MoDOT Field Office Update

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Construction and Materials

2020 MAPA Annual Conference
Columbia, MO
January 8, 2020

Agenda

- **Micro-Surfacing Changes**
- **Performance Testing**
- **Electronic Ticketing**
- **Intelligent Compaction / PMTPS**
- **Quantities Placed 2019**
- **STIP Projections**
- **2019 Mix Design Review**

Miro-Surfacing Change Overview

- JSP Changes Proposed Summer 2018
  - NJSP1804
- Plans to review and evolve JSP this winter following 2019 Season

Addition of Grade A, B & C

New Aggregate Quality Requirements

1) Absorption
2) Deleterious
3) Shale
4) Other Foreign - Unchanged
5) Thin/Elongated
6) Micro-Deval
7) LA Abrasion
8) Acid Insoluble Residue
9) Sand Equivalent

Property	Grade A	Grade B	Grade C
Absorption, AASHTO T 85, percent, max	2.0	4.0	5.5
Deleterious rock, percent by weight, max	2.0	4.0	8.0
Shale, percent by weight, max	0.5	0.75	1.0
Other foreign material, percent by weight, max.	0.5	0.5	0.5
Two fractured faces, percent, min	100	100	100
Thin, elongated particles, ASTM D4791, 5:1, percent, max[a]	10	N/A	N/A
Micro-Deval, AASHTO T 327, percent, max	18	20	N/A
Los Angeles Abrasion, AASHTO T96, percent loss, max	30	35	50
Acid Insoluble Residue (AIR), MoDOT TM76, min	85	N/A	N/A
Sand Equivalent, AASHTO T 176, percent min	65	65	65

[a]Test material retained on the No. 4 sieve.

New Performance Criteria

Test	ISSA Technical Bulletin No.	Specification
Mix Time @ 77 ° F	TB 113	120 seconds, Min.
Wet Cohesion **@ 30 seconds, Min. (Set)** **@ 60 minutes, Min. (Traffic)**	TB 139	12 kg-cm, Min. 20 kg-cm or Near Spin, Min.
Wet Stripping	TB 114	90 %, Min.
Wet Track Abrasion Loss **@ 1-hour soak** **@ 6-day soak**	TB 100	50 g/ft^2 (538 g/m^2), Max. 75 g/ft^2 (807 g/m^2), Max.
Lateral Displacement	TB 147	5 % Maximum

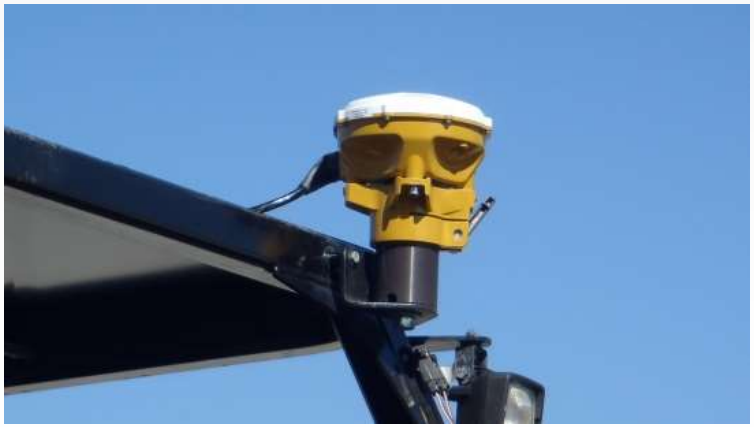
Required Quantities

Material	Requirement
Type II Mineral aggregate, lbs./yd^2 dry mass, min.	20.0
Type III Mineral aggregate, lbs./yd^2 dry mass, min.	25.0
Type IIIR Mineral aggregate, Tons dry mass	As necessary
Polymer solids content, based on asphalt weight, min. percent	3.0
Polymer Modified Emulsion (residual), percent, min.	7.5
Mineral Filler, percent by mass of dry aggregate, max.	2.0

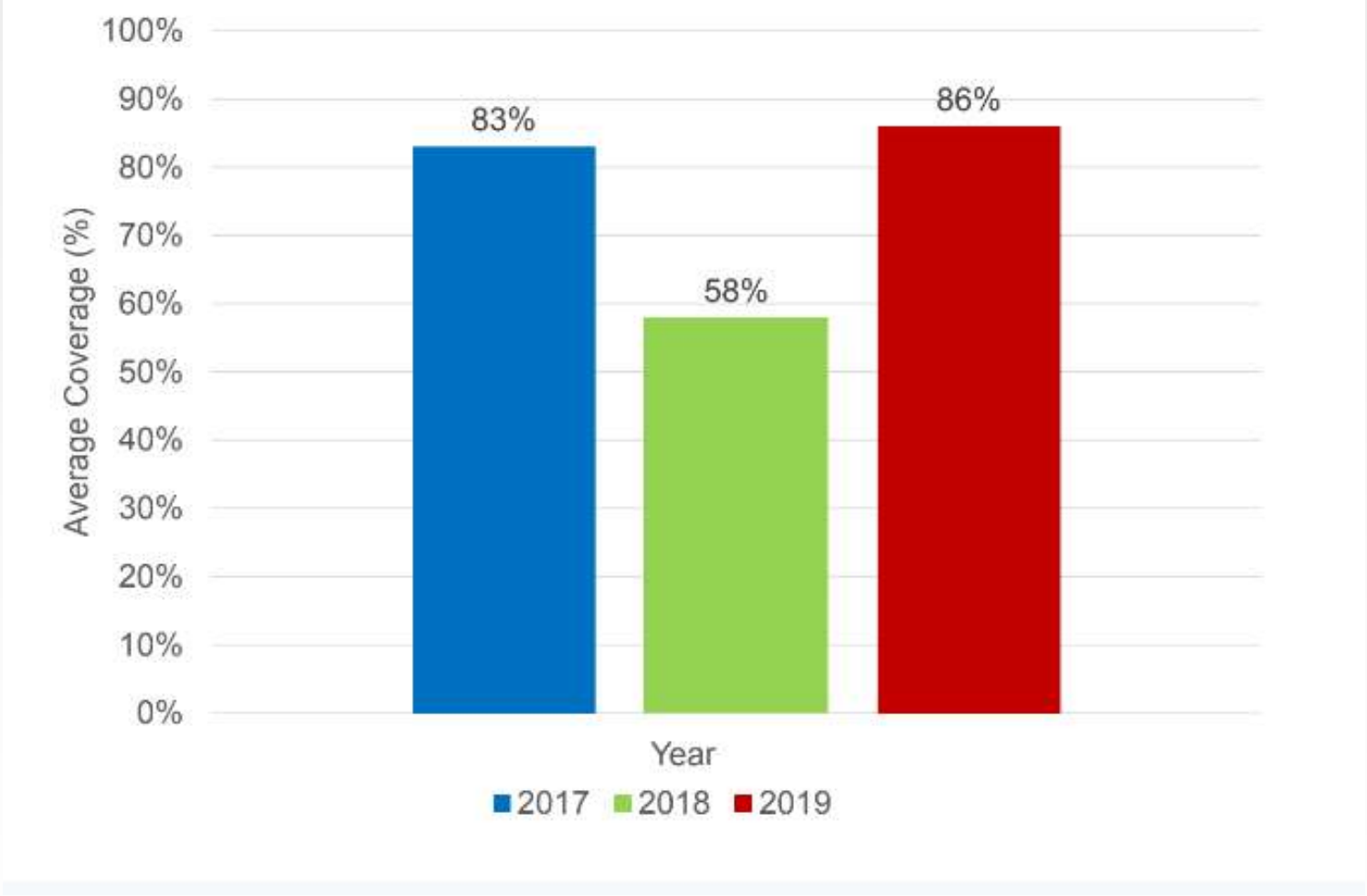
IC / PMTPS - Update

- Included in 42 Projects
  - Past 3 Construction Seasons

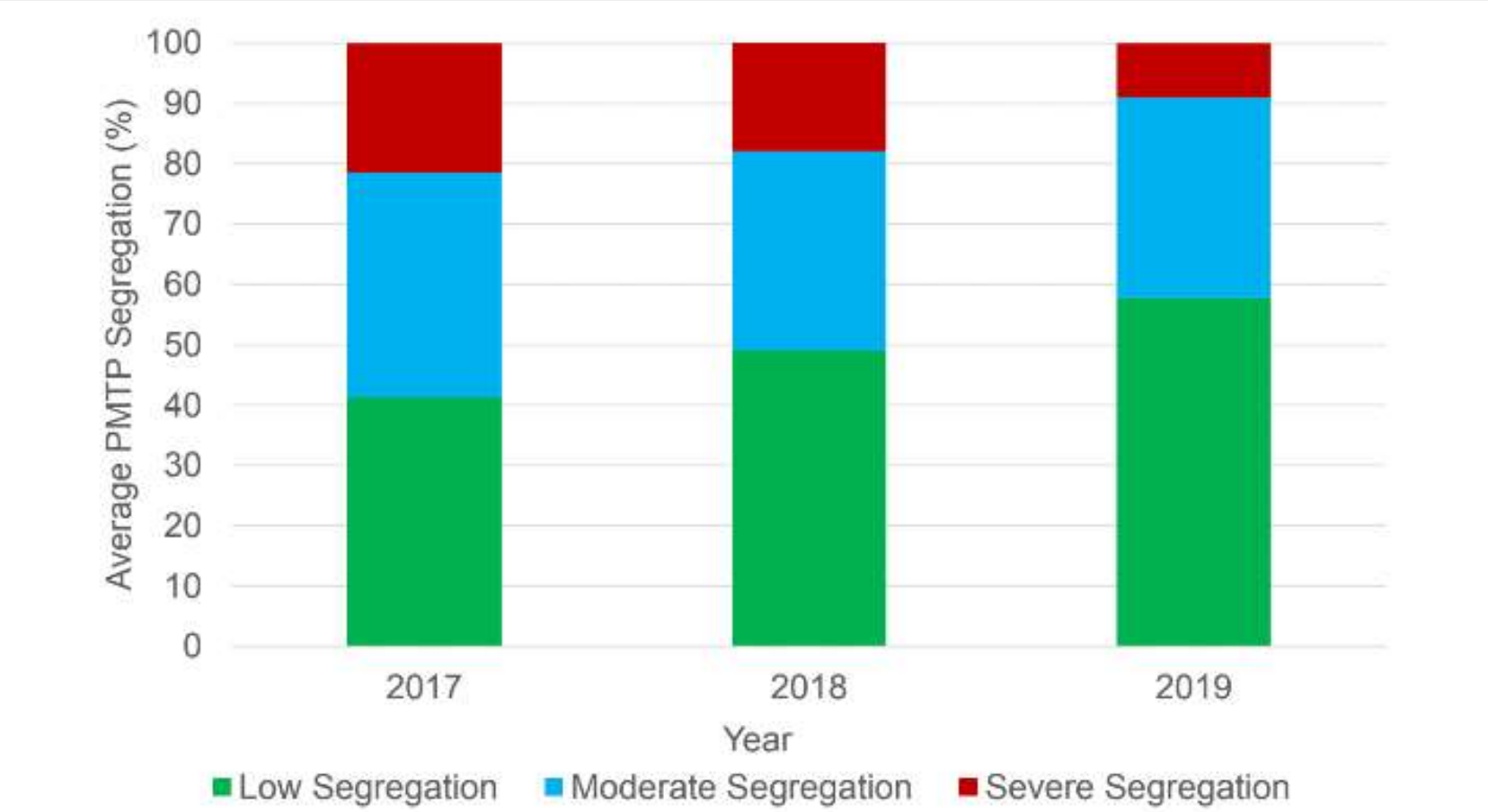
- 23 Projects put Forward by Districts for 2020 Season



Average Coverage All Projects 2017 - 2019



Average Thermal Segregation All Projects 2017 - 2019



Changes for 2020

- Shoulders to be included on some projects
- Provisions for Data Loss
  - Immediate Notification of RE
  - Prompt Resolution
- **Quality Assurance Component**
  - QA Receivers Rotated on IC Rollers

Next Steps

- Planning Meeting Held December 18th
  - Future Refinements Underway
  - Establish Framework for use in Acceptance of Pavement – 2021 Season
    - New Role for Cores

Performance Testing

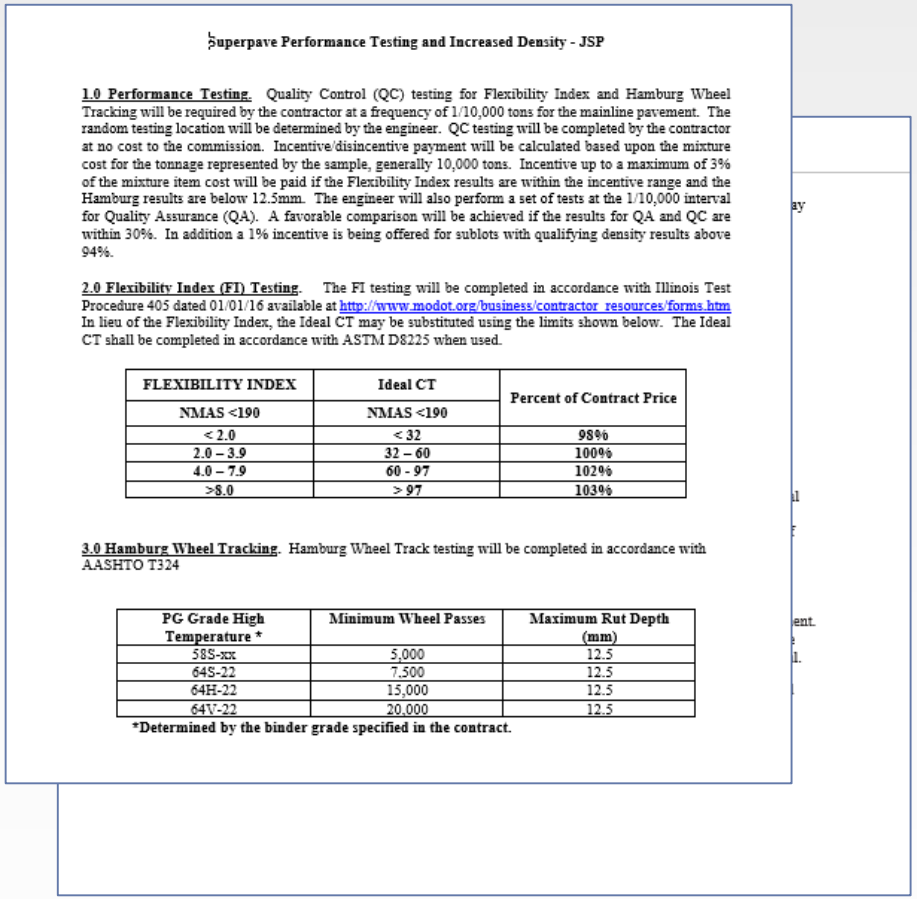
- 10 Projects originally put forward for 2020
  - Only Superpave Limits in Current JSP
    - Proving Problematic in Urban Districts
      - SMA Criteria needed

Performance Testing

Incentives
- Cracking Test Results
- Density above 94%

Rutting Requirement
- 12mm Max Hamburg

Allows
- Reduced Gyrations
- Reduced Air Voids



Superpave Performance Testing and Increased Density - JSP

1.0 Performance Testing. Quality Control (QC) testing for Flexibility Index and Hamburg Wheel Tracking will be required by the contractor at a frequency of 1/10,000 tons for the mainline pavement. The random testing location will be determined by the engineer. QC testing will be completed by the contractor at no cost to the commission. Incentive/disincentive payment will be calculated based upon the mixture cost for the tonnage represented by the sample, generally 10,000 tons. Incentive up to a maximum of 3% of the mixture item cost will be paid if the Flexibility Index results are within the incentive range and the Hamburg results are below 12.5mm. The engineer will also perform a set of tests at the 1/10,000 interval for Quality Assurance (QA). A favorable comparison will be achieved if the results for QA and QC are within 30%. In addition a 1% incentive is being offered for sublots with qualifying density results above 94%.

2.0 Flexibility Index (FI) Testing. The FI testing will be completed in accordance with Illinois Test Procedure 405 dated 01/01/16 available at http://www.modot.org/business/contractor_resources/forms.htm In lieu of the Flexibility Index, the Ideal CT may be substituted using the limits shown below. The Ideal CT shall be completed in accordance with ASTM D8225 when used.

FLEXIBILITY INDEX	Ideal CT	Percent of Contract Price
NMAS <190	NMAS <190	
< 2.0	< 32	98%
2.0 – 3.9	32 – 60	100%
4.0 – 7.9	60 - 97	102%
>8.0	> 97	103%

3.0 Hamburg Wheel Tracking. Hamburg Wheel Track testing will be completed in accordance with AASHTO T324

PG Grade High Temperature *	Minimum Wheel Passes	Maximum Rut Depth (mm)
58S-xx	5,000	12.5
64S-22	7,500	12.5
64H-22	15,000	12.5
64V-22	20,000	12.5

*Determined by the binder grade specified in the contract.

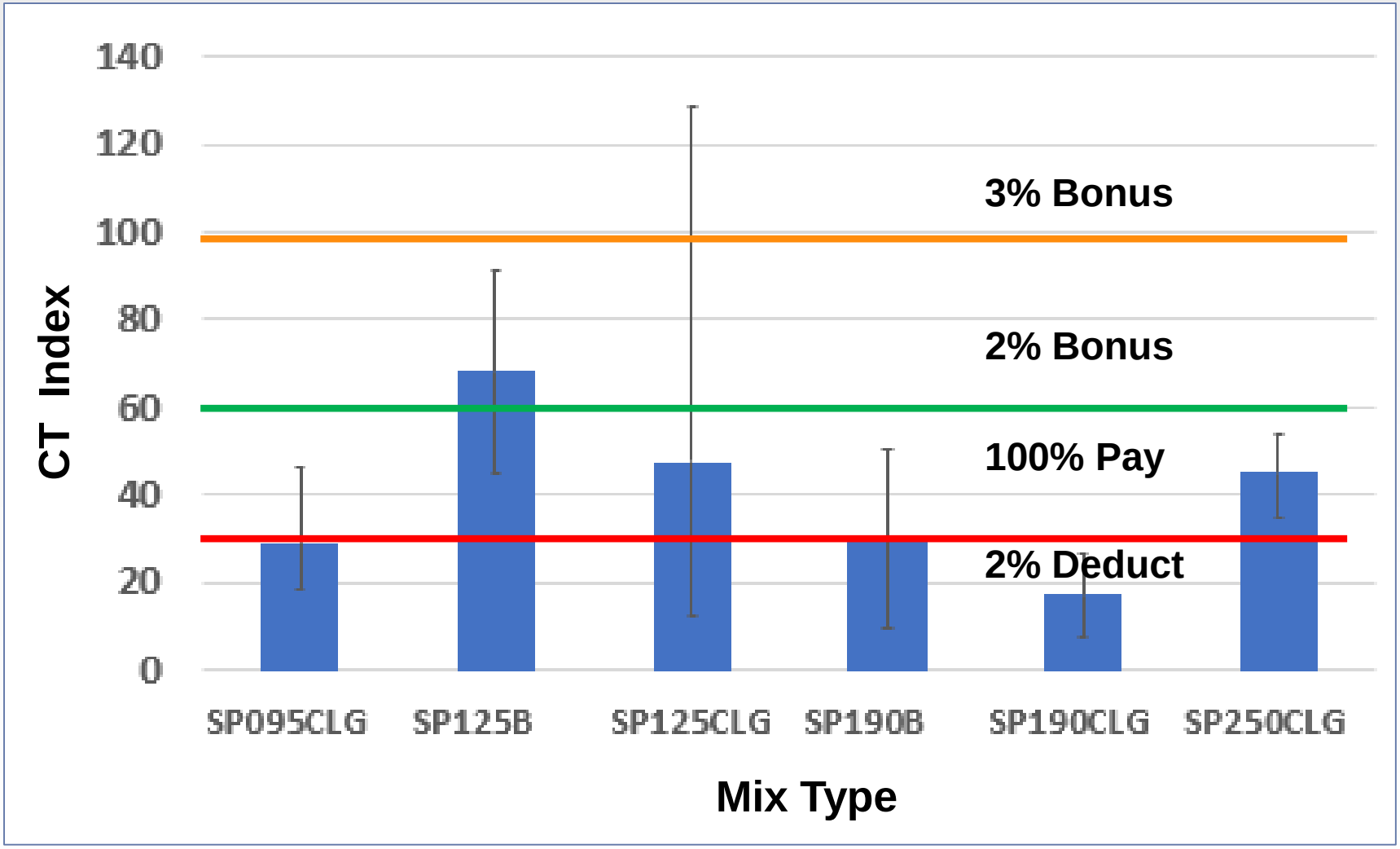
Incentive / Disincentive

Flexibility Index	Ideal CT	Percent of Contract Price
NMAS <190	NMAS <190	
< 2.0	< 32	98%
2.0 – 3.9	32 – 60	100%
4.0 – 7.9	60 - 97	102%
>8.0	> 97	103%

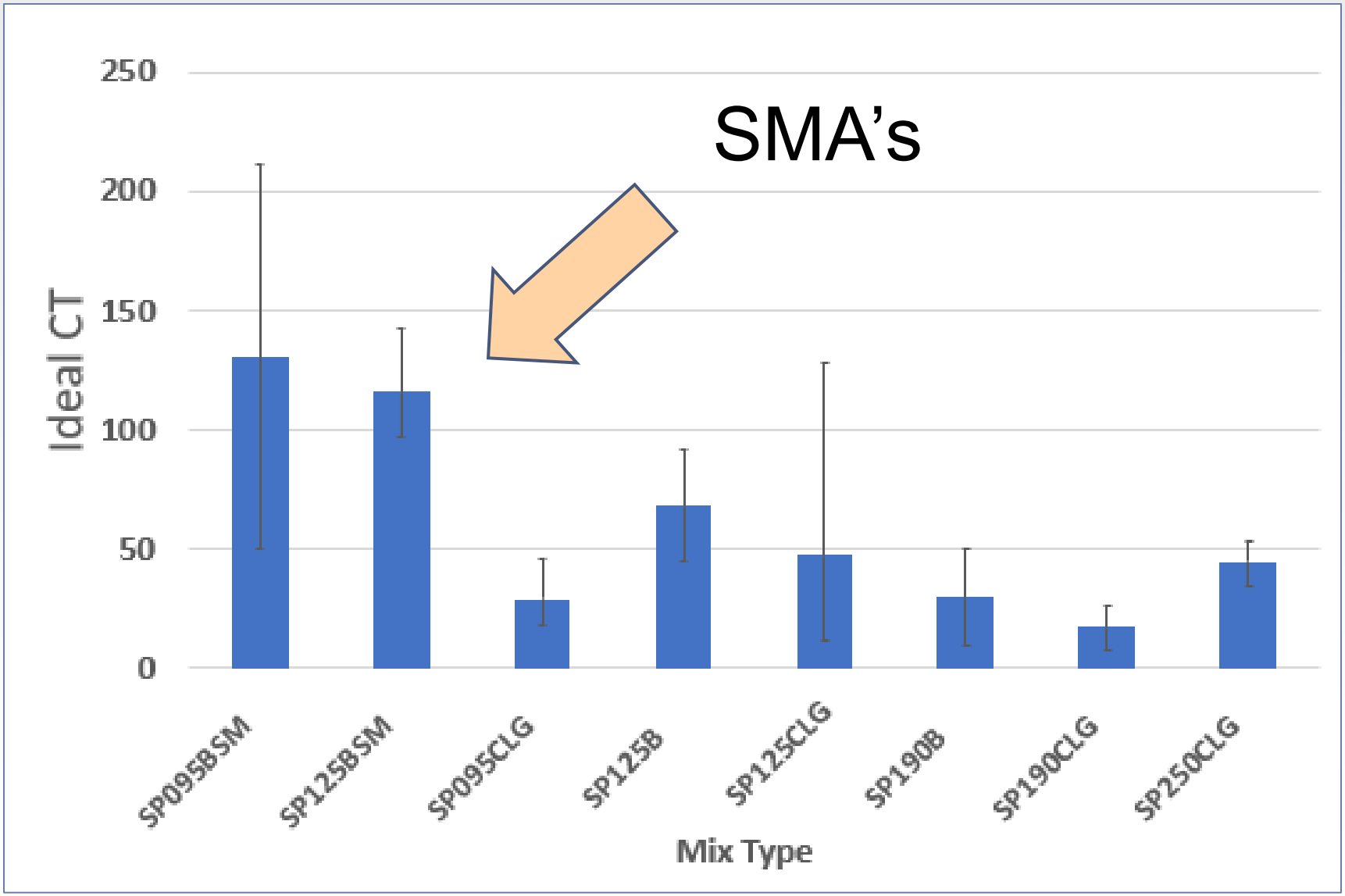
Hamburg Rut Depth Requirements

PG Grade High Temperature *	Minimum Wheel Passes	Maximum Rut Depth (mm)
58S-xx	5,000	12.5
64S-22	7,500	12.5
64H-22	15,000	12.5
64V-22	20,000	12.5

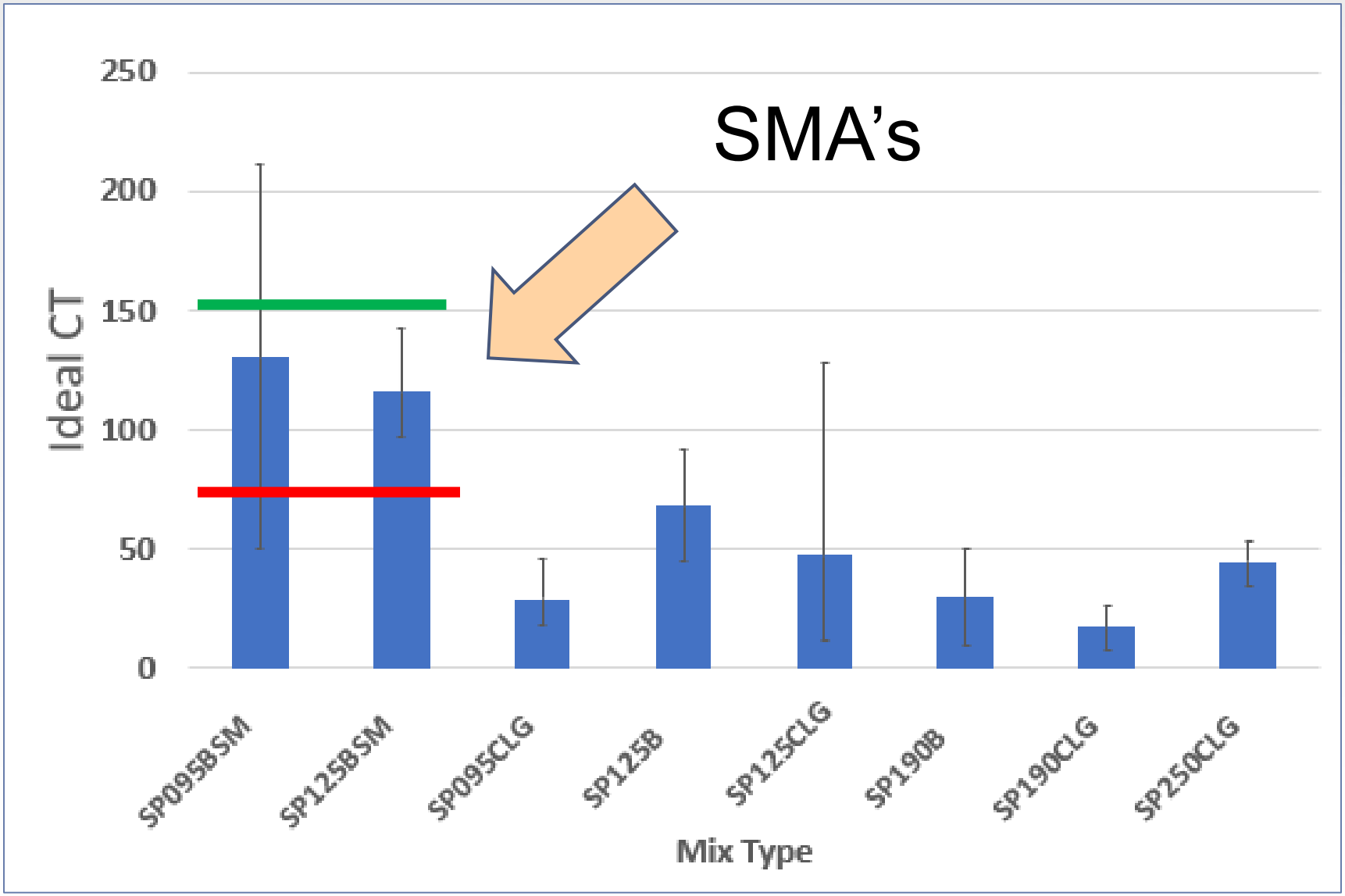
2019 Testing



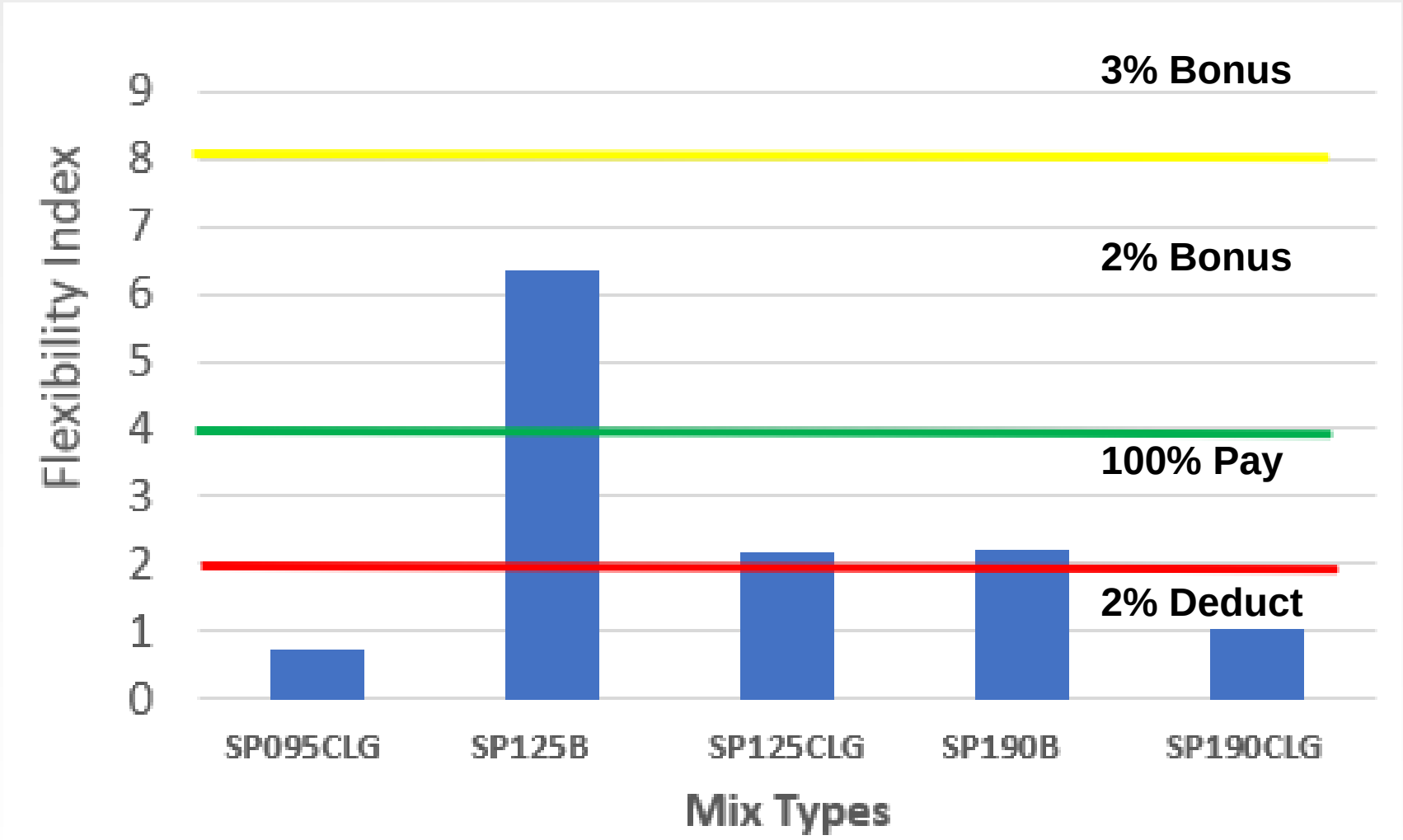
2019 Testing



2019 Testing



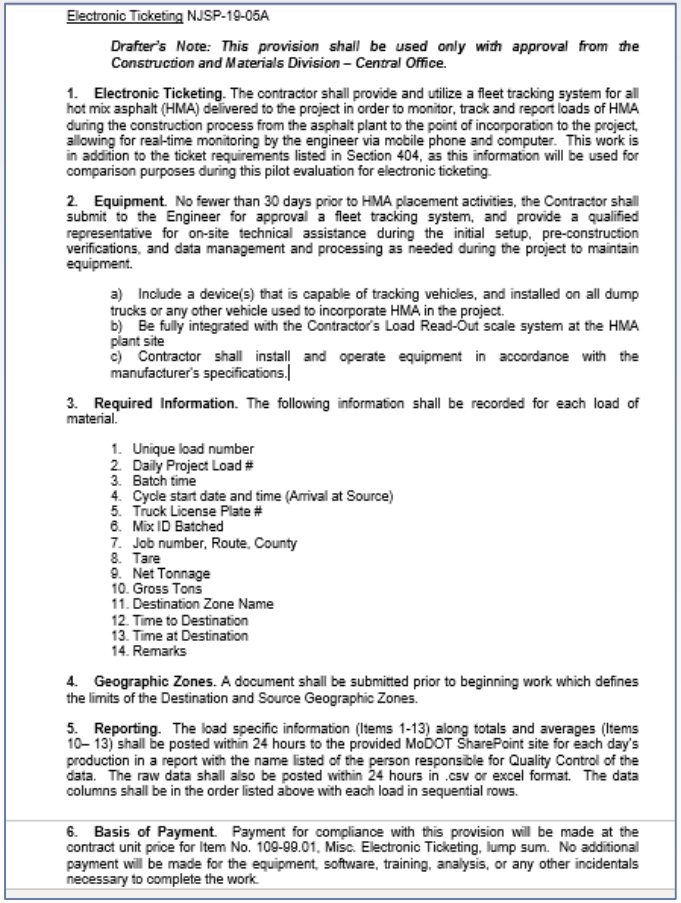
2019 Testing



Electronic Ticketing

NJSP-19-05A

- Piloting 3-5 Projects
  - 2020 Construction Season
- Kansas City Area



Electronic Ticketing NJSP-19-05A

Drafter's Note: This provision shall be used only with approval from the Construction and Materials Division – Central Office.

1. **Electronic Ticketing.** The contractor shall provide and utilize a fleet tracking system for all hot mix asphalt (HMA) delivered to the project in order to monitor, track and report loads of HMA during the construction process from the asphalt plant to the point of incorporation to the project, allowing for real-time monitoring by the engineer via mobile phone and computer. This work is in addition to the ticket requirements listed in Section 404, as this information will be used for comparison purposes during this pilot evaluation for electronic ticketing.

2. **Equipment.** No fewer than 30 days prior to HMA placement activities, the Contractor shall submit to the Engineer for approval a fleet tracking system, and provide a qualified representative for on-site technical assistance during the initial setup, pre-construction verifications, and data management and processing as needed during the project to maintain equipment.

   a) Include a device(s) that is capable of tracking vehicles, and installed on all dump trucks or any other vehicle used to incorporate HMA in the project.
   b) Be fully integrated with the Contractor's Load Read-Out scale system at the HMA plant site
   c) Contractor shall install and operate equipment in accordance with the manufacturer's specifications.

3. **Required Information.** The following information shall be recorded for each load of material.

   1. Unique load number
   2. Daily Project Load #
   3. Batch time
   4. Cycle start date and time (Arrival at Source)
   5. Truck License Plate #
   6. Mix ID Batched
   7. Job number, Route, County
   8. Tare
   9. Net Tonnage
   10. Gross Tons
   11. Destination Zone Name
   12. Time to Destination
   13. Time at Destination
   14. Remarks

4. **Geographic Zones.** A document shall be submitted prior to beginning work which defines the limits of the Destination and Source Geographic Zones.

5. **Reporting.** The load specific information (Items 1-13) along totals and averages (Items 10– 13) shall be posted within 24 hours to the provided MoDOT SharePoint site for each day's production in a report with the name listed of the person responsible for Quality Control of the data. The raw data shall also be posted within 24 hours in .csv or excel format. The data columns shall be in the order listed above with each load in sequential rows.

6. **Basis of Payment.** Payment for compliance with this provision will be made at the contract unit price for Item No. 109-99.01, Misc. Electronic Ticketing, lump sum. No additional payment will be made for the equipment, software, training, analysis, or any other incidentals necessary to complete the work.

Electronic Ticketing

- Advantages
  - Reduced Personnel Exposure to Hazardous Conditions
  - Strengthened Operational Awareness
  - Time Savings

Source: https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=2633&context=ktc_researchreports

Required Items

1. Unique load number
2. Daily Project Load #
3. Batch time
4. Cycle start date and time (Arrival at Source)
5. Truck License Plate #
6. Mix ID Batched
7. Job number, Route, County
8. Tare
9. Net Tonnage
10. Gross Tons
11. Destination Zone Name
12. Time to Destination
13. Time at Destination
14. Remarks

Requirements

- Zones Identified 30 Days Before Starting
  - Plant
  - Work Area
- Data
  - Available in Real-Time
  - Data Uploaded to SharePoint
    - Within 24 Hours of Day’s end.

QA Cores

- Intend to Begin Using Tamper Proof Bags for all QA cores
  - Phase in during 2020 Construction Season

Asphalt Mix Placed From 2015 to 2019

- Hot Mix Asphalt
- UBAWS

Total Hot Mix Asphalt From 2015 to 2019

- Resurfacing and Full Depth Quantities (Tons)

Year	Surface Leveling	401 Mixes	Superpave Mixes	Total
2015	531,383	872,368	901,458	2,305,209
2016	288,229	758,846	1,367,896	2,414,971
2017	529,531	905,760	1,572,102	3,007,393
2018	488,700	940,622	1,626,289	3,055,610
2019	697,077	818,546	1,387,530	2,903,153

- *401 Mixes: BP-1, BP-2, BP-3 & Bit. Base*
- *Superpave: SP048, SP095, SP125, SP190 & SP250*

Total UBAWS From 2015 to 2019

- Resurfacing Quantities (Square Yards)

Year	Type A	Type B	Type C	Total
2015	99,044	275,353	1,117,602	1,491,999
2016	160,047	734,034	1,018,268	1,912,349
2017	0	430,710	1,401,467	1,832,177
2018	0	496,504	1,273,511	1,770,015
2019	0	8,088	685,800	693,888

STIP: FY 2020 – FY 2021

Resurfacing Quantities

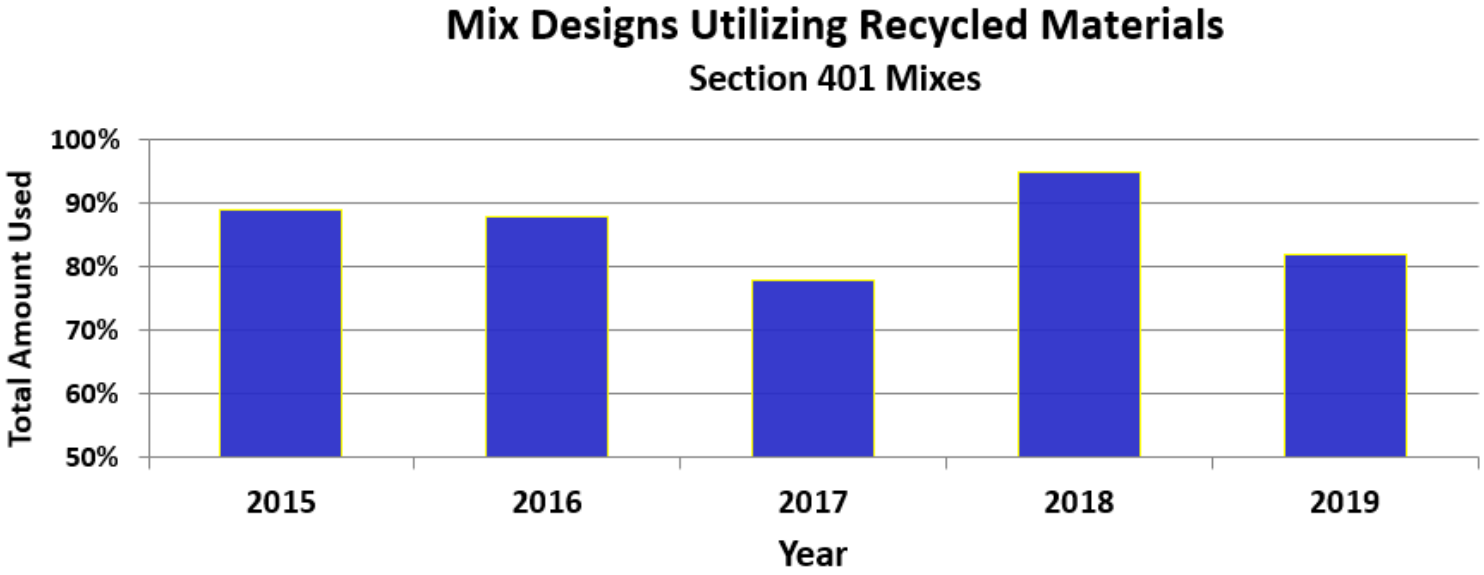
District	FY 2020		FY 2021	
	Miles	Tons	Miles	Tons
NW	**109.0**	**334,254**	**0.0**	**175,471**
NE	**193.4**	**343,225**	**131.2**	**295,950**
KC	**159.7**	**429,506**	**135.5**	**339,577**
CD	**228.0**	**372,131**	**172.6**	**331,801**
SL	**71.7**	**387,186**	**4.5**	**118,634**
SL Design/Build	**50.2**	**46,300**	**0**	**0**
SW	**799.6**	**606,016**	**729.8**	**590,712**
SE	**472.6**	**690,624**	**391.2**	**467,212**
Total	**2,084.2**	**3,209,242**	**1,564.7**	**2,319,357**

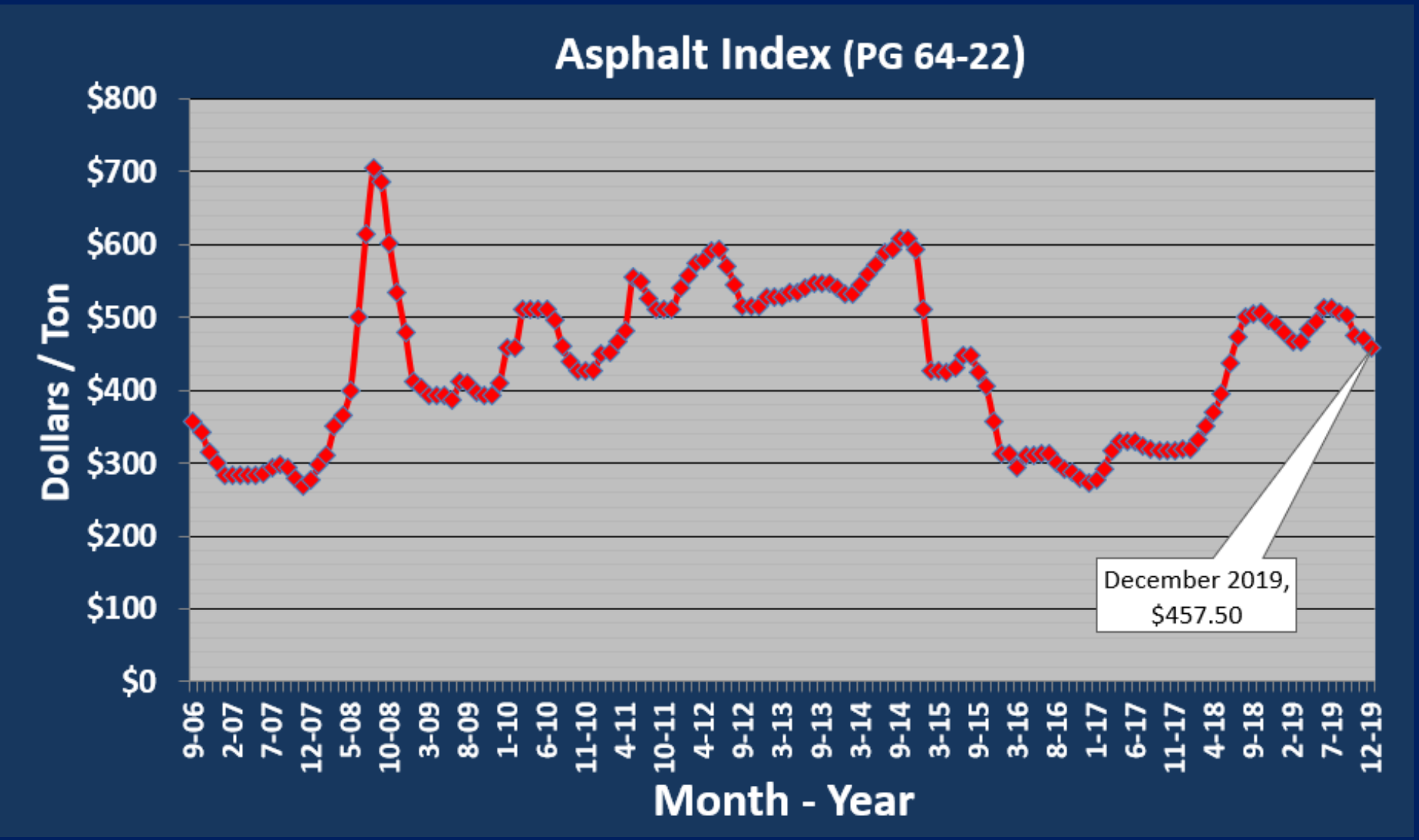
- *Fiscal years 2022, 2023 & 2024 are not fully programmed*

MoDOT's use of Recycled Materials

Mixes Using Recycled Materials

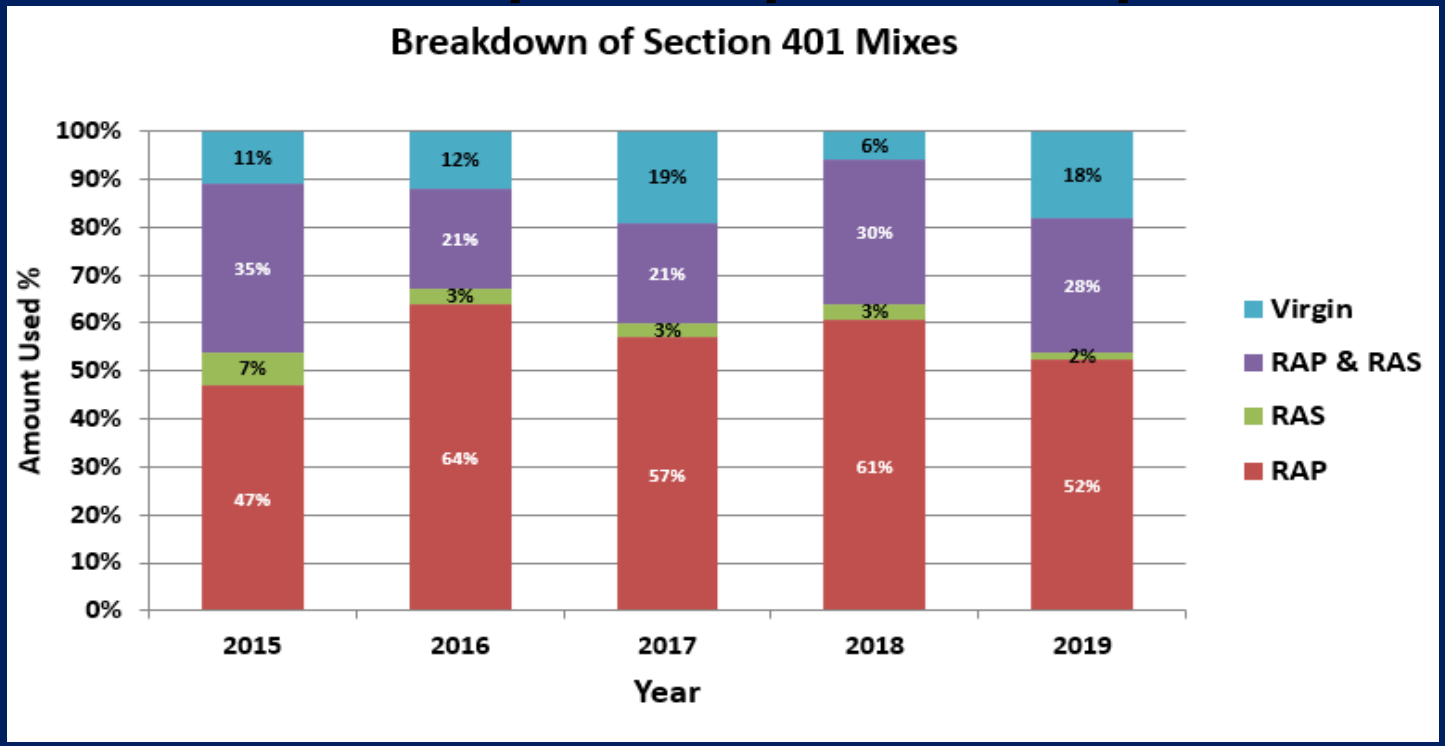
Year	BP-3	BP-2	BP-1	Bit. Base	Total
2015	71%	90%	90%	90%	89%
2016	100%	85%	87%	91%	88%
2017	100%	81%	80%	74%	78%
2018	75%	91%	98%	97%	94%
2019	60%	83%	82%	84%	82%




Asphalt Index (PG 64-22)
$800
$700
$600
$500
$400
$300
$200
$100
$0
Dollars / Ton
9-06
2-07
7-07
12-07
5-08
10-08
3-09
8-09
1-10
6-10
11-10
4-11
10-11
4-12
9-12
3-13
9-13
3-14
9-14
3-15
9-15
3-16
8-16
1-17
6-17
11-17
4-18
9-18
2-19
7-19
12-19
Month - Year
December 2019,
$457.50

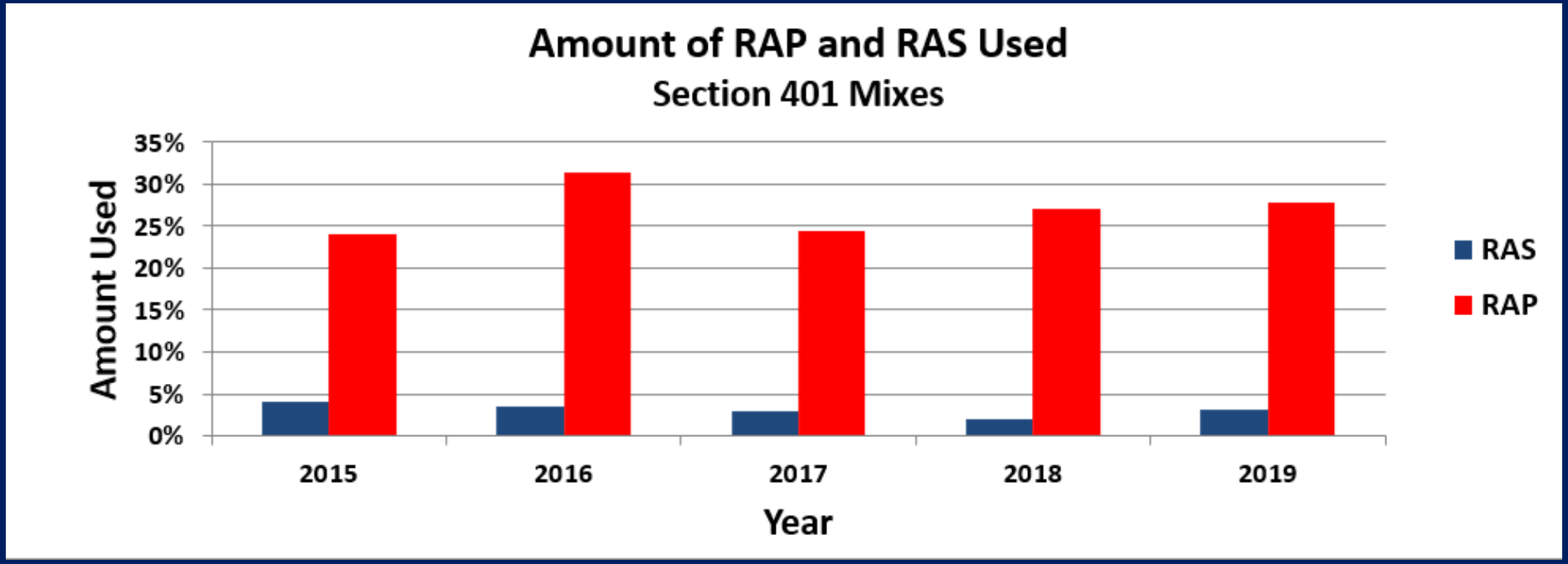
Breakdown – Section 401

Year	RAP	RAS	RAP & RAS	Virgin
2015	47%	7%	35%	11%
2016	64%	3%	21%	12%
2017	57%	3%	21%	19%
2018	61%	3%	30%	6%
2019	52%	2%	28%	18%



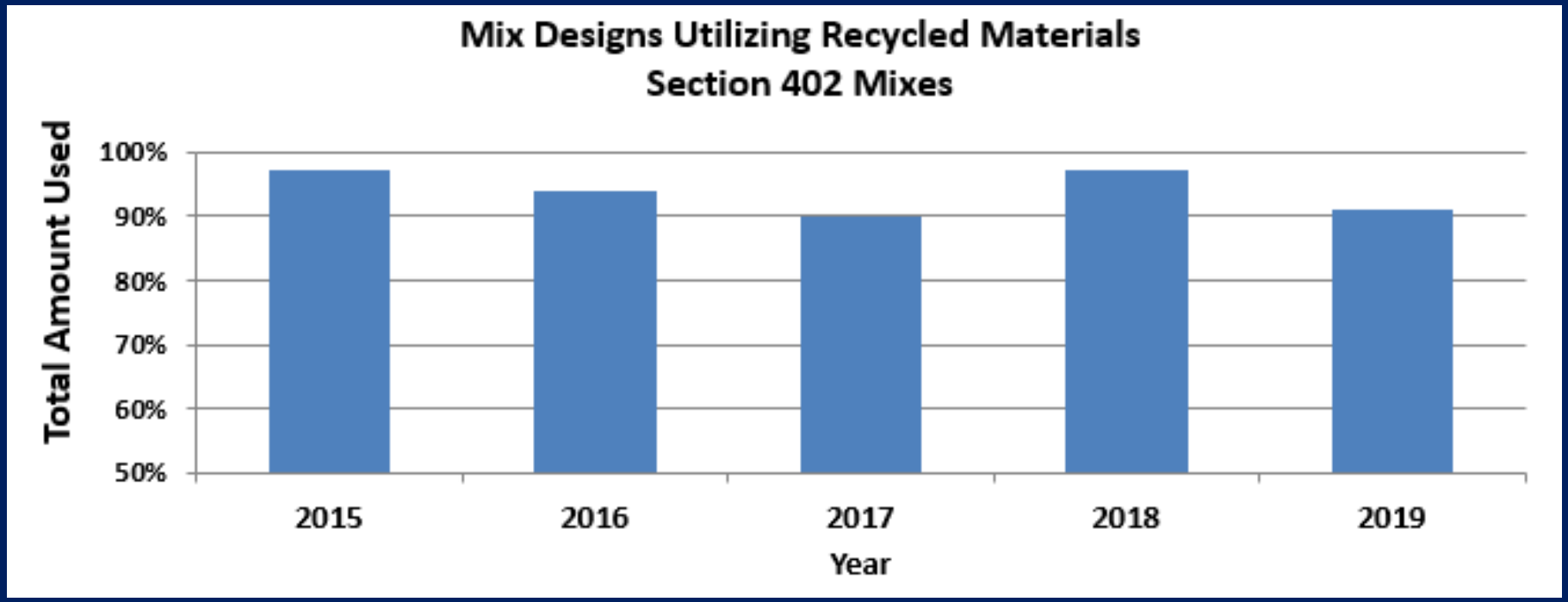
Amount of RAP & RAS – Section 401

Year	RAS	RAP
2015	3.0%	24.1%
2016	2.1%	31.4%
2017	3.2%	24.4%
2018	3.2%	27.0%
2019	3.1%	27.8%



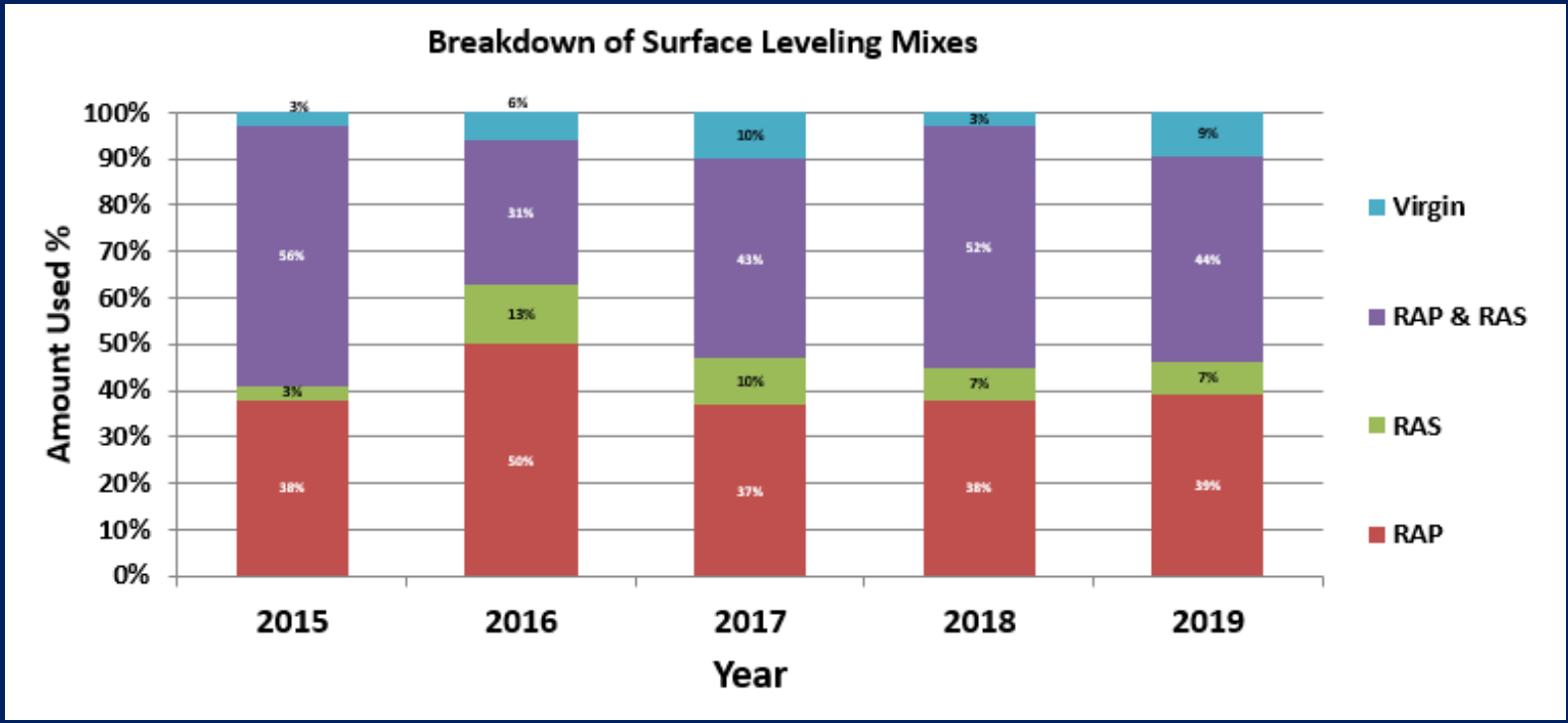
Mixes Using Recycled Materials

Year	Surface Leveling
2015	97%
2016	94%
2017	90%
2018	97%
2019	91%



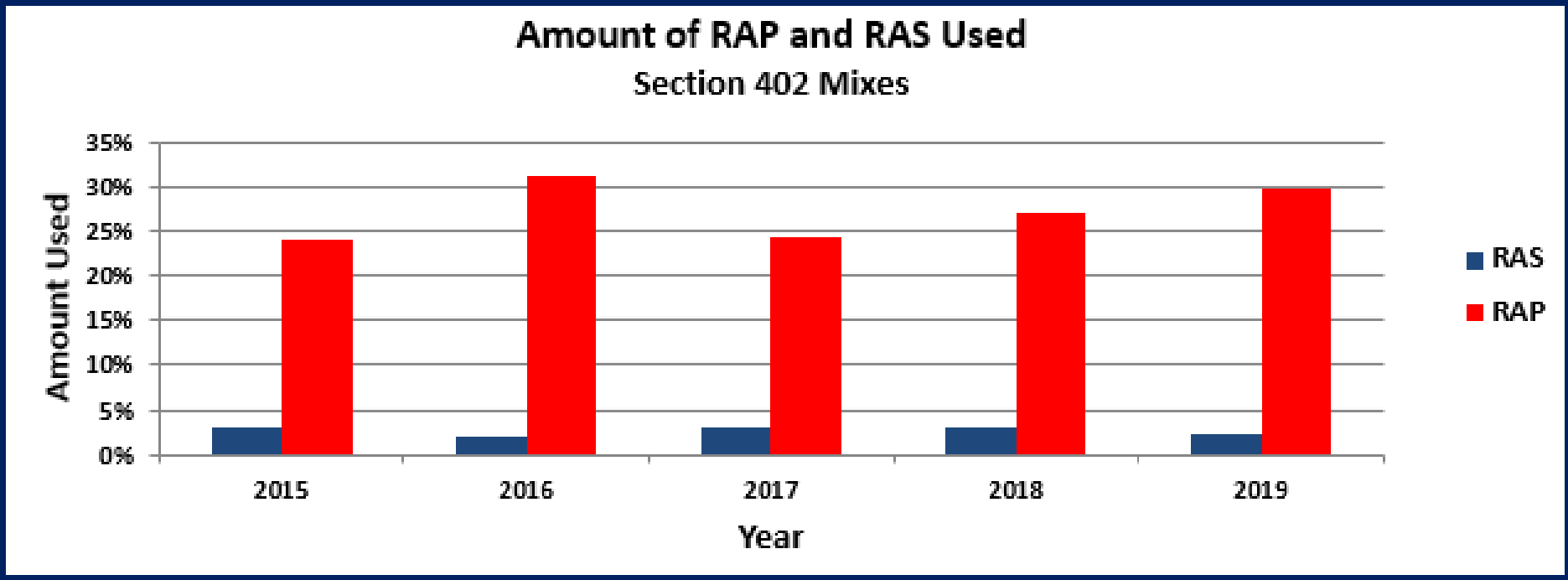
Breakdown – Section 402

Year	RAP	RAS	RAP & RAS	Virgin
2015	38%	3%	56%	3%
2016	50%	13%	31%	6%
2017	37%	10%	43%	10%
2018	38%	7%	52%	3%
2019	39%	7%	44%	9%



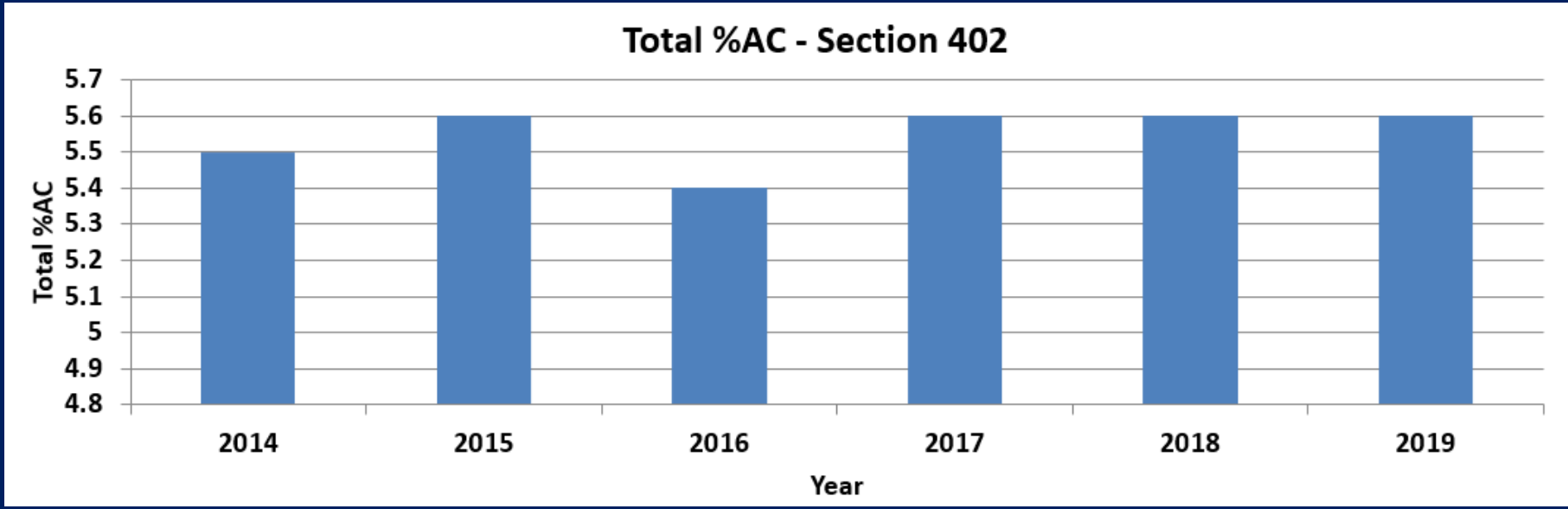
Amount of RAP & RAS – Section 402

Year	RAS	RAP
2015	3.0%	24.1%
2016	2.1%	31.4%
2017	3.2%	24.4%
2018	3.0%	27.0%
2019	2.4%	29.9%



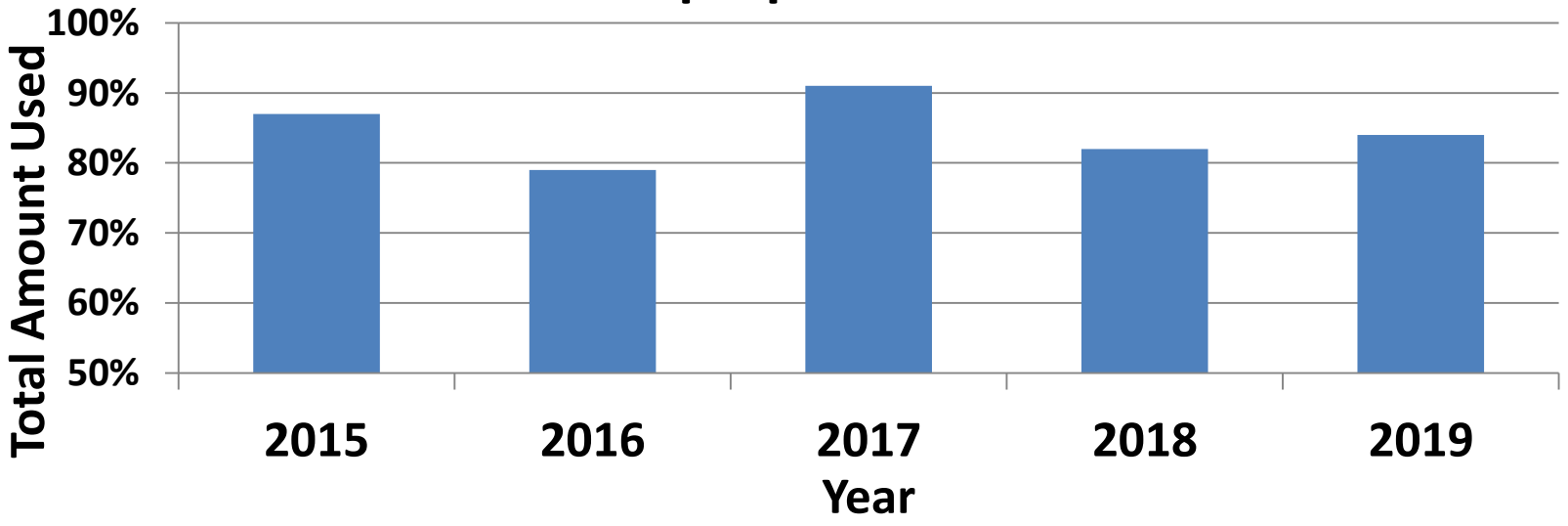
Surface Leveling Mixes

Year	2014	2015	2016	2017	2018	2019
Va	3.5	3.5	3.5	3.5	3.5	3.5
VMA	14.8	14.9	14.7	14.9	15	15.1
Total AC	5.5	5.6	5.4	5.6	5.6	5.6



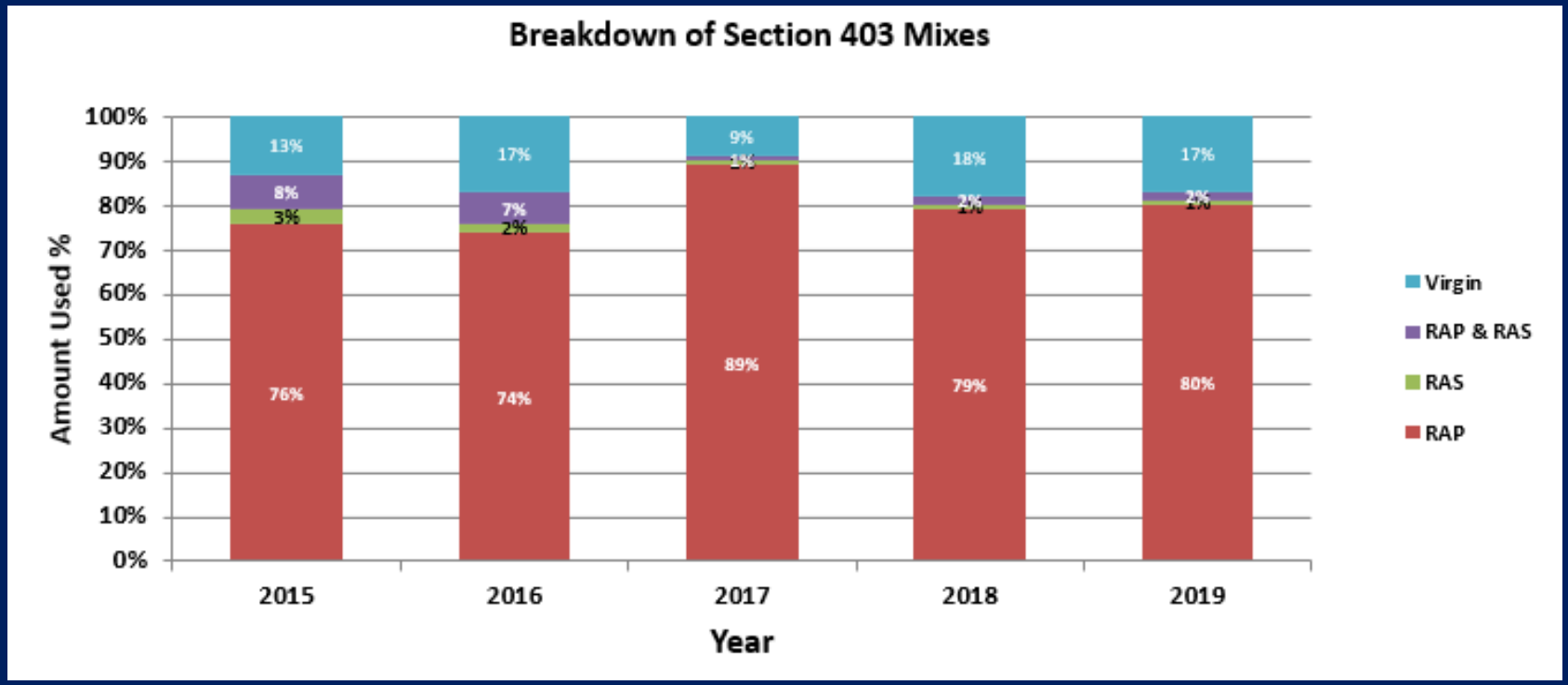
Mixes Using Recycled Materials

Year	SP048	SP095	SP125	SP190	SP250	Total
2015	100%	80%	83%	93%	100%	87%
2016	100%	71%	80%	100%	100%	79%
2017	100%	75%	92%	100%	100%	91%
2018	100%	55%	84%	100%	100%	82%
2019	86%	61%	85%	94%	100%	83%



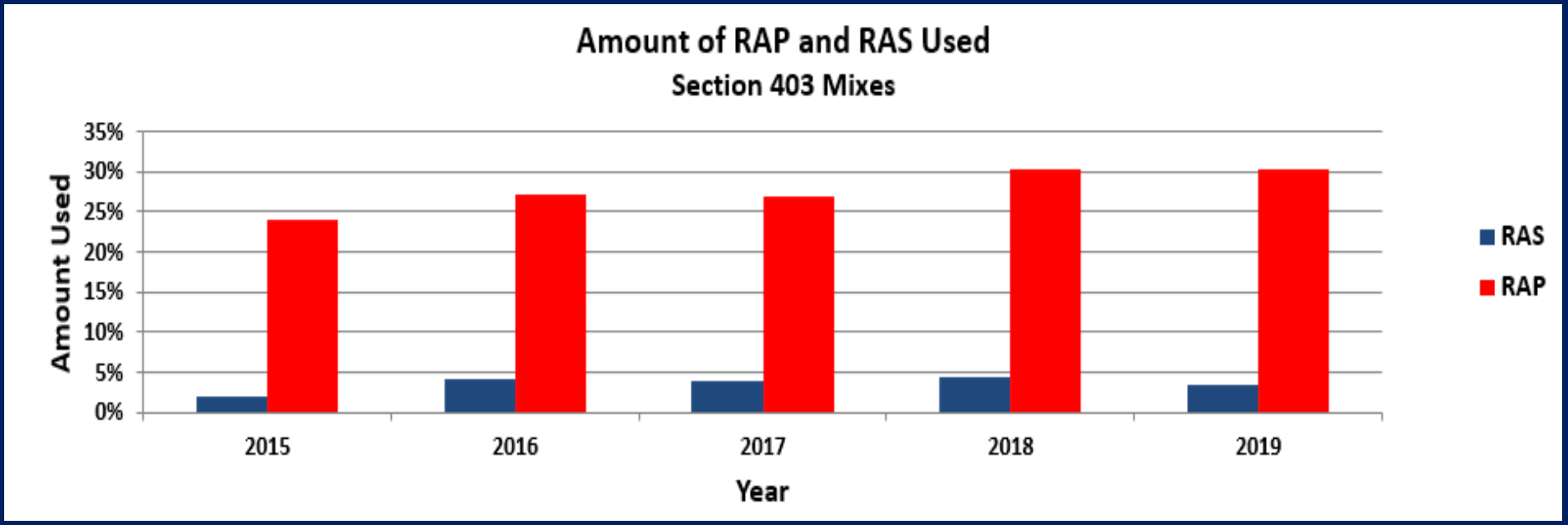
Breakdown – Section 403

Year	RAP	RAS	RAP & RAS	Virgin
2015	76%	3%	8%	13%
2016	74%	2%	7%	17%
2017	89%	1%	1%	9%
2018	79%	1%	2%	18%
2019	80%	1%	2%	17%



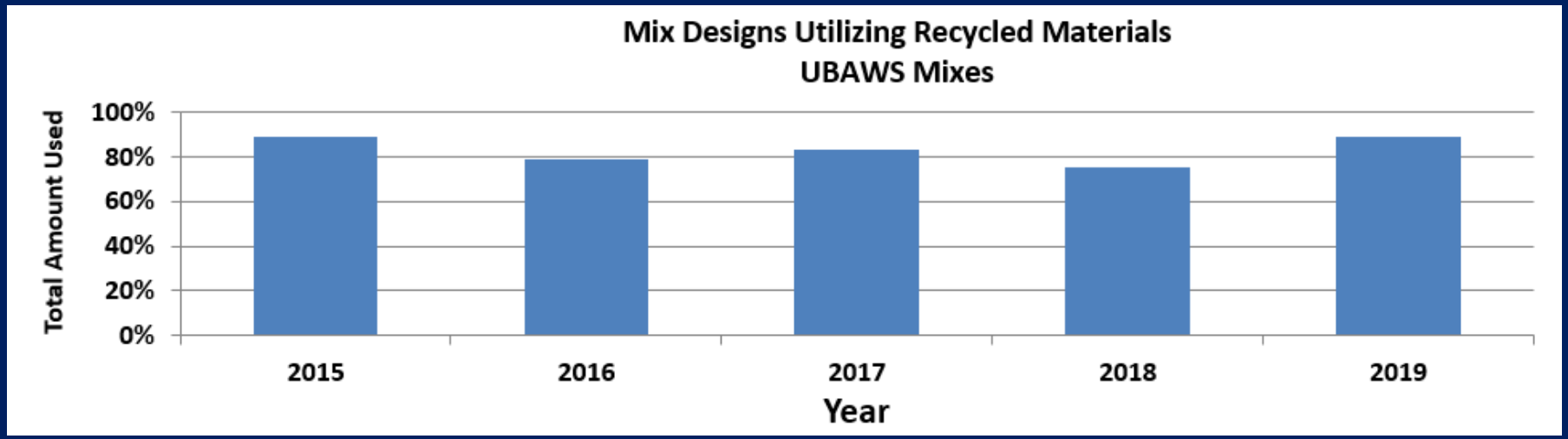
Amount of RAP & RAS – Section 403

Year	RAS	RAP
2015	1.90%	24.10%
2016	4.20%	27.10%
2017	4.00%	26.80%
2018	4.4%	30.3%
2019	3.3%	30.2%



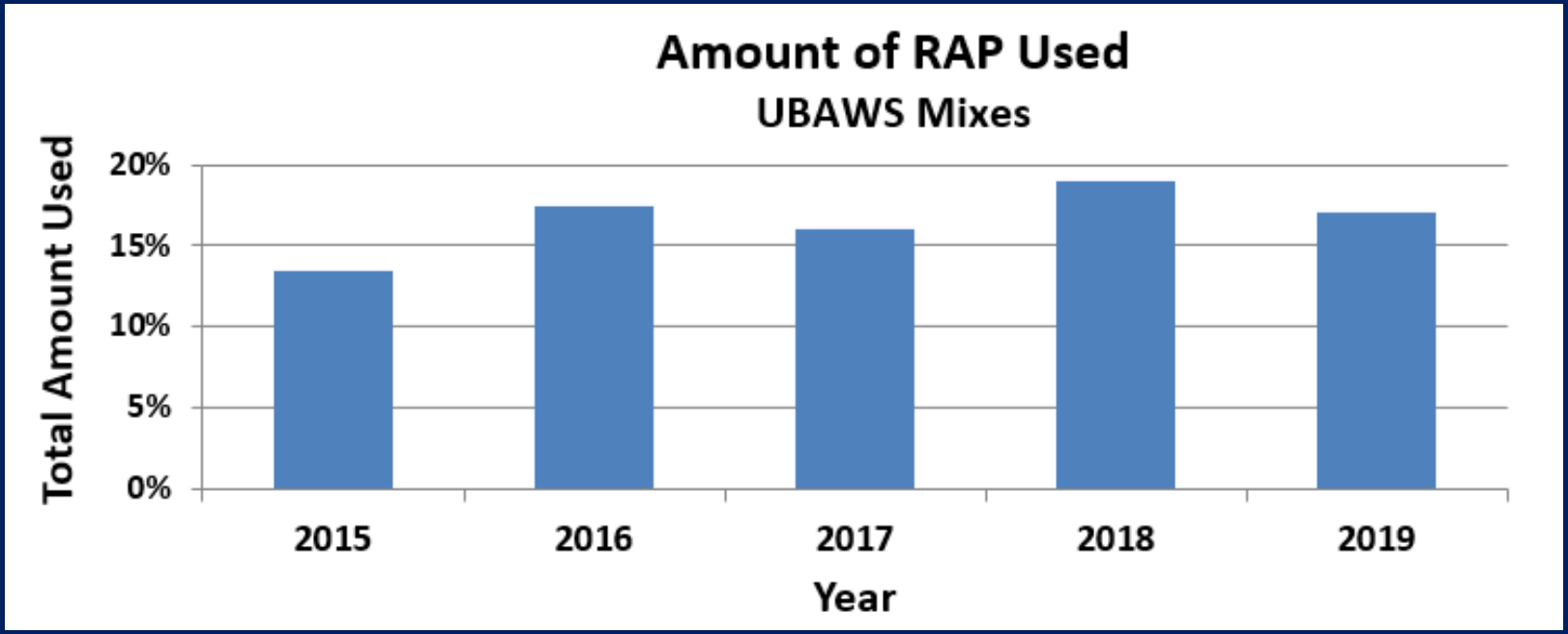
UBAWS Utilizing RAP

Year	RAP
2015	89%
2016	79%
2017	83%
2018	75%
2019	89%



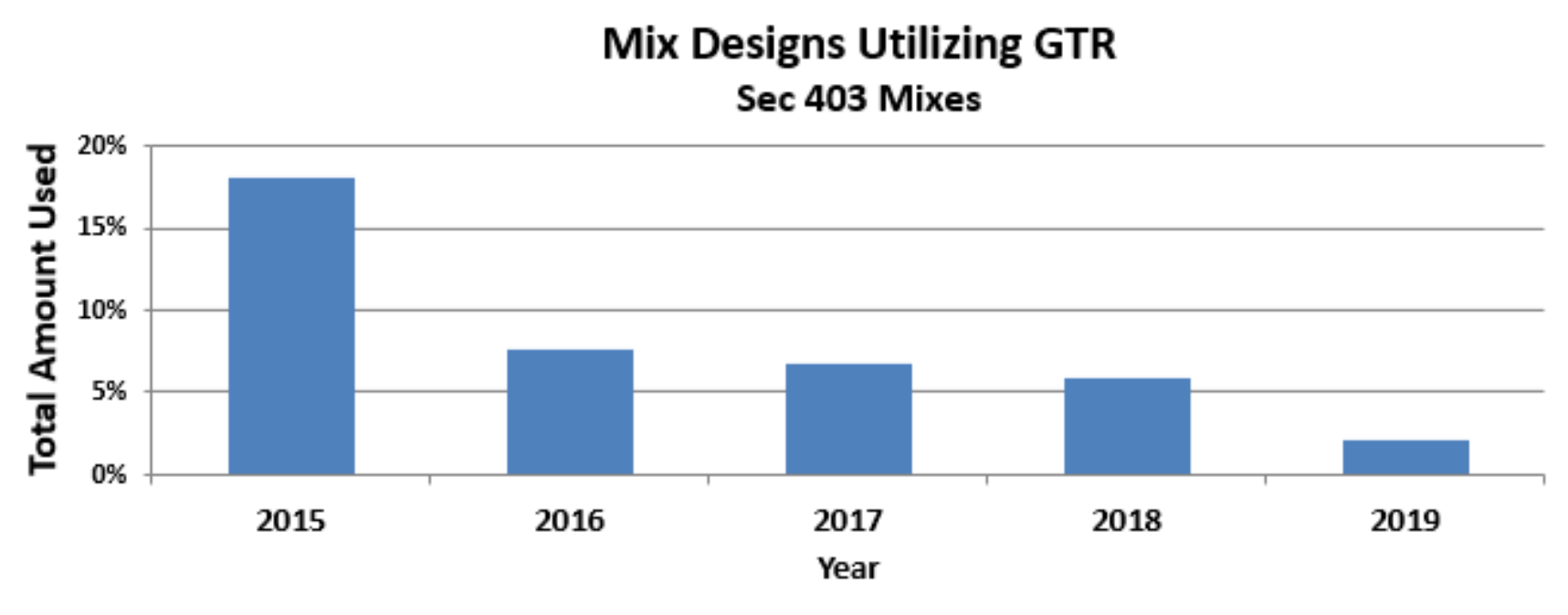
Amount of RAP - UBAWS

Year	Total
2015	13.4%
2016	17.4%
2017	16.0%
2018	19.0%
2019	17.0%



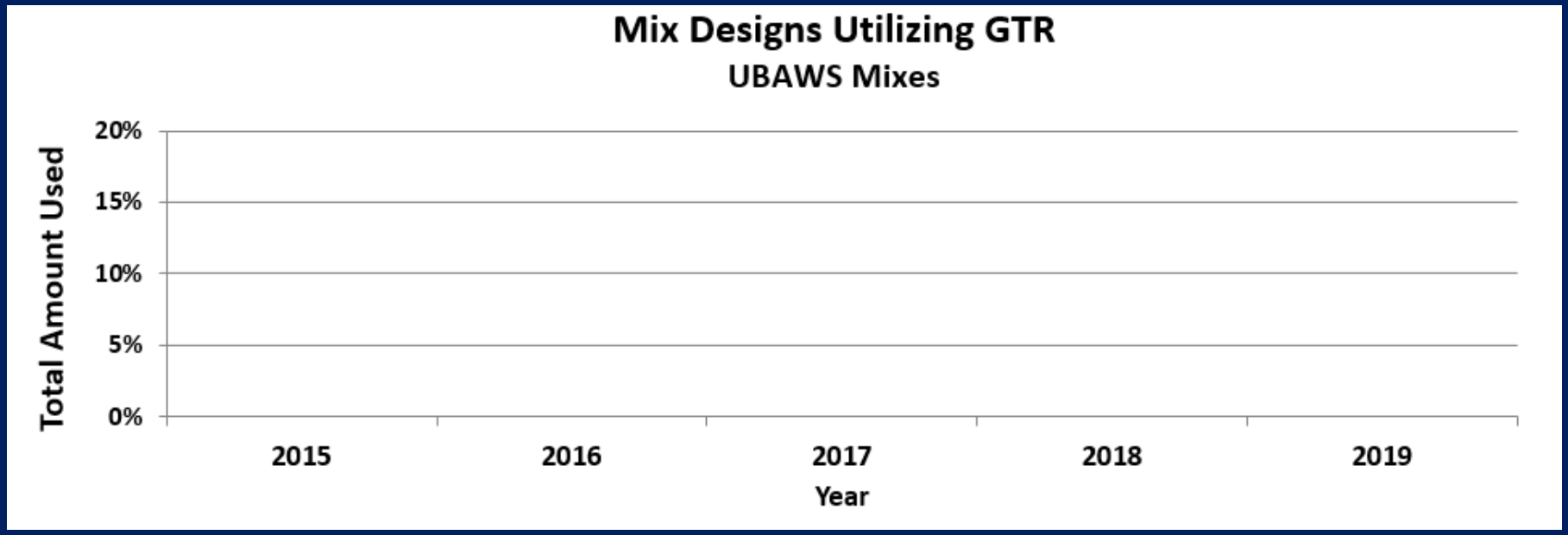
Section 403 Mixes Utilizing GTR

Year	Total
2015	18.10%
2016	7.60%
2017	6.70%
2018	5.90%
2019	2.10%



UBAWS Mixes Utilizing GTR

Year	Total
2015	0%
2016	0%
2017	0%
2018	0%
2019	0%




Thank You
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