TWO LANE PAVEMENT RECONSTRUCTION AND WIDENING STRATEGIES• OAPC, FEBRUARY 1, 2023













OHIO DEPARTMENT OF TRANSPORTATION

TWO LANE PAVEMENT RECONSTRUCTION AND WIDENING STRATEGIES

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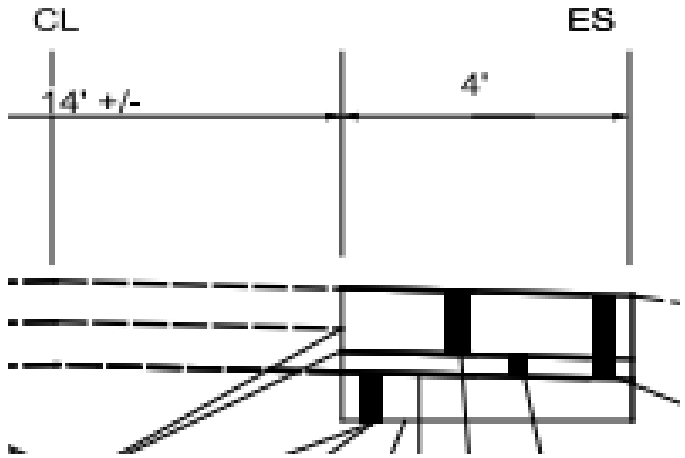
ODOT Office of Pavement Engineering

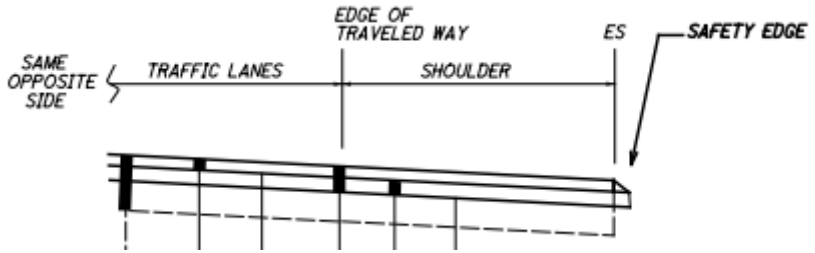
WHERE DO YOU START?

- Initial Considerations
  - Pavement type and width(s)
  - Maintenance required
  - Current and historical distresses and conditions
- Rehab Options
  - Edge replacement/repair and overlay salvaged
  - FDR (cement and emulsion)
  - Rubblize and full replacement
- Field Investigation

REHABILITATION OPTIONS

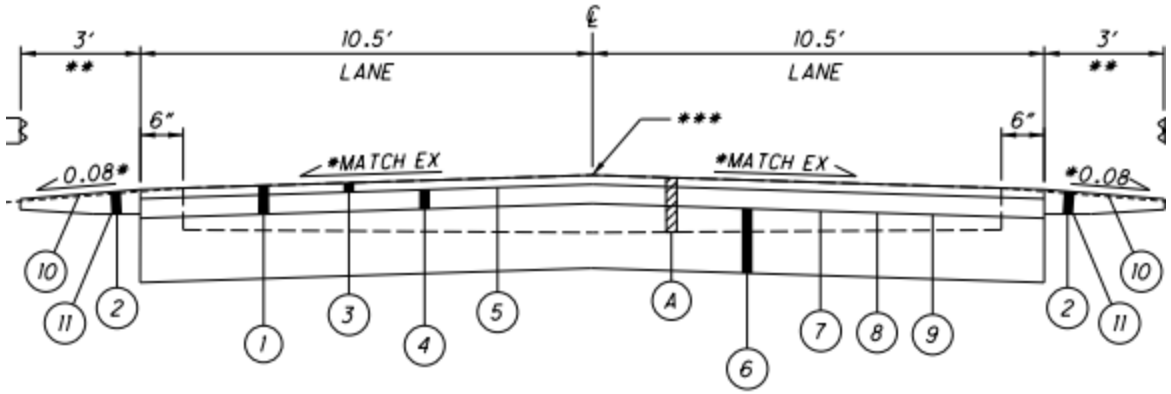
- Edge Replacement
  - Middle of pavement generally in good shape and mostly solid
  - Previous edge widening not sufficient thickness
  - No aggregate base or subgrade compaction under edges

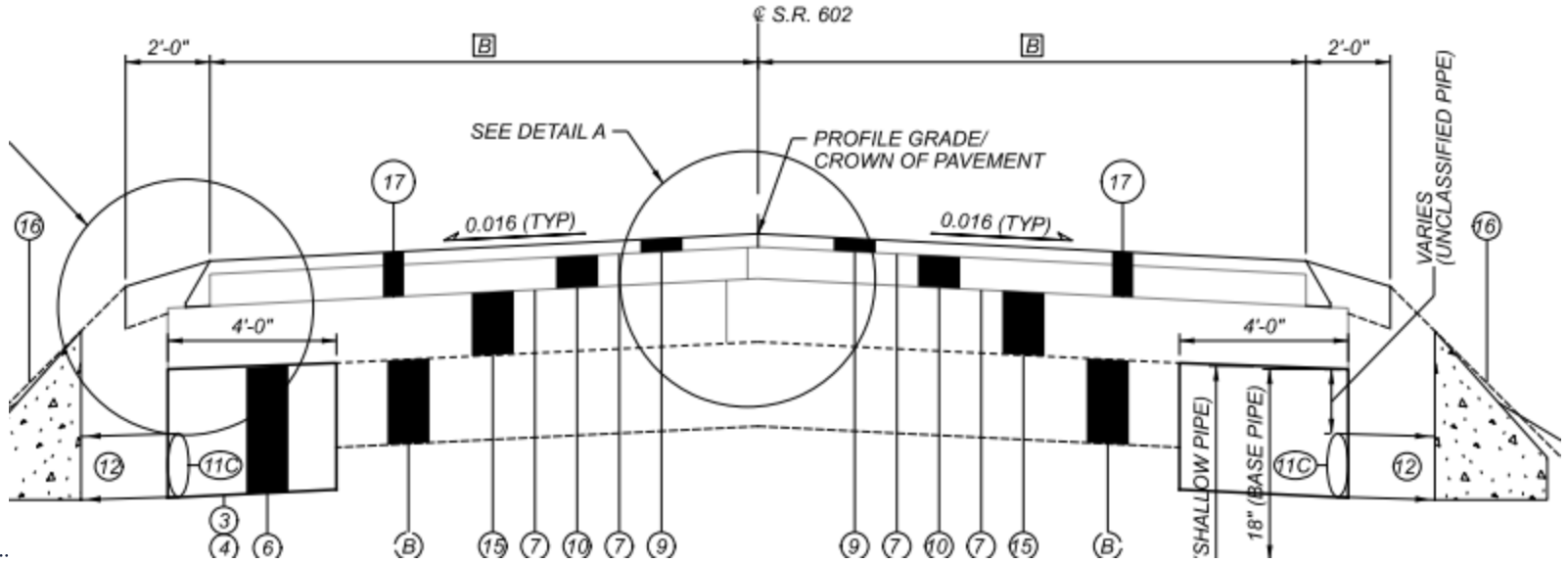




REHABILITATION OPTIONS

- FDR with Cement
  - Suitable AC thickness
  - Stripped/deteriorated AC
- FDR with Emulsion
  - Macadam base
  - Coarser mixture
  - Layer thickness





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REHABILITATION OPTIONS

- Rubblize and Roll
  - Concrete wide enough
  - Can have aggregate base added adjacent to increase width
- New Pavement
  - Concrete or brick cannot be salvaged
  - Existing elevation challenges

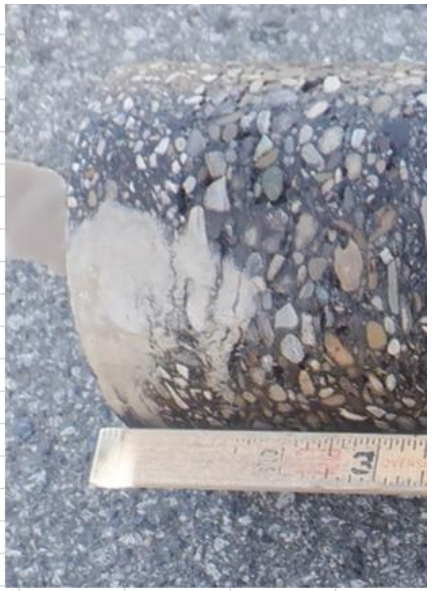
FIELD INVESTIGATION

- Pavement Coring
  - Extract cores representing the edge and middle.
  - 0.5 Mile intervals staggered
- Aggregate Base Sampling
  - Use a bucket auger to collect 1 sample/mile/direction, approx. 200 gram bag sample for gradation

SAMPLE CORE REPORT INFORMATION

core#	**1**	Pavement Type at Core Location	Flexible
location SLM	26.75	MacAdam base present?	No
Depth of core (in)	15	Paved shoulder width*	2.5
Depth of core hole (in)	15	Distance from center line to core*	6.5
Bottom of core hole	aggergate	Core Condition / Notes	
Drainage	Good		
		Pavement layers (in)	
# of photos	**2**	1	15
		2	
Lane width*	11.5	3	
		4	
Core Location	Middle	5	

* Decimal Feet



core#	**2**	Pavement Type at Core Location	Flexible
location SLM	26.75	MacAdam base present?	No
Depth of core (in)	7	Paved shoulder width*	2.5
Depth of core hole (in)	11	Distance from center line to core*	11

SAMPLE CORE REPORT SUMMARY

Up Summary							
Statistic	Core Depth (in)		Core Hole Depth (in)		Drainage	Top Layer (in)	Bottom Layer (in)
	Edge	Middle	Edge	Middle			
Average	9.61	11.07	12.79	15.27		5.29	8.00
Min	4.5	2	5	10.5		2	5.5
Max	18	18.5	18	18.5		11	10.5
Mode	5	17	10	15	Good	2	8.5

Down									
CORE	SLM	Pavement Type	Core Depth		Core Hole Depth		Drainage	Top Layer	Concrete/Mac Thickness (in)
			Edge	Middle	Edge	Middle			
1	10.49	Flexible		11		11	Good	6.75	
2	10.49	Flexible	11.25		11.25		Good	3.5	
3	9.98	Flexible		16		17	Good	10.5	
4	9.98	Flexible	16		17		Good	16	
5	9.47	Flexible		6		6	Good	6	0
6	9.47	Flexible	11		11		Good	11	
7	9	Flexible		6		6	Good	6	0

SAMPLE AGGREGATE BASE SAMPLE INFORMATION

- Most interested in fine material (M and C)

Borehole	Depth	Sample	Lab ID	G (%)	CS (%)	FS (%)	M (%)	C (%)	LL	PL	PI	M (%)	LOI (%)	ODOT CLASS	USCS CLASS
X-001-0-21/ 0.02 Up E	0.5	BS- 1	18161	47	12	14	17	10	21	15	6	14		A-2-4	SC-SM
X-002-0-21/ 0.75 Dn E	0.5	BS- 1	18162	42	18	17	16	7	NP	NP	NP	12		A-1-b	SM
X-003-0-21/ 1.0 Up M	0.5	BS- 1	18163	46	30	9	10	5	NP	NP	NP	14		A-1-b	SM
X-004-0-21/ 1.75 Dn E	0.5	BS- 1	18164	32	18	21	18	11	22	15	7	12		A-2-4	SC-SM
X-005-0-21/ 2.0 Up E	0.5	BS- 1	18165	71	10	8	7	4	23	17	6	13		A-1-a	GP-GC
X-006-0-21/ 2.73 Dn M	0.5	BS- 1	18166	34	12	23	26	5	NP	NP	NP	15		A-2-4	SM
X-007-0-21/ 3.0 Up M	0.5	BS- 1	18167	27	9	19	28	17	24	16	8	20		A-4a	SC

GEOTECHNICAL INVESTIGATION

- CBR for design calculations
- Unsuitable and Unstable soil identification
- Low N60 Values

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT	
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI
1	B	SS-1	1.5	3.0	0.0	1.5	24			24	18	6	16	14	30	14	10	A-2-4	0
	001-0	SS-2	3.0	4.5	1.5	3.0	17			24	17	7	16	9	25	11	10	A-2-4	0
	21	SS-3	4.5	6.0	3.0	4.5	13			18	17	1	20	13	33	9	10	A-2-4	0
		SS-4	6.0	7.5	4.5	6.0	13	13		18	17	1	20	13	33	9	10	A-2-4	0
2	B	SS-1	1.5	3.0	0.0	1.5	10		0.25	26	18	8	52	24	76	19	13	A-4b	8
	002-0	SS-2	3.0	4.5	1.5	3.0	15			25	20	5	22	11	33	15	10	A-2-4	0
	21	SS-3	4.5	6.0	3.0	4.5	15			25	20	5	22	11	33	16	10	A-2-4	0
		SS-4	6.0	7.5	4.5	6.0	8	8		25	20	5	22	11	33	18	10	A-2-4	0

Design CBR | **7**

% Proposed Subgrade Surface	
Unstable & Unsuitable	13%
Unstable	12%
Unsuitable	1%

CASE STUDY 1 – EDGE REPLACEMENT

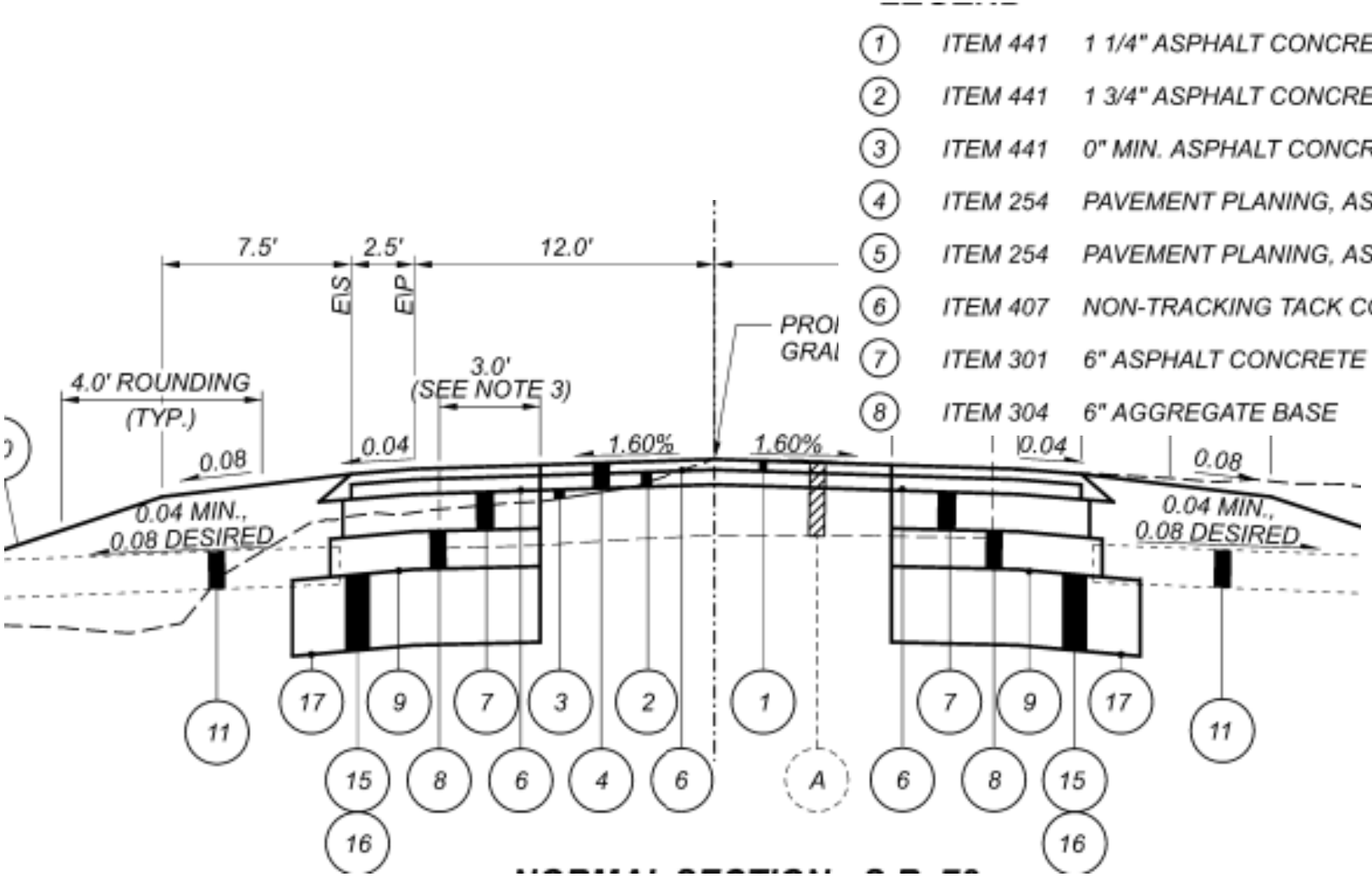
- HUR 4 Prior Condition

CASE STUDY 1 – EDGE REPLACEMENT

- Typical solid and sufficiently thick middle

- Thinner and deteriorated edge asphalt without base

CASE STUDY 1 – EDGE REPLACEMENT



1	ITEM 441	1 1/4" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (446), PG64-22
2	ITEM 441	1 3/4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (446)
3	ITEM 441	0" MIN. ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (449) (SEE NOTE 2.)
4	ITEM 254	PAVEMENT PLANING, ASPHALT CONCRETE (VARIABLE DEPTH,SEE NOTE 1.)
5	ITEM 254	PAVEMENT PLANING, ASPHALT CONCRETE (3" DEPTH)
6	ITEM 407	NON-TRACKING TACK COAT
7	ITEM 301	6" ASPHALT CONCRETE BASE, PG64-22, (449)
8	ITEM 304	6" AGGREGATE BASE

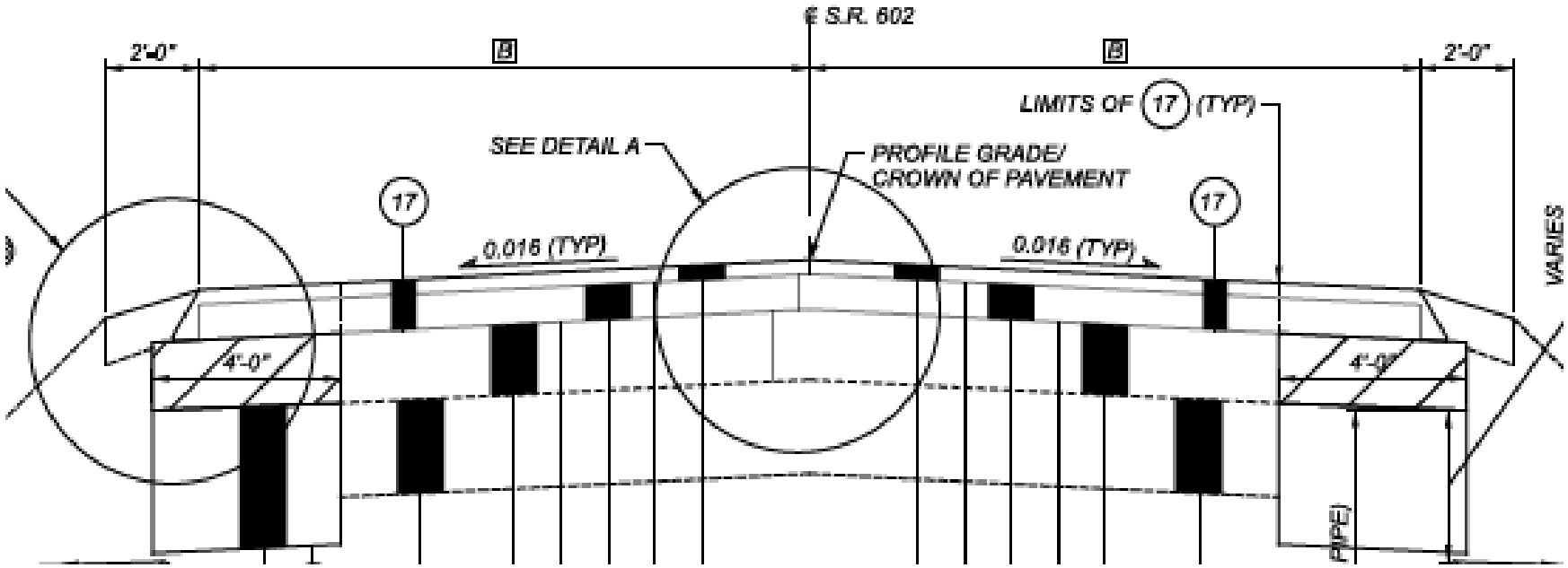
CASE STUDY 2 – FDR WITH EMULSION

- CRA 602 Prior Condition

CASE STUDY 2 – FDR WITH EMULSION

- Layer deterioration
- Macadam Base

CASE STUDY 2 – FDR WITH EMULSION



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CASE STUDY 2 – FDR WITH EMULSION

- Construction of FDR layer

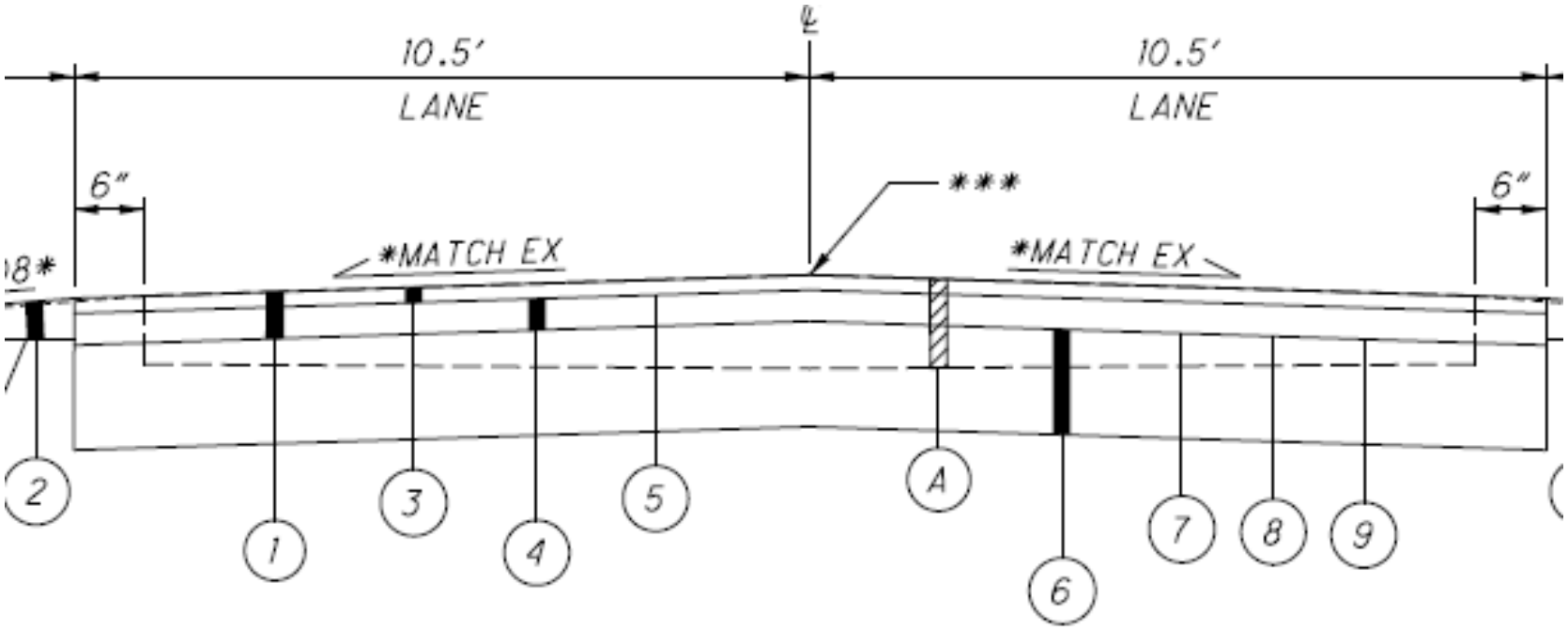
CASE STUDY 3 – FDR WITH CEMENT

- GUE/COS/MUS 662 Prior Condition

CASE STUDY 3 – FDR WITH CEMENT

- Deterioration
- Aggregate Base gradation

CASE STUDY 3 – FDR WITH CEMENT



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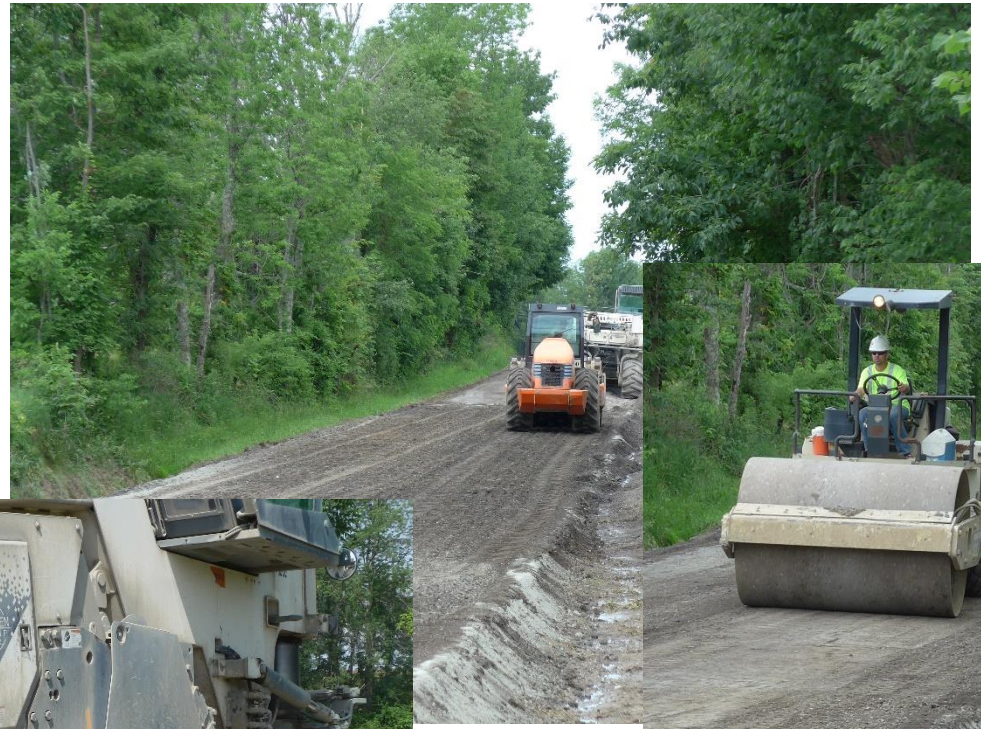
CASE STUDY 3 – FDR WITH CEMENT

- MOE 26 Construction



SUMMARIZE

- Each section needs consideration
- Determine what is cost effective
- MOT can drive up costs and practicality
- Investigation helps understand good rehabilitation approach
- Length of time needed for investigations are reasonable to accommodate

QUESTIONS

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