MaineDOT Data Collection and Analysis

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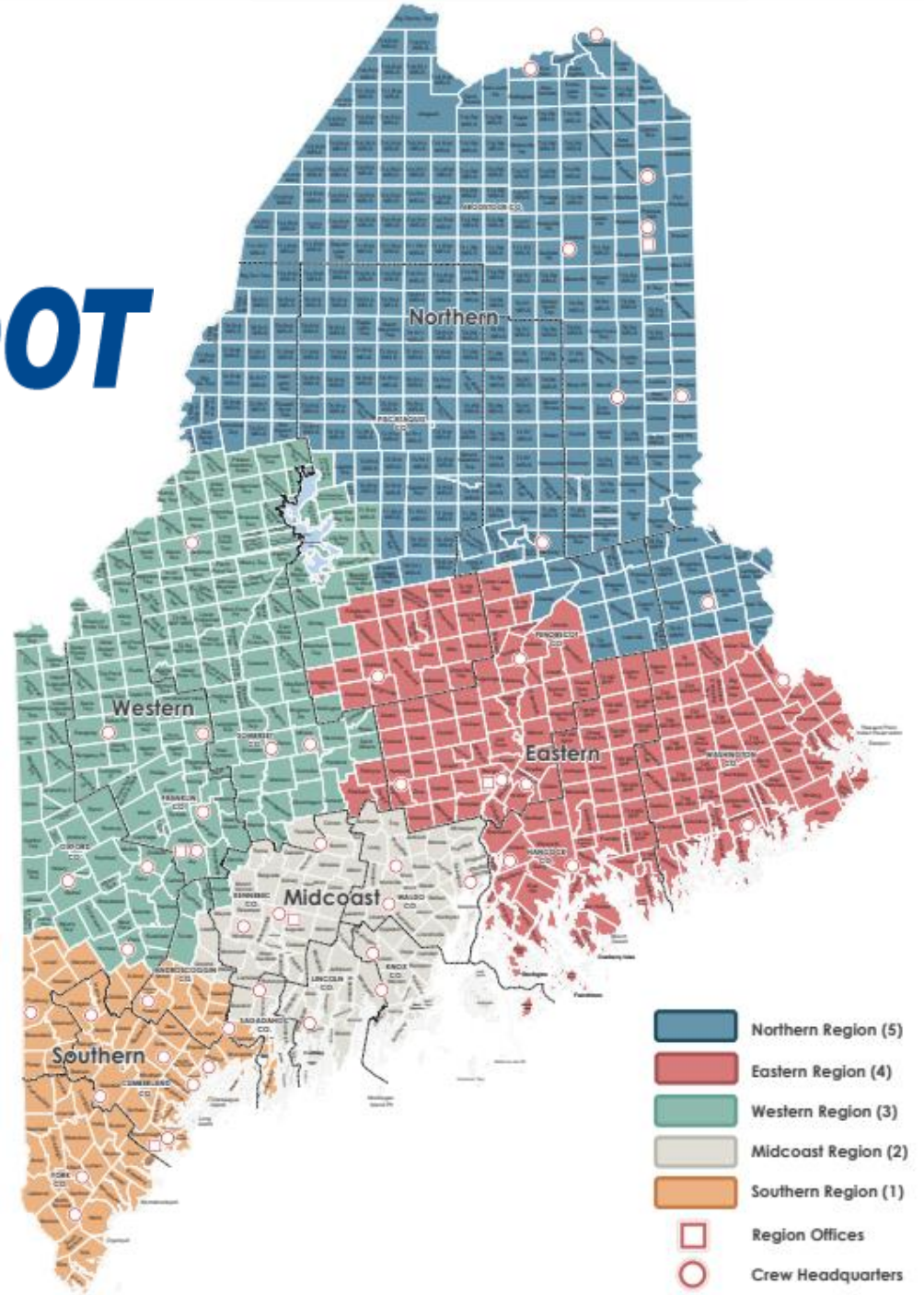
Results and Information Office, MaineDOT

NATIONAL PAVEMENT PRESERVATION CONFERENCE
npc23
IMPACTS AND BENEFITS FROM PAVEMENT PRESERVATION

ncpp
National Center for Pavement Preservation

MaineDOT

- Population: 1,362,359
- Area: 35,385 sq miles
- Total Public Road: 23,485 miles
- DOT Jurisdiction: 8,788 miles
- Turnpike (non-DOT toll road): 259 miles
- National Highway System: 1,883 miles
- More than 6,000 lakes and 3,500 miles of coastline



Work Plan

- Published January 2023 for 2023-2024-2025
- 340 pages
- 2,599 items
- $3.94 Billion
- $542M for Pavement Preservation

Data we need to create paving candidates

- Highway Corridor Priority (HCP)
- Built / Unbuilt status
- Pavement Condition (PCR, IRI, Rut)
- Most Recent Treatment
- Urban Compact / MPO
- AADT
- Shoulder type
- Cost estimate

Where we get our paving candidates from

- Candidates that did not get funded in the previous cycle
- New candidates generated from dTIMS
- Most Recent Treatment (is it time again?)
- Corridor management plans
- Other office additions (Safety Office, Bureau of Planning, etc.)
- Region office recommendations

Highway Corridor Priority (HCP)

- Developed as a state prioritization, independent from, but based on FFC, NHS, Jurisdiction
- Developed 10-15 years ago, significant updates in 2017 and 2021

- HCP 1 – Interstate and NHS
- HCP 2 – Principal / Minor Arterials
- HCP 3 – Minor Arterials / Major Collectors
- HCP 4 – Major / Minor Collectors
- HCP 5 – Local roads

Priority	Miles	% Miles	% Traffic
HCP 1	1883	8%	40%
HCP 2	1251	5%	18%
HCP 3	1257	5%	12%
HCP 4	4656	20%	17%
HCP 5	14438	61%	13%

ARAN® Automatic Road Analyzer

PAVE3D

This system collects continuous 3D images of the road surface. This unique 3D vision technology allows for precise pavement condition measurement, day or night, up to highway speeds (60mph). The Pave 3D system has the highest transverse and longitudinal resolution, resulting in the best quality pavement condition measurements. This 3D technology allows for fully automated pavement condition of over 13 feet (4m) in width. Cracking and other distresses are extracted from the 3D profile data. The system uses depth information for each crack to know for sure if the crack has depth compared to the road surface. This significantly reduces false positives, and greatly increases the reliability and repeatability of the automated detection results from the Pave3D system.

POSITIONING -GPS

The ARAN is equipped with a GPS and is integrated with other subsystems so that if the receiver cannot lock on enough satellities to determine its position, the ARAN DMI and the ARAN Inertial Reference System will fill in the gaps.

RIGHT-OF-WAY VIDEO

The ARAN is outfitted with three HDTV camers that capture right-of-way images allowing you to virtually view the road from the comfort and safety of the office.

ROUGHNESS

The Laser SDP is a longitudinal profile measurement system that provides road profile data capture and real-time roughness index calculation using a combination of high-speed lasers and accelerometers.

3D SENSOR WORKING PRINCIPLE

Crack Classification and Rating: The detected cracks are analyzed using Fugro's Vision software that includes pattern recognition algorithms to determine the types of distresses (longitudinal, transverse, alligator cracks, etc.). Cracking data can then be reported according to the client's distress manual, by roadzone, severity level and by aggregating the data to determine length of cracking, width, number of cracks, area of cracking, and extent (length of road affected).

Rutting: Pave3D delivers the highest resolution road surface transverse profile that can be attained on the market today. It utilizes its industry leading 4,000+ points of transverse resolution one point every 1mm (0.04") across a full lane width 4m (13 feet) to create a detailed transverse profile for rutting calculations.

Pave3D has been field tested to accurately record rut depth measurements to within +– 1mm (0.04") as compared with precision straight edge rod and level surveys. The system conforms to all AASHTO and ASTM standards.

3D Sensor Working Principle

POSITIONING-DMI

The Distance Measuring Instrument measures ARAN chainage and linear distance travelled. The ARAN is equipped with a GPS and is integrated with other subsystems so that if the receiver cannot lock on enough satellities to determine its position, the ARAN DMI and the ARAN Inertial Reference System will fill in the gaps.

TEXTURE

Smart Texture utilizes high frequency lasers to measure the mean profile depth of road surface macrotexture.

MaineDOT

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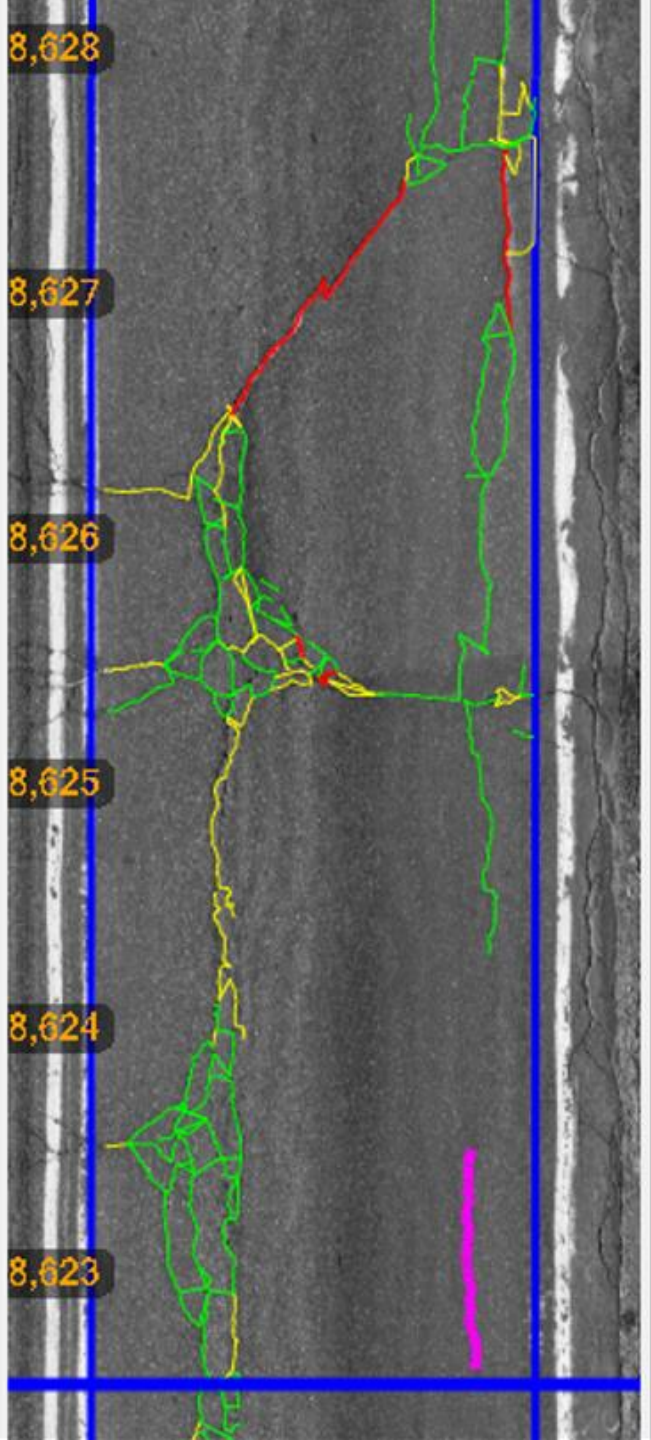
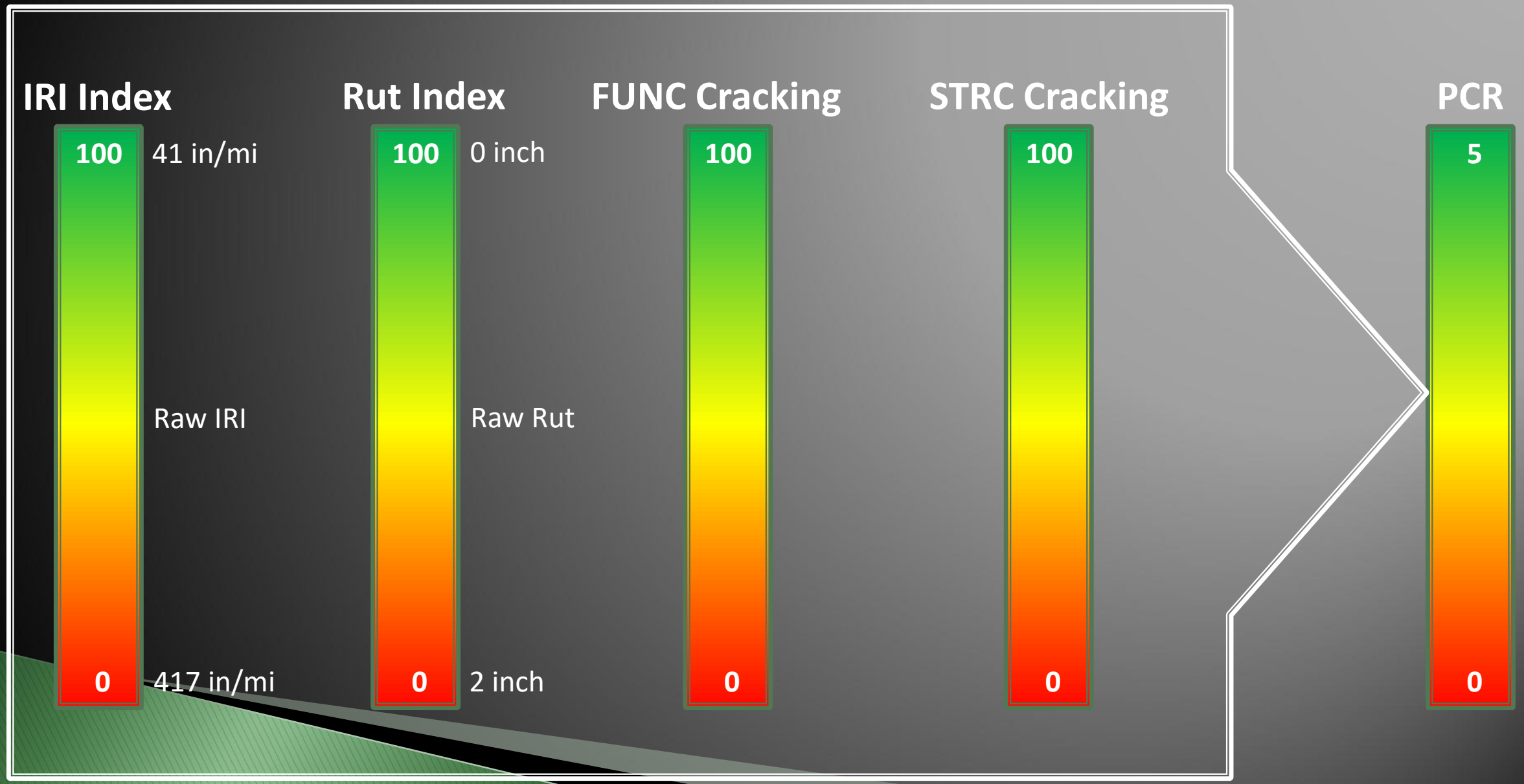

8,628
8,627
8,626
8,625
8,624
8,623

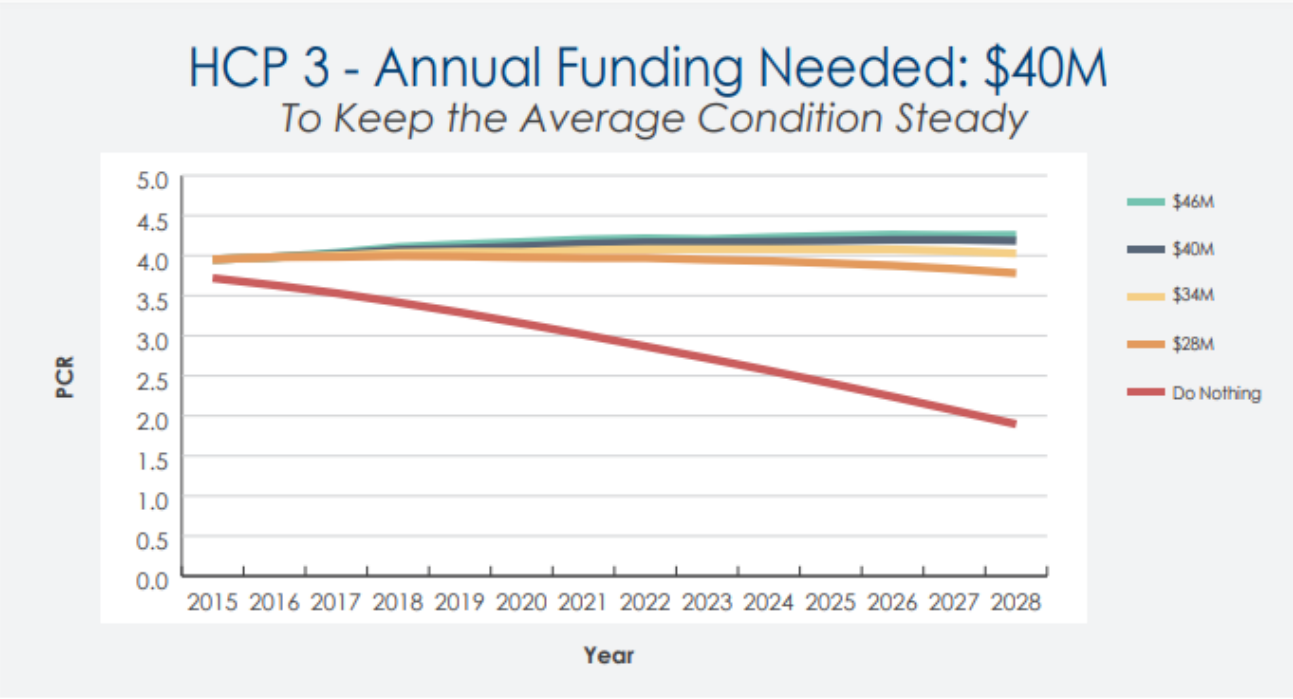
Condition Index and Pavement Condition Rating

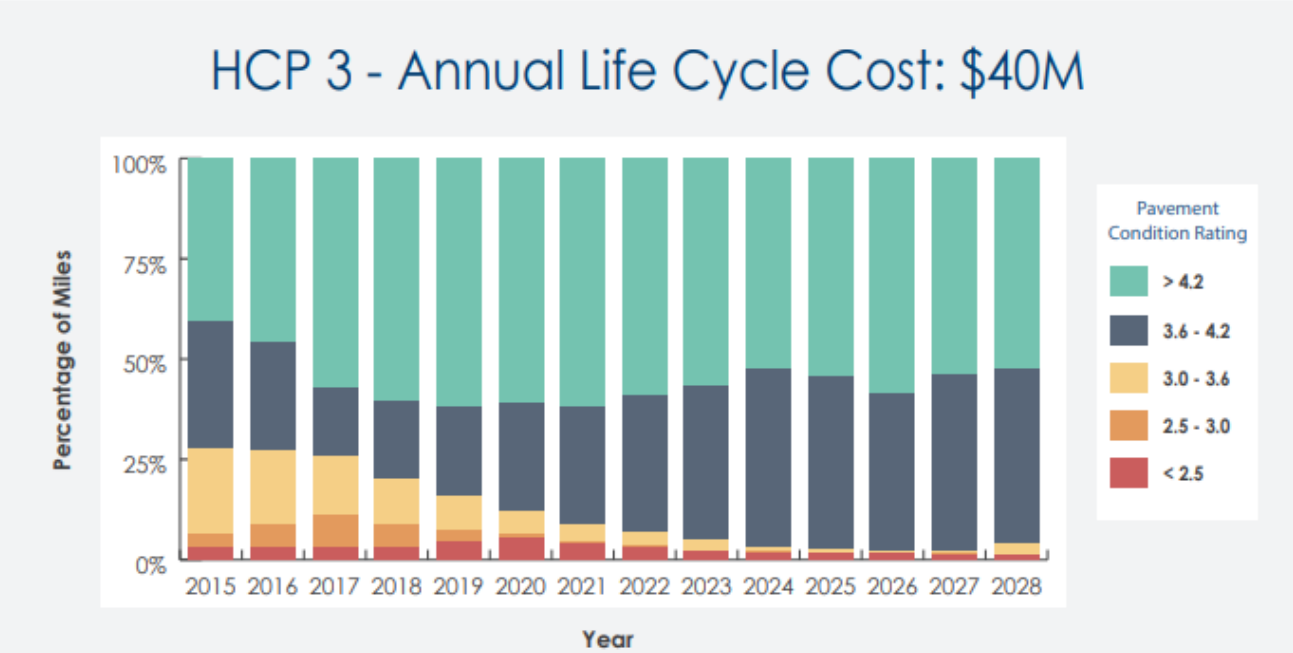


dTIMS – How we pick candidates

- Condition calculations
  - For internal use and FHWA submittal
- Life cycle cost analysis
- Program budgeting
- **Candidate selection**

deighton





Treatment Triggers

Triggers are checked in this order				TRIGGERS		INDEX IRI		INDEX RUT		INDEX FUNC		INDEX STRC		0-5 PCR	TREATMENT	Minor Ancill.	Yrs. To Wait	Budg. Category	Subsq. Trtmts Allowed	Re-Sets nAAV Yrly Cost#; Re-calc PCR#	
prpsHCP		ABN		Other Criteria																	
0, 1 or 2	&	A	&	4 years after Reconstr or Rehab	&	AGE >2				>=80	&	>=90	&	4.0-4.7	Seal — Fog, Cape, Chip (not Crack Seal)	Major	3 (4)	Preserv	Seal?,utb, 075/125,m&f	Age=0,IRI,Rt,St not reset	
				Use Adder in Benefit calculation	DO NOT USE						DO NOT USE									FUNC= <of FNC+10,99	
4	&	Any	&	AGE >= 7											LCP	Major	4 (4)	Maint	LCP	AGE= 0	
3	&	B	&	AGE >= 7															PMRAP	IRI (>of IRI+20 or	80
1 or 2	&	B or R	&	AGE >= 7															Reconstr	RUT*,FUNC,STRC	90/90/95
															CPR — Cyclical Pavement Resurfacing	Major	7 (7)	CPR	CPR	AGE= 0	
3	&	A or P	&	AGE >=9	&			>=30			&	>=40								IRI, RUT*	90
																				FUNC, STRC	90/90/95
															Ultra_Thin_Bond	Major	5 (5)	Preserv	utb,75,125 Mill_Fill_150 Pvmt_Rehab	AGE= > of age-7, 3	
0,1,2	&	A or P	&		&	>75	&	**>69**	&	>70	&	>80	&	(3.2-4.0)						IRI, RUT*	90
																				FUNC, STRC	92/95
															PPM_075	Major	5 (5)	Preserv	All Lights** PPM_125 Mill_Fill Pvmt_Rehab	AGE= > of age-7, 3	
0				*no 3/4" on Interstate*																	
1 or 2	&	A or P	&	abfTRG_PPM_075_HCP_1_2	&	>65	&	>62	&	**>65**	&	>75	&	(3.0-3.8)						IRI, RUT*	90
																				FUNC, STRC	90/95
0	&	A	&		&	(20-80	&	20-80	&	40-80	&	60-90)	&	(2.0-3.5)	PPM_125 — cannot be used where there is curb	Major	5 (5)	Preserv	All Lights** PPM_125 Mill_Fill_150 Pvmt_Rehab	AGE= > of age-10, 4;shld:if G ->P	
1 or 2	&	A or P	&	Shld_code cannot be C	&	(20-80	&	20-80	&	40-70	&	60-90)	&	(2.0-3.5)						IRI, RUT*	94
				convert any gravel shoulders																FUNC, STRC	94/97
				(build that into Cost Expression)																	
0,1,2	&	A or P##	&	Shld_code cannot be G	&	(20-60	or	20-65	or	20-60)	&	55-90	&	(2.0-3.2)	Mill_Fill_150 — (includes prior Mill_Fill_175 for Int'st)	Major	5 (5)	Preserv	All Lights** PPM_125 Mill_Fill_150 Pvmt_Rehab	AGE= > of age-10, 4	
																				IRI, RUT*	94
																				FUNC, STRC	
0, 1 or 2	&	A or P	&		&					(0-50	or	0-60)	&	<=2.5	Pvmt_Rehab — HIPR, CIPR, Strct. M/F,Strc. O'lay	Major	5 (5)	Preserv	All Lights** PPM_125 Mill_Fill_150 Pvmt_Rehab	**ABN**, AGE, FWD, shld	**A**,0,S,P
																				Do not re-set any CSLs	
																				IRI, RUT*, F, ST	98/99
3	&	B, P or R	&		&					< 60	&	<80	&	< 2.7	PMRAP — Plant-Mixed Recycled Asphalt	Major	9 (9)	PMRAP	CPR LCP	abn, age, shld, QF	P,0,P,avg
																				IRI, RUT*, F, ST	90/90/90/95
																				Do not re-set any CSLs	
no Reconstr on Interstate for 10-20+ years															Reconstruction — Foamed Asph't, FDR, cement-stblz	Major	5 (5)	Unbuilt	All Lights** PPM_125 Mill_Fill	abn, age, shld, QF	A,0,P,avg
1	&	B	&		&					(0-50	or	0-50)	&	<=3.2						IRI, RUT*, F,ST	100
2	&	B	&		&					(0-50	or	0-50)	&	<=2.8						Do not re-set any CSLs	

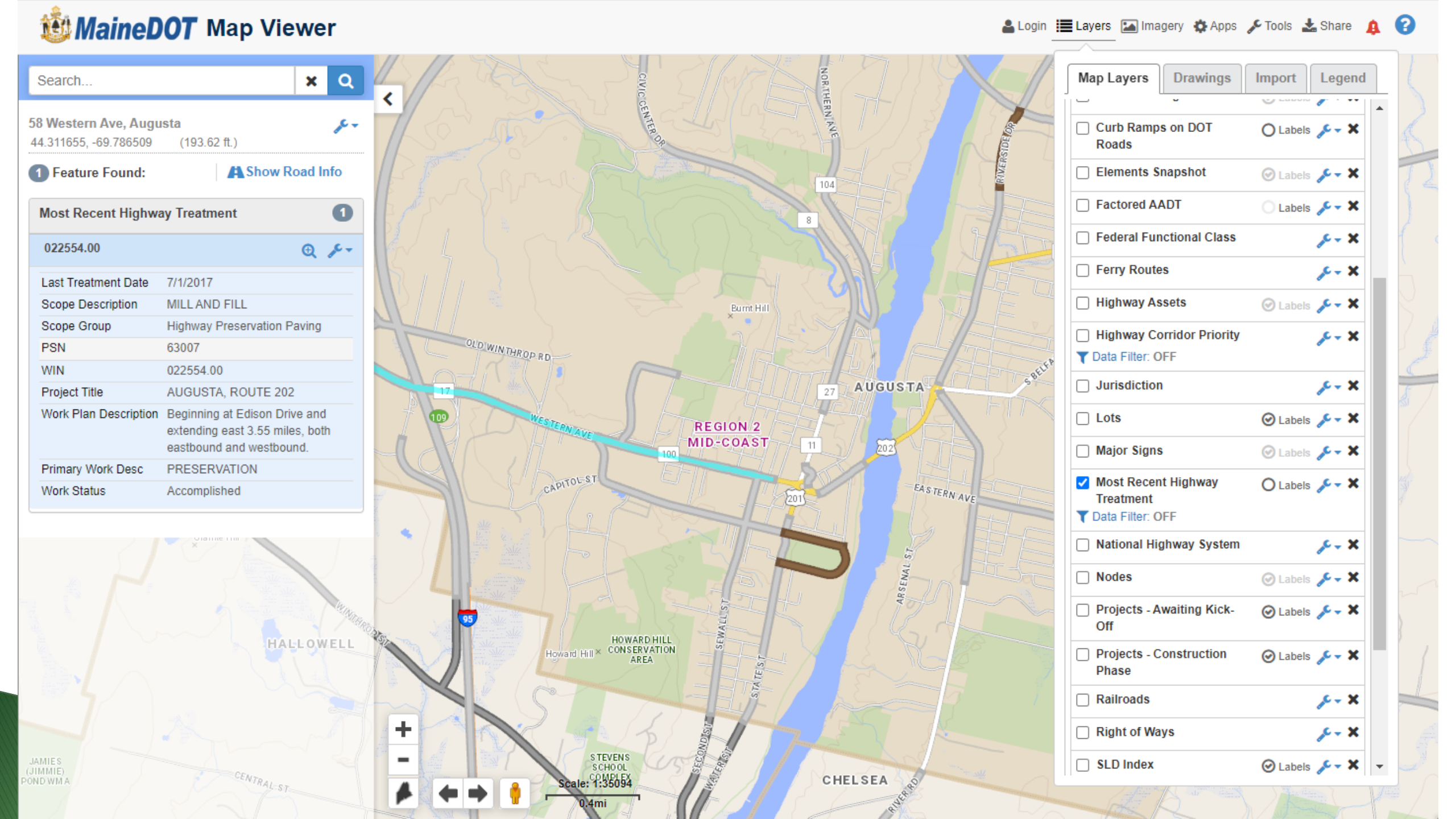
Treatment Framework

Proposed HCP	Built	Unbuilt	Improvement
1	PPP	LCP	Rehab/Recon
2	PPP	LCP	Rehab/Recon
3	CPR	LCP	Rehab
4	LCP	LCP	MPI

Treatment Toolbox

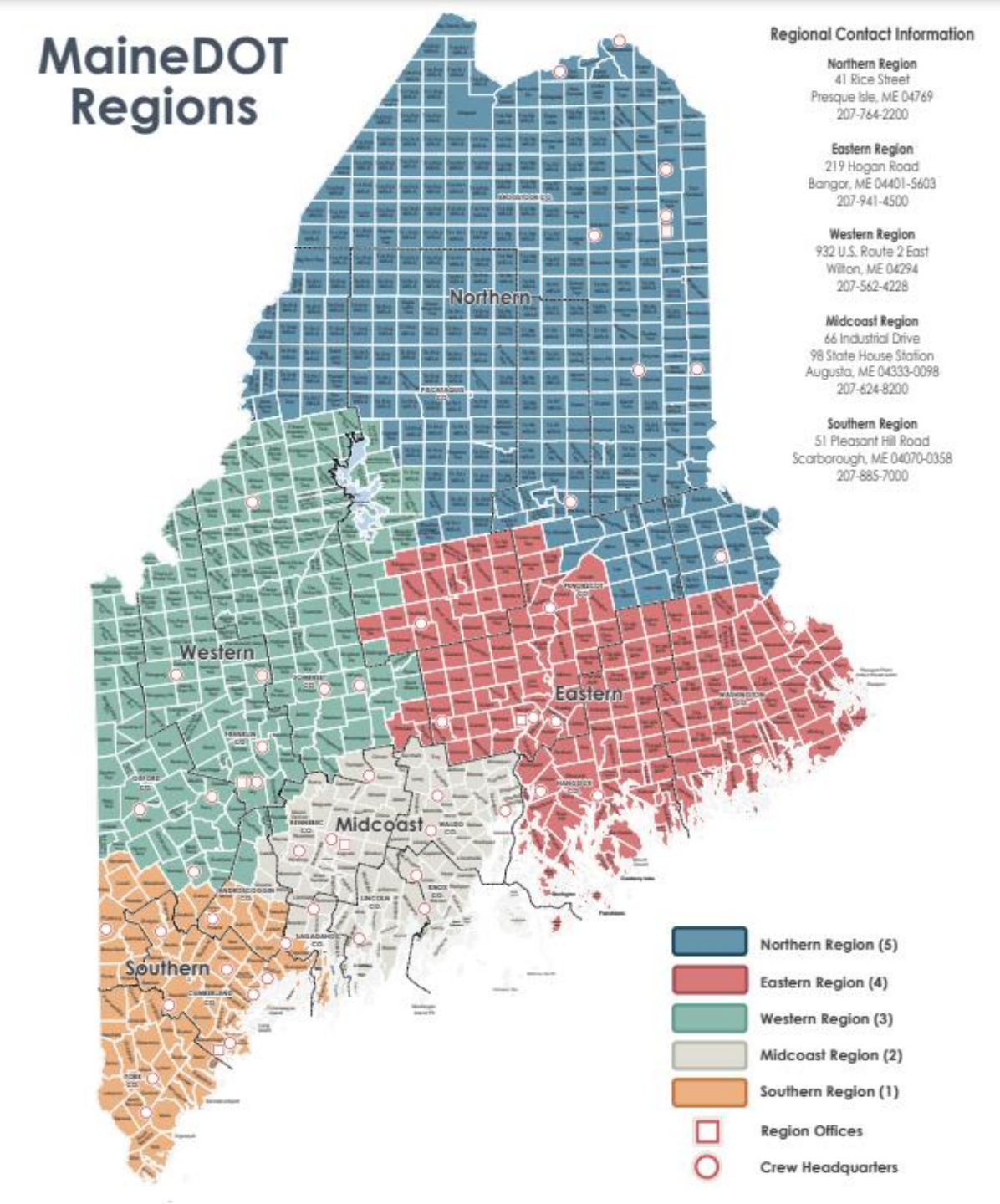
- Light Treatments (planning for 2024)
  - Seals (Crack, Fog, ~~Chip~~)
  - Ultra-Thin Bonded Wearing Course
  - ¾" Overlay
- Heavy Treatments (planning for 2026)
  - 1 ¼" Overlay
  - Mill and Fill
  - Pavement Rehab (HIPR, CIPR, Structural M&F, Structural Overlay)
- Highway Rehab (Full Depth Reclamation)
- Reconstruction, New Construction, PMRAP / CHIP

- Cycle Paving
  - Cyclical Pavement Resurfacing (CPR) – 9 years?
  - Light Capital Paving (LCP, LCPP) – 7 years


MaineDOT Map Viewer
Login
Layers
Imagery
Apps
Tools
Share
Search...
58 Western Ave, Augusta
44.311655, -69.786509 (193.62 ft.)
1 Feature Found:
Show Road Info
Most Recent Highway Treatment 1
022554.00
Last Treatment Date 7/1/2017
Scope Description MILL AND FILL
Scope Group Highway Preservation Paving
PSN 63007
WIN 022554.00
Project Title AUGUSTA, ROUTE 202
Work Plan Description Beginning at Edison Drive and extending east 3.55 miles, both eastbound and westbound.
Primary Work Desc PRESERVATION
Work Status Accomplished
Map Layers
Drawings
Import
Legend
Curb Ramps on DOT Roads
Elements Snapshot
Factored AADT
Federal Functional Class
Ferry Routes
Highway Assets
Highway Corridor Priority
Data Filter: OFF
Jurisdiction
Lots
Major Signs
Most Recent Highway Treatment
Data Filter: OFF
National Highway System
Nodes
Projects - Awaiting Kick-Off
Projects - Construction Phase
Railroads
Right of Ways
SLD Index
Labels
AUGUSTA
REGION 2 MID-COAST
HALLOWELL
CHELSEA
HOWARD HILL CONSERVATION AREA
STEVENS SCHOOL COMPLEX
Burnt Hill
Howard Hill
JAMIES (JIMMIE) POND WMA
CIVIC CENTER DR
NORTHERN AVE
RIVERSIDE DR
OLD WINTHROP RD
WESTERN AVE
CAPITOL ST
EASTERN AVE
SEWALL ST
STATE ST
ARSENAL ST
SECOND ST
WATER ST
RIVER RD
CENTRAL ST
WINTHROP ST
104
8
27
11
202
201
100
17
109
95
Scale: 1:35094
0.4mi

Candidate Review

- Candidate lists are shared with Regions and Project Development for comments and input
- Each of the candidates are reviewed on a ride to evaluate scope and details for estimating



Proj Seq	Status	Priority (text)	Priority(numeric)	Year of Last Work
	Look at for 2023 Lt Trtmt			2013

AADT	FFC	Jurisdition	MPO	NHS	Urban/Rural	PCR
1186	5	State hwy		0	R	3.57

Recent Review Type	Recent Review By	Recent Review Date
Estimating Complete	James Havu	6/17/2022

Route	BMP	EMP	Length	Treatment	Cost/Mile	Paving Cost	Comment
0011X	331.86	352.36	20.50	PPM_075	$0	$0	
From Town to Town (Street):	From to .						
					Total Paving Cost	$0	

Type	Name	Unit	Cost/Unit	Quantity	Line Item Cost	Comment
Tons	Surface_HMA	ton	$125.00	14238.3	$1,779,788	28' - 32' wide, full width, 11' lanes
Tons	Shim	ton	$130.00	14238.3	$1,850,979	3/4" avg shim
LumpSum	Driveways	total	$1.00	50000	$50,000	
LumpSum	Maint_of_Traffic	total	$1.00	700000	$700,000	includes striping
LumpSum	Crack seal/repair	total	$1.00	190000	$190,000	mostly CS
LumpSum	Equipment Rental	total	$1.00	270000	$270,000	
LumpSum	Mobilization	total	$1.00	726115	$726,115	15%
LumpSum	SWEPCP	total	$1.00	48408	$48,408	1%
				Total Item Cost	$5,615,290	

Type	Date	Comment
017_Office_Review	4/27/2017	2013 3/4" Overlay
	2/28/2018	Feb 2018 dTIMS run (24594,95) chose 2027 PPM_125
	4/18/2019	MPs may have shifted to 335.88-352.19, ~ same length. Consdier with MapID 536.
	5/23/2019	There are higher priorities for 2020. Look at 5773 in 2020 for 2021 UTB; re-estimate then. MapID 5773 & 536 may not make it until 2022.
	4/25/2020	2020 dTIMS run picked 2022 UTB.
	5/8/2020	This, with 536, Brent's top Priority for 2021.
	5/15/2020	Ruts: 1/8", 1/4", 3/8". Shldrs are bad.
	5/15/2020	Could go in 2021 or could wait another year. Pick Caribou 0161X before this.
	1/27/2021	2019 Pavement Condition CSL is mostly B.
	4/14/2021	This MapID is on two H-routes (H6380 and H6390).
	4/14/2021	2021 dTIMS picked 2030 PPM_125 (2030 PCR=2.58 & IBC = 0.00229) for $5,122,204 on the element that is on H6380, 10.529-23.39 (12.861 miles), which is longer than the MapID element.
	4/14/2021	2021 dTIMS picked 2031 PPM_125 (2031 PCR=2.27 & IBC = 0.00279) for $3,173,027 on the element that is on H6390, 0-7.55.

	4/14/2021	Index values are for the exact RLMs.
	4/22/2021	For 337.5-339 STRC dropped noticeably (5-15 points) from 2019 to 2020 (though PCR is fairly stable).
	4/27/2021	for 2022, lower priority than PI 1X and 0163X (557, 533).
	4/27/2021	through 2020, appeared to be holding up well. But, Ride in 2021 and update estimate.
	5/14/2021	Add MapID 536 to this. This part (16.41 miles) needs much more shim than previously estimated. Like southern piece, this part could go in 2022, 2023 or 2024.
	5/14/2021	beginning of structural problems (NB RWP, Oxbow, approx, 17 mi. s/o Ashland).
	7/2/2021	Used to be 0011X, 335.85-352.26. Estimate includes MapID 536.
	7/1/2022	It was re-estimated as a 3/4" OL to compare the total cost of the project based on each treatment. Andy made the decision to do 3/4" OL for the total of $6,109,869 instead of UTB for the total $7,142,146.

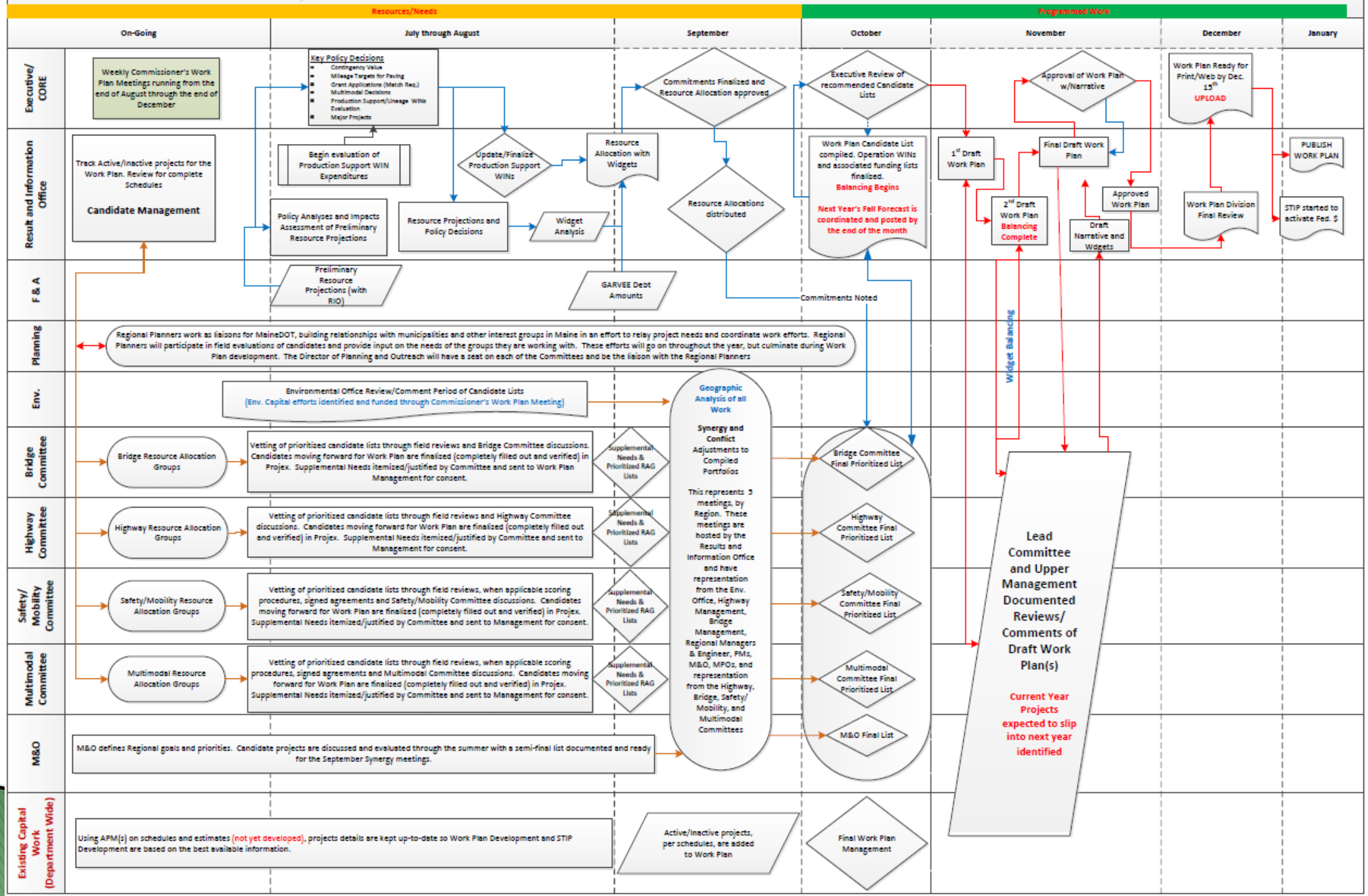
Location, %	Location Cost
Nightwork, %	Nightwork Cost
Other, %	Other Cost

PE, %	PE Cost
4.00%	$224,612
CE, %	CE Cost
6.00%	$336,917

sum Paving+Line Item $
$5,615,290
Total Cost
$6,176,819

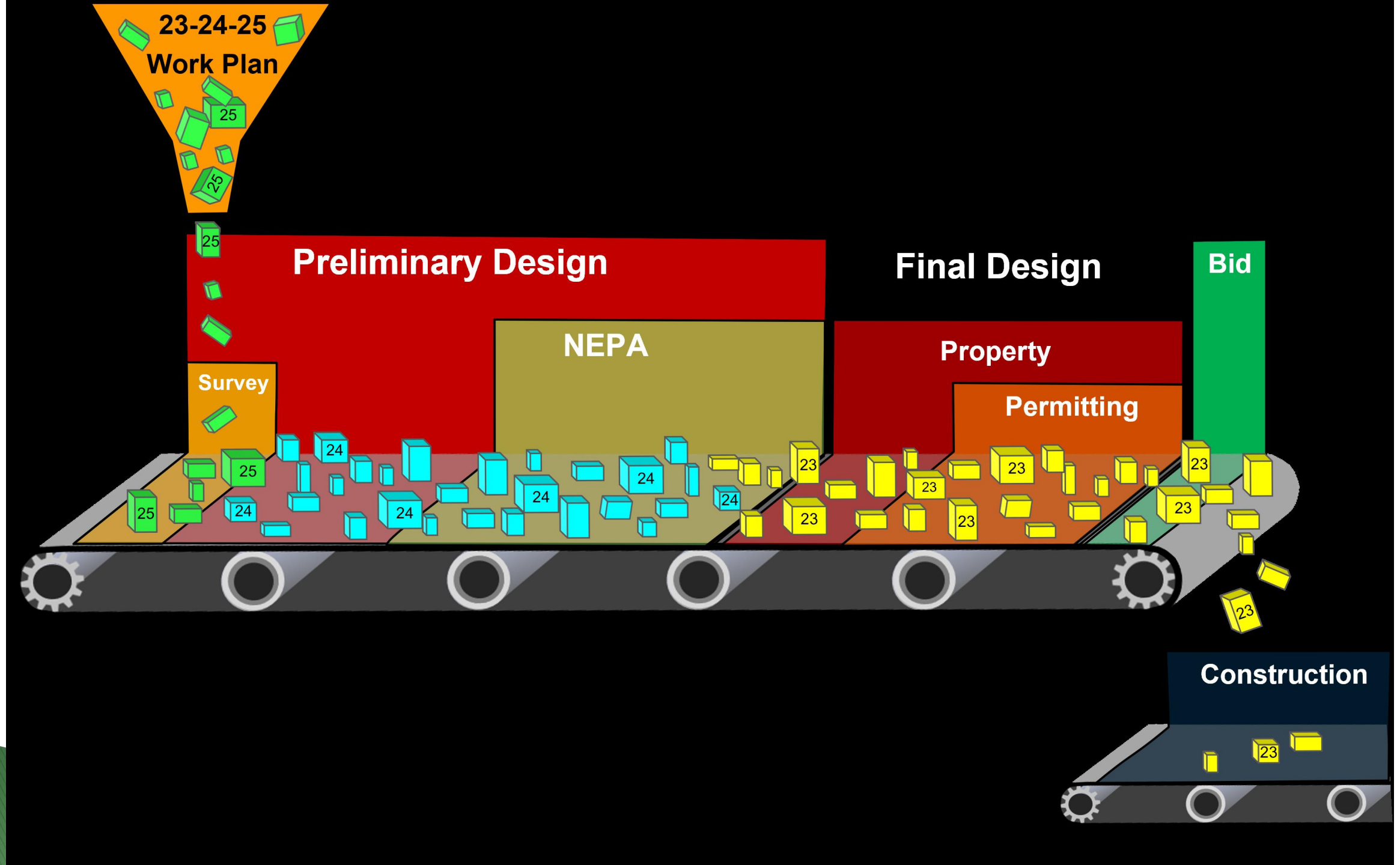
Annual Work Plan Development

12/17/20



Highway Management Schedule

- Collect ARAN data (April-December), Manual QC (July-February)
- Process ARAN data in dTIMS and create candidates (January-March)
  - Gather all the candidates
  - Update pavement condition and inventory data in database
  - Combine candidates where necessary
  - Share the list with Highway Program and Region personnel for comments and additions.
- Ride: Light treatments (May), Heavy treatments (July-August)
- Estimate projects and prioritize
- Synergy meetings and project selection (September)
- Work Plan published (January), Projects handed off to Project Development for delivery


23-24-25
Work Plan
25
25
25
Preliminary Design
Final Design
Bid
NEPA
Property
Survey
Permitting
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Construction
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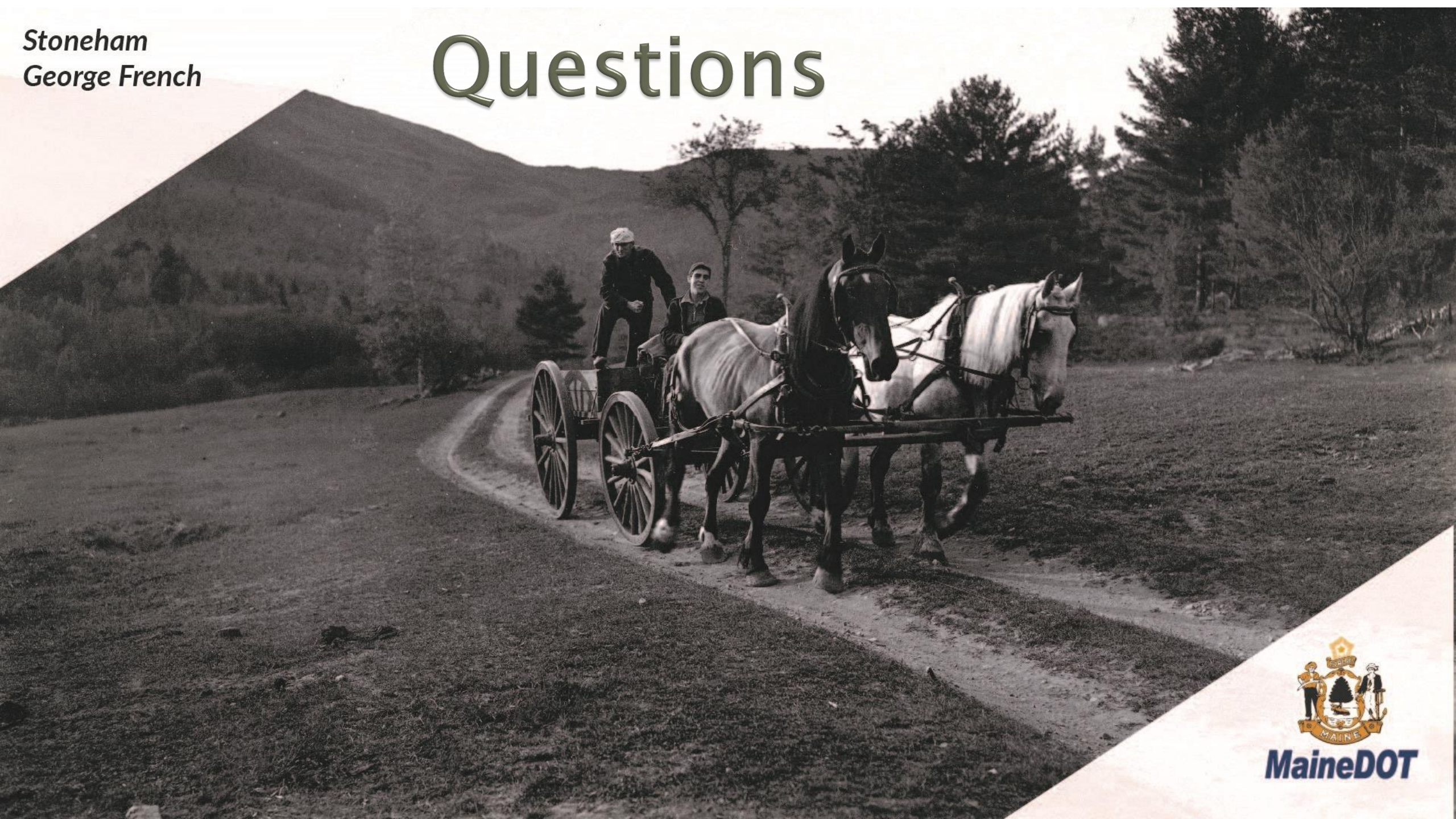
Stoneham
George French

Questions



MaineDOT

Further reading

- Roads Report (pdf)
- iVision Video (youtube)
- CSL Methodology (pdf) – MaineDOT grading rubric for roads
- MaineDOT Asset Management – Highways
- ARAN Poster (pdf)
- james.e.havu@maine.gov