.50	27.60	0.18	0.06	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	0.900	1.000	2000	4.2	<input type="checkbox"/>	30.00	31.50	0.22	0.07	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	1.000	1.100	2000	3.9	<input type="checkbox"/>	37.20	46.20	0.26	0.06	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	1.100	1.200	2000	4.0	<input type="checkbox"/>	38.50	35.10	0.22	0.15	<input type="checkbox"/>	0.2	2000/08/01
I 24		M	1	16	1	1.200	1.300	2000	4.0	<input type="checkbox"/>	39.30	41.70	0.25	0.07	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	1.300	1.400	2000	3.3	<input type="checkbox"/>	67.60	82.80	0.21	0.09	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	1.400	1.500	2000	4.0	<input type="checkbox"/>	39.70	39.70	0.23	0.07	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	1.500	1.600	2000	4.1	<input type="checkbox"/>	33.20	34.30	0.17	0.06	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	1.600	1.700	2000	4.2	<input type="checkbox"/>	29.60	29.00	0.19	0.08	<input type="checkbox"/>	0.1	2000/08/01
I 24		M	1	16	1	1.700	1.800	2000	4.2	<input type="checkbox"/>	30.90	27.90	0.17	0.09	<input type="checkbox"/>	0.1	2000/08/01

OK

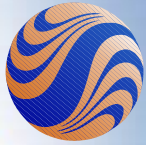


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# Highway Information

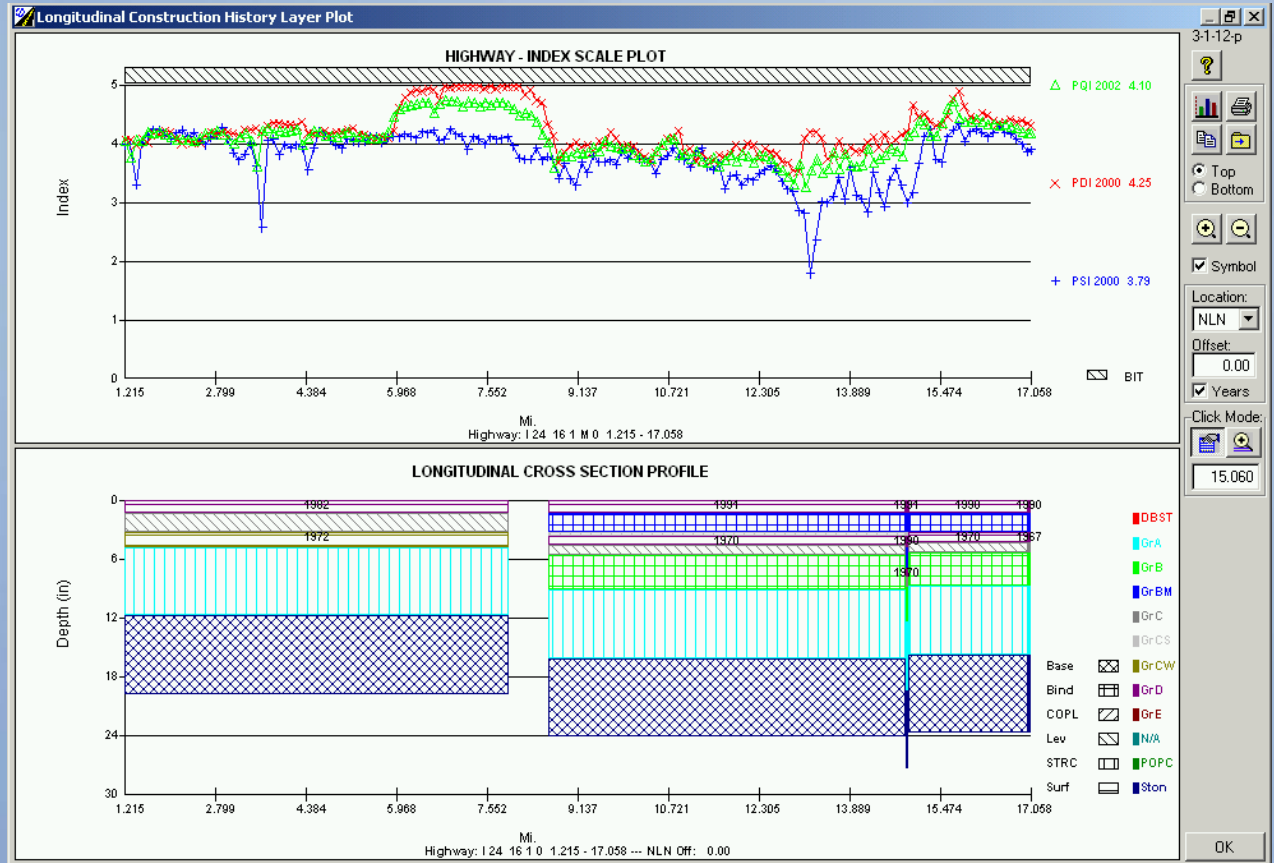


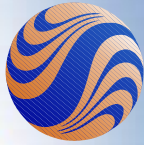




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# Highway Log Plot



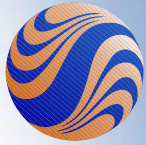


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# Deflection Data

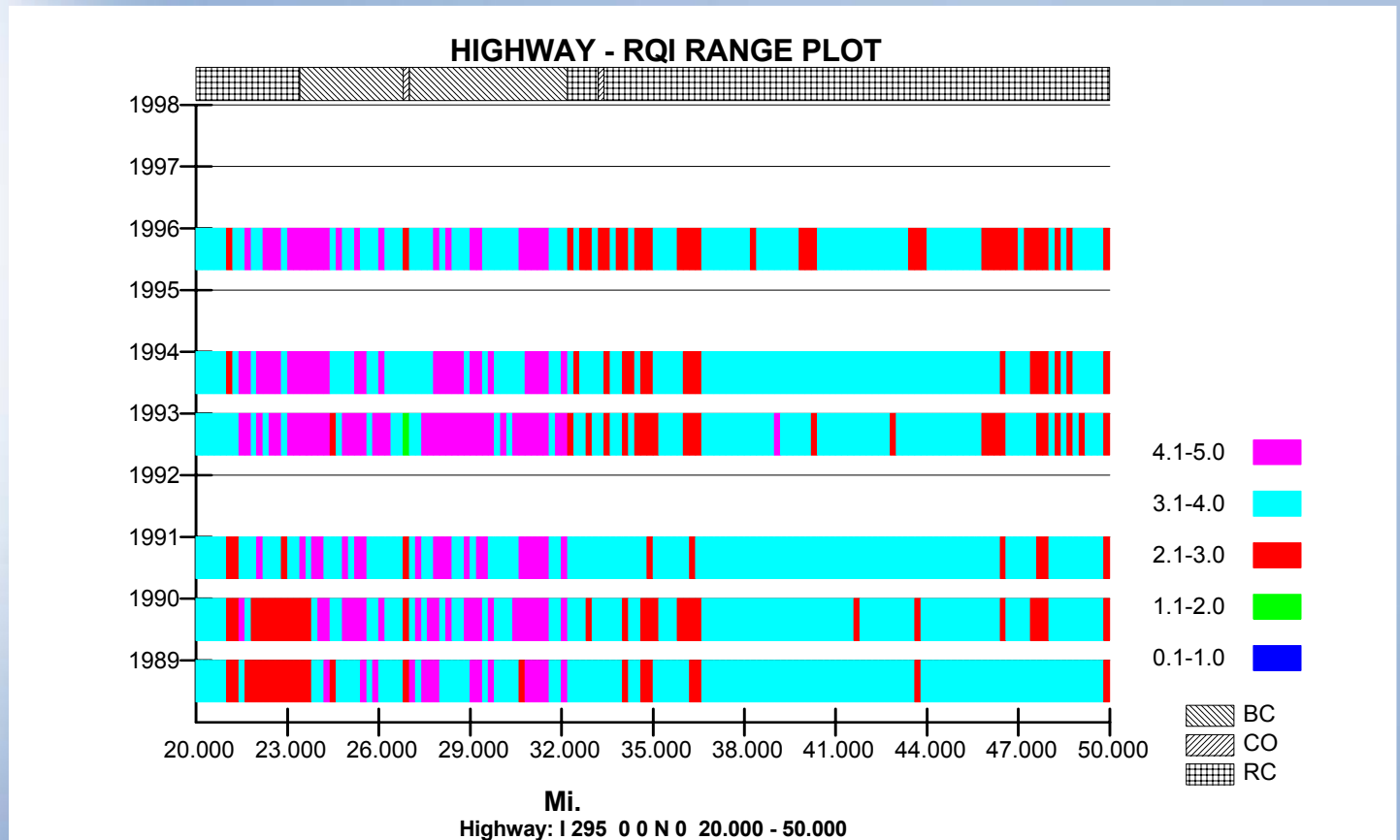
RT	#	Aux	Dir	Location	Year	Eff. SN	SubMod	ESAL (RSL)	Deflection	Test	Plate Load	Pav. Temp.	Defl. 2	Defl. 3	Defl. 4	Defl. 5	Defl. 6	Defl. 7	Defl. 8	Defl. 9	Plate Radius
NJ	18		N	6.020	2002	9.66	7707	262	212.000	F	800.000	14	175.000	171.000	132.000	99.000	72.000	53.000	0.000	0.000	0.000
NJ	18		N	6.100	2002	11.00	7380	712	162.000	F	806.000	14	143.000	143.000	117.000	94.000	74.000	57.000	0.000	0.000	0.000
NJ	18		N	6.200	2002	10.16	5947	221	199.000	F	785.000	14	172.000	168.000	138.000	110.000	88.000	70.000	0.000	0.000	0.000
NJ	18		N	6.300	2002	9.75	5432	127	126.000	F	439.000	14	111.000	110.000	89.000	71.000	55.000	42.000	0.000	0.000	0.000
NJ	18		N	6.400	2002	10.73	6323	403	178.000	F	793.000	14	160.000	159.000	132.000	105.000	83.000	67.000	0.000	0.000	0.000
NJ	18		N	6.500	2002	10.87	5832	372	170.000	F	795.000	11	152.000	152.000	132.000	108.000	90.000	73.000	0.000	0.000	0.000
NJ	18		N	6.600	2002	10.48	5098	200	187.000	F	785.000	10	167.000	168.000	145.000	121.000	101.000	83.000	0.000	0.000	0.000
NJ	18		N	6.700	2002	8.64	6138	62	148.000	F	435.000	10	122.000	116.000	87.000	63.000	48.000	37.000	0.000	0.000	0.000
NJ	18		N	6.800	2002	9.04	6339	96	241.000	F	783.000	11	191.000	188.000	143.000	109.000	83.000	65.000	0.000	0.000	0.000
NJ	18		N	6.990	2002	8.93	6780	103	241.000	F	775.000	11	199.000	197.000	146.000	106.000	77.000	60.000	0.000	0.000	0.000
NJ	18		N	7.000	2002	9.61	6491	170	218.000	F	786.000	13	181.000	180.000	140.000	106.000	81.000	64.000	0.000	0.000	0.000
NJ	18		N	7.150	2002	8.33	7110	65	164.000	F	436.000	13	126.000	127.000	92.000	64.000	43.000	31.000	0.000	0.000	0.000
NJ	18		N	7.200	2002	10.15	10305	780	177.000	F	812.000	13	138.000	135.000	100.000	73.000	55.000	40.000	0.000	0.000	0.000
NJ	18		N	7.300	2002	10.30	8575	577	183.000	F	822.000	14	150.000	148.000	115.000	86.000	65.000	50.000	0.000	0.000	0.000
NJ	18		N	7.400	2002	10.38	8606	623	172.000	F	825.000	11	143.000	145.000	112.000	85.000	65.000	50.000	0.000	0.000	0.000
NJ	18		N	7.500	2002	10.19	6026	232	108.000	F	444.000	12	94.000	94.000	76.000	61.000	48.000	40.000	0.000	0.000	0.000
NJ	18		N	7.600	2002	10.96	6742	557	168.000	F	829.000	12	150.000	148.000	124.000	101.000	81.000	66.000	0.000	0.000	0.000
NJ	18		N	7.700	2002	10.62	6643	414	180.000	F	822.000	12	158.000	160.000	131.000	104.000	82.000	66.000	0.000	0.000	0.000
NJ	18		N	7.800	2002	9.36	4771	67	247.000	F	785.000	12	216.000	219.000	176.000	140.000	110.000	87.000	0.000	0.000	0.000
NJ	18		N	7.900	2002	9.77	6951	228	113.000	F	430.000	13	95.000	95.000	73.000	54.000	41.000	33.000	0.000	0.000	0.000
NJ	18		N	7.950	2002	9.83	7355	274	203.000	F	796.000	13	172.000	170.000	132.000	99.000	74.000	56.000	0.000	0.000	0.000
NJ	18		N	8.000	2002	9.41	7412	194	229.000	F	805.000	14	190.000	188.000	140.000	100.000	76.000	55.000	0.000	0.000	0.000
NJ	18		N	8.100	2002	9.94	8608	433	198.000	F	808.000	15	165.000	161.000	122.000	89.000	65.000	48.000	0.000	0.000	0.000
NJ	18		N	8.175	2002	10.07	8244	435	147.000	F	610.000	15	122.000	119.000	92.000	68.000	51.000	38.000	0.000	0.000	0.000

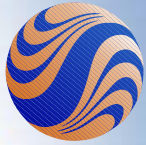
SAI: [ ] Deflection: 1 2 3 4 5 6 7 8 9  
 212.00 175.00 171.00 132.00 99.000 72.000 53.000 0.000 0.000  
 Device Type: [ ] Test Type: F Plate Load: 800.00 Air Temp.: 0 Pavement Temp.: 14  
 Total Records: 94 [ Device Type... ] [ Test Type... ] [ OK ]



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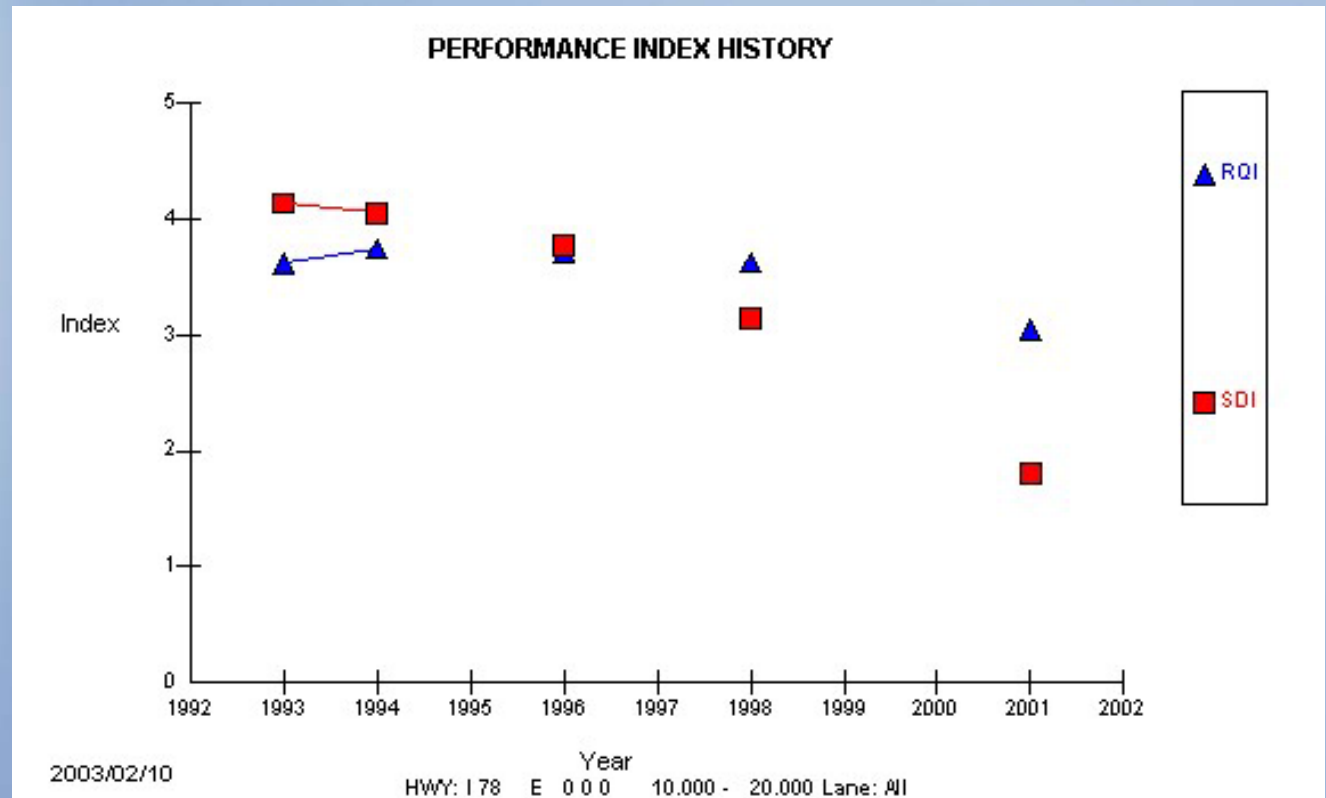
# Current Road Performance

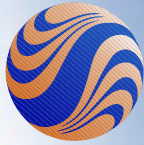




Stantec

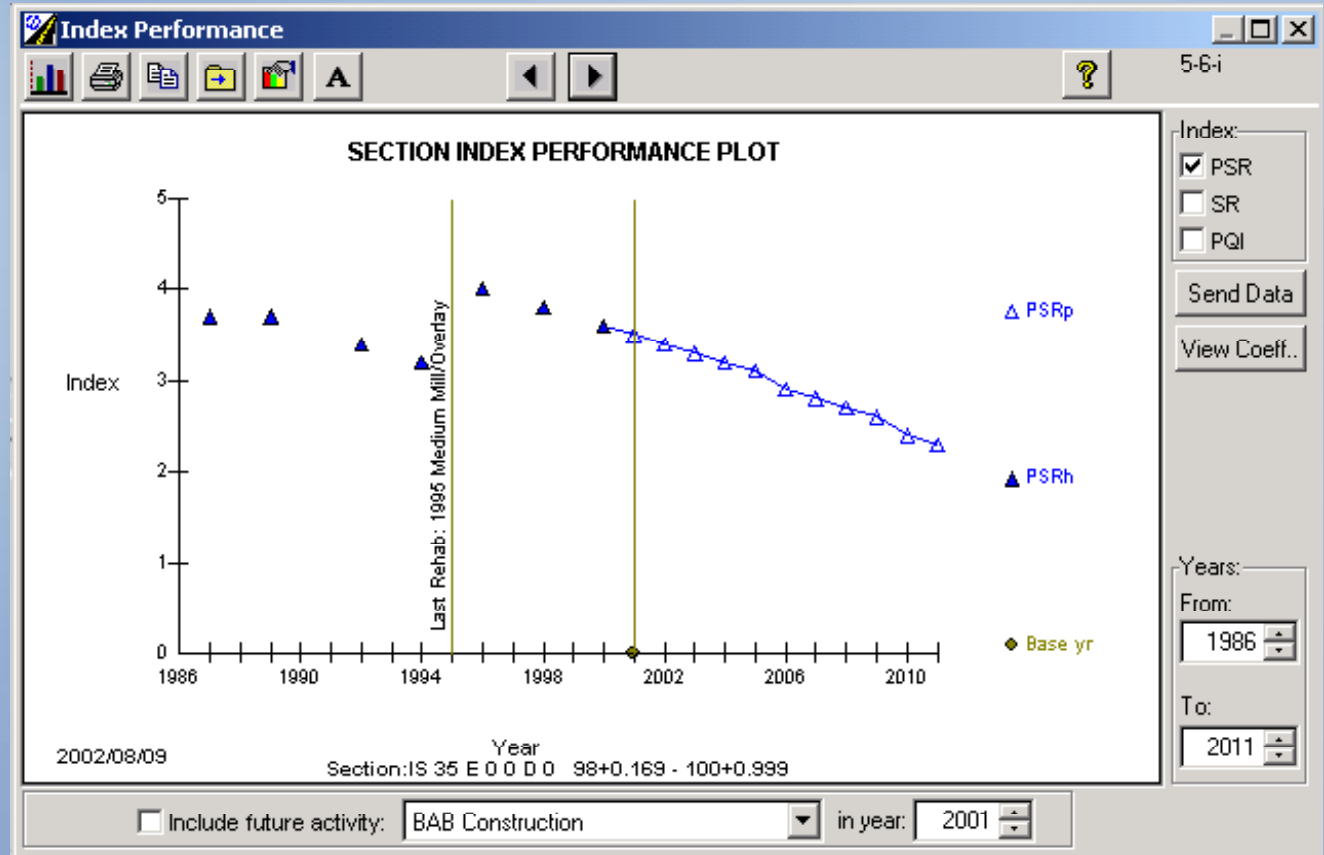
# Highway Performance

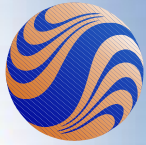




Stantec

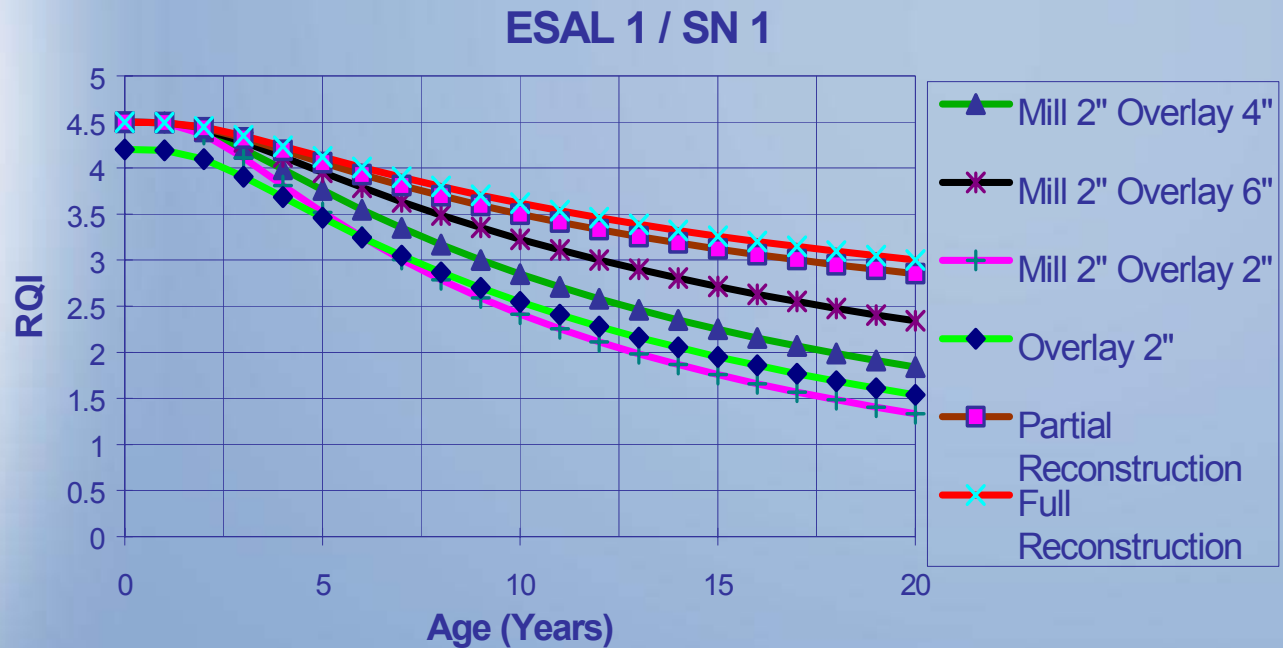
# Index Prediction Example

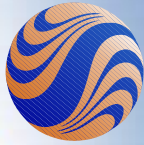




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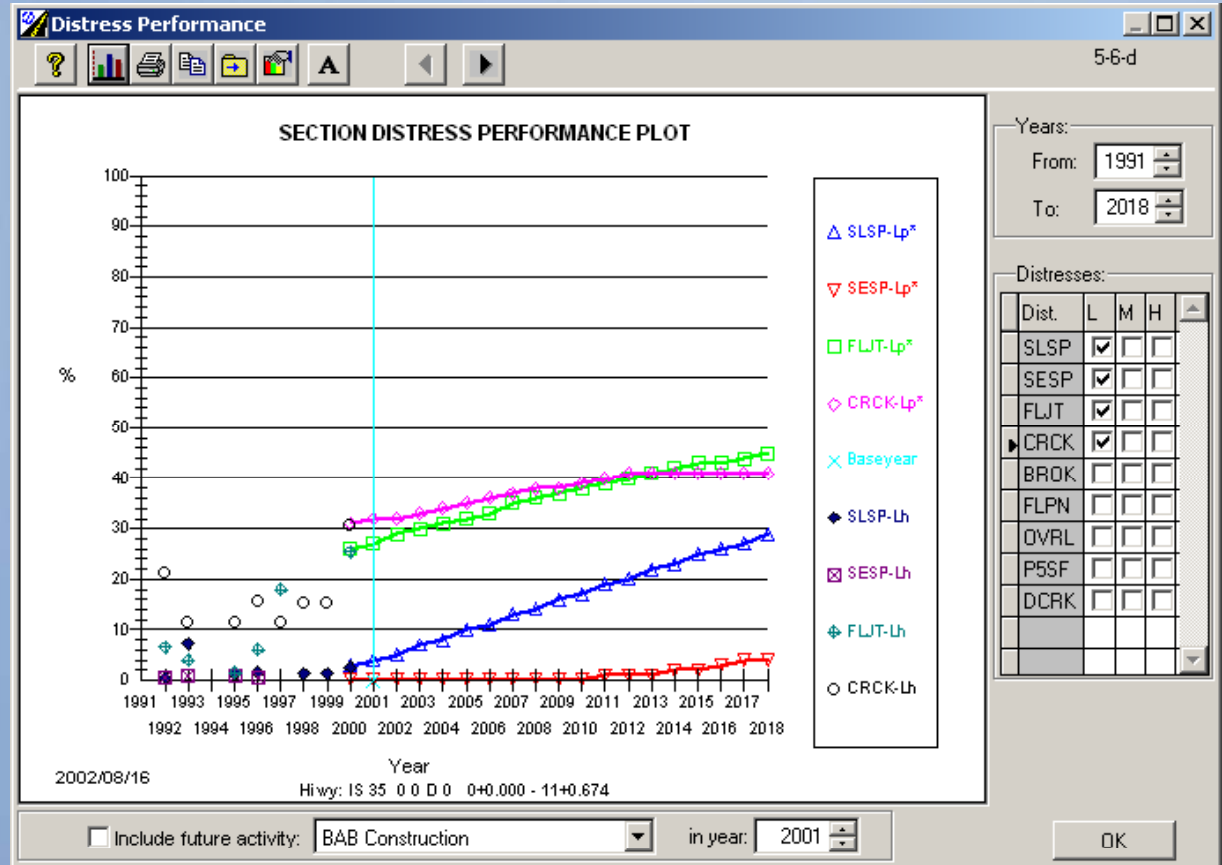
# Default Performance Models

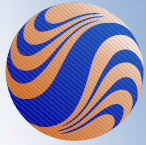




Stantec

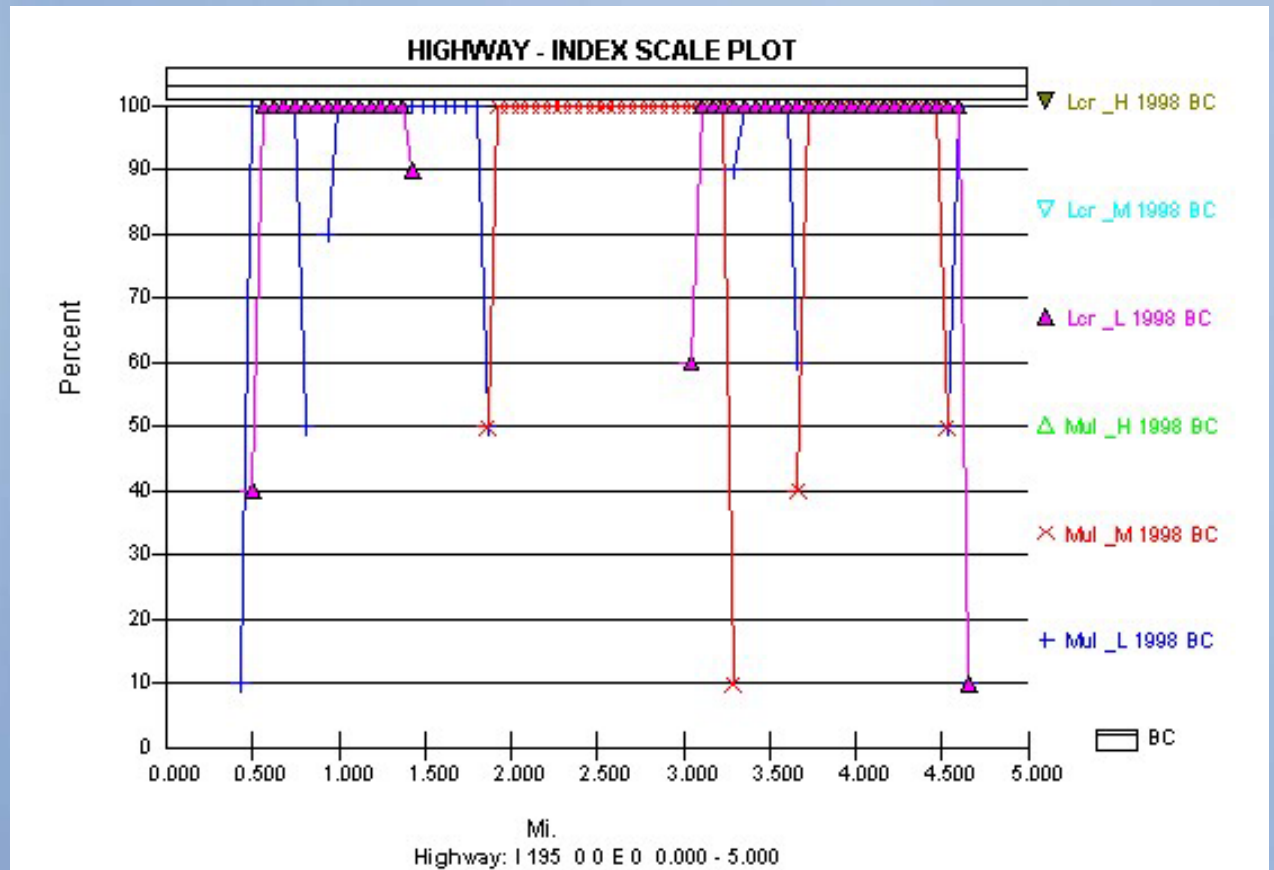
# Distress Prediction Example



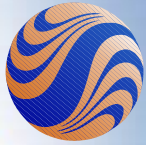


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# Highway Distress

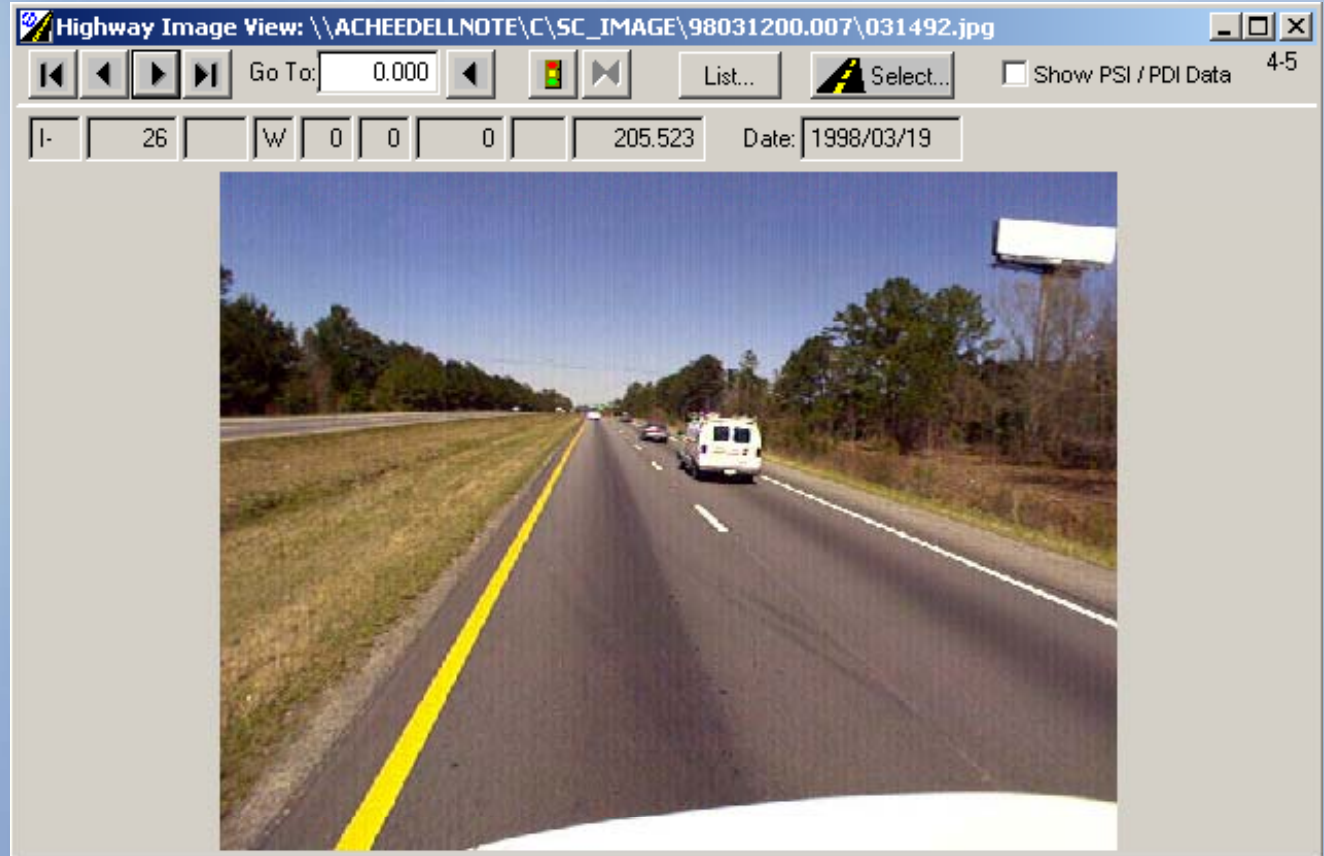


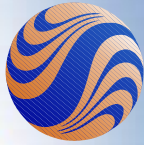




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# Highway Images

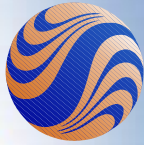




Stantec

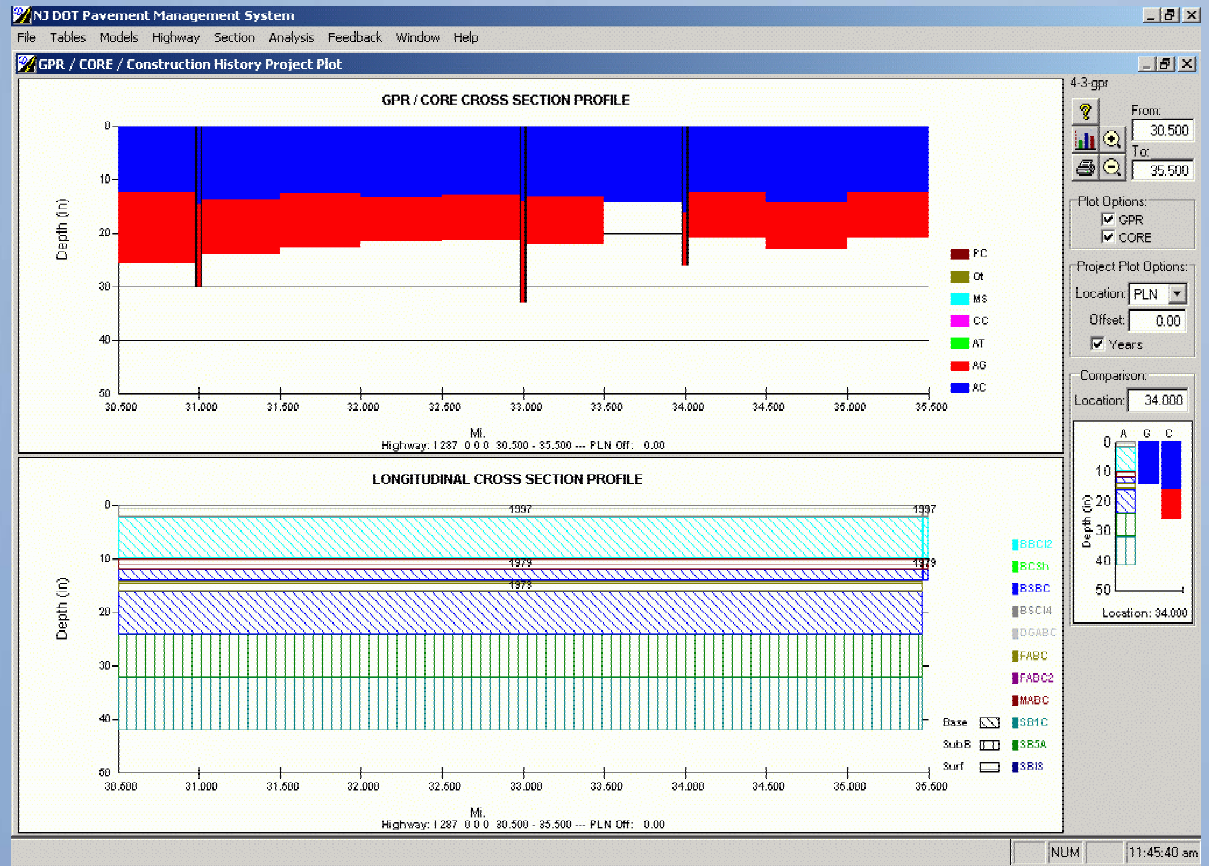
# Detailed Layer Information

- Material properties can be stored to increase accuracy level of rehabilitation activities
- Material variability and reliability information can be accumulated
- Layer thickness and variability information from as-built documents, coring, and non-destructive methods (GPR)



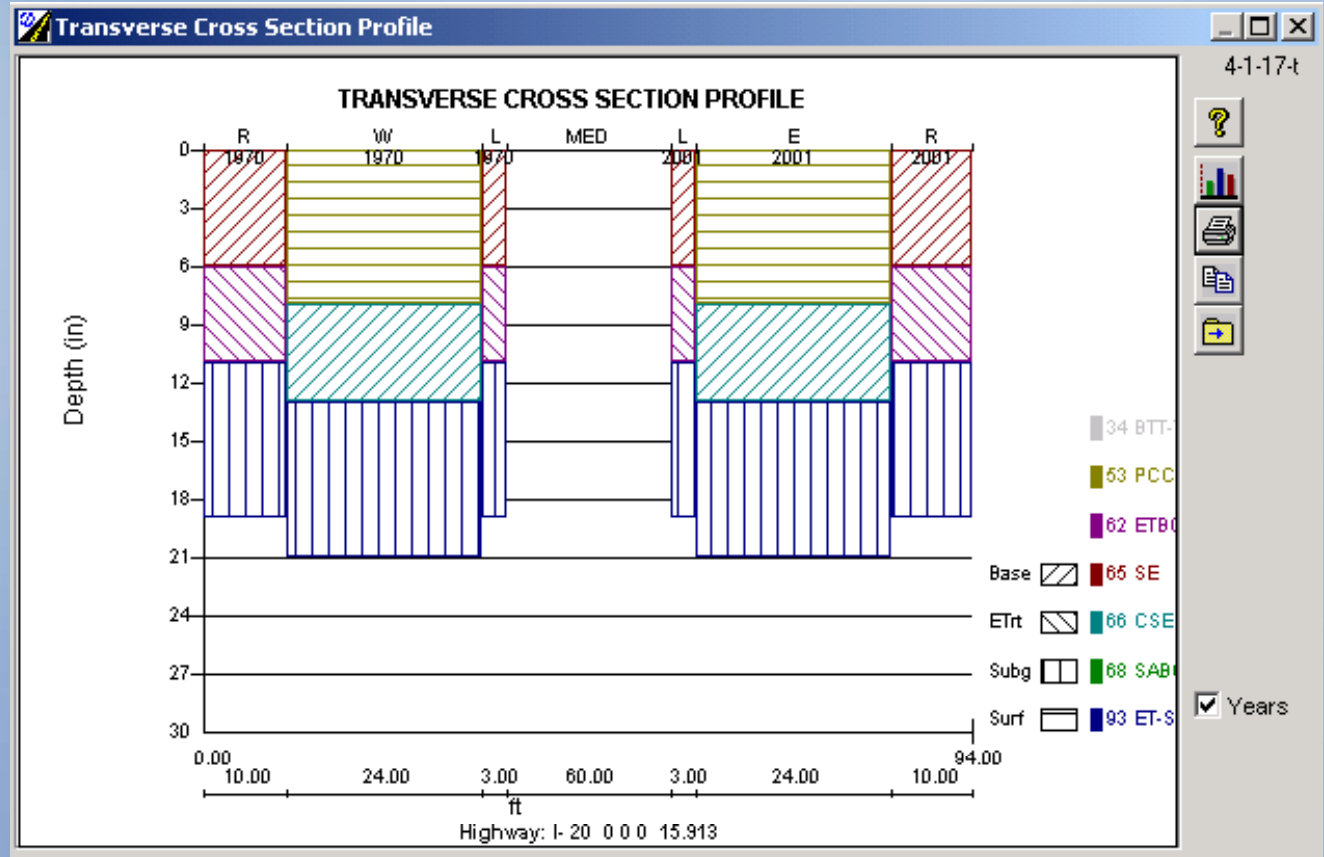
Stantec

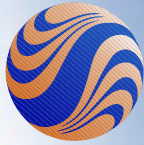
# Highway Cross-Section





# Highway Layer Graph





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# M & R Treatments

M&R Activities 6-2-1

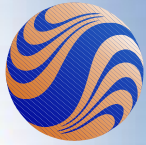
Index Increase

Code	ID	Description	Type	Thk	Unit Cost	PSR	SR	Mill	Staged	Pavement	SurfType
15	R/CrS/Chip	Rut Fill/CrkS+Chip S	G	0.00	6100.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
16	R/CrS/Micr	Rut Fill/CrkS+Micro	G	0.00	10500.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
17	R/CrR/Chip	Rut Fill/CrkR+ChipSI	G	0.00	13700.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
18	R/CrR/Micr	Rut Fill/CrkR+Micro	G	0.00	18150.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
19	Ruts/CrkSI	Rut Fill/Crack Seal	M	0.00	2500.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
20	Thin OL	Thin Overlay	R	2.00	17500.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
21	Med OL	Medium Overlay	R	3.00	35000.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
22	Thick OL	Thick Overlay	R	4.00	50000.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
23	Thin M&OL	Thin Mill/Overlay	R	0.00	24000.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC
24	Med M&OL	Medium Mill/Overlay	R	0.00	45000.00	0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>		AC

Unit Cost:  \$/s.y.  
 \$/lane-mi    Std. Width:

Unit Cost by Jurisdiction Hierarchy      
 Unit Cost by Highway Segment   

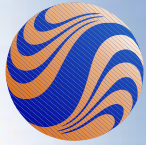
Milling:  
Mill Depth Factor:   
Max. Mill Depth:



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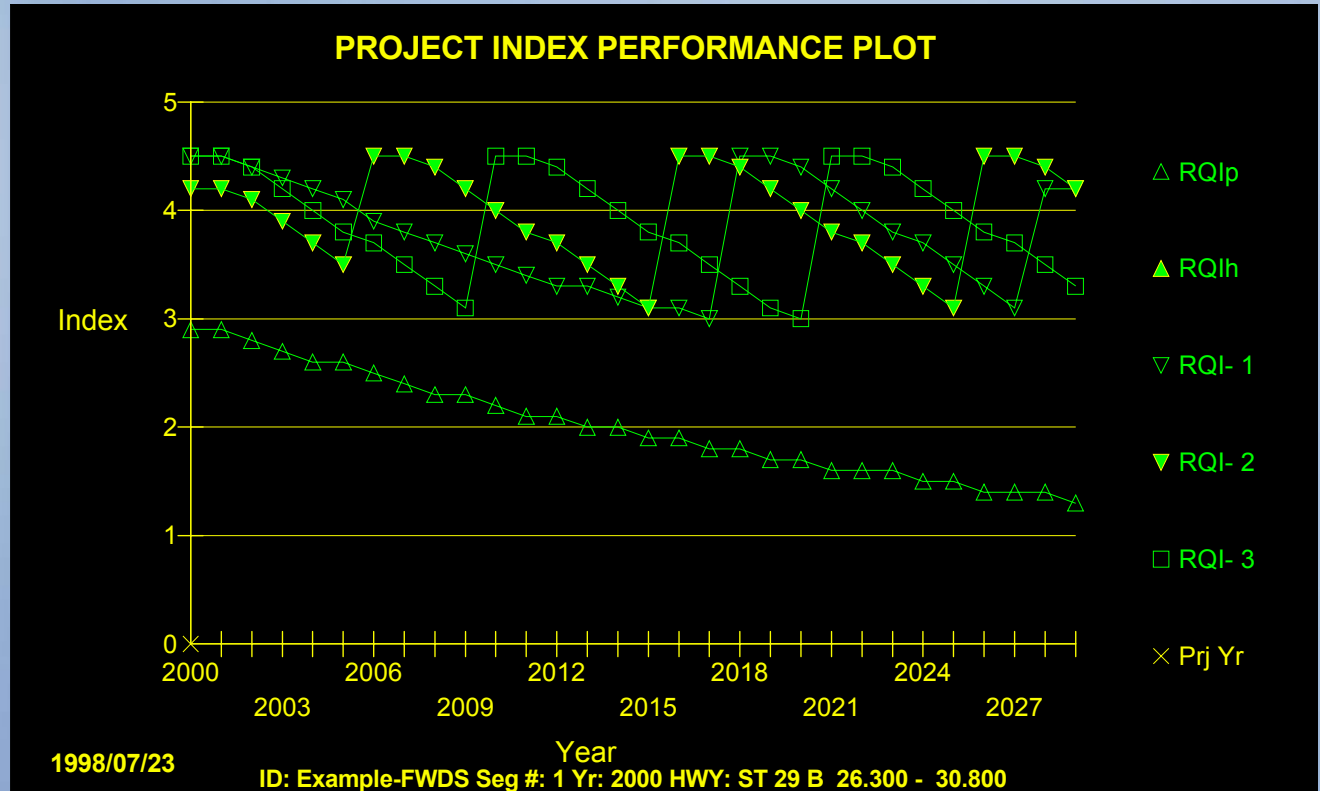
# Project Design Analysis

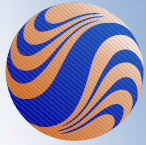
- Standard or Staged Alternatives
- Detailed User Delay Cost Analysis
- Life Cycle Cost Analysis



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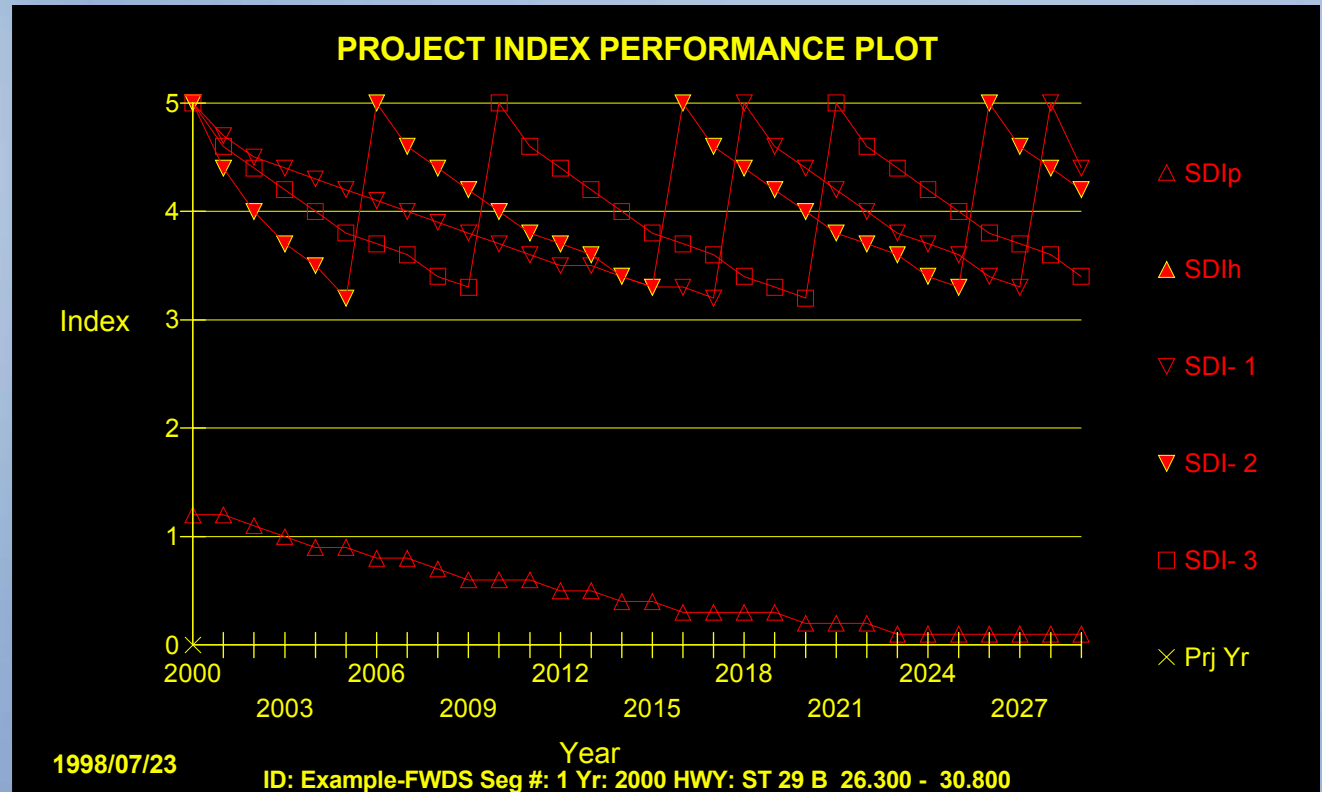
# Life Cycle Analysis (RQI)



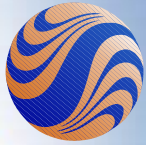


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# Life Cycle Analysis (SDI)



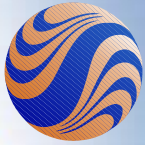




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# Feedback Analysis

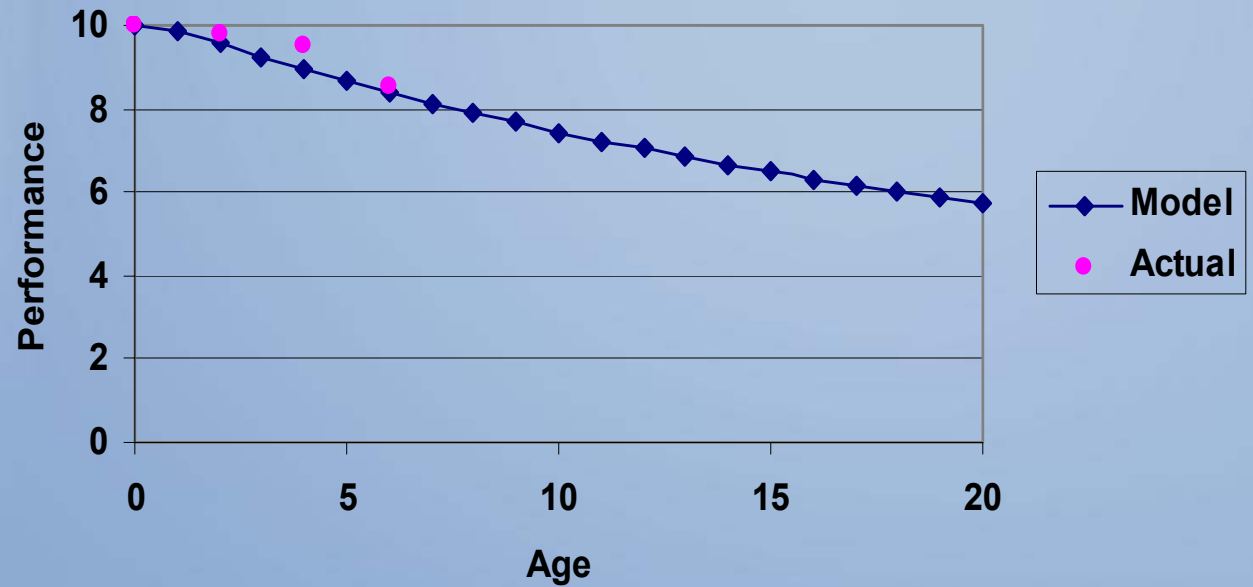
- Analysis of Historical Database
- Update Prediction Models
- Analyze Treatment Effectiveness
- Track Work Programs

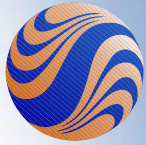


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# Index Prediction Models

Performance Prediction Models

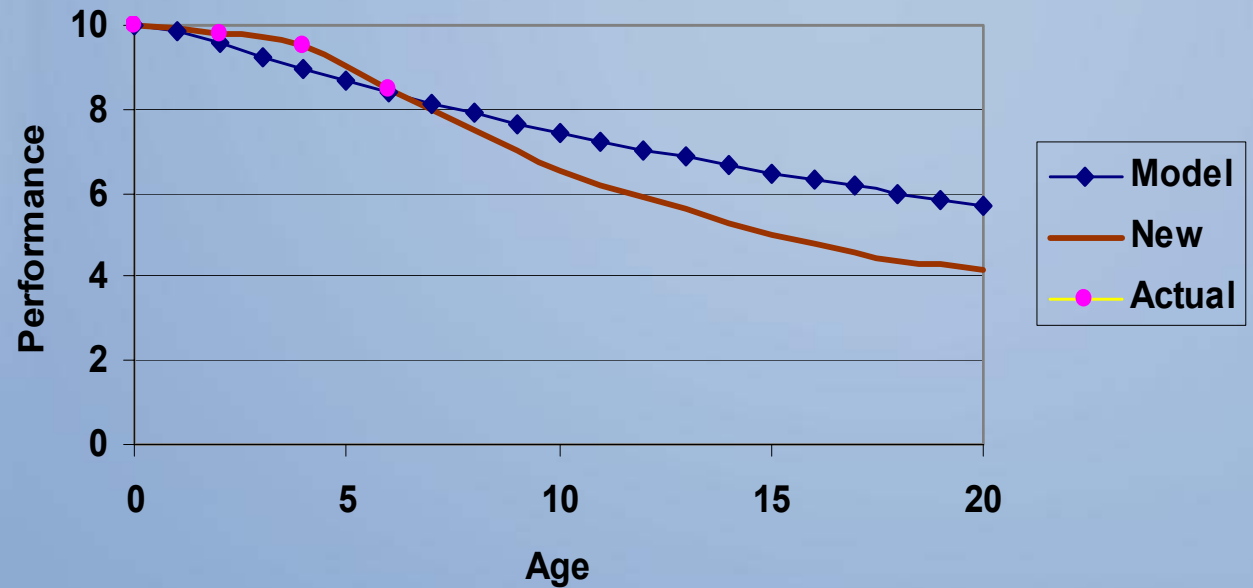


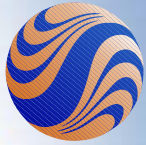


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# Index Prediction Models

Performance Prediction Models

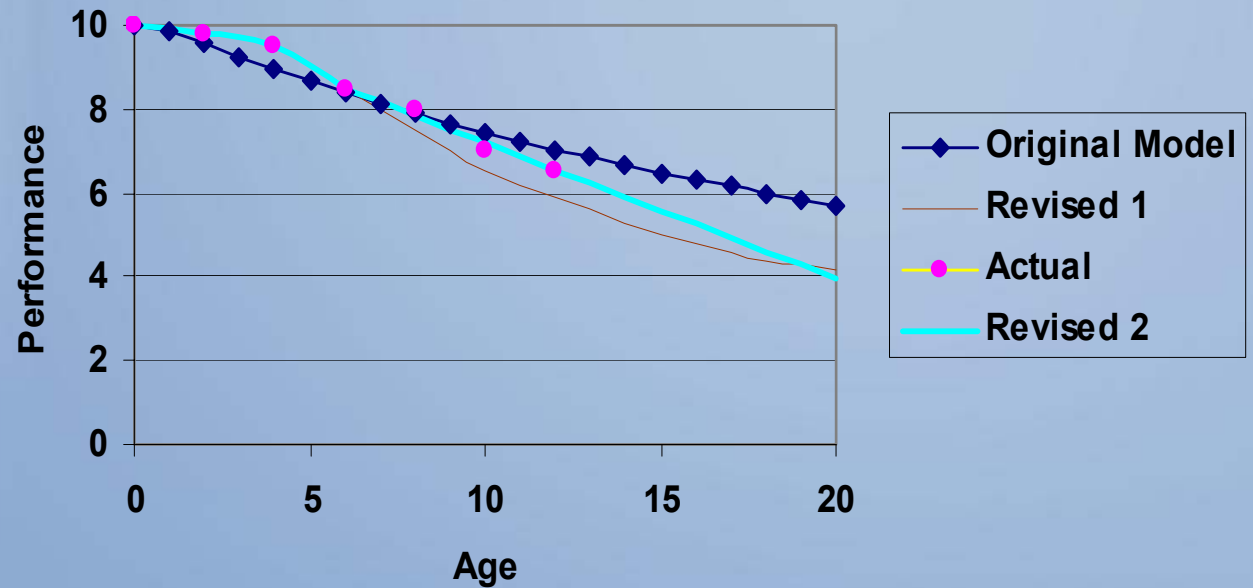


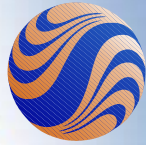


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# Index Prediction Models

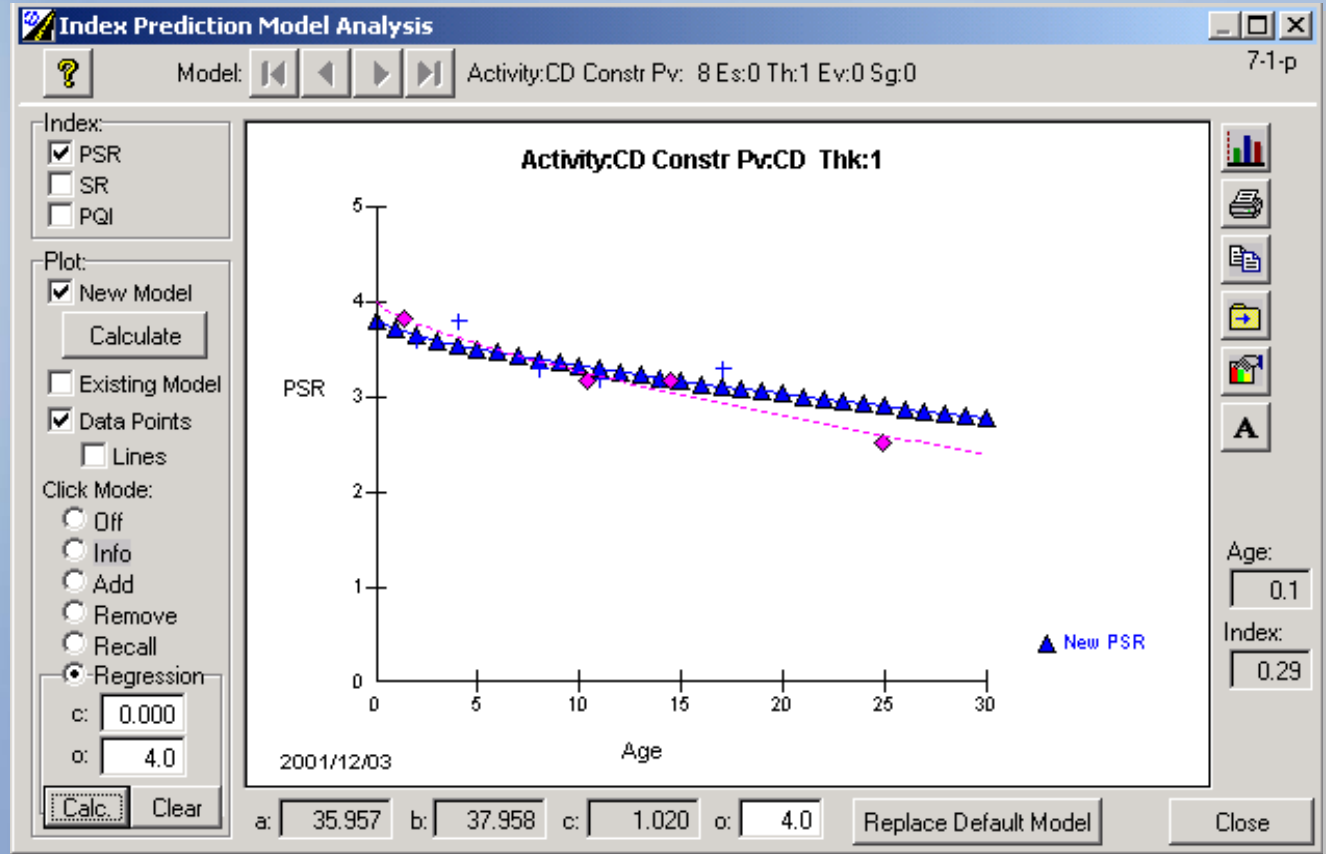
Performance Prediction Models

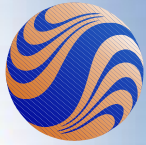




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# Index Model Feedback





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**Thank You...**