

Residual dolerite

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1. Introduction

- **Residual dolerite** soil formed in place from underlying dolerite rock.
- **Aim**
 - ↳ To discuss the formation of residual dolerite and their effect on engineering geology and their suitability for construction under different climatic conditions. Further more, the presentation includes the characteristics, engineering properties, problems and uses of residual dolerite under different climatic condition.

2. Formation of residual dolerite

- Residual dolerite forms from weathering of dolerite rock which is an igneous rock composed of plagioclase and pyroxene.
- The type of residual dolerite that forms is highly influenced by the climatic conditions and topography under which it occurs.

- ↳ N-Value >5: Sandy residual dolerite soil.
- ↳ N-Value <5: Clay residual dolerite soil (montmorillonite → kaolinite).



figure 1: Dolerite clay
<http://soer.justice.tas.gov.au/2009/image>

Formation

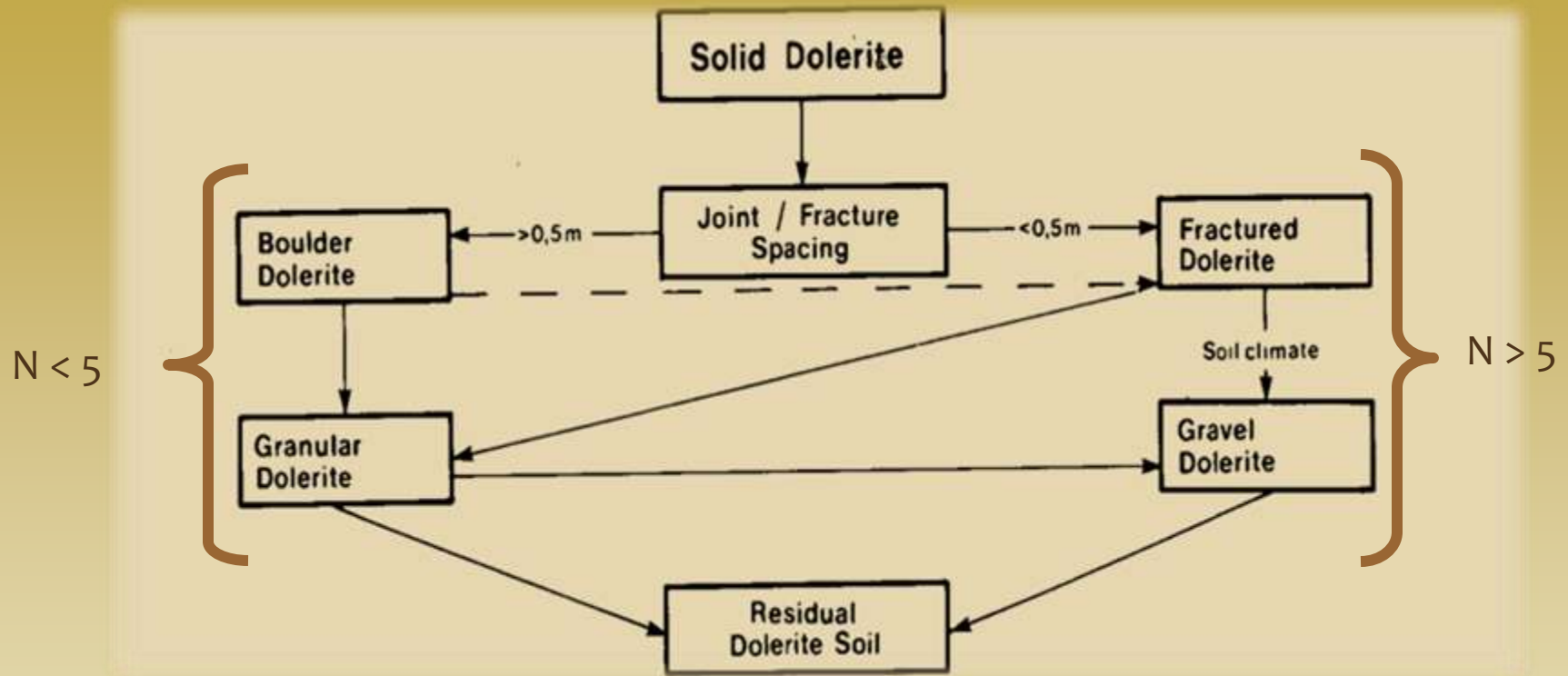


figure 2: The development of classes of weathering from fresh dolerite in different climatic environments (Brink, 1983).

3. Characteristics



Clay

Sand



Figure 3: Sand residual dolerite
www.ilmenite.com.au/Tio2/geologyimages

Figure 4: Clay residual dolerite
<http://soer.justice.tas.gov.au/2009/image>

4. Engineering Properties

- **Strength of the soil**

- ↳ Depends on the characteristics of the soil, parent material(dolerite), climatic conditions.

- **Permeability**

- ↳ Sandy residual dolerite is less permeable as it lacks cohesion.

- ↳ Clay residual dolerite is highly permeable.

Engineering Properties

- **Durability of the soil**

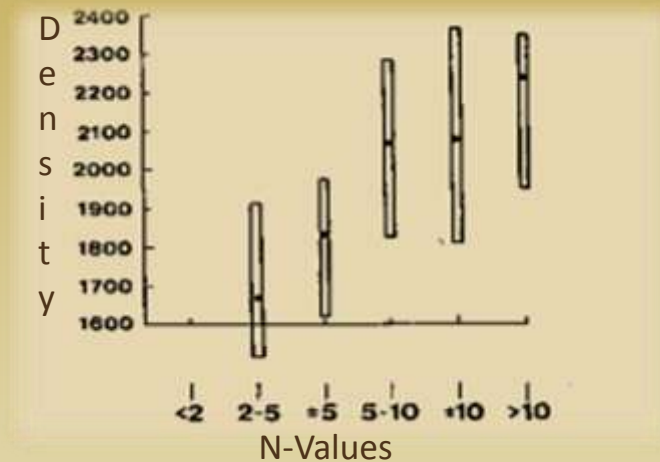
- ↳ Resistance of soil to abrasion or wearing and chemical attack or physical disintegration.
- ↳ Sandy residual dolerite at $N > 5$ are durable.
- ↳ Clay residual dolerite at $N < 5$ are less durable.

- **Excavatability of soil**

- ↳ Residual dolerite soil can easily be excavated using a shovel, pick or a bulldozer.

Engineering Properties

- Density of the soil

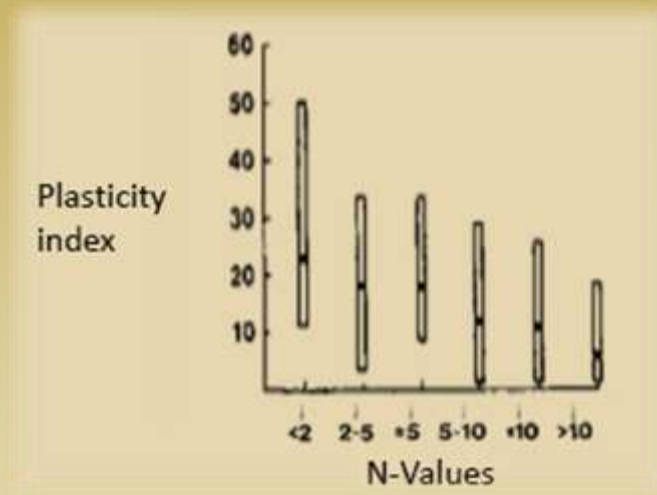


↳ Soil density increases with an increase in N-value

figure 5: The effect of climate on the density of residual dolerite (Brink, 1983).

Engineering Properties

- Plasticity index of the soil



↳ The plasticity index of soil decrease with increase in N-value

Figure 6: The effect of climate on plasticity index (Brink, 1983).

5. Engineering uses

N-value >5	N-value <5
Used for concrete aggregate.	Clay for dam core to prevent permeability.
Good material for construction (Foundation, road).	

Table 1: Table shows uses of residual dolerite (Brink, 1983).

6. Engineering problems

- **N-Value > 5.**
 - ↳ Low shearing strength
 - ↳ Lacks cohesion
- **N-Value < 5.**
 - ↳ Expansive clay soils.

7. Conclusion

- The climatic condition of an area plays a major role in the weathering of dolerite rock.
- Mineralogy of the rock determines the type of soil that forms under different climatic condition.
- The properties of residual dolerite that forms determines the usefulness of the soil in engineering practices .
- Whenever residual dolerite is to be used for engineering/construction purpose, the activity of the soil has to be considered.

References

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