NEW JERSEY DEPARTMENT OF TRANSPORTATION

RIDE QUALITY SPECIFICATION 2014

BY

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AGENDA

- NEW TABLE 401.03.03-7
- CURRENT AND NEW SPEC. COMPARISON
- CHANGES IN LOCALIZED FACTORS
- PAY ADJUSTMENT ESTIMATOR
- EXAMPLES

TABLE 401.03.03-7 PAY EQUATIONS FOR RIDE QUALITY

PAY ADJUSTMENT EQUATION
BASED ON
NETWORK IRI PERFORMANCE DATA

$$PA = \frac{\$2{,}148.61}{(-37.75347 * Ln(Target\ IRI) + 194.87)} - \frac{\$2{,}148.61}{(-37.75347 * Ln(Sublot\ IRI) + 194.87)}$$

**AVERAGE COST
OF
REPLACING THE PAVEMENT PER LOT.**

AVERAGE COST IS REPLACED WITH THE PROJECT SPECIFIC COST

$$1267.2 \times \left[\frac{M}{9} + \frac{ND}{150} \right]$$

TABLE 401.03.03-7 PAY EQUATIONS FOR RIDE QUALITY

Table 401.03.03-7 Pay Equations for Ride Quality		
	Excluded	**Pay Equation(s)**
		PA on lots of 0.01 mile length
Route A from MP 20.3 to MP 22.2	<u>NB</u> Lane 1 - 5 Lane 2 – 6	PA=PAE Target IRI (T) = 60 Inch/Mile
Pay Adjustment Equation (PAE)=	$\dfrac{A}{-37.75347 \times LN(T) + 194.87} - \dfrac{A}{-37.75347 \times LN(IRI) + 194.87}$	
A=	$1267.2 \times \left[\dfrac{M}{9} + \dfrac{ND}{150} \right]$	
M=	Bid price of Milling, per Square Yard	
N=	Bid price of last lift of the pavement structure to be evaluated, per Ton	
D=	Average thickness of last lift to be evaluated, Inch	
T_{Deck}=	Target IRI for Bridge Deck Overlay and equal to Target IRI (T) of travel lanes of the roadway section where Overlaid Bridge Deck is located.	

TABLE 401.03.03-7 PAY EQUATIONS FOR RIDE QUALITY

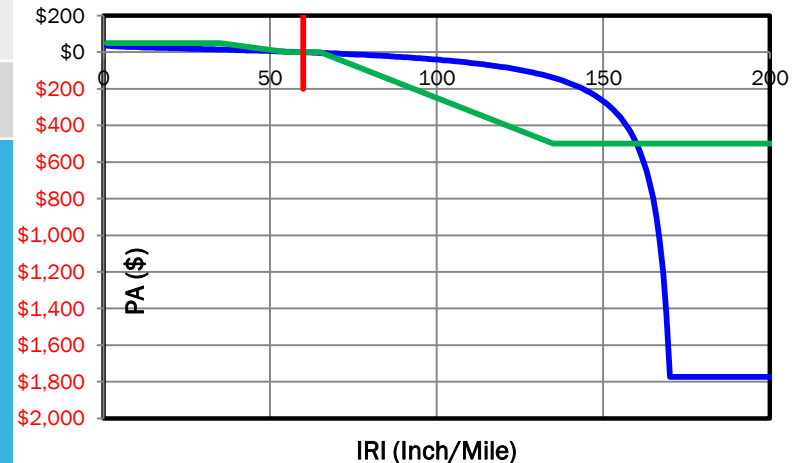| Table 401.03.03-7 Pay Equations for Ride Quality			
	Excluded Lots	**Pay Equation(s)**	
		PA on lots of 0.01 mile length	
Route <u>A</u> Ramps and Shoulders and other paved sections within the project limit not included above.	Will include, if tested	IRI ≤ 120	PA = $0
		120 < IRI ≤ 170	PA = (IRI − 120) x (−$10.00)
		IRI > 170	Maximum Negative Pay or Corrective action
Overlaid Bridge Decks on Route A Between MP 20.3 and MP 22.2	None	PA on lots of 0.01 mile length	
		$IRI < T_{Deck}$	PA=PAE
		$T_{Deck} \leq IRI \leq 120$	PA=0
		$120 < IRI \leq 170$	PA=PAE
		IRI>170	Maximum Negative Pay or Corrective action

COMPARISON
OF
CURRENT PAY ADJUSTMENT EQUATION
AND
NEW PAY ADJUSTMENT EQUATION

COMPARISON OF CURRENT AND NEW PAY ADJUSTMENT EQUATION

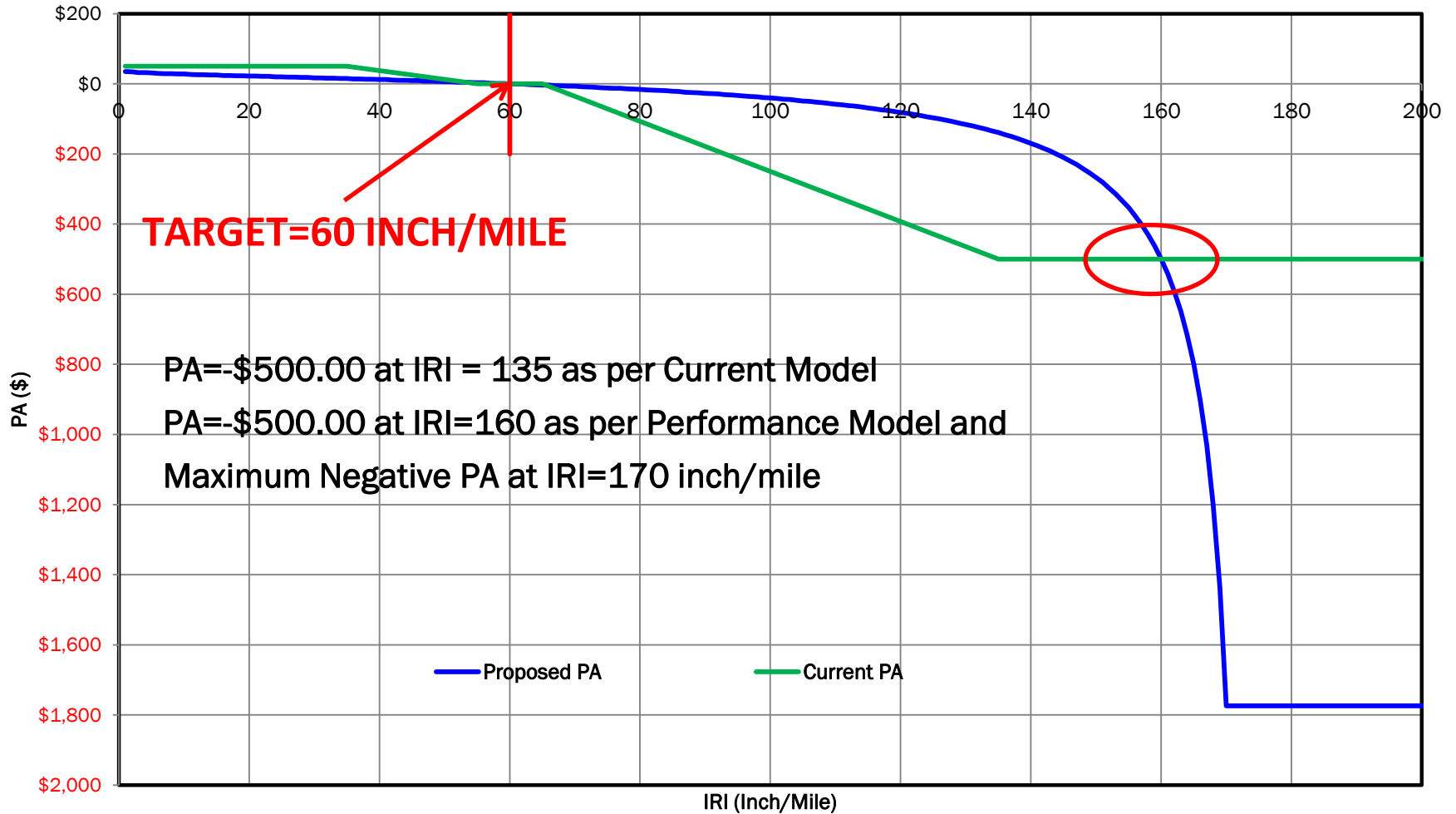|	2010 Spec	2014 Spec
Base IRI	45 inch/mile for Freeway/ Limited Access Highway	50 inch/mile for Freeway/Limited Access Highway
	55 inch/mile for other than Freeway/Limited Access Highway	60 Inch/Mile for other than freeway with speed limit ≥35 MPH
		70 Inch/mile for other than freeway with speed limit <35 MPH
Type of Pay Adjustment equations	Linear slopes on both sides of zero band with positive pay adjustment to negative pay adjustment ratio= 1:10	Based on models developed from the Network IRI Performance data

COMPARISON OF CURRENT AND NEW PAY ADJUSTMENT EQUATION

|	2010 Spec	2014 Spec

Maximum Positive Pay Adjustment	$50 at Target IRI-25.	• Depend on
		   -Type of treatment and
		   -Bid price of surface course.
		• Opportunity to earn positive PA greater than $50

Maximum Negative Pay Adjustment	$-500.00 at Target IRI+75	• Depend on
		   -Type of treatment and
		   -Bid price of surface course.
		•Maximum negative PA=Cost of Surface course of a lot at IRI=170 Inch/Mile

Slope of Negative Pay Adjustment	Linear, Pay Adjustment for every 1 inch/mile IRI beyond zero band = -$7.143	•Exponential slope, •Flat close to the target and steeper as IRI approaches to 170 inch/mile. •Similar slopes within 30-40 inch/mile on either side of target.

COMPARISON OF CURRENT AND NEW PAY ADJUSTMENT EQUATION

Pay Adjustment based on CURRENT and NEW PA Equations

TARGET=60 INCH/MILE

PA=-$500.00 at IRI = 135 as per Current Model

PA=-$500.00 at IRI=160 as per Performance Model and

Maximum Negative PA at IRI=170 inch/mile

COMPARISON OF CURRENT AND NEW PAY ADJUSTMENT EQUATION

IRI	PA
50	$6
51	$6
52	$5
53	$5
54	$4
55	$3
56	$3
57	$2
58	$1
59	$1
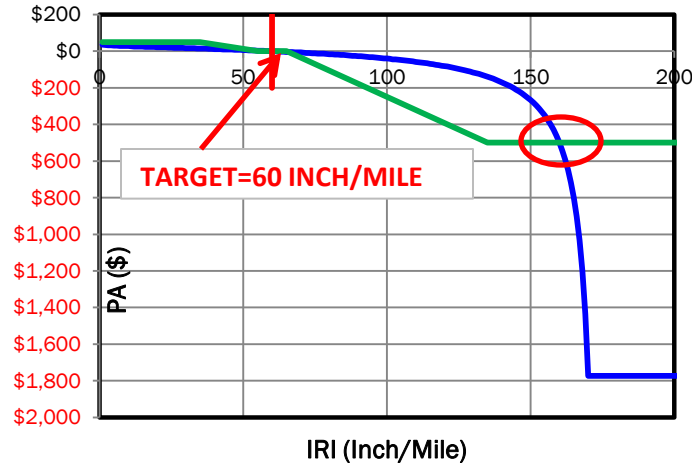
IRI	PA
61	-$1
62	-$1
63	-$2
64	-$3
65	-$4
66	-$4
67	-$5
68	-$6
69	-$7
70	-$7

TARGET=60 INCH/MILE
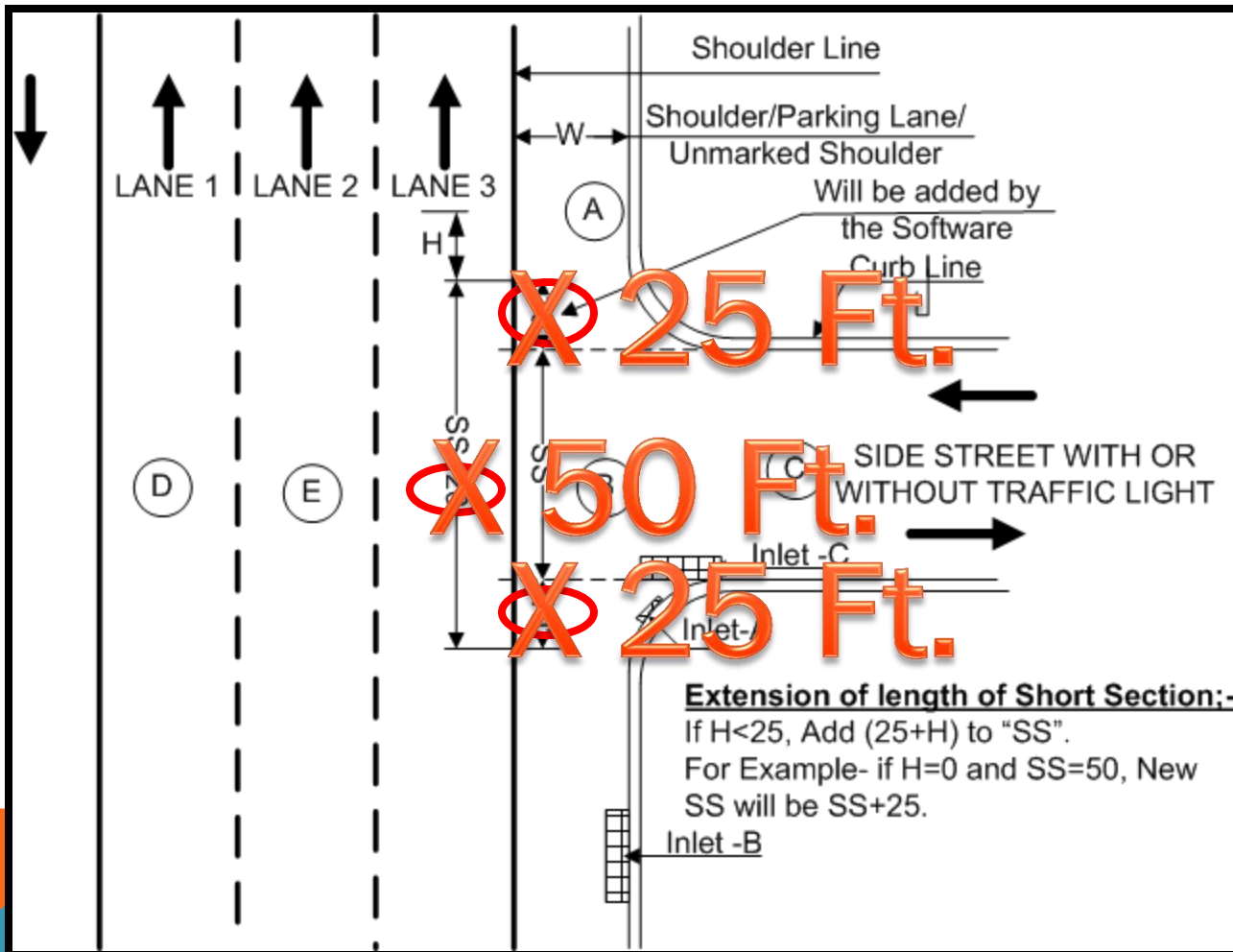
**Target = 60 Inch/Mile
PA=0**

EXCLUSIONS

Exclusions

IMPEDIMENTS
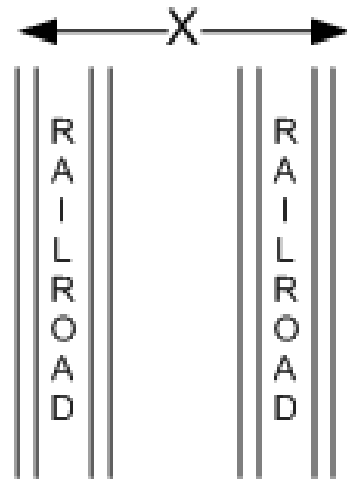
MANHOLES, INLETS, UTILITY VALVES

Threshold for impediments = 2⬚ ft 50 ft

Already implemented in projects advertised on
or after September 1, 2013.

Exclusions

Exclusion Width=X+Threshold length of Impediment

FIGURE 9

RIDE QUALITY PAY ADJUSTMENTS

HOW TO ESTIMATE PAY ADJUSTMENTS DURING BID?

RIDE QUALITY PAY ADJUSTMENTS

RIDE QUALITY
PAY ADJUSTMENT ESTIMATOR
Version 1.0

Will be available SOON on

NJDOT RIDE QUALITY WEB PAGE

RIDE QUALITY PAY ADJUSTMENT ESTIMATOR

RIDE QUALITY PAY ADJUSTMENT ESTIMATOR

RIDE QUALITY PAY ADJUSTMENT ESTIMATOR

NEW JERSEY DEPARTMENT OF TRANSPORTATION

RIDE QUALITY PAY ADJUSTMENT ANALYSIS

Bid Price of Milling existing HMA per Square Yard	$3.00
Bid Price of Surface Course Mix (final riding surface) per Ton	$80.00
Thickness of surface course lift (final riding surface)	2 Inch

COEFFICIENTS FROM PAY ADJUSTMENT EQUATION

Sample Pay adjustment equation

$$PA = \frac{A}{-37.75347 \times LN(TARGET\ IRI) + 194.87} - \frac{A}{-37.75347 \times LN(IRI) + 194.87}$$

X   Y

Please enter above COEFFICIENTS from pay adjustment equation of a project to be analyzed

X= -37.7535	Y= 194.87	Target IRI,	60 Inch/Mile

IRI interval for Pay adjustment Calculation	1 Inch/Mile

CALCULATE PAY ADJUSTMENT

RIDE QUALITY PAY ADJUSTMENT ESTIMATOR

NEW JERSEY DEPARTMENT OF TRANSPORTATION

RIDE QUALITY PAY ADJUSTMENT ANALYSIS

INPUT

Bid Price of Milling existing HMA per Square Yard	$3.00
Bid Price of Surface Course Mix (final riding surface) per Ton	$80.00
Thickness of surface course lift (final riding surface), Inch	2

Pay adjustment Factors

X= -37.75347	Y= 194.87

RESULTS

TARGET IRI =	60 Inch/Mile

$$\text{Pay Adjustment (\$) } = 44.0281 - \frac{1774.08}{-37.75347 \times LN(IRI) + 194.87}$$
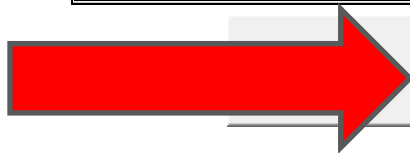
PAY ADJUSTMENT

IRI	PA	IRI	PA	IRI	PA	IRI	PA	IRI	PA	IRI	PA	IRI	PA
1	$35	26	$19	51	$6	76	$13	101	$42	126	$100	151	$281
2	$34	27	$19	52	$5	77	$13	102	$44	127	$104	152	$297
3	$32	28	$18	53	$5	78	$14	103	$45	128	$108	153	$314
4	$32	29	$18	54	$4	79	$15	104	$47	129	$112	154	$333
5	$31	30	$17	55	$3	80	$16	105	$49	130	$116	155	$353
6	$30	31	$17	56	$3	81	$17	106	$50	131	$120	156	$376
7	$29	32	$16	57	$2	82	$18	107	$52	132	$124	157	$402
8	$29	33	$16	58	$1	83	$19	108	$54	133	$129	158	$430
9	$28	34	$15	59	$1	84	$20	109	$56	134	$134	159	$463
10	$28	35	$15	60	$0	85	$21	110	$58	135	$139	160	$499
11	$27	36	$14	61	$1	86	$22	111	$60	136	$145	161	$542
12	$26	37	$14	62	$1	87	$24	112	$62	137	$150	162	$591
13	$26	38	$13	63	$2	88	$25	113	$64	138	$156	163	$648
14	$25	39	$13	64	$3	89	$26	114	$66	139	$163	164	$717
15	$25	40	$12	65	$4	90	$27	115	$69	140	$170	165	$800
16	$24	41	$12	66	$4	91	$28	116	$71	141	$177	166	$902
17	$24	42	$11	67	$5	92	$29	117	$74	142	$184	167	$1,032
18	$23	43	$10	68	$6	93	$31	118	$76	143	$192	168	$1,203
19	$23	44	$10	69	$7	94	$32	119	$79	144	$201	169	$1,436
20	$22	45	$9	70	$7	95	$33	120	$82	145	$210	170	$1,774
21	$22	46	$9	71	$8	96	$35	121	$84	146	$220		
22	$21	47	$8	72	$9	97	$36	122	$87	147	$230		
23	$21	48	$8	73	$10	98	$37	123	$90	148	$242		
24	$20	49	$7	74	$11	99	$39	124	$94	149	$254		
25	$20	50	$6	75	$12	100	$40	125	$97	150	$267		

Positive Pay Adjustment at IRI= 1 is $35	Maximum Negative Pay Adjustment is -$1774 at IRI = 170 Inch/Mile

RIDE QUALITY PAY ADJUSTMENT ESTIMATOR
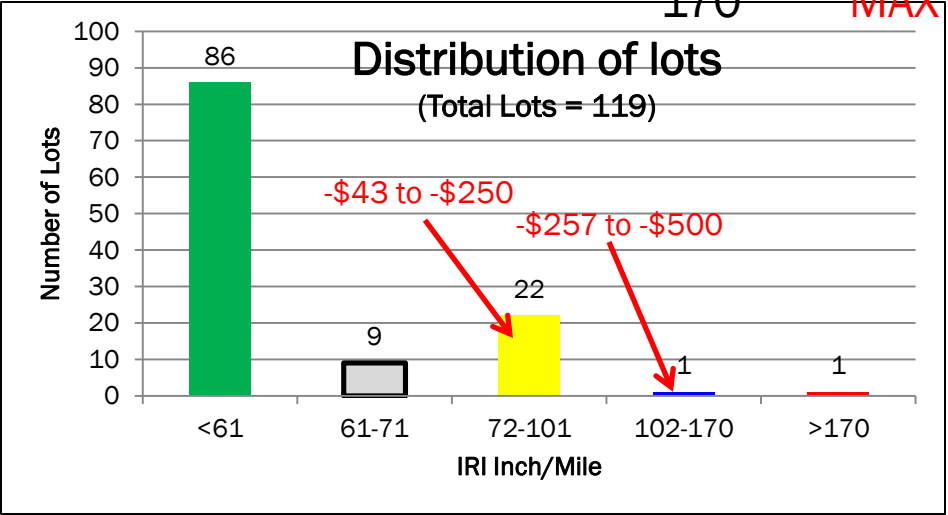

RIDE QUALITY PAY ADJUSTMENT

Target IRI = 60 Inch/Mile

Positive Pay Adjustment at IRI= 1 is $35

Maximum Negative Pay Adjustment is -$1774 at IRI = 170 Inch/Mile

IRI (Mile/Inch)

Pay Adjustment ($)
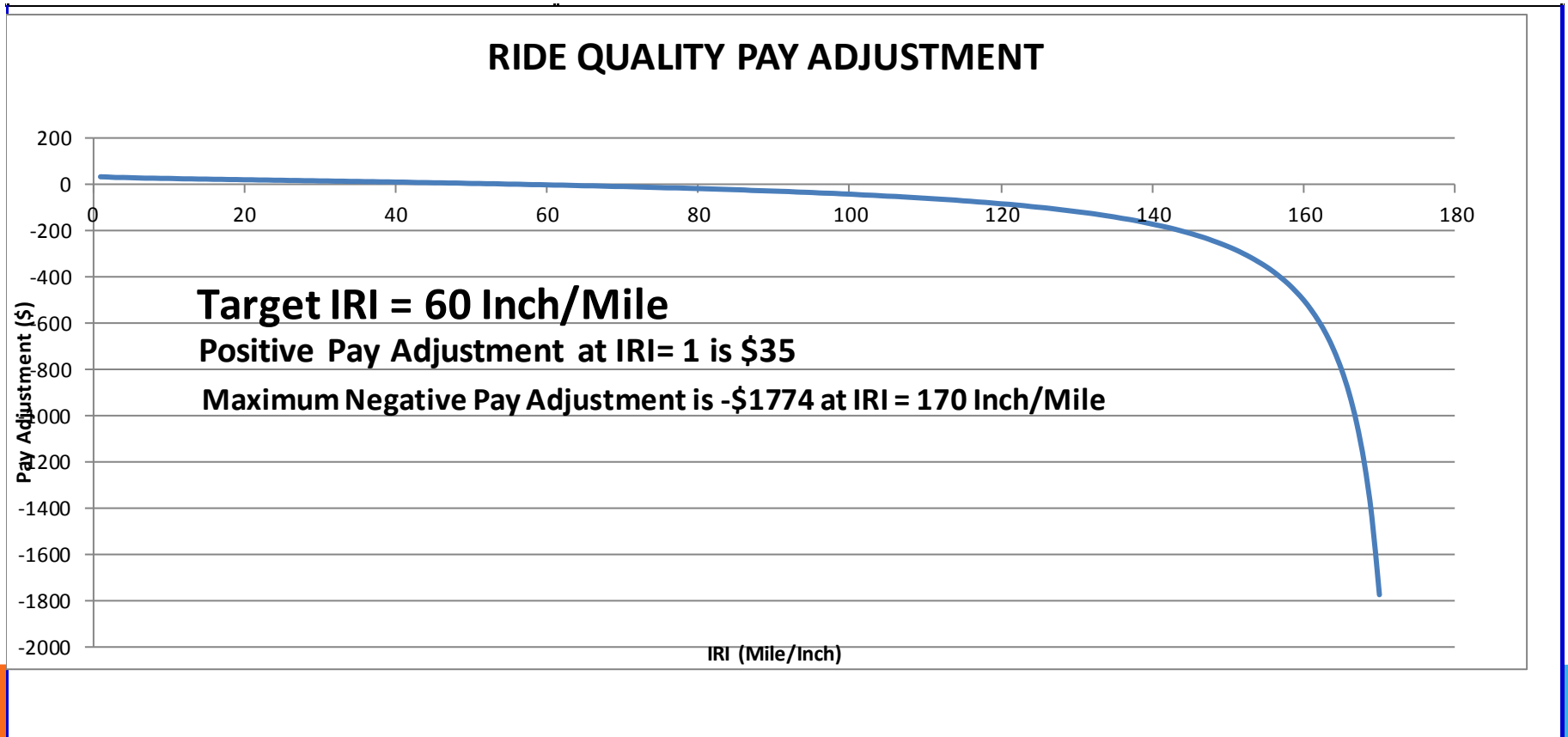
EXAMPLES

EXAMPLES

IRI	PA
72	-$6
101	-$47
102	-$49
170	MAX

PROJECT 1

ORIGINAL SPEC OF PROJECT

Target IRI	61 Inch/Mile
Exclusions	7 Lots
IRI Delivered before exclusions	54 Inch/Mile
IRI Delivered after Exclusions	50 Inch/Mile

Distribution of lots
(Total Lots = 119)

-$43 to -$250
-$257 to -$500

Number of Lots / IRI Inch/Mile

<61: 86
61-71: 9
72-101: 22
102-170: 1
>170: 1

ORIGINAL RIDE QUALITY PAY ADJUSTMENT = $ 1,104

NEW SPEC OF PROJECT

Target IRI	66 Inch/Mile
Exclusions	11 Lots
IRI Delivered before exclusions	54 Inch/Mile
IRI Delivered after exclusions	49 Inch/Mile

NEW RIDE QUALITY PA

Mill /Pave 2" SMA	$1,373
Mill /Pave 3" SMA	$1,938
Mill /Pave 2" HMA	$1,108
Mill /Pave 3" HMA	$1,523

EXAMPLES

PROJECT 2

IRI	PA
72	-$6
101	-$47
102	-$49
170	MAX

ORIGINAL SPEC OF PROJECT	
Target IRI	61 Inch/Mile
Exclusions	17 Lots
IRI Delivered before exclusions	80 Inch/Mile
IRI Delivered after Exclusions	70 Inch/Mile

Distribution of lots
Total Lots = 195

-$43 to -$250
-$257 to -$500

Number of Lots

IRI Inch/Mile

<61: 81
61-71: 34
72-101: 54
102-170: 20
>170: 6
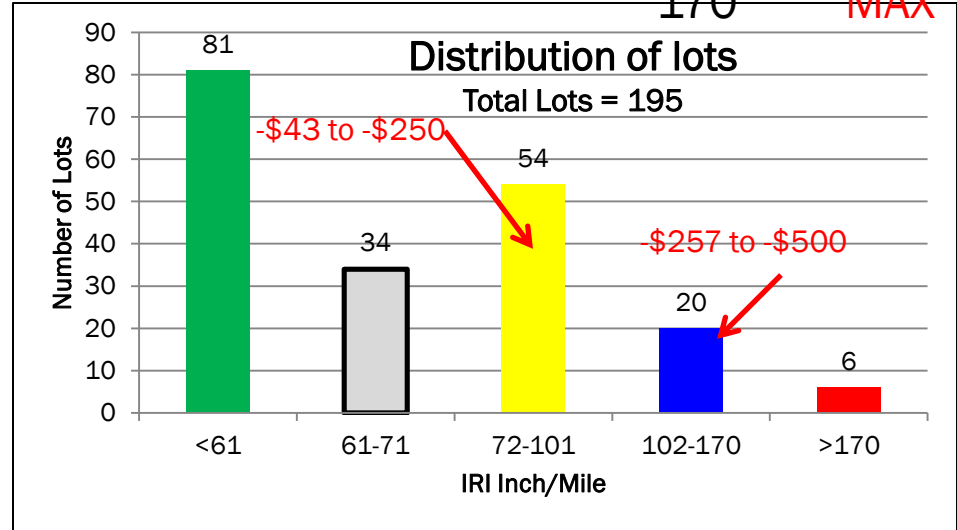
ORIGINAL RIDE QUALITY PAY ADJUSTMENT = -$21,209

NEW SPEC OF PROJECT	
Target IRI	66 Inch/Mile
Exclusions	37 Lots
IRI Delivered before exclusions	80 Inch/Mile
IRI Delivered after exclusions	65 Inch/Mile

NEW RIDE QUALITY PA	
Mill /Pave 2" SMA	($1,537)
Mill /Pave 3" SMA	($2,150)
Mill /Pave 2" HMA	($1,239)
Mill /Pave 3" HMA	($1,704)

EXAMPLES

PROJECT 3

IRI	PA
72	-$6
101	-$47
102	-$49
170	MAX

ORIGINAL SPEC OF PROJECT

Target IRI	61 Inch/Mile
Exclusions	8 Lots
IRI Delivered before exclusions	81 Inch/Mile
IRI Delivered after Exclusions	79 Inch/Mile

Distribution of lots
Total Lots = 799

-$43 to -$250

-$257 to -$500

Number of Lots: 243, 186, 252, 83, 35
IRI Inch/Mile: <61, 61-71, 72-101, 102-170, >170
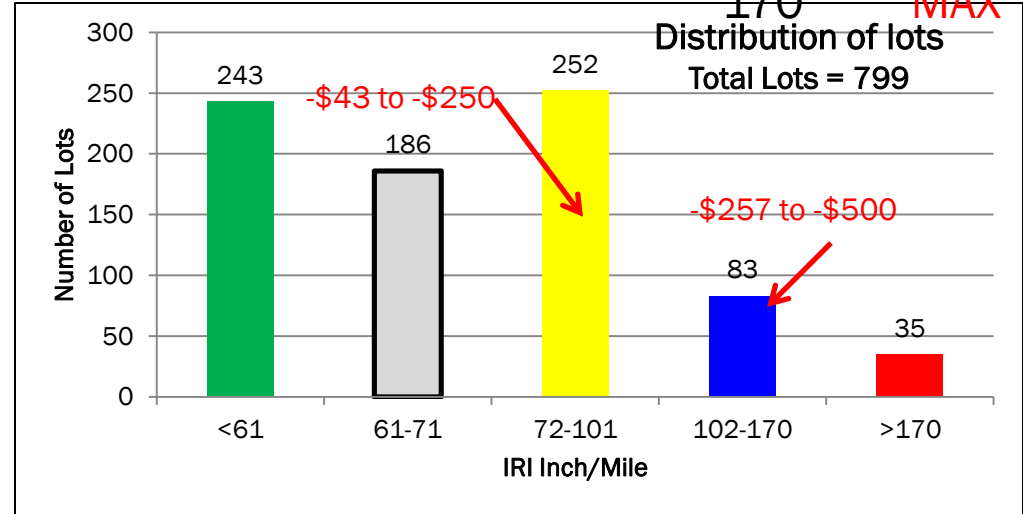
ORIGINAL RIDE QUALITY PAY ADJUSTMENT = -($75,478)

NEW SPEC OF PROJECT

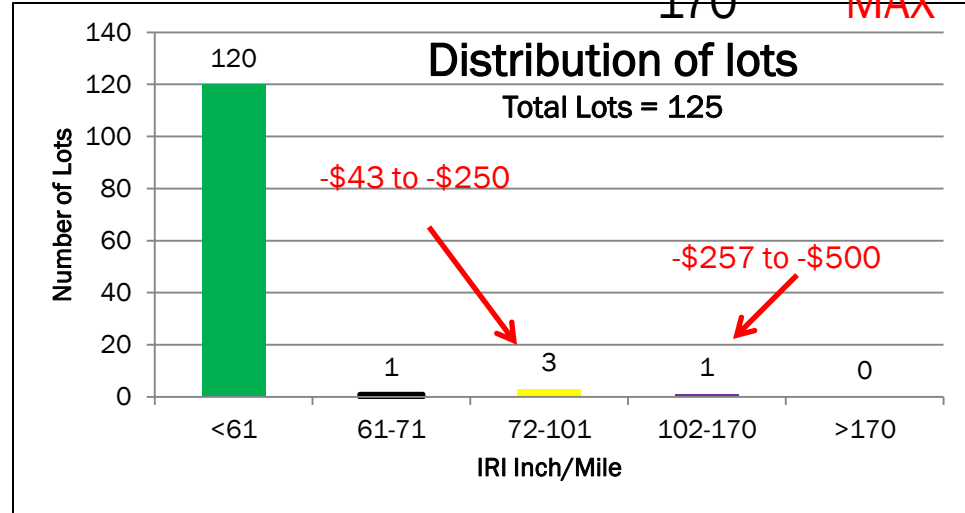|	
Target IRI	66 Inch/Mile
Exclusions	18 Lots
IRI Delivered before exclusions	81 Inch/Mile
IRI Delivered after exclusions	77 Inch/Mile

NEW RIDE QUALITY PA

Mill /Pave 2" SMA	($64,535)
Mill /Pave 3" SMA	($95,264)
Mill /Pave 2" HMA	($52,044)
Mill /Pave 3" HMA	($71,561)

EXAMPLES

IRI	PA
72	-$6
101	-$47
102	-$49
170	MAX

PROJECT 4

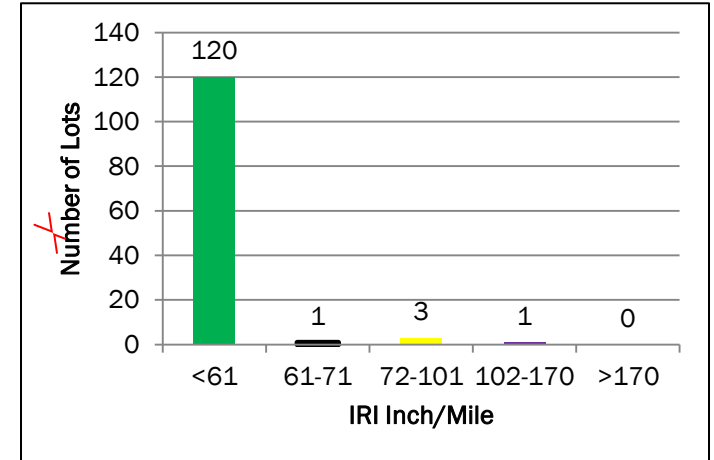| ORIGINAL SPEC OF PROJECT	
Target IRI	61 Inch/Mile
Exclusions	3 Lots
IRI Delivered before exclusions	37 Inch/Mile
IRI Delivered after Exclusions	36 Inch/Mile

Distribution of lots
Total Lots = 125

-$43 to -$250

-$257 to -$500

Number of Lots vs IRI Inch/Mile — bar chart: <61 = 120, 61-71 = 1, 72-101 = 3, 102-170 = 1, >170 = 0

ORIGINAL RIDE QUALITY PAY ADJUSTMENT = $5,075

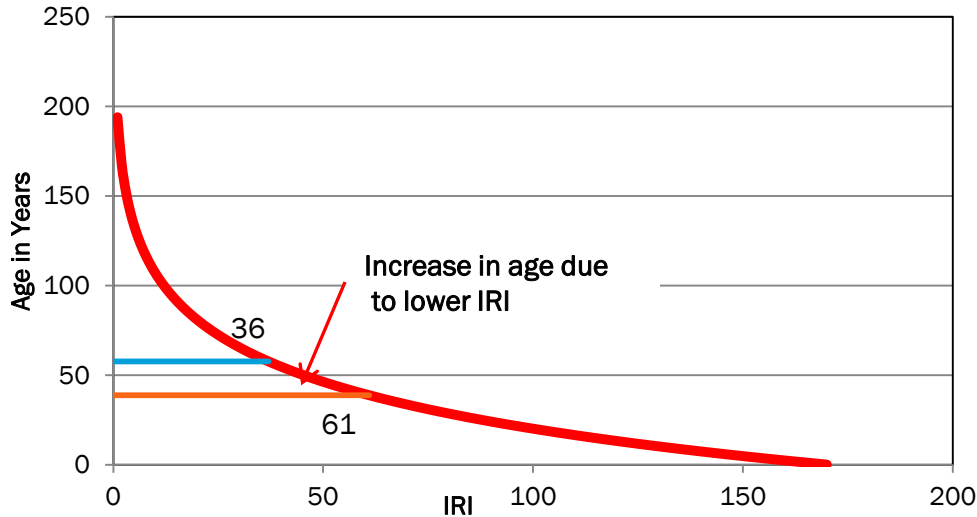| NEW SPEC OF PROJECT	
Target IRI	66 Inch/Mile
Exclusions	3 Lots
IRI Delivered before exclusions	37 Inch/Mile
IRI Delivered after exclusions	36 Inch/Mile

NEW RIDE QUALITY PA	
Mill/Pave 2" SMA	$2,650
Mill /Pave 3" SMA	$3,740
Mill /Pave 2" HMA	$2,138
Mill /Pave 3" HMA	$2,938

EXAMPLES

PROJECT 4

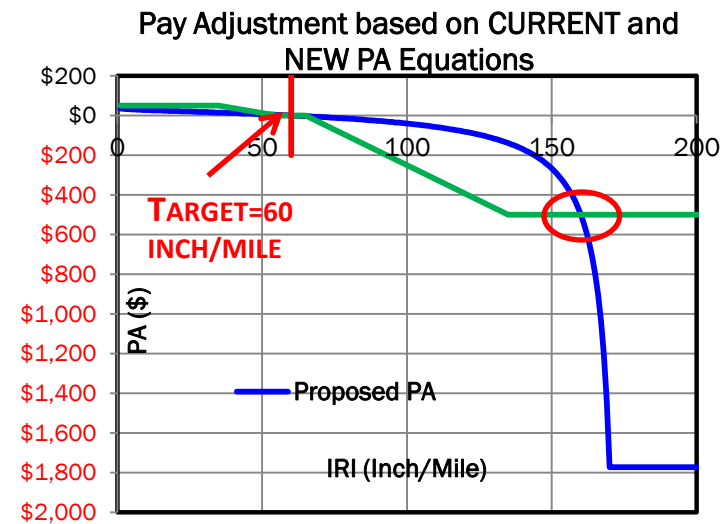| NEW SPEC OF PROJECT	
Target IRI	66 Inch/Mile
Exclusions	3 Lots
IRI Delivered before exclusions	37 Inch/Mile
IRI Delivered after exclusions	36 Inch/Mile

NEW RIDE QUALITY PA	
Mill/Pave 2" SMA	$2,650
Mill /Pave 3" SMA	$3,740
Mill /Pave 2" HMA	$2,138
Mill /Pave 3" HMA	$2,938

CONCLUSION

Pay Adjustment based on CURRENT and NEW PA Equations
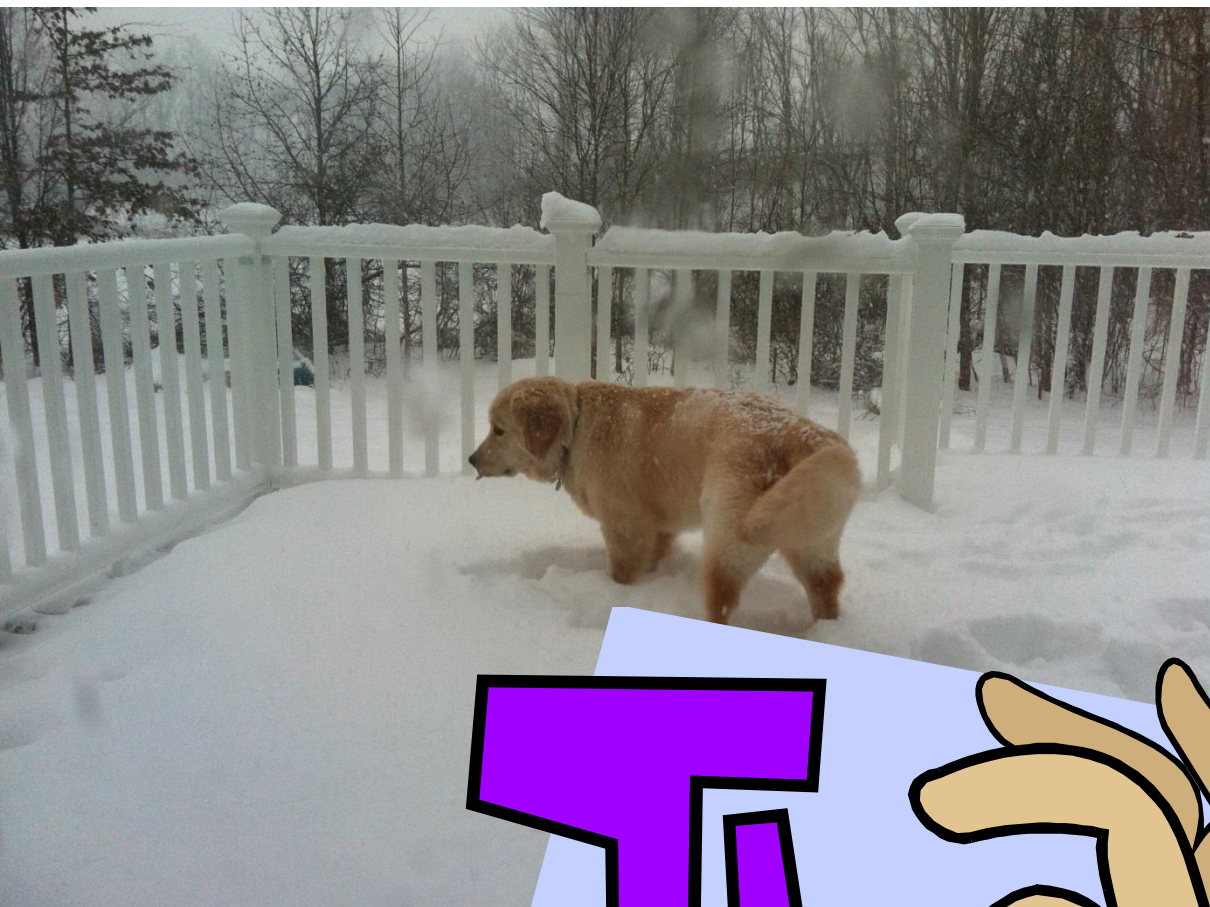
TARGET=60 INCH/MILE

Proposed PA

IRI (Inch/Mile)

PA ($)

1. Base IRI is increased by 5 inch/mile.
2. Threshold length of Impediments and short section is changed to 50 ft.
3. New Performance based PA equation have similar slopes within 30-40 inch/mile on either side of target.
4. Opportunity to earn positive PA greater than $50 depending upon type of treatment and bid price.
5. The negative PA will be reduced drastically, if IRI is close to the target IRI.
6. Negative PA increases, if IRI approaches toward 170 inch/mile