



CITY OF COCKBURN

ROAD CONSTRUCTION SERVICES

Crushed Recycled Concrete in Road Construction

By

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Use of Recycled Crushed Concrete in Road Construction

- **City of Cockburn endeavours to maximise the utilisation of waste material in its activities in line with its Sustainability values and policies.**
- **The City initially looked into using Crushed Recycled Concrete (CRC) in the construction of road pavements in lieu of the typically, crushed limestone subbase and crushed granite basecourse.**
- **To minimise the risks, the City decided to use it for the subbase pavement only at this stage.**
- **Verde Drive Extension Project was identified as a pilot project for this purpose.**



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- **The project includes construction of approx. 1.5 km long roadway requiring 3,000 cubic metres of subbase material (~6,000 ton)**
- **IPEAWALGA Specification for Class 2 Crushed Recycled Concrete Subbase, was adopted.**
- **Material was supplied by Urban Resources from its quarry in Hope Valley.**
- **The source of material was from the demolished concrete from Subiaco Stadium.**



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MATERIAL PROPERTIES

1. Particle Size Distribution (Percent Passing by Mass)

Sieve Size (mm)	<u>Specified</u>		<u>Lab Test Results</u>
	<u>Crushed Limestone</u>	<u>CRC</u>	
75	100	100	100
19	55 - 85	95 - 100	99
9.5		59 - 82	65
4.75		41 - 55	45
2.36	35 - 65	29 - 52	34
1.18		20 - 41	27
0.6		13 - 29	21
0.425		10 - 23	15
0.3		8 - 20	10
0.15		5 - 14	5
0.075	0 - 15	3 - 11	3



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MATERIAL PROPERTIES

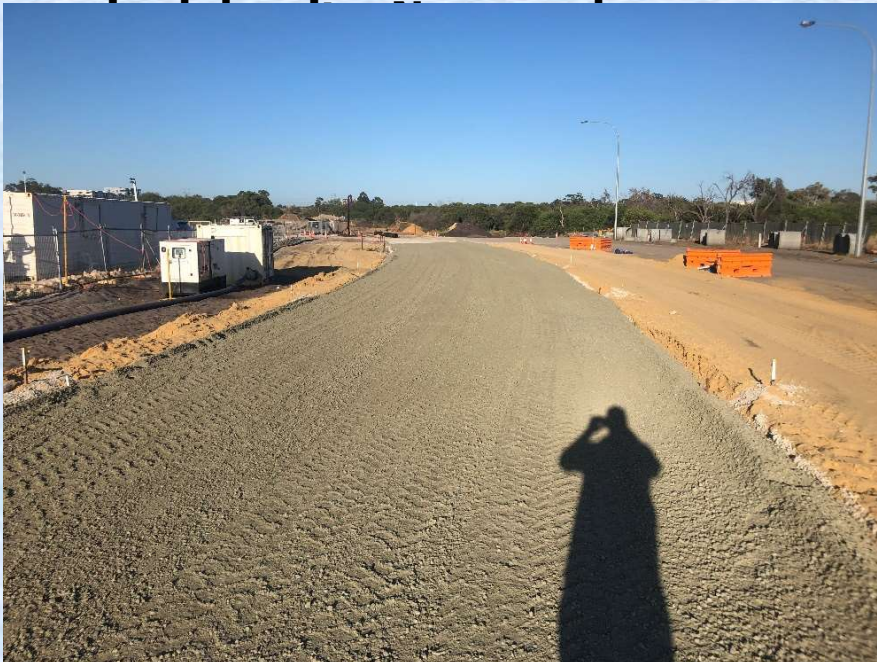
	<u>Specified</u>	<u>Lab Test Results</u>
2. Linear Shrinkage	4.0% Maximum	0
3. Los Angeles Abrasion	42% Maximum	39.6%
4. California Bearing Ratio (CBR)	100% Minimum	150%
5. Foreign Material (Maximum percentage by Weight)		
❖ Crushed Recycled Concrete (CRC)	100%	92.2%
❖ Recycled Asphalt Pavement (RAP)	15%	0.3%
❖ High density clay brick & tile	15%	5.0%
❖ High density aggregates from roads etc	100%	2.2%
❖ Low density material (plastic, plaster, etc.)	1.5%	0.1%
❖ Organic Matter (Wood, etc.)	1%	0.1%
❖ Unacceptable high-density materials	3%	<u>0.1%</u>
		100%



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CONSTRUCTION

	<u>Specified</u>	<u>Lab Test Results</u>
1. Minimum Dry Density Ratio	95%	101% (Average)
3. Maximum Dryback	85% Maximum	60% (Average)
4. Optimum Moisture Content (OMC)	-	11.1% (Average)
5. In general, material was easy to work. No difficulties encountered in achieving		





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CONCLUSION

- **The City's first trial to use CRC in constructing subbase pavement for Verde Drive construction project was successful. The success was attributed to:**
 - **The quality of material properties exceeded the specified limits.**
 - **The brick and tile contents was low.**
 - **Compaction density and moisture content were relatively easy to achieve.**

- **The City is currently considering using CRC in future 2021/22 road construction projects:**
 - **Jandakot Road Upgrade project in Jandakot. The project requires 9,000 m³ (~18,000 tons) of subbase and 8,000m³ (~16,000 tons) of basecourse.**
 - **Hammond Road Upgrade Project in Success. The project requires 6,000 m³ (~12,000 tons) of subbase and 5,000m³ (10,000 tons) of basecourse.**



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CONCLUSION

➤ **Factors to be considered:**

- **Material Availability**
- **Quality of Materials**
- **Specifications to be adopted: IPEAWALGA spec vs. Main Roads WA Spec.**
- **Cost**

THANK YOU