



**CE 442**  
**CONSTRUCTION AND MAINTENANCE OF HIGHWAYS AND AIRPORTS**

**HW No. 2**

Crushed aggregate base for Dammam-Dhahran expressway (Jubail) was compacted in the laboratory using proctor compactor at three compactive efforts, namely 10, 30 and 65 blows. The relation between moisture content (**MC%**), dry density ( **$\gamma$ , g/cm<sup>3</sup>**) and California bearing ratio (CBR) is given in Table-1.

Draw the relation between moisture content and dry density and comment on the observed trend.

Draw the relation between moisture content and CBR and comment on the observed trend.

Draw the relation between dry density and CBR as a function of moisture content and comment on the result. How can this graph be used for the quality control of the crushed aggregate base during construction if the aggregate base is MOT Grading II as per MOT specifications shown in Table-2?

Table-1 Relation between moisture content, dry density and CBR

65 - Blows		
MC%	CBR	$\gamma$ , g/cm <sup>3</sup>
2.92	74	2.13
3.63	124	2.16
4.70	231	2.19
5.81	266	2.22
6.82	108	2.19

30 - Blows		
MC%	CBR	$\gamma$ , g/cm <sup>3</sup>
3.76	66	2.10
4.69	109	2.13
5.80	159	2.16
6.48	159	2.19
7.41	64	2.17

10 - Blows		
MC%	CBR	$\gamma$ , g/cm <sup>3</sup>
4.91	32	1.98
5.71	36	2.07
6.69	42	2.11
7.69	45	2.00
9.16	32	1.93

**Table-2**

<b>Aggregate Bases Grading Requirements</b>			
	<b>Percentage Passing</b>		
<b>Sieve Sizes</b>	<b>Grading I</b>	<b>Grading II</b>	<b>Grading III</b>
<b>50 Mm (2 Inch)</b>	<b>100</b>	<b>-</b>	<b>-</b>
<b>37.5 Mm (1 Inch)</b>	<b>-</b>	<b>100</b>	<b>-</b>
<b>25 Mm (1 Inch)</b>	<b>55-85</b>	<b>70-95</b>	<b>100</b>
<b>19 Mm ( Inch)</b>	<b>50-80</b>	<b>55-85</b>	<b>70-100</b>
<b>4.75 Mm (No. 4)</b>	<b>30-60</b>	<b>30-60</b>	<b>35-65</b>
<b>0.425 Mm (No. 40)</b>	<b>10-25</b>	<b>10-25</b>	<b>15-25</b>
<b>0.075 Mm (No. 200)</b>	<b>3-10</b>	<b>3-10</b>	<b>3-10</b>
<p><b>The Fraction Passing The No. 200 Sieve Shall Not Exceed The Fraction Passing The 0.425 Mm (No. 40) Sieve.</b></p>			
<b>Quality Requirements</b>			
<b>Sodium Sulphate Soundness, &amp; Loss</b>		<b>12 Max.</b>	
<b>Abrasion Loss</b>		<b>45 Max.</b>	
<b>Sand Equivalent</b>		<b>45 Min.</b>	
<b>Liquid Limit</b>		<b>25 Max.</b>	
<b>Plasticity Index</b>		<b>6 Max.</b>	
<b>California Bearing Ratio Grading I</b>		<b>100 Min.</b>	
<b>California Bearing Ratio) Grading II</b>		<b>80 Min.</b>	
<b>California Bearing Ratio (CBR) Grading III</b>		<b>65 Min.</b>	