

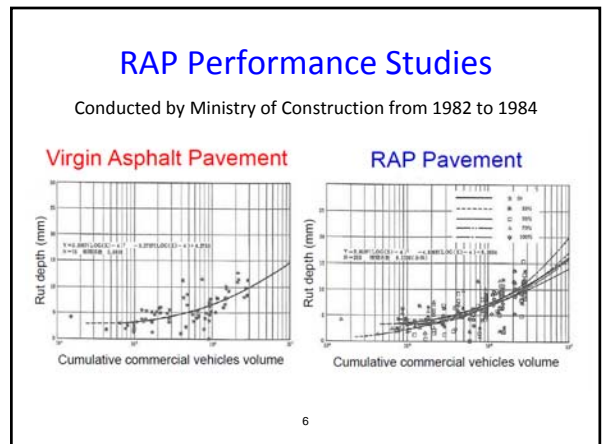
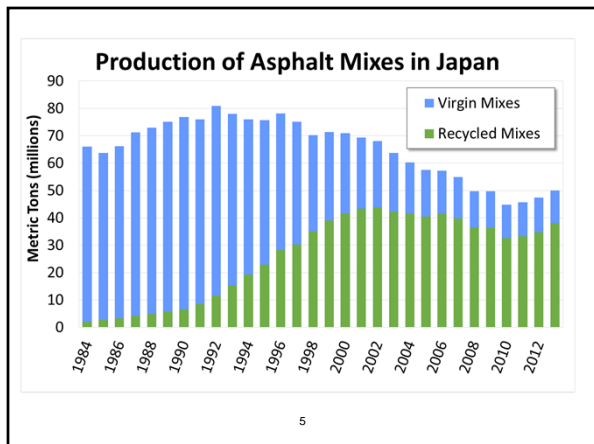


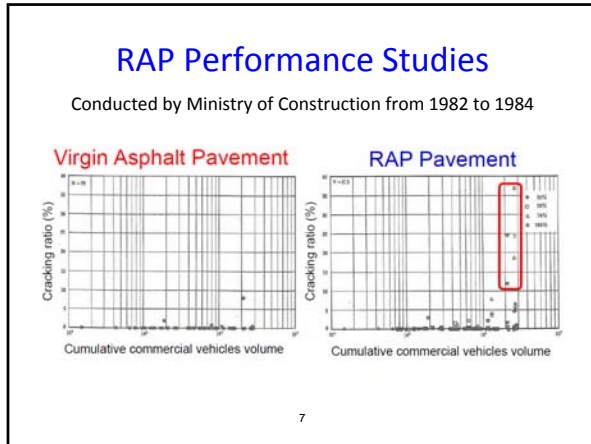
### Comparisons

	U.S.	Japan	%
<b>Land Area</b>	3,806,000 mi <sup>2</sup>	145,925 mi <sup>2</sup>	3.8%
<b>Population</b>	321 million	128 million	40%
<b>Miles of Paved Roads</b>	2,605,331	791,189	30.4%
<b>No. of Asphalt Plants</b>	~3000	1150	38%
<b>Asphalt Mix Tons/Yr.</b>	350 million	55 million	15.7%

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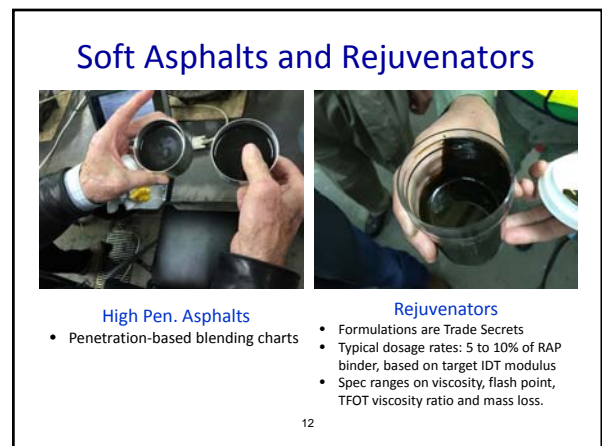
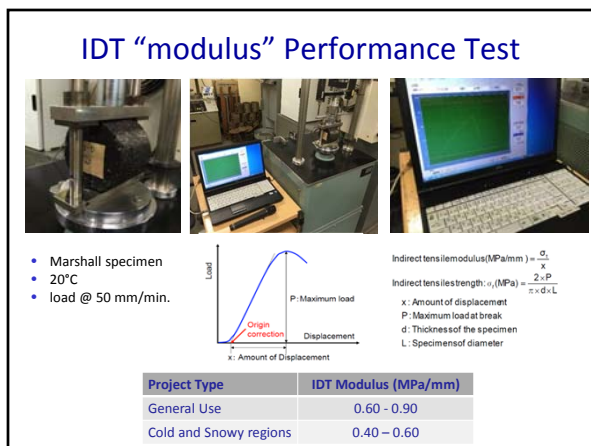
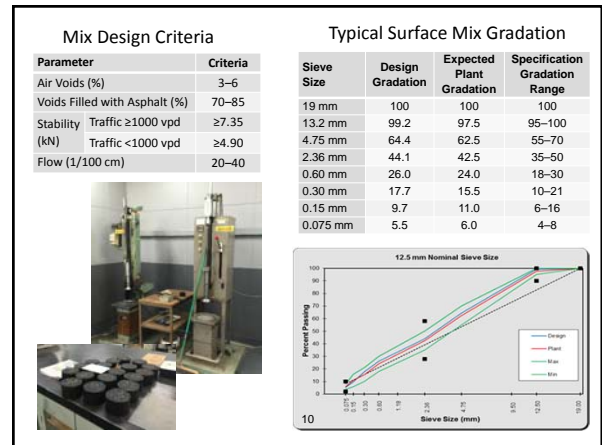




### RAP Quality Specifications

Characteristic	Spec. Limit
Min. Asphalt Content	3.8%
Min. Pen. of Recovered AC	20
Max. P <sub>200</sub> of Unextracted RAP	5.0%

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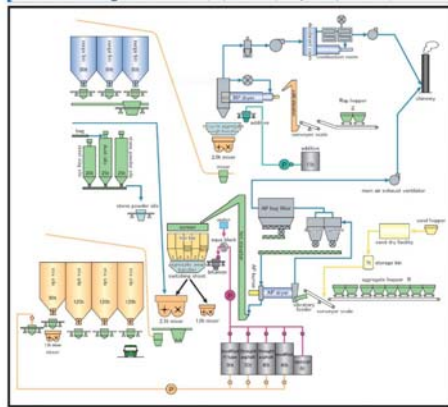


### Asphalt Plants in Japan

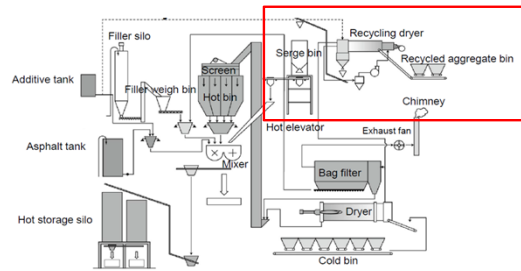
- 1150 total plants
- 84% are batch plants
- Plants visited in Tokyo were very sophisticated



Manufacturing flow chart (Asphalt Plant, Recycle Asphalt Plant)



### 2/3 of Batch Plants use Parallel Heating System for RAP



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### Parallel RAP Dryer

- Low moisture content of RAP prior to drying/heating
- RAP dryer at one site was 8 ft. diameter by 33 ft. long with a capacity of 110 tph
- Exhaust gases thru thermal oxidizer to eliminate smoke
- RAP exit temp. ~330°F
- Hot RAP mixed immediately with rejuvenator and stored for 2-3 hours prior to mixing with virgin materials



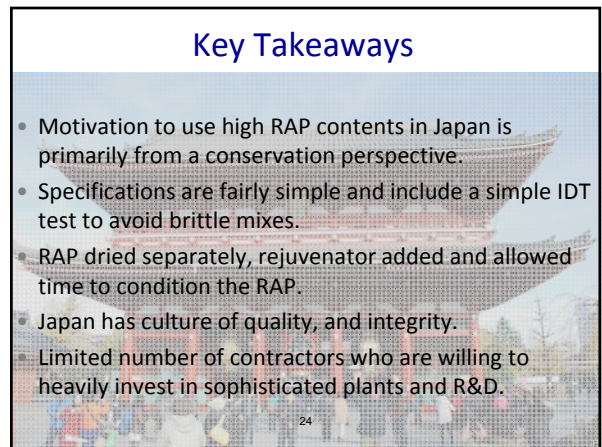
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Mixes were produced for us with all virgin materials, 45% RAP and 60% RAP. All of the mixes looked and handled the same.

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## Key Takeaways

- Motivation to use high RAP contents in Japan is primarily from a conservation perspective.
- Specifications are fairly simple and include a simple IDT test to avoid brittle mixes.
- RAP dried separately, rejuvenator added and allowed time to condition the RAP.
- Japan has culture of quality, and integrity.
- Limited number of contractors who are willing to heavily invest in sophisticated plants and R&D.



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