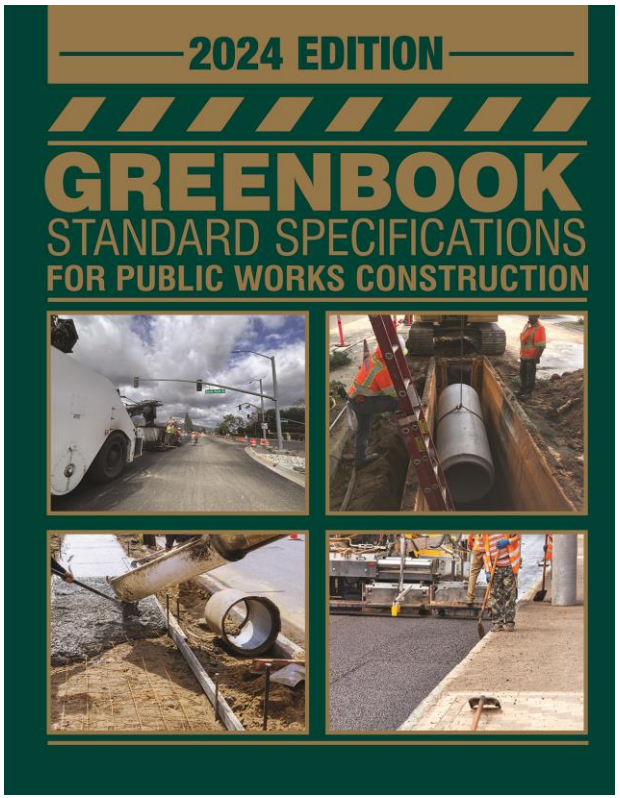
GREENBOOK SEMINAR

October 29, 2024

PART 2

CONSTRUCTION MATERIALS



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SECTION 200 - ROCK MATERIALS

200-1 ROCK PRODUCTS.

200-1.2 Crushed Rock and Rock Dust.

200-1.2.1 General.

1) "… ***shall be the product of crushing rock or gravel.***"

2) "… ***shall be specified by nominal size …***"

.

200-1.2.2 Screenings.

1) "… ***shall be composed of crushed rock … except the quality*** …"

2) **Used as cover aggregate for chip seals.**

3) **Specific gradations for specific binders (PME, ARAM).**

200-1.3 Gravel.

1) "... *composed entirely of particles that have no more than one fractured face*." **[Note: this is not a base material]**

200-1.6 Rock for Slope and Erosion Protection (Rip Rap)

200-1.6.2 Grading Requirements.

1) "*Rock for slope and erosion protection shall be specified by Class and conform to … Table 200-1.6.2*."

Comment:

- **Specify the size required for rock for slope and erosion protection by the Class as shown in Table 200-1.6.2.**

200-1.7 Aggregate for Slurry Seal Surfacing.

1) Types I, II, and III.

200-1.8 Aggregate for Microsurfacing.

1) Types II and III only.

200-1.9 Reclaimed Asphalt Pavement (RAP) Aggregate.

1) New in the 2024 Edition.

2) Slurry, Micro, & Chip (PME only) applications.

3) Unextracted & Extracted gradations

200-1.7 and 200-1.8 Comments:

1) "Type" is the term used by the International Slurry Surfacing Association (ISSA) for combined aggregate gradation.

200-1.9 Comments:

1) "Type RAP" is unique to the SSPWC and not an ISSA term.

2) RAP first used in PME chip seals in 2008.

3) Common usage in So. Cal.

AB 2953:

SECTION 1. Section 42704.6 is added to the Public Resources line 2 Code, to read:

42704.6 *(a) To the extent feasible and cost effective, the department and a local agency that has jurisdiction over a street or highway shall use advanced technologies and material recycling techniques that reduce the cost of maintaining and rehabilitating streets and highways and that exhibit reduced levels of greenhouse gas emissions through material choice and construction method.*

(b) Beginning January 1, 2024, a local agency that has over a street or highway shall, to the extent feasible and cost effective, apply standard specifications that allow for the use of recycled materials in streets and highways.

(c) Beginning January 1, 2024, and until January 1, 2027, the standard specifications described in subdivision (b) shall allow recycled materials at or above the level allowed in the department's [Caltrans]standard specifications that went into effect on October 22, 2018, line 12 for all of the following:

(1) Recycled base and subbase materials as set forth in Sections 25-1.02 and 26-1.02 of the department's standard specifications.

(2) Reclaimed asphalt pavement and other materials in asphalt as set forth in Section 39-2.02B of the department's standard specifications.

(3) Reclaimed aggregate, fly ash, returned plastic concrete, and other materials in concrete as set forth in Sections 90-1.02, 90-2.02, and 90-9 of the department's standard specifications.

200-2 UNTREATED BASE MATERIALS...

1) "*When base material without further qualification is specified, the Contractor shall supply crushed aggregate base*." (200-2.1) [Conflicts with AB 2953 requirements.]

2) "*When a particular classification of base material is specified, the Contractor may substitute any higher classification* ..." (200-2.1)

3) Crushed Aggregate Base: "... *crushed rock and rock dust*." (200-2.2.1)

4) **Processed Miscellaneous Base:** **"... *broken or crushed asphalt concrete, Portland cement concrete, railroad ballast, glass, crushed porcelain material, crushed rock, rock dust, or natural material*." (200-2.5.1)**

5) **Select Subbase:** ***"... soil, mineral aggregates, asphalt concrete, Portland cement concrete, or blends of these."*** **(200-2.6.1)**

6) **Crushed Miscellaneous Base:** **"... *broken and crushed asphalt concrete or Portland cement concrete and may contain crushed aggregate base or other rock*." (200-2.6.1)**

200-2.8 Pulverized Miscellaneous Base.

1) "… ***asphalt concrete or Portland cement concrete pavement*** **[not possible to pulverize PCC]** ***that has been pulverized in place …"***
(200-2.8.1)

2) ***"… shall only be produced through the operation of a machine specifically designed for pulverizing, stabilizing and blending of this material."*** **(200-2.8.1)**

Comments:

1) **A reclaimer is <u>not</u> a rolling crusher. A reclaimer can break up soil and AC to a 1-1/2” maximum size. It does <u>not</u> crush material, nor can it pulverize material to a specific gradation.**

2) ***This specification is neither practical nor biddable*** **(no way of knowing how much imported rock products will be needed for blending).**

3) **This specification, editorially, should be in Part 3.**

200-3 PERMEABLE MATERIAL.

201-3.1 General.

1) "*Permeable material shall be specified by Class.*"

Comments:

1) New in the 2021 Edition.

2) The "material" is aggregate. When produced or combined at the specified gradations, the resultant material allows water to flow through.

200-4 LEAN CONCRETE BASE.

Comments:

1) Sometimes used under concrete pavement.

201-2 REINFORCEMENT FOR CONCRETE.

1) ***Bar, wire, welded wire, and fiber reinforcement shall conform to the dimensions, quantity, and details shown on the Plans ...*** **(201-2.1)**

2) **"*Unless otherwise specified, reinforcing steel shall be either Grade 40 … or Grade 60 ...*" (201-2.2.1)**

3) **"*The gage of the wire and the dimensions of the mesh shall be as shown on the Plans …*" (201-2.2.3)**

201-6 CONTROLLED LOW STRENGTH MATERIAL (CLSM).

201-6.1 Requirements.

201-6.1.1 General.

1) "*CLSM shall consist of cement, aggregates, water, and fly ash*."

2) "*The actual mix proportions and flow characteristics shall be determined by the producer …*"

3) "*When minimum and/or maximum compressive strength is required, the strength shall be as shown on the Plans*."

201-6.1 Comments:

1) **American Concrete Institute (ACI) definition:**

"A controlled low-strength material (CLSM) is a self-consolidating, cementing material used primarily as a backfill as an alternative to compacted fill (ACI 229R). Several terms have been used to describe this material, including flowable fill, unshrinkable fill, controlled density fill, flowable mortar, plastic soil-cement, and soil-cement slurry; however, the correct terminology is controlled low-strength material. CLSM is intended to result in a compressive strength of 1200 psi (8.3 MPa) or less."

201-6.1 Comments:

2) 50 to 200 psi (hand excavation ≤ 100 psi), 3/8” maximum size aggregate.

3) Self-consolidating. No vibration necessary.

4) 201-6.6 and 201-6.7 should be, editorially, in Part 3.

201-8 SOIL-CEMENT.

1) ***"… a mixture of soil, Portland cement, and water mixed at a central mixing plant, in-place, or off-road."*** **(201-8.1)**

2) **"*The required 7-Day compressive strength shall be <u>as shown on the Plans</u>."* (201-8.1)**

3) **Refer to 301-3.2.**

201-9 CEMENT TREATED BASE.

1) ***"… a mixture of untreated base material, Portland cement, and water mixed at a central mixing plant or in-place."*** **(201-9.1)**

2) **"*The required 7-Day compressive strength shall be <u>as shown on the Plans</u> …"*** **(201-9.1)**

3) ***"Untreated base material shall be crushed aggregate base …, crushed miscellaneous base …, <u>or</u> pulverized miscellaneous base …"*** **(201-9.2.1)**

3) **Refer to 301-3.3.**

201-8, 201-9 Comments:

1) **Part 2 specifications are for production at a central mixing plant.**

2) **Part 3 specifications are for in-place production, and placement.**

SECTION 203 - BITUMINOUS MATERIALS

203-1 PAVING ASPHALT.

1) "***Paving asphalt shall be specified by performance grade …***" **(203-1.2)**

Comments:

1) **Table 203-1.2 specifies 4 out of the 5 climatic grades used in California.**

2) **Specify the Performance Grade based on the Caltrans Pavement Climate Regions Map.**

203-1 Comments:

3) Caltrans Pavement Climate Regions Map, 10/5/05:

https://dot.ca.gov/-/media/dot-media/programs/maintenance/documents/office-of-concrete-pavement/climate/pavement-climateregions-100505-a11y.pdf

4) "*For example, PG 64-16 [paving] asphalt is intended to provide:*

- *enough stiffness at 64^{0}C pavement temperature to help the mix resist permanent deformation or rutting.*
- *enough elasticity at -16^{0}C to prevent low temperature thermal cracking, and*
- *enough flexibility at intermediate temperatures to minimize fatigue cracking."*

"Performance Graded (PG) Asphalts in California," Technical Topics No. 6, Institute of Transportation Studies, U. C. Berkeley.

203-2 LIQUID ASPHALT.

Comments:

1) **Subsection title should be, "Cutback Asphalt."**

2) **Cutback Asphalt: "*Asphalt cement which has been liquefied by blending with a petroleum solvent … the solvents evaporate, leaving the asphalt cement to perform the function.*" Asphalt Institute MS-22, Third Edition, page 204.**

3) **Not commonly used, except for "cold mix"**

4) **SC = Slow Curing**

5) **RC = Rapid Curing**

6) **MC = Medium Curing**

7) **"Cold Mix:" typically SC 800.**

203-3 EMULSIFIED ASPHALT.

1) "… ***shall be composed of a paving asphalt base uniformly emulsified with water***." **(203-3.1)**

2) "… ***shall be anionic, cationic, polymer modified, or rubberized polymer modified.***" **(203-3.4.1)**

Comments:

1) **C = Cationic**
2) **RS = Rapid Setting**
3) **SS = Slow Setting**
4) **QS = Quick Setting**
5) **h = hard (base asphalt)**
6) **1, 2 = viscosity**
7) **PM = Polymer Modified**
8) **% Residue from Distillation**

203-3 Comments:

8) Anionic vs. Cationic

9) Polymer Modified: Used in slurry seals and chip seals

10) Microsurfacing Emulsion: Specifically formulated for microsurfacing only.

10) Rubberized Polymer Modified (RPME): Used in REAS

203-4 EMULSIFIED RECYCLING AGENT.

Comments:

1) Used in CIR and CCPR (refer to Part 10).

203-5 RUBBERIZED EMULSION-AGGREGATE SLURRY (REAS).

1) ***"… a stable mixture of RPME, aggregate, water, and Portland cement."*** **(203-5.1)**

2) **"REAS shall be *specified by combined aggregate gradation*, e.g. Type II-REAS." (203-5.1)**

3) ***"The combined aggregate gradation (Type) shall be as specified in the Special Provisions or shown on the Plans."*** **(203-5.1)**

4) ***"REAS shall be <u>transported</u> from the central mixing plant to the Work site in trucks … equipped with an <u>agitator</u>."*** **(203-5.4)**

203-6 ASPHALT CONCRETE.

203-6.1 General.

1) "… *the product of mixing mineral aggregate and up to 25 percent … (RAP) with asphalt binder …*"

2) "*When so specified in the Special Provisions, … greater than 25 percent RAP … warm mix asphalt (WMA) technology*."

3) "*Unless otherwise specified … mixtures shall conform to 203-6.4* **[not 203-6.5]**."

203-6.3 Job Mix Formula and Mix Designs.

203-6.3.1 General.

1) *"For asphalt concrete with 20 to 25 percent reclaimed asphalt, the grade of the virgin binder must be the specified grade of asphalt binder for the asphalt concrete with the upper and lower temperature classification reduced by 6 degrees C."*

203-6.4 Asphalt Concrete Mixtures.

203-6.4.1 Class and Grade.

1) "… *shall be designated by class of combined aggregate gradation and performance grade of paving asphalt, e.g. "C2-PG 64-10."*

2) “*The class and grade shall be as shown on the Plans or specified in the Special Provisions.*”

203-6.5 Type III Asphalt Concrete Mixtures.

203-6.5.1 Class and Grade.

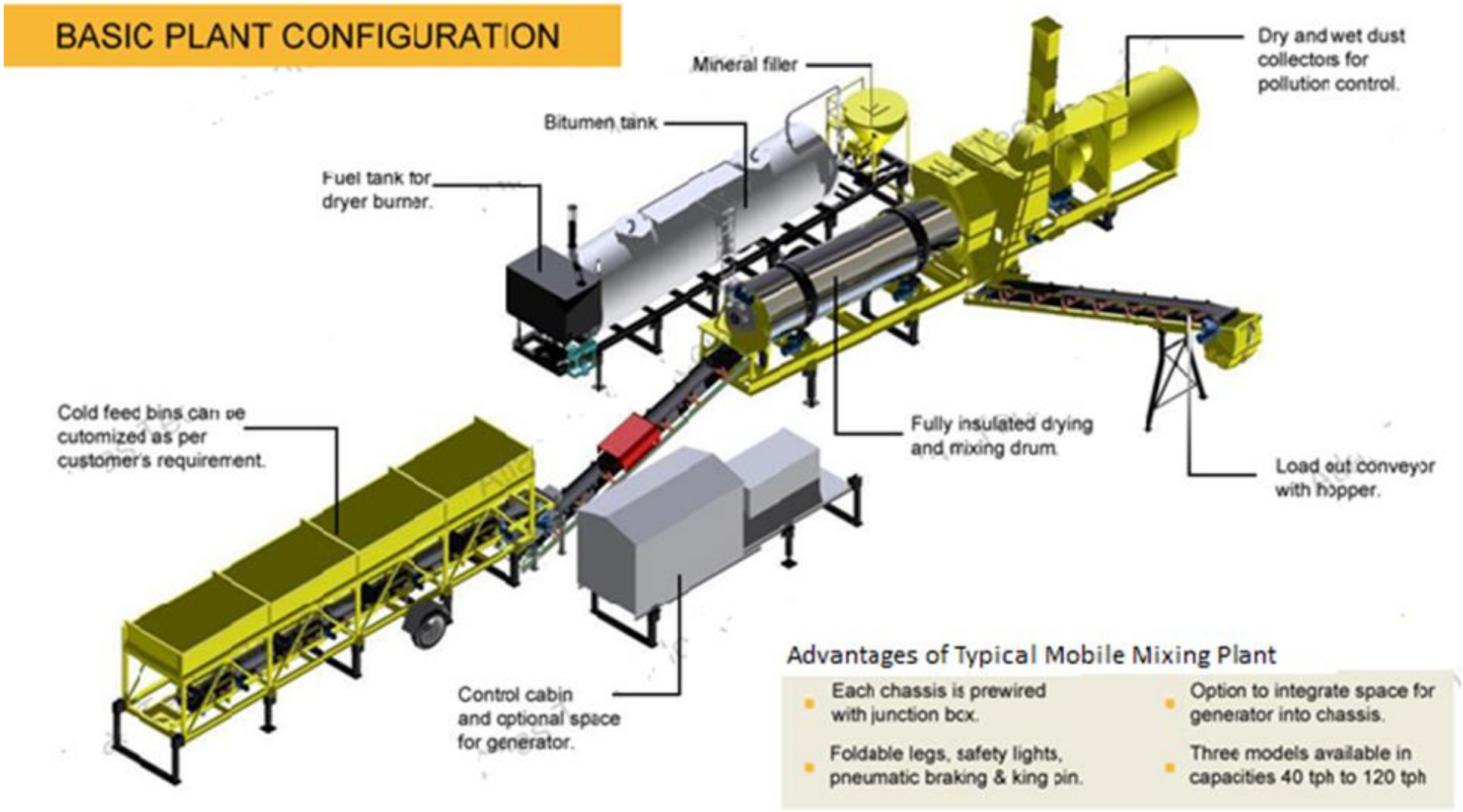
1) “… *shall be designated by type (III), class of combined aggregate gradation and performance grade of paving asphalt, e.g. “III-C2-PG 64-10.*”

2) “*The type, class, and grade shall be as shown on the Plans or specified in the Special Provisions.*”

Comments:

1) 203-6.4 mixtures vs. 203-6.5 mixtures

203-6.7 Production.



Note: The schematic for a stationary plant is similar to that for a mobile plant shown above.

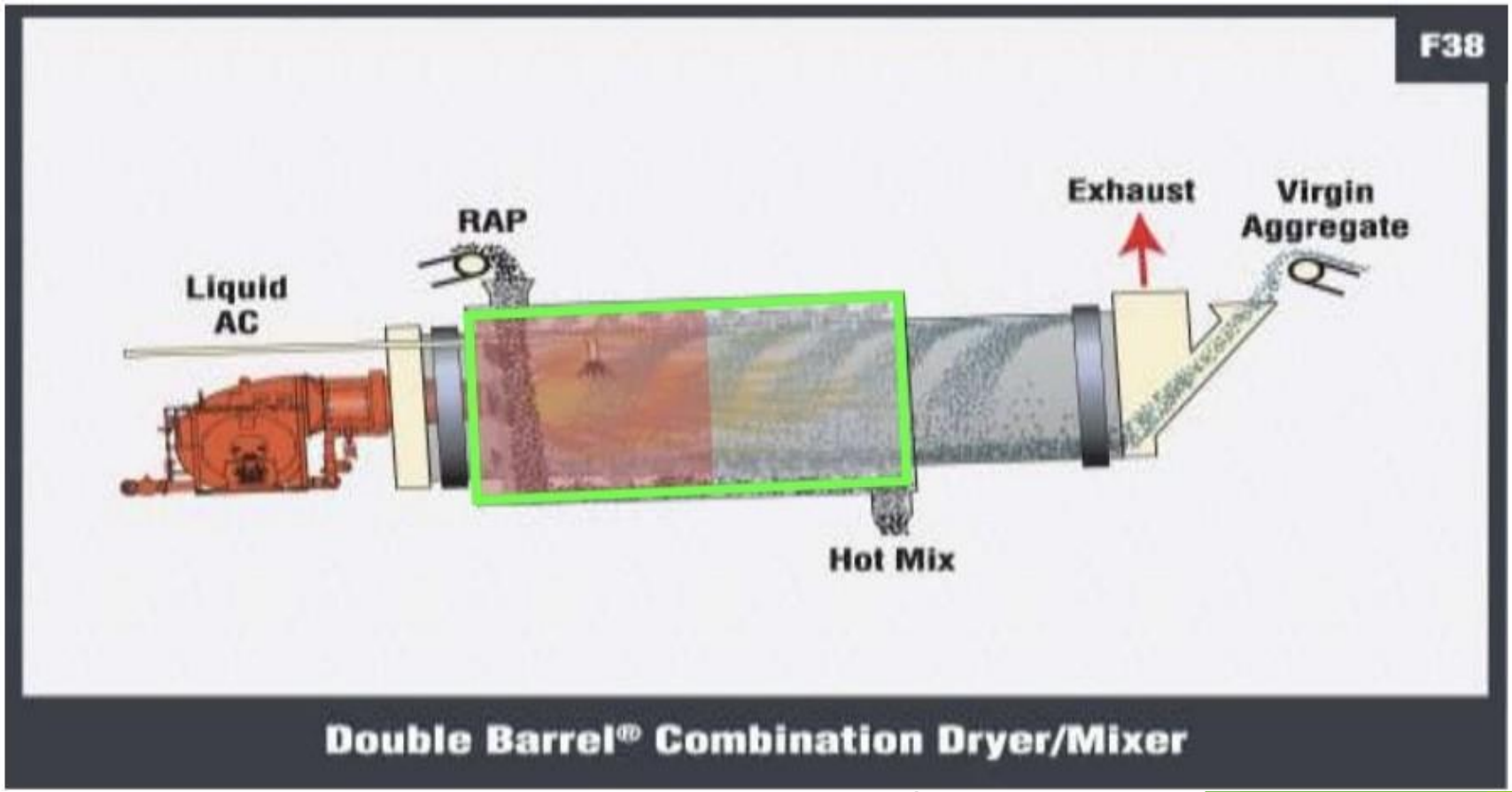
203-6.7 Production.

Cold Feed (aggregate) bins:

Aggregate Belt Feed:

RAP Feed:

203-6.7 Production.



203-6.7 Production.

Bag House (fines):

Storage Silos:

203-6.7 Production.

203-6.7.2 Warm Mix Asphalt (WMA) Technologies.

1) "... ***may*** ***be produced using a WMA technology if so specified in the Special Provisions***."

2) ***"The WMA technology mixing and placing temperatures shall be as specified*** **[recommended]** ***in the approved mix design*** **[JMF]** ."

Comments:

1) **203-6.7.2 does not contain detailed technical requirements or alternatives.**

2) **203-6.7.2 is intended to be a heading placeholder for the Agency to specify WMA in the Special Provisions if optional or required.**

203-6.7.2 Comments:

3) "***What is WMA? Very simply, WMA technologies allow the mixing and placement of asphalt mix at temperatures significantly lower than those used with conventional hot mix asphalt (HMA). These technologies reduce the viscosity of the asphalt mix and provide complete aggregate coating at temperatures 35 to 100^{0}F (20 to 55^{0}C) lower than HMA.***"

"Warm Mix Asphalt Hits the Road," Pavement Technology Update, Vol. 2, No. 1, July 2010, Institute of Transportation Studies, U. C. Berkeley.

203-6.7.2 Comments:

4) WMA Technologies:

- **Additive Technologies**
- **Water Injection Technologies**

5) Caltrans Authorized Materials List:

https://dot.ca.gov/programs/engineering-services/authorized-materials-lists

203-9 SEALCOAT – ASPHALT BASED.

1) ***"This specification applies to sealcoat intended to be used for sealing miscellaneous areas such as asphalt parking lots, playgrounds, and similar areas."*** **(203-9.1)**

Comments:

1) **Typically, proprietary.**

2) **Two proprietary materials are commonly used in Southern California.**

Terminology

Courtesy: Don Goss, Valero

Two Technologies/Processes

"Field Blend" ("Wet") Process (203-11)

"Terminal Blend" Process (203-14)

203-11 ASPHALT RUBBER HOT MIX (ARHM).

1) "... *shall consist of a mixture of paving asphalt, asphalt modifier, crumb rubber modifier (CRM), and aggregate* ..." (203-11.1)

2) "*The Contractor shall submit test reports and Certificates of Compliance for the paving asphalt, asphalt modifier, and CRM to be used*." (203-11.2)

3) "*Paving asphalt ... shall be PG 64-16* ..." (203-11.2.1)
[Don't specify a different Performance Grade.]

4) "*Asphalt-rubber hot-mix gap graded (ARHM-GG) shall be designated by type and class, i.e., ARHM-GG-C, ...*" (203-11.3)

RUBBERIZED ASPHALT CONCRETE TECHNOLOGY CENTER

COMPOSITION OF ARHM

- **Gap Graded Aggregate.**
- **Binder**

- Paving Asphalt (PG 64-16) - 80%

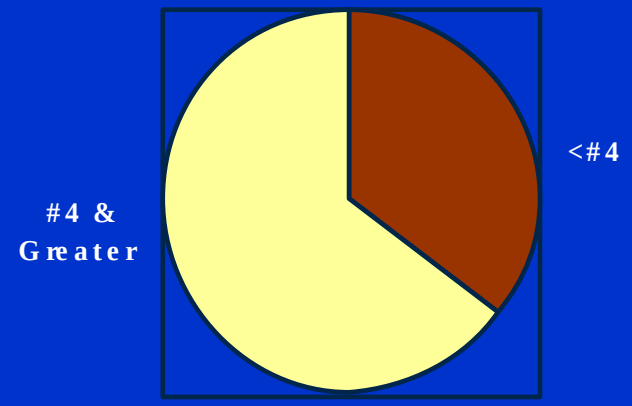
- Crumb Rubber Modifier (CRM) - 20%
(75% Scrap Tire, 25% High Natural Rubber)

- Asphalt Modifier (2.5% - 6% of Paving Asphalt)

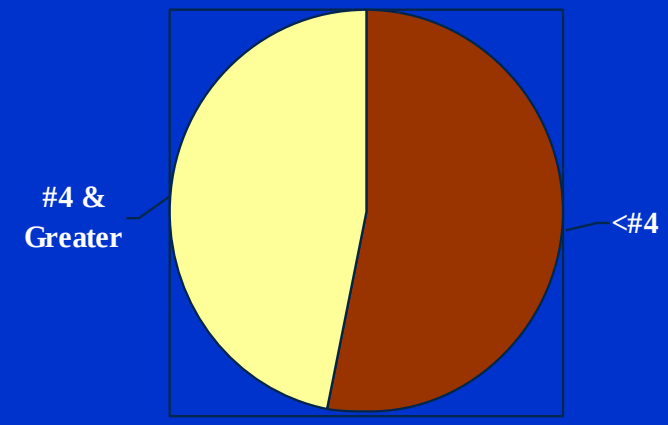
RUBBERIZED ASPHALT CONCRETE TECHNOLOGY CENTER

"GAP GRADED" AGGREGATE GRADATIONS

Sieve Size	C2			ARHM-GG-C		
	1/2" dense gr.			1/2" gap gr.		
	Min.	-	Max	Min.	-	Max
(3/4 in.)	100			100		
(1/2 in.)	(2.5)	95 - 100	(97.5)	(5.0)	90 - 100	(95)
(3/8 in.)	(17.5)	72 - 88	(80)	(10.0)	78 - 92	(85)
(No. 4)	(27.0)	46 - 60	(53)	(50.0)	28 - 42	(35)
(No. 8)	(18.0)	28 - 42	(35)	(15.0)	15 - 25	(20)
(No. 30)	(14.0)	15 - 27	(21)	(10.0)	5 - 15	(10)
(No. 50)	(6.0)	10 - 20	(15)			
(No. 200)	(10.5)	2 - 7	(4.5)	(5.5)	2 - 7	(4.5)



GAP GRADED



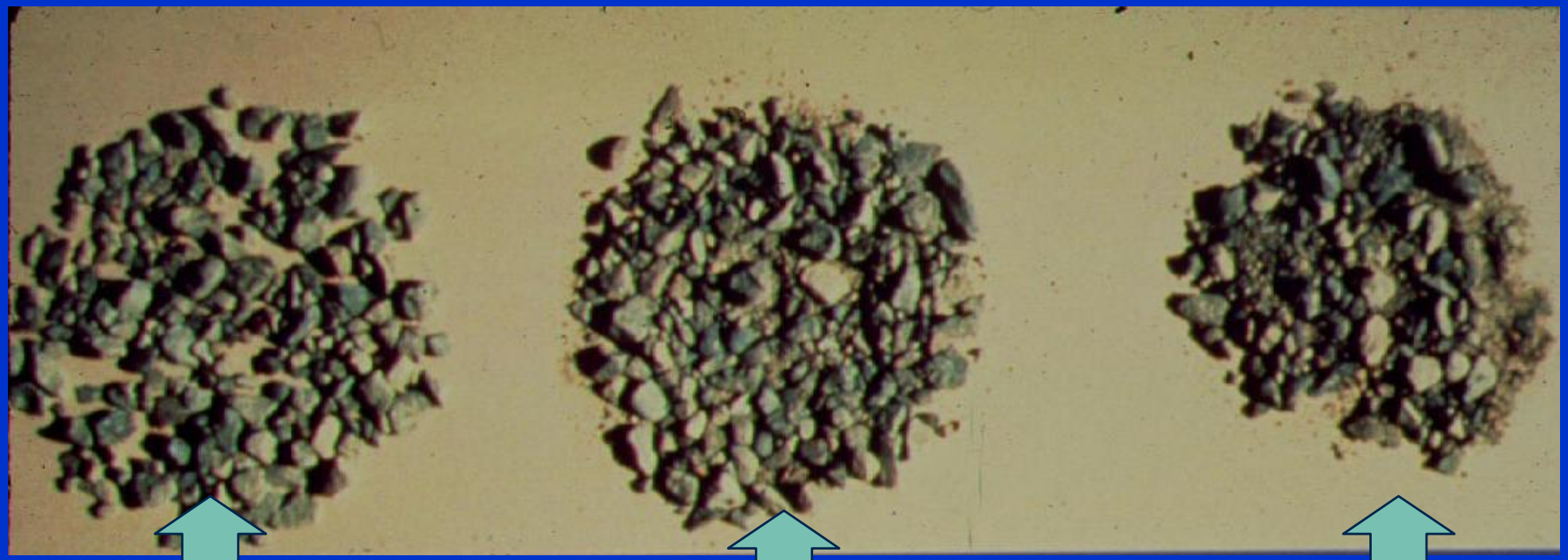
DENSE GRADED

A gap-graded mix is defined as continuously graded with 1 or 2 finer sieve sizes missing

Aggregate Ratios

RUBBERIZED ASPHALT CONCRETE TECHNOLOGY CENTER

AGGREGATE GRADATION COMPARISON



Open Graded

Gap Graded

Dense Graded

RUBBERIZED ASPHALT CONCRETE TECHNOLOGY CENTER

GRADATION COMPARISON

GAP GRADED

Sieve Size	C2	ARHM-GG-C
	1/2" dense gr.	1/2" gap gr.
	Min. - Max	Min. - Max
(3/4 in.)	100	100
(1/2 in.)	95 - 100 (97.5)	90 - 100 (95)
(3/8 in.)	72 - 88 (80)	78 - 92 (85)
(No. 4)	46 - 60 (53)	28 - 42 (35)
(No. 8)	28 - 42 (35)	15 - 25 (20)
(No. 30)	15 - 27 (21)	5 - 15 (10)
(No. 50)	10 - 20 (15)	
(No. 200)	2 - 7 (4.5)	2 - 7 (4.5)

DENSE GRADED

RUBBERIZED ASPHALT CONCRETE TECHNOLOGY CENTER

CRUMB RUBBER MODIFIER

CRUMB RUBBER MODIFIER

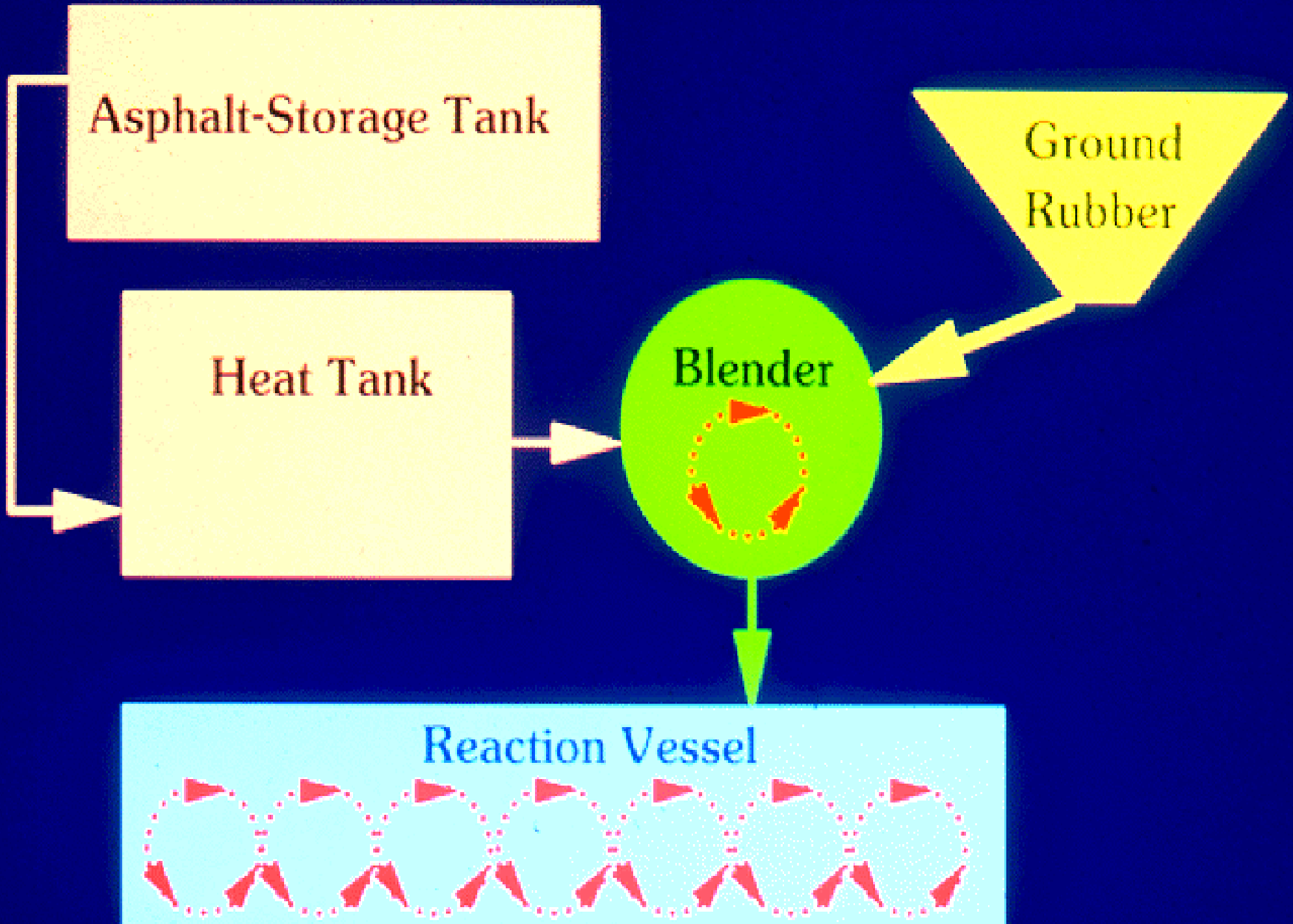
- Scrap Tire CRM (75 +/- 2 %)
- High Natural CRM (25 +/- 2 %)
- Max. 0.01 % wire (by wt. Of CRM)
- Max. 0.05 % fabric (by wt. Of CRM)
- Max. 3 % calcium carbonate or talc may be added
- Specific Gravity: 1.1 - 1.2 (ASTM D297)

RUBBERIZED ASPHALT CONCRETE TECHNOLOGY CENTER

ASPHALT MODIFIER

- **Aids in the reaction of the crumb rubber by providing aromatics which are absorbed by the rubber, and help with dispersion by chemically suspending the rubber in the asphalt.**

Asphalt-Rubber Blending Schematic



Portable asphalt-rubber blending equipment connected to a drier-drum plant:

2,000 pound “supersacks” of crumb rubber:

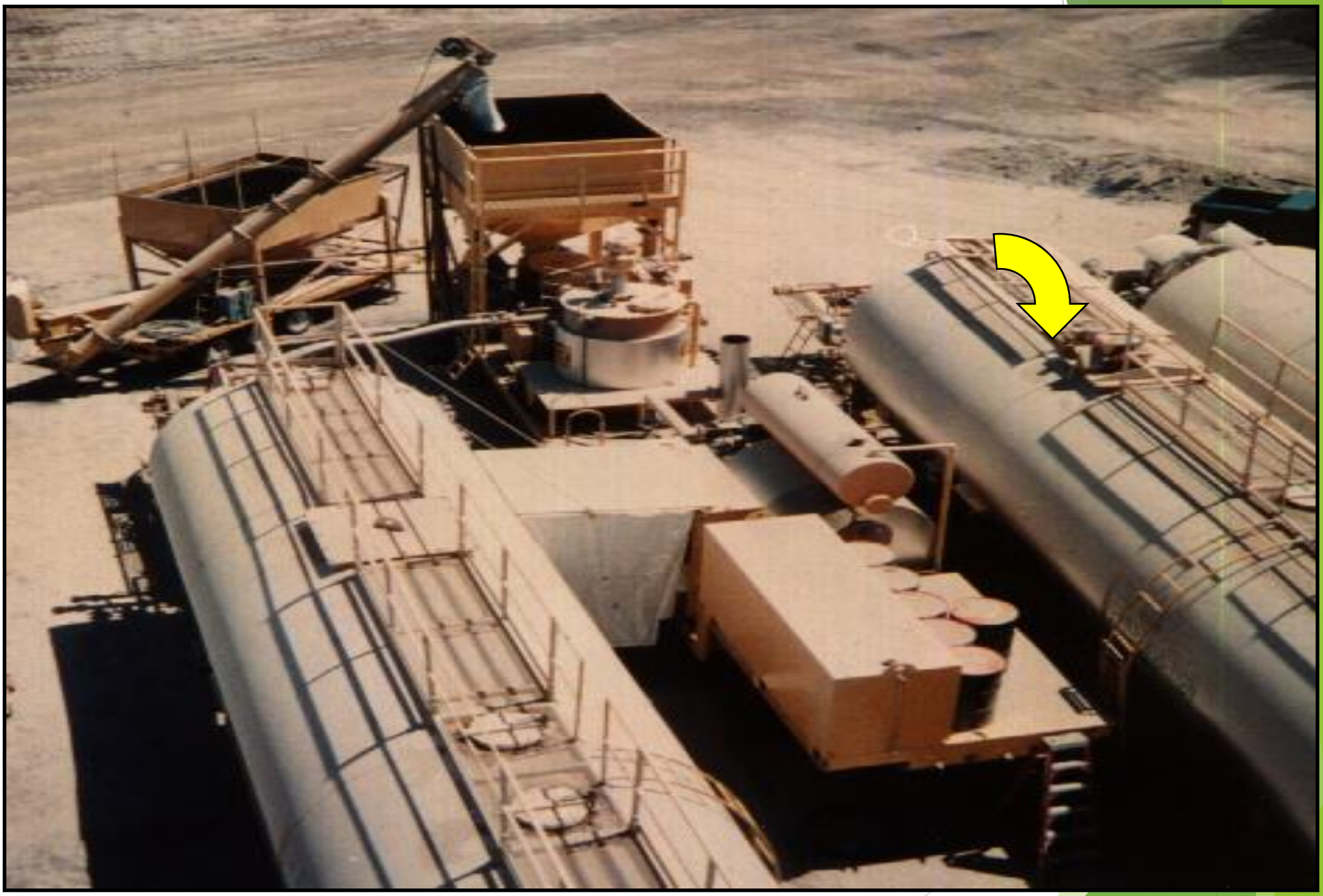
Crumb rubber being loaded into the hopper of the blending unit:

Crumb rubber is weighed in the hopper:

Crumb rubber is fed from the hopper into the blender (high shear mixer):

Paving asphalt (PG 64-16) tank:

Reaction Tank:



Reaction Tank:

Internal Mixing Unit

Once blended, the asphalt-rubber binder is agitated in “reaction tanks” for a minimum of 45 minutes.

Asphalt-Rubber binder, after the "reaction," is metered into the hot mix plant.

203-12 ASPHALT RUBBER AND AGGREGATE MEMBRANE (ARAM).

203-14 TIRE RUBBER MODIFIED ASPHALT CONCRETE (TRMAC).

203-14.1 General.

1) *"TRMAC shall be the product of mixing mineral aggregate and up to ~~20~~ [25] percent reclaimed asphalt pavement (RAP) with tire rubber modified paving asphalt at a central mixing plant."*

203-14.4 TRMAC Mixtures.

203-14.4.1 General.

1) *"Dense graded mixtures may be produced using MAC-15TR, PG 64-28TR, or PG 76-22TR."*

2) *"Gap-graded mixtures shall only be produced using MAC-15TR."*

203-14.4.2 Class and Grade.

1) "*Dense-graded mixtures shall be specified by class of combined aggregate gradation and grade of tire rubber modified paving asphalt (e.g. "C2-MAC-15TR," C2-PG 64-28TR")."*

2) *"Gap-graded mixtures shall be specified by the class of combined aggregate gradation followed by "MAC-15TR" (e.g. "GG-C-MAC-15TR")."*

3) "*The class and grade shall be as shown on the Plans or specified in the Special Provisions*."

203-14 Comments:

1) Different material than Asphalt-Rubber.

2) Sometimes referred to as “Terminal Blend”, which refers to where the binder is produced (a terminal or refinery).

3) Fine mesh crumb rubber is blended with paving asphalt at a refinery or terminal.

4) High shear process dissolves the crumb rubber modifier into the paving asphalt.

5) Used in dense-graded mixes in applications similar to Polymer Modified.

6) MAC-15TR vs. PG 64-28TR vs. PG 76-22TR

203-16 POLYMER MODIFIED ASPHALT CONCRETE (PMAC).

203-16.1 General.

1) ***"PMAC shall be the product of mixing mineral aggregate and up to ~~20~~ [25] percent reclaimed asphalt pavement (RAP) with polymer modified paving asphalt at a central mixing plant."***

203-16.4 PMAC Mixtures.

203-16.4.1 Class and Grade.

1) ***"PMAC shall be specified by class of combined aggregate gradation and performance grade of polymer modified paving asphalt (e.g. "C2-PG 64-28PM").***

3) "***The class and grade shall be as shown on the Plans or specified in the Special Provisions.***"

203-16 Comments:

1) "***The polymer addition increases the viscosity (stiffness) and flexibility of the blend at high and intermediate temperatures, thus improving the rut resistance and fatigue characteristics of the mix while the softer asphalt base and polymer presence provide improved low temperature cracking resistance.***"
"Performance Graded (PG) Polymer Modified Asphalts in California," Technical Topics No. 7, Institute of Transportation Studies, U. C. Berkeley.

2) **Typical Application: Roads with moderate to high traffic indexes and/or in areas of extreme temperature.**

SECTION 206 - MISCELLANEOUS METAL ITEMS

206-3 GRAY IRON AND DUCTILE IRON CASTINGS. (Revised in the 2024 Edition)

206-6 CHAIN LINK FENCE.

206-7 COMPOSITE MANHOLE FRAMES AND COVERS. (New in the 2024 Edition)

SECTION 211 – MATERIAL TESTS

211-2 CHEMICAL RESISTANCE (PICKLE JAR) TEST.

1) "*This test is used to determine the physical properties and weight change of material specimens used in sewers after exposure to chemical solutions*."

211-4 HAND HELD VISCOMETER TEST.

1) **Test for viscosity of asphalt-rubber binder.**

SECTION 213 - ENGINEERING GEOSYNTHETICS

213-4 PAVEMENT FABRIC.

1) ***"… fabric material placed within or under an asphalt concrete layer or a chip seal."***

213-5 GEOTEXTILES AND GEOSYNTHETICS.

1) *"… shall conform to Table 213-5.2 (A) or 213-5.2 (B) for the type shown on the Plans or specified in the Special Provisions."*

Comments:

1) Before specifying, review manufacturer's literature.

2) Determine if the application requires woven, nonwoven, or geogrids.

3) Tables revised in the 2021 Edition.

SECTION 214 – TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

SECTION 217 – BEDDING AND BACKFILL MATERIALS

217-1 BEDDING MATERIALS.

217-1.1 General.

1) ***"Unless otherwise specified … or shown on the Plans bedding material, except for plastic pipe, shall be … granular material …"***

217-2 TRENCH BACKFILL.

217-2.1 General.

1) *"… native material generated from trench excavations or imported."* **[Specify the basis of bidding: native or imported. If imported is required, so specify.]**

2) "*Trench backfill material shall conform to … Table 217-2.1 and the following*:"

217-2.2 Imported Trench Backfill.

217-3 STRUCTURE BACKFILL.

217-4 PERVIOUS BACKFILL.

SECTION 218 – INTERLOCKING CONCRETE PAVEMENT MATERIALS

(New in the 2024 Edition)

SECTION 219 – PERMEABLE INTERLOCKING CONCRETE PAVEMENT MATERIALS

(New in the 2024 Edition)

City and County Pavement Improvement Center

References and Links

City and County
Pavement Improvement Center

CCPIC Mission and Vision

- **Website**
  - www.ucprc.ucdavis.edu/ccpic
- **Mission**
  - CCPIC works with local governments to increase pavement technical capability through timely, relevant, and practical support, training, outreach and research
- **Vision**
  - Making local government-managed pavement last longer, cost less, and be more sustainable

City and County Pavement Improvement Center

- Sponsored by the League of California Cities, County Engineers Association of California, and the California State Association of Counties
- Chartered September 28, 2018

City and County Pavement Improvement Center

- **University of California Partners**
  - University of California Pavement Research Center (lead)
  - UC Berkeley ITS Tech Transfer
- **California State University Partners**
  - CSU-Chico, CSU-Long Beach, Cal Poly San Luis Obispo

CCPIC Scope

- **Technology Transfer:**
  - Training courses
  - Pavement engineering and management certificate program for working professionals through UC Berkeley ITS Tech Transfer
  - Outreach
- **Technical Resources:**
  - Technical briefs, guidance, sample specifications, tools, and other resources
- **Resource Center:**
  - Outreach, questions, pilot study documentation, and forensic investigations
- **Research and Development:**
  - For local government needs that are not covered by State and Federal efforts
  - Adapting work done for state government

Pavement Engineering & Management Certificate: Curriculum

	Fundamentals	Hrs	Management	Hrs	Materials and Construction	Hrs	Design	Hrs
CORE 56.5 required	CCA-01 Introduction to Pavement Engineering and Management	10	CCB-01 Life Cycle Cost Analysis	4	CCC-01 Asphalt Concrete Materials and Mix Design	8		
	CCA-02 Pavement Sustainability	4	CCB-02 Pavement Management Systems and Preservation Strategies	10	CCC-02 Pavement Preservation Treatments, Materials, Construction, Quality Assurance	8		
					CCC-03 Pavement Construction Specifications and Quality Assurance	12.5		
56.5	**Fundamentals, CORE**	14	**Management, CORE**	14	**Materials and Construction, CORE**	28.5	**Design, CORE**	0
ELECTIVE 32 required 84 offered			CCB-21 Financing and Cash Flow for Pavement Networks	4	CCC-21 Concrete Materials & Mix Design	8	CCD-21 Asphalt Pavement Structural Section Design	8
			CCB-22 Integrated Asset Management for Multi-Functional Pavements	8	CCC-22 In-Place Recycling	8	CCD-22 Design, Construction, and Maintenance of Interlocking Concrete Pavers	6
					CCC-23 Gravel Roads Engineering, Construction, and Management	8	CCD-23 Concrete Pavement Design	8
					CCC-24 Roadway Construction Phasing, Scheduling, and Traffic Control	4		
					MISC Classes from Pavement Construction Inspection Certificate curriculum			
					CCC-26 Pavement Construction Management	8		
					CCC-27 Asphalt Pavement Maintenance Construction	6		
					TS-10 Work Zone Safety	8		
84	**Fundamentals, ELECTIVE**	0	**Management, ELECTIVE**	12	**Materials and Construction, ELECTIVE**	50	**Design, ELECTIVE**	22
Total for Certificate 88.5 hours	**Fundamentals**	14	**Management**	26	**Materials and Construction**	78.5	**Design**	22

Pavement Construction Inspection Certificate: Curriculum

	Core		Hrs
CORE 68.5 required	PD-01	Construction Inspection	16
	CCI-01	Asphalt Pavement Construction Inspection	4
	CCI-02	Concrete Pavement Construction Inspection	4
	CCI-03	Concrete Street Improvements Construction Inspection	4
	CCI-04	Pavement Preservation Construction Inspection	4
	CCC-02	Pavement Preservation Treatments, Materials, Construction, Quality Assurance	8
	CCC-03	Pavement Construction Specifications and Quality Assurance	12.5
	CCC-26	Pavement Construction Management	8
	TS-10	Work Zone Safety	8
68.5	Core		68.5
	Electives (choose 12 hours from list below)		Hrs
ELECTIVE 12 required 26 offered	CCC-22	In-Place Recycling	8
	CCC-24	Roadway Construction Phasing, Scheduling, and Traffic Control	4
	CCI-06	Construction Inspection of Asphalt-Rubber Pavement Materials	2
	PD-02	Construction Inspection of Traffic Signals	8
	TS-18	Excavation and Trenching Safety	4
12	Electives		26
80.5	Total required for certificate		

CCPIC Classes Currently Open for Enrollment

(www.techtransfer.Berkeley.edu)

Code	Title	Date	Location
CCB-21	Financing and Cash Flow for Pavement Networks	TBD	Online (Self-Paced)
CCC-21	Concrete Materials and Mix Design	TBD	Online (Self-Paced)
CCI-02	Concrete Pavement Construction Inspection	TBD	Online (Self-Paced)
CCI-03	Construction Inspection of Concrete Street Improvements	TBD	Online (Self-Paced)
CCI-04	Pavement Preservation Construction Inspection	TBD	Online (Self-Paced)
CCI-06	Construction Inspection of Asphalt-Rubber Pavement Materials	TBD	Online (Self-Paced)

In-Person Outreach Presentations/Discussions

- **Offered at no cost**
- **2-1/2 - 3 hours, virtual or in-person**
- **Current Topics:**
  - Use of PCI
  - AC/HMA Compaction
  - AB 2953 Recycling
  - RAP
  - Warm Mix Asphalt (WMA)

Technical Guidance and Tools
CCPIC website: www.ucprc.ucdavis.edu/ccpic

Tech Briefs

- PCI: There's More (and Less) to the Score
- Writing and Enforcing Specifications for Asphalt Compaction

Specifications/Special Provisions

- Superpave HMA for Local Government (HMA-LG)
  - Modified Caltrans format
  - Greenbook format
- Asphalt Compaction Special Provisions
  - Generic format
- Tack Coat Special Provisions
  - Caltrans format
  - Greenbook format (use with 2021 and earlier editions)

Summary of Technical Resources

CCPIC website: www.ucprc.ucdavis.edu/ccpic

Questions?

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