

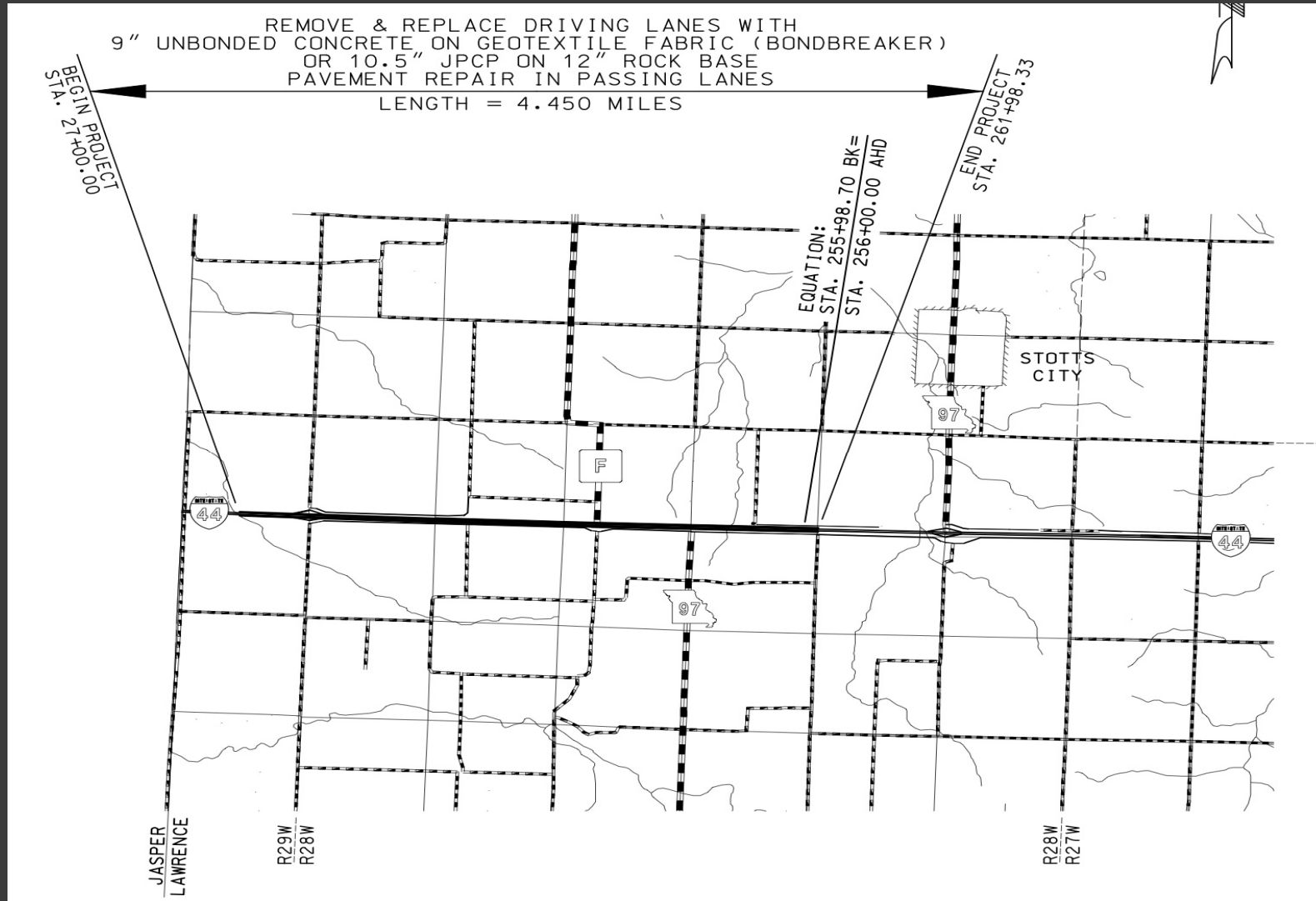


180216-G08  
LAWRENCE CO

# Project Background

- Unbonded overlay on the driving lanes of I-44
- Remove and replace existing unbonded overlay
- Perform the work as quickly as possible
- Minimize impact to traveling public
- Joplin Project office- Marvin Morris RE

# Project Background





# Project Background





# Why?

- Driving Lane had previously been ground
- Panels were faulting
- Faulting due to failure of previous bond breaker



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# What to do

- ④ Remove the existing driving lane and previous bond breaker
- ④ Leave shoulder intact
- ④ Leave passing lane intact
- ④ Install new bond breaker
- ④ Pour back driving lane

# Sounds simple

- ⦿ Begin with full depth pavement repair
- ⦿ Build crossovers
- ⦿ Switch traffic head to head
- ⦿ Begin removals
- ⦿ Bond breaker
- ⦿ Drill bars
- ⦿ Baskets
- ⦿ Pave

# Unknowns

- How much pavement repair would there be in driving and passing lanes?
- Underlying damage to adjacent concrete





# Removals

- Antigo performed breaking operations
- Existing bond breaker was no problem
- Had spalling due to expansion of broken concrete and existing slab conditions



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# Removals

- ◉ Trackhoe to remove bulk of material
- ◉ Skidsteer provided clean up
- ◉ Material hauled back to plant location





# Removals

- Had spalling problem on the first half
- Vibratory ripper was used to try and fix issues
- Spalling still occurred



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# Drilling

- ◉ Shoulder was drilled
- ◉ Tie-Bars were epoxied into place
- ◉ Dual five gang drills were used





# Bond breaker

- Geotextile fabric used as bond breaker
- Rolled out very quickly
- Pinned baskets once down



# 10.5" Full Depth Replacement

- Under the overpasses MoDOT opted for full depth removal and replace
- Both driving and passing lanes were replaced
- We removed both lanes at once





# 10.5" Full Depth Replacement

- ① 12" of rock base was installed
- ② We paved the passing lane first
- ③ This allowed us to pave through continuously in the driving lane





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# Constant Time Crunch

- \$306,000 bonus was possible at \$8,500 a day
- 75 days maximum days head to head
- Completed head to head in 39 days
- Reduce the time head to head made for a safer project



# Constant Time Crunch

- ⦿ Set forth certain criteria when bidding project
- ⦿ Plan the work and work the plan
- ⦿ Be prepared to adjust on the fly
- ⦿ Learn from one side before moving to the other



# Mix Design

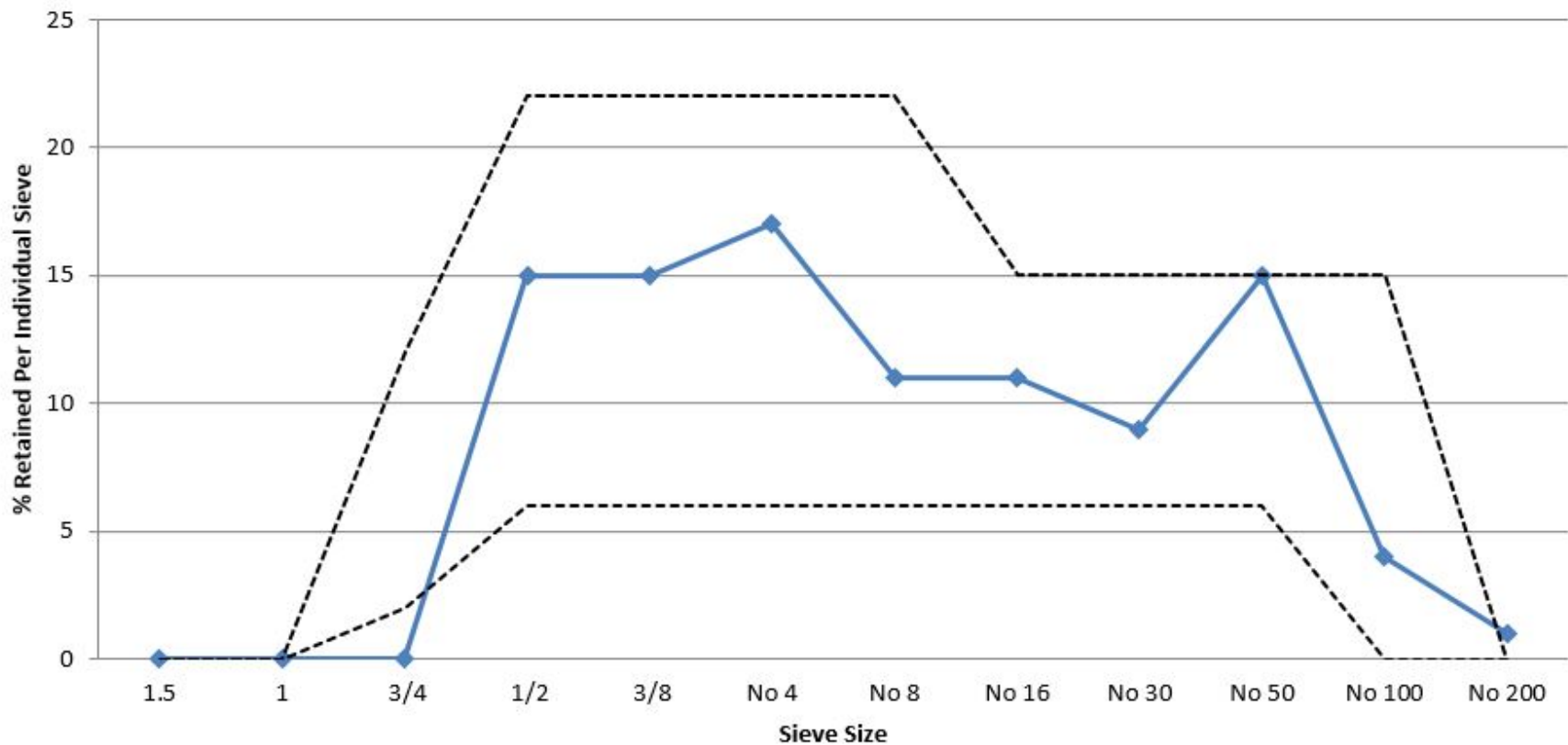
- Optimize Mix Design
- 3 aggregate system
- Maximum amount of flyash used
- Minimum cementitious material content
- Aggregate proportions to give best paving mix possible
- Tarantula Curve, Percent Retained, Shilstone all weighed to blend aggs

# Mix Design

Mix Designs			Mix Type		MFP													
		Type	Amount	Specific Gravity	Absorptions	100.00%		Coarseness Factor	52	WF	CF	FAA-Specs						
Aggregate 1	Jasper Stone	1" Max	51.00%	2.66	0.60%			Workability	42	28	75	3/8"	0					
Aggregate 2	River Valley	Class A	35.00%	2.62	0.20%			Target Workability	38	40	75	No. 4	0-10					
Aggregate 3	Mulberry Stone	Chip	14.00%	2.66	0.60%			Workability Difference	4	32.5	45	No. 8	0-27					
							W/C Ratio	Design CF	Air	Slump			No. 16	15-55				
							0.41	521	6.00%	2			No. 30	40-77				
Ash Grove Chanute		Type I/II	75.00%	3.15									No. 50	70-93				
Boral Resources Springfield		Class C	25.00%	2.65									No.100	90-100				
Air (Oz/100 wt. Cement)		Polychem SA	1.10		2-2oz. 100 wt. of cementitious								No. 200	98-100				
Water Reducer (oz/100 Wt.)		Polychem 400N	6.00		3-5oz.per 100 wt. of Cementitious													
	Aggregate 1	Aggregate 2	Aggregate 3	Aggregate 4	Cum. % Retained	% Retained Per Sieve	Gradation Envelope		Gradation Envelope		Cum % Passing	Sieve Sizes	CPA-1	CPA-3	CPA-4			
	1" Max	Class A	Chip	0			MA-3		MA-5			1"	0-10					
	51.00%	35.00%	14.00%	0.00%	Upper		Lower		3/4"	14-35		0	0-20					
Sieve												1/2"		0-35				
1.5	0	0	0	0	0	0	0	0	0	0	100	3/8"	50-75	30-70				
1	0	0	0	0	0	0	0	0	0	0	100	No. 4		75-100				
3/4	0.22	0	0	0	0	0	12	2	12	2	100							
1/2	28.6	0	0	0	15	15	22	6	34	8	85	No. 8	95-100	95-100	95-100			
3/8	59.26	0	0	0	30	15	22	6	34	22	70	No. 30						
No 4	90.19	2.62	2.58	0	47	17	22	6	65	22	53							
No 8	91	8.28	65	0	58	11	22	6	65	55	42							
No 16	94.26	21.2	93.45	0	69	11	15	6	100	55	31							
No 30	95.02	47.3	95.31	0	78	9	15	6	100	75	22							
No 50	95.94	86.53	96.13	0	93	15	15	6	100	75	7							
No 100	96.76	98.44	96.63	0	97	4	15	0	100	95	3							
No 200	97.46	99.6	97.03	0	98	1	0	0	100	98	2							
	FM	2.6437		Coarse Sand % 8-30		31	Yes											
				Fine Sand % 30-200		29	Yes											
Cementitious Volume			2.7756		Cu. Ft.		Batch Weights (LBS)		Moisture	Absorption	Correction	Cu/Yd	Cu/Ft	2.5				
Water Volume			3.4232		Cu. Ft.		Cement	390.75				390.75	14.5	36.2	0.72361			
Air Volume			1.62		Cu. Ft.		Flyash	130.25				130.25	4.8	12.1	0.2412			
Total Volume			7.8189		Cu. Ft.		Coarse Agg	1615.09	0.82%	0.60%	100.2%	1618.6	59.9	149.9	2.99745			
Aggregate Volume Required			19.1811		Cu. Ft.		Fine Agg	1108.39	3.56%	0.20%	103.4%	1145.6	42.4	106.1	2.12141			
Volume of 100lb of Aggregate			0.6057		Cu. Ft.		Int. Agg	443.36	1.01%	0.60%	100.4%	445.2	16.5	41.2	0.82438			
Total Aggregate Per Yard			3166.84				Water	213.61				171.1	6.3	15.8				
							Water Gal	25.7				20.6	0.8	1.9				
							Air	5.731				5.731	6.28	15.7				
Cost Analysis							W/R	31.26				31.26	34.24	85.6				

# Mix Design

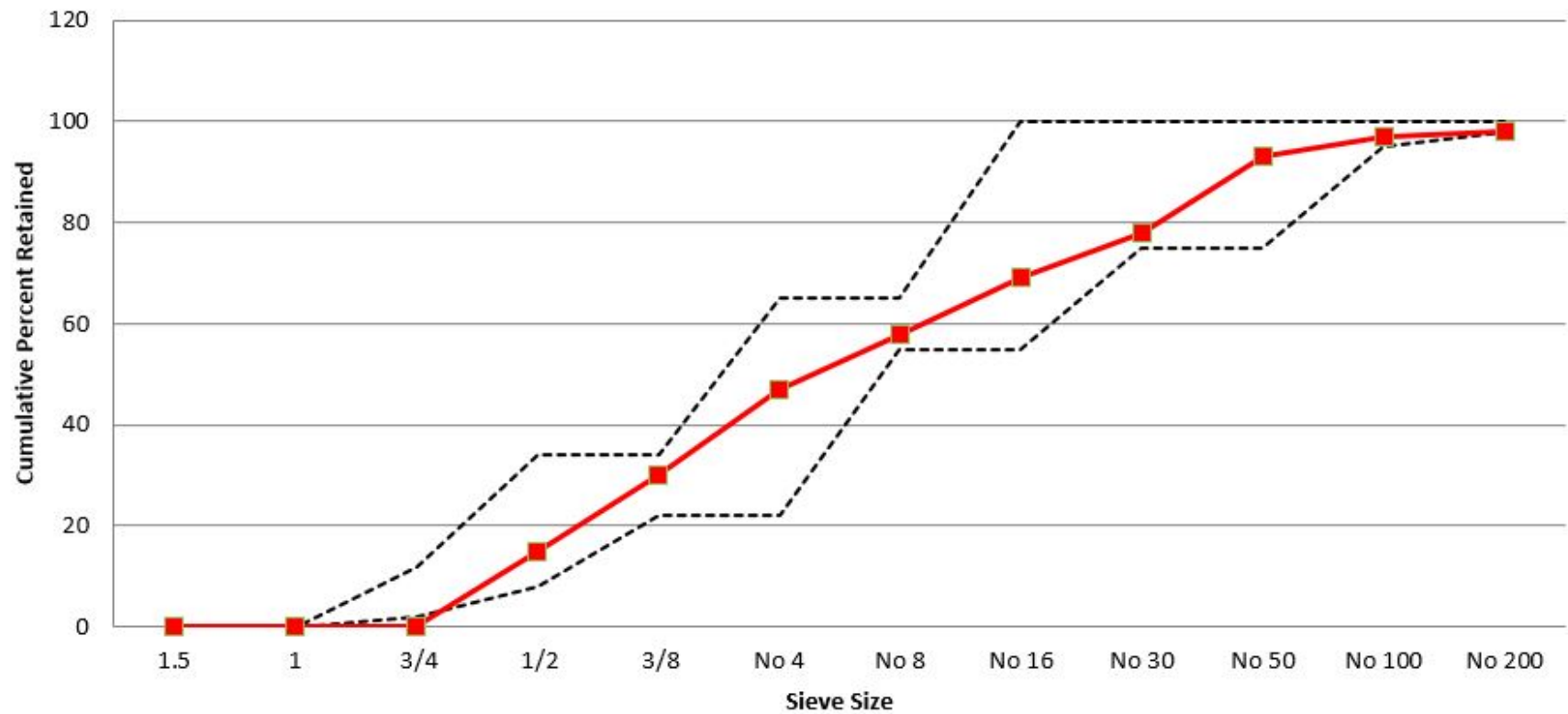
**MA-3 Gradation Distribution Chart**





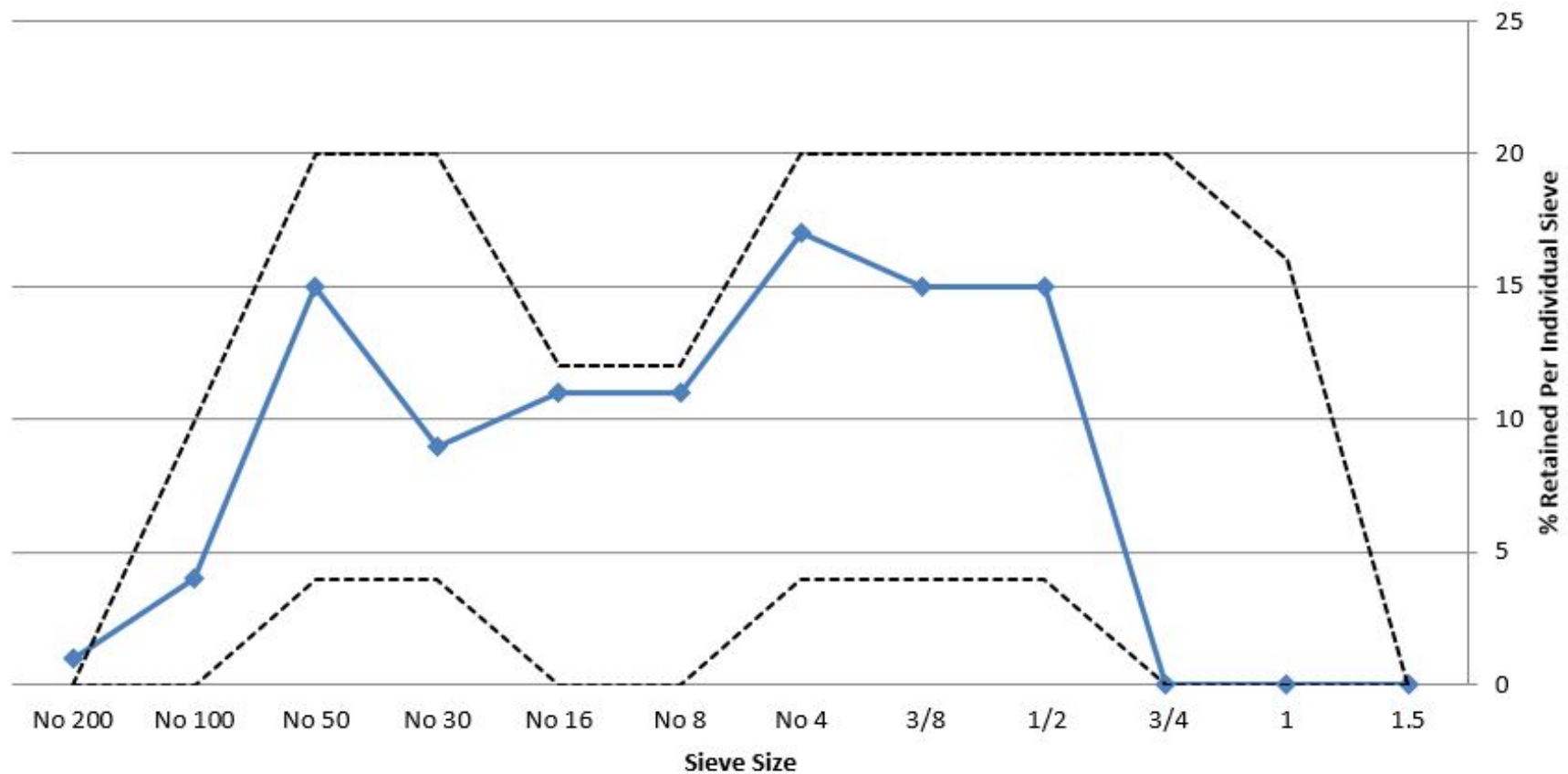
# Mix Design

**MA-5 Gradation Distribution Chart**



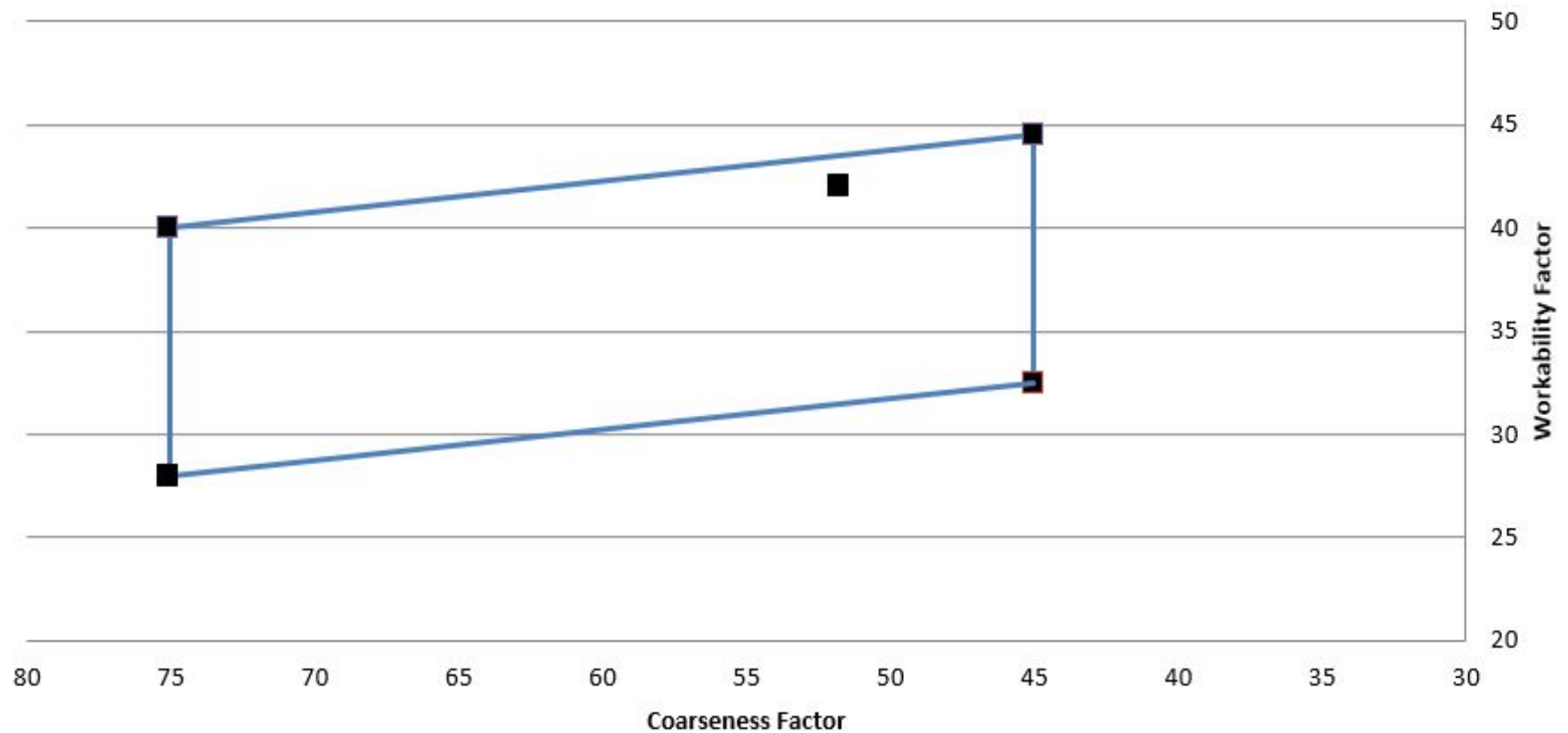
# Mix Design

**Tarantula Gradation Distribution Chart**



# Mix Design

**Coarseness and Workability Chart**





# Game Plan

- ⦿ Started on WB Lanes
- ⦿ Started on East end of project  
continuous paving until we reached  
West end
- ⦿ Switched crews every 12 hours
- ⦿ Paver never stopped running

# Paving

- Averaged roughly 190 yds an hour
- Yds/hr and pace was limited to paver speed
- New RexCon Mobile 12 Self-Erecting Batch Plant



# Paving

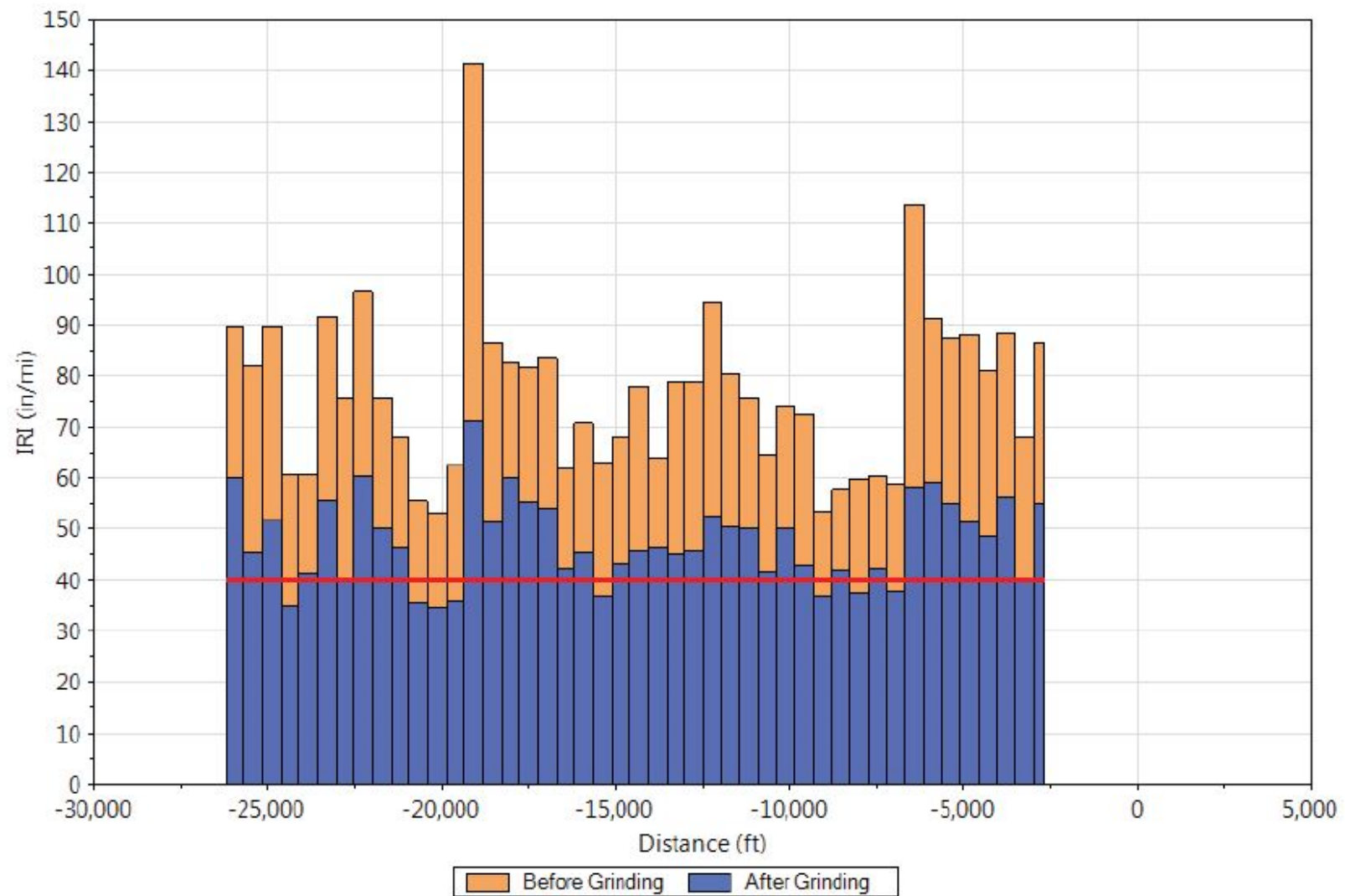




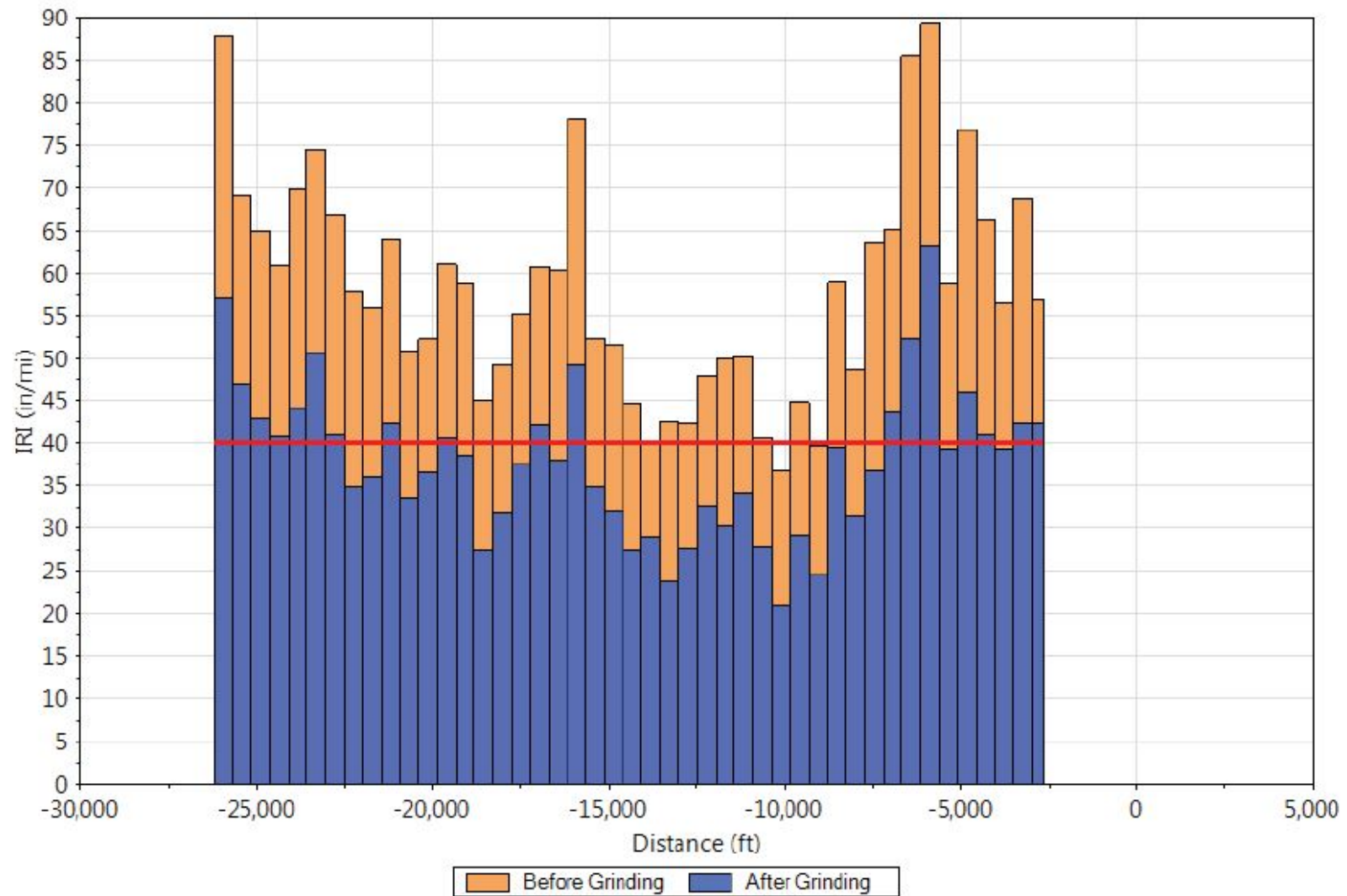
# Smoothness Challenges

- ◉ Smoothness testing
- ◉ Performed with High Speed Inertial Profilers
- ◉ JSP referred back to 610 without the 15 adjoining exception
- ◉ Ran profile before construction on shoulder and passing lane
- ◉ Gave idea of existing roadway

# Left Wheel Path

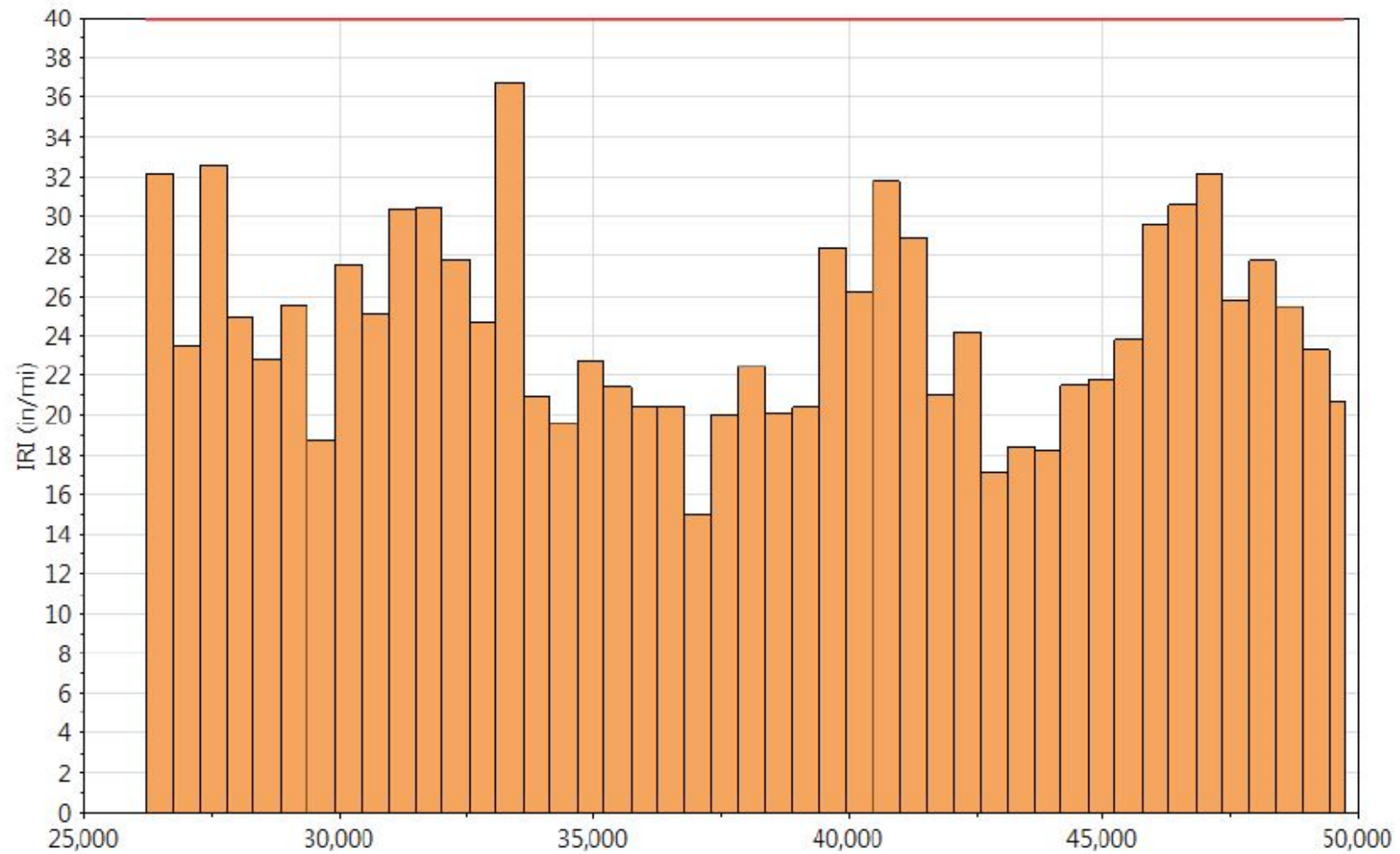


# Right Wheel Path

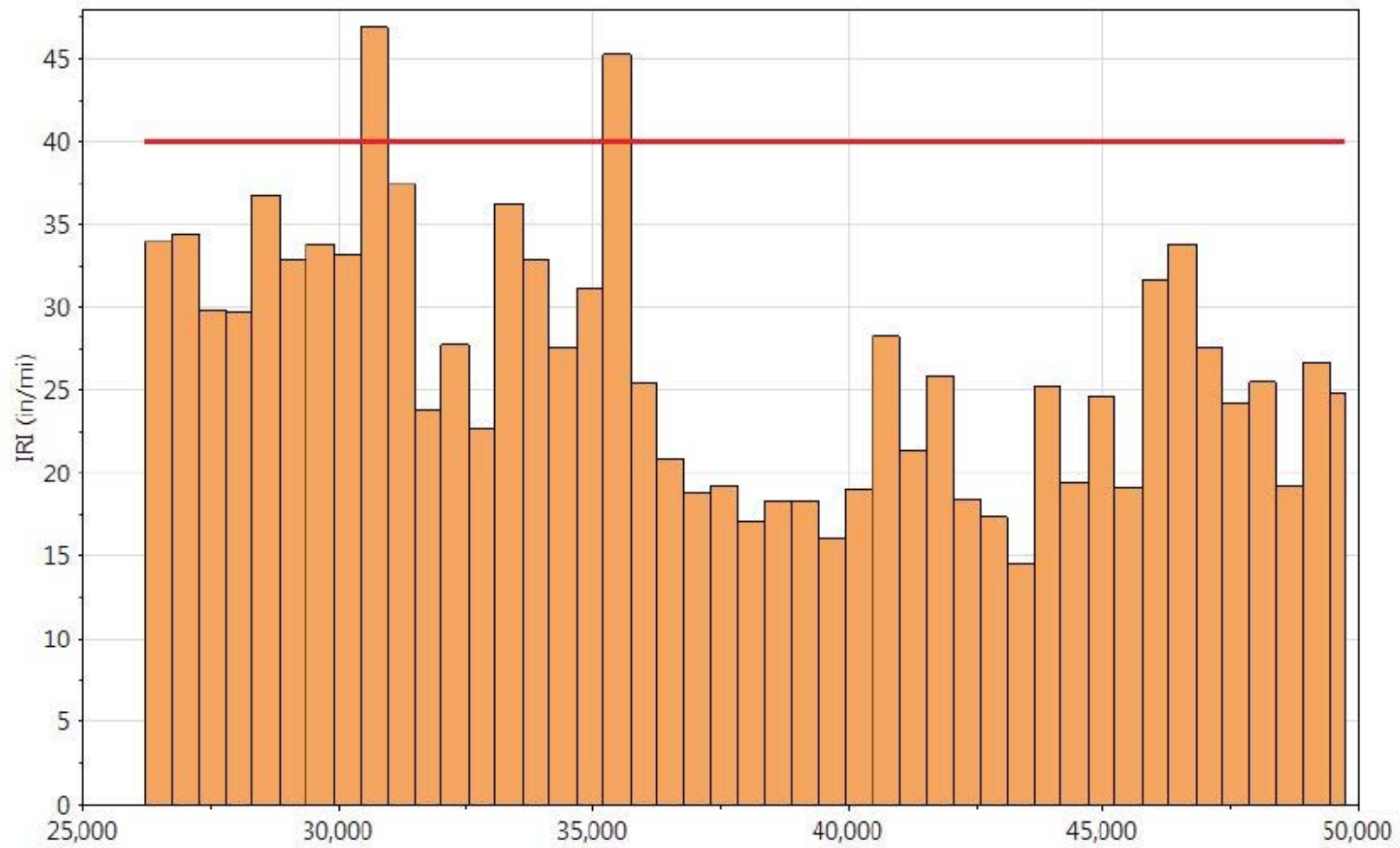




# Post Grind Left



# Post Grind Right



# WB Overlay Smoothness

- Pre-Grind Numbers
- IRI combined average 67.49
- Decent ride
- Had ALR's to address
- Post-Grind Numbers
- IRI combined average 25.7
- Very smooth and rides really well



# Overlay Smoothness

- Post-Grind Numbers
- EB Driving Lane IRI Average 23.6
- WB Driving Lane IRI Average 25.7
- Project smoothness overall success

# Results

- Strength Average was 6,828PSI
- Standard Deviation was 621PSI
- QL average on strength was 5.21

# Going forward

- Stick to the plan and meet the schedule
- Be prepared for unknowns
- Entire contractor team has to be on-board a project like this





# Questions?

- Contact Information

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