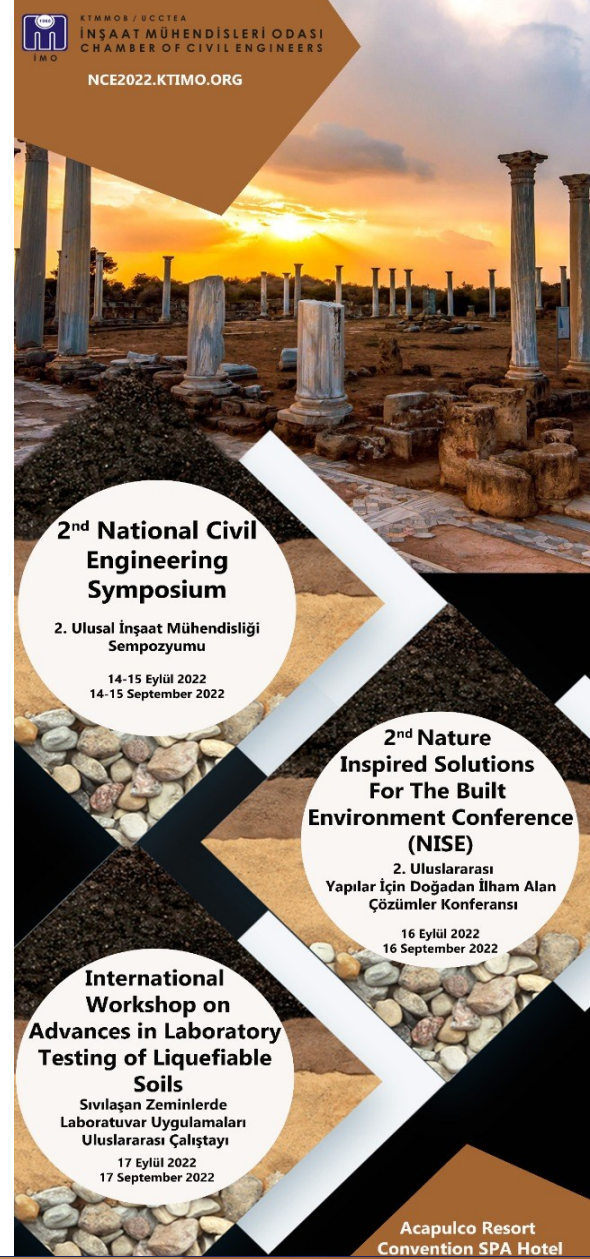


EFFECT OF WASTE UTILIZATION ON BEHAVIOR OF BEAMS

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2nd National Civil Engineering Symposium
2. Ulusal İnşaat Mühendisliği Sempozyumu
14-15 Eylül 2022
14-15 September 2022

2nd Nature Inspired Solutions For The Built Environment Conference (NISE)
2. Uluslararası Yapılar İçin Doğadan İlham Alan Çözümler Konferansı
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Out Lines

- Introduction
- Main Idea
- Marble Dust
- Physical and Chemical Properties
- Conclusion

Introduction

- Construction industry is one of the main industries that has a detrimental impact on the environment
- Massive amounts of power and fuel are needed to produce cement
- Sustainable materials

Main Idea

- a review on the utilization of marble dust as reusable material on behaviour of beams is presented by using various marble dust filler percentages to illustrate the compressive strength of concrete.
- Highlights:
 - Workability
 - Mechanical Qualities
 - Durability
 - Tensile Strength

Marble Dust

- produced as a result of cutting in mines, has been widely used in concrete production within materials.
- A proper estimate regarding the amount of marble waste produced in Turkey cannot be achieved as no registry exists with respect to its generation. However, it is stated in Alyamaç and Ince (2009) that 40 percent of world's marble reserves is found in Turkey.
- It is also reported that marble reserves of Turkey are nearly 3.8 million m³ and in Afyon city alone, approximately 125000 ton of marble is produced.

• Physical and Chemical Properties

- Chemical:
 - Calcium oxide (Cao)
 - Little Bits of Ferric Oxide (Fe₂O₃)
 - Silicon Dioxide (SiO₂)



(a) Marble waste pile



(b) Marble waste dumped on the site



(c) Coarse aggregate from marble waste

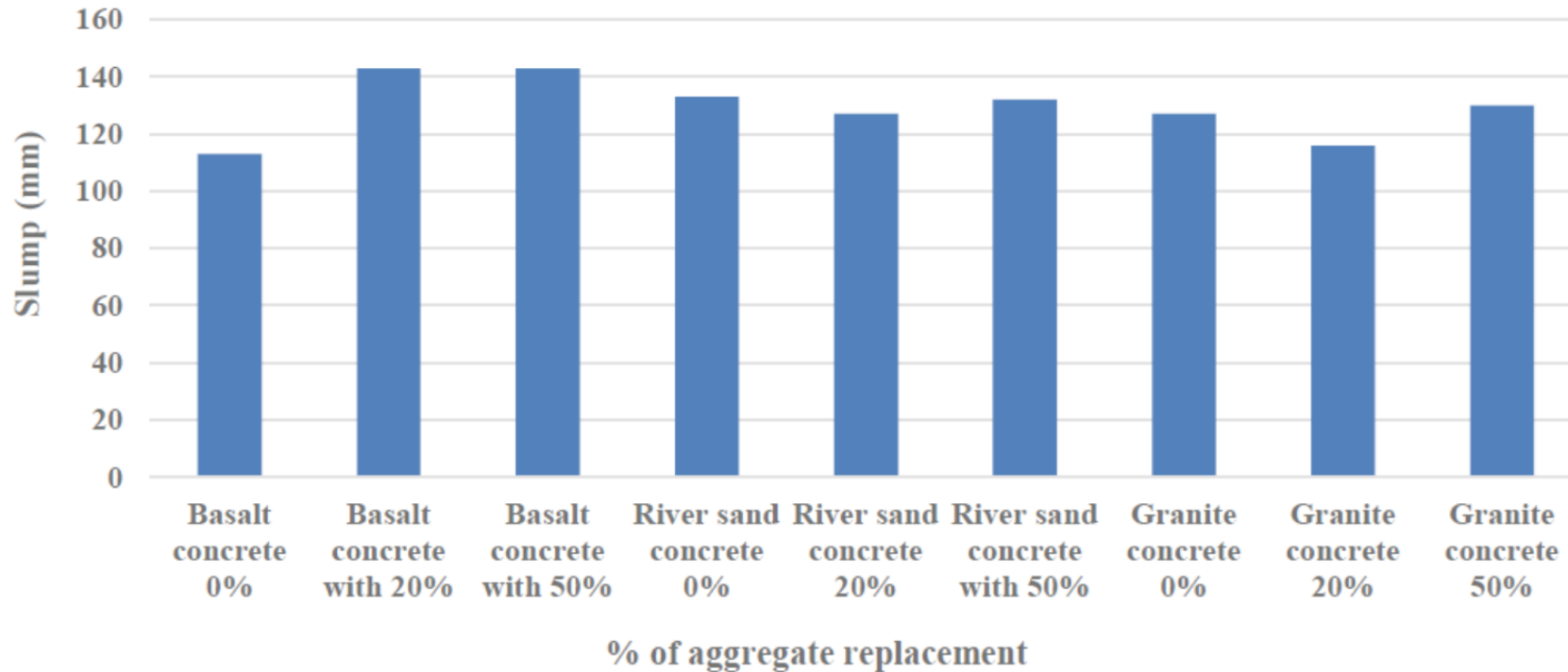
Physical and Chemical Properties

Workability:

- Marble Sand Has Lowest Water Absorption
- Addition of Silica Fume and Marble Waste
- Adding Superplasticizers from an Economic Point of View

Physical and Chemical Properties

Workability:



Physical and Chemical Properties

Mechanical Properties

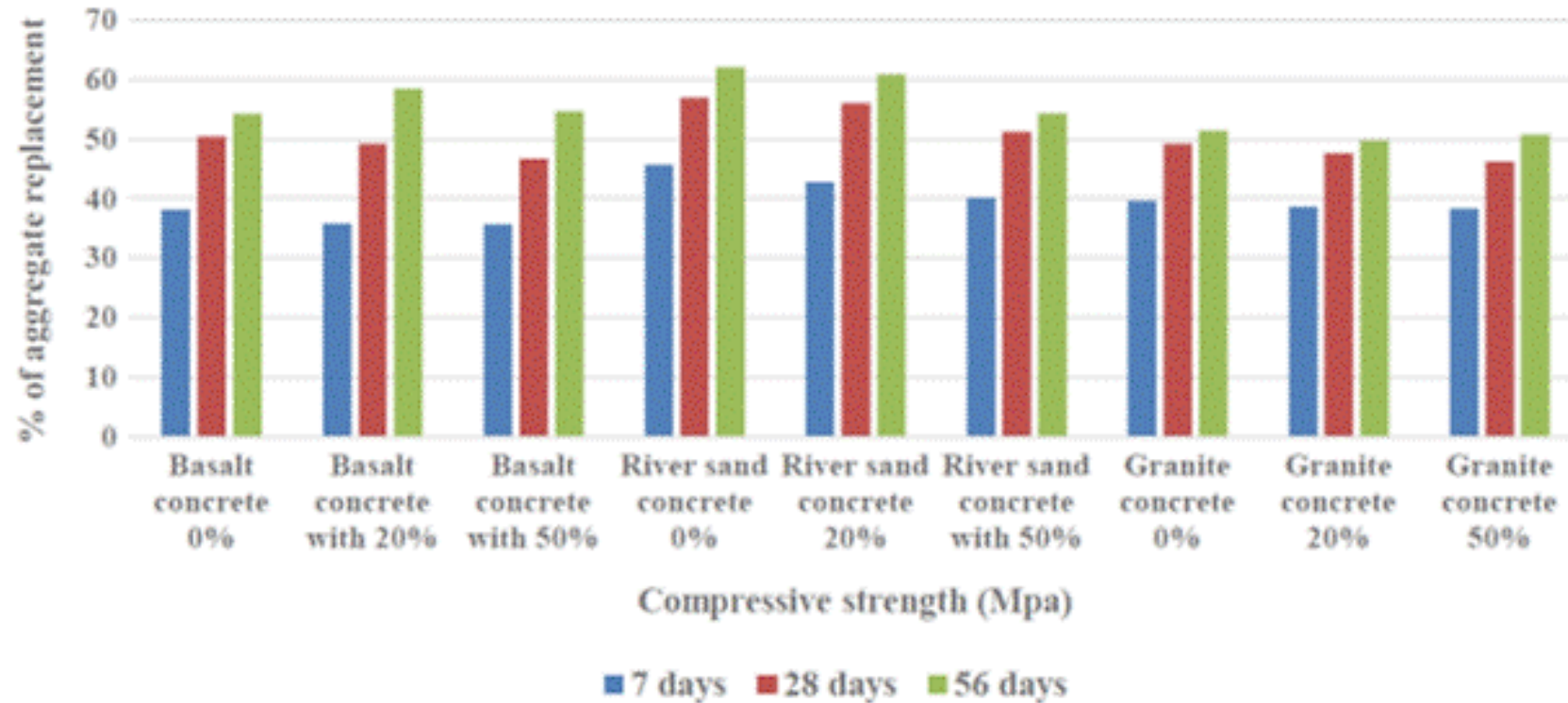
- ***Compressive Strength:***

Properties of marble dust rely on few factors:

- superplasticizer
- mineral dust content
- water absorption
- curing conditions

Physical and Chemical Properties

Compressive Strength:



Physical and Chemical Properties

Mechanical Properties

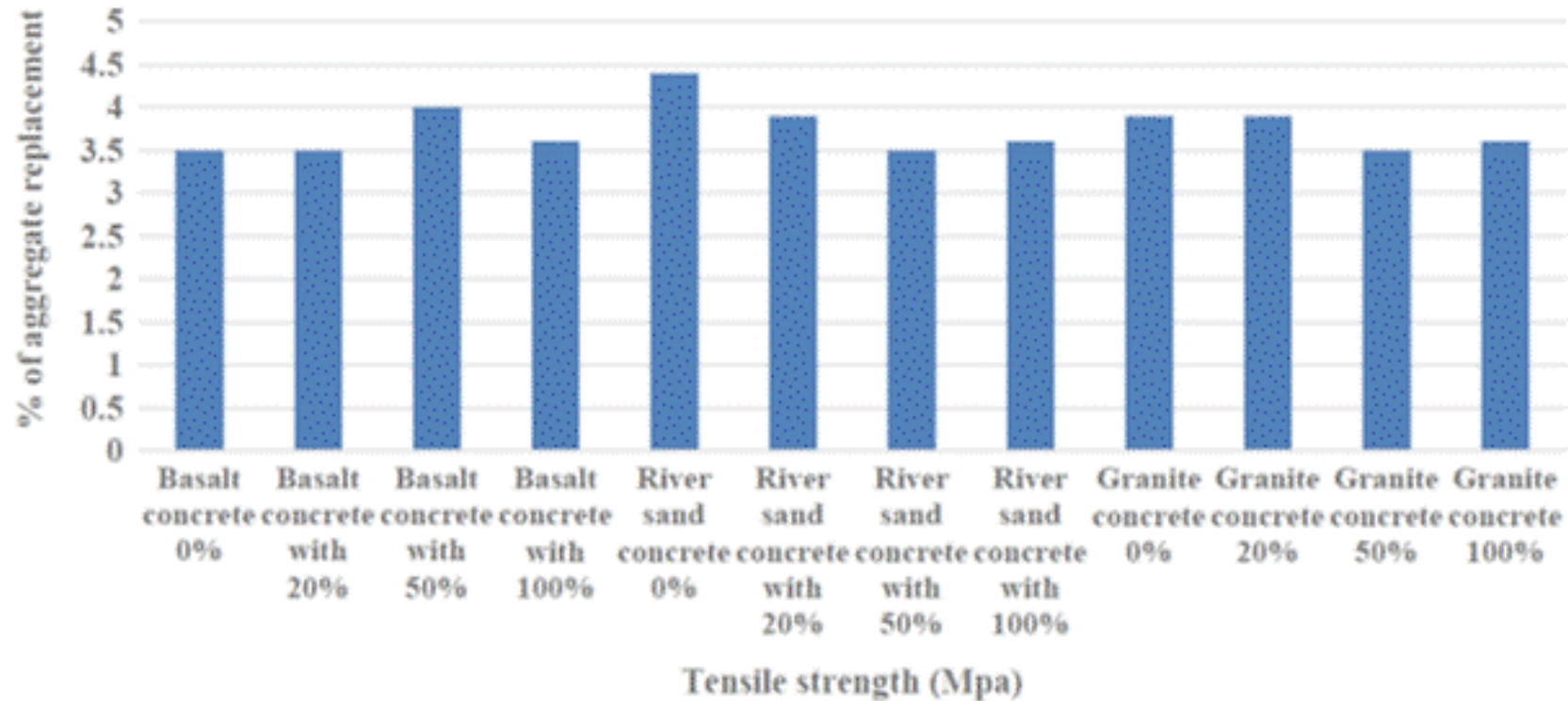
- ***Tensile Strength:***

factors on which tensile strength of marble dust depends:

- Water–cement ratio
- chemical mixing method
- Shape of coarse aggregates
- sizes of coarse aggregates

Physical and Chemical Properties

Tensile Strength :

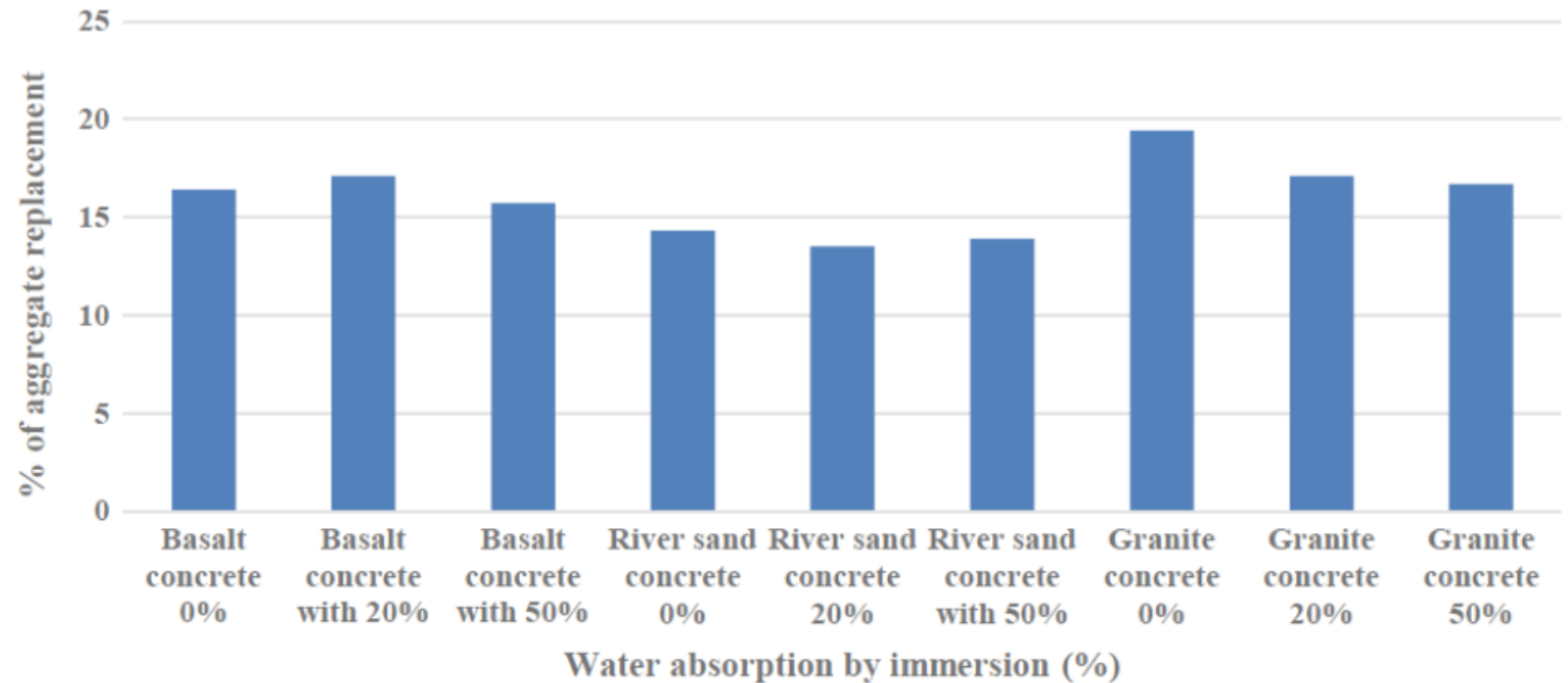


Physical and Chemical Properties

Mechanical Properties

- ***Durability Properties:***

Water absorption is one of the essential factors which impacts the durability properties of marble aggregates.



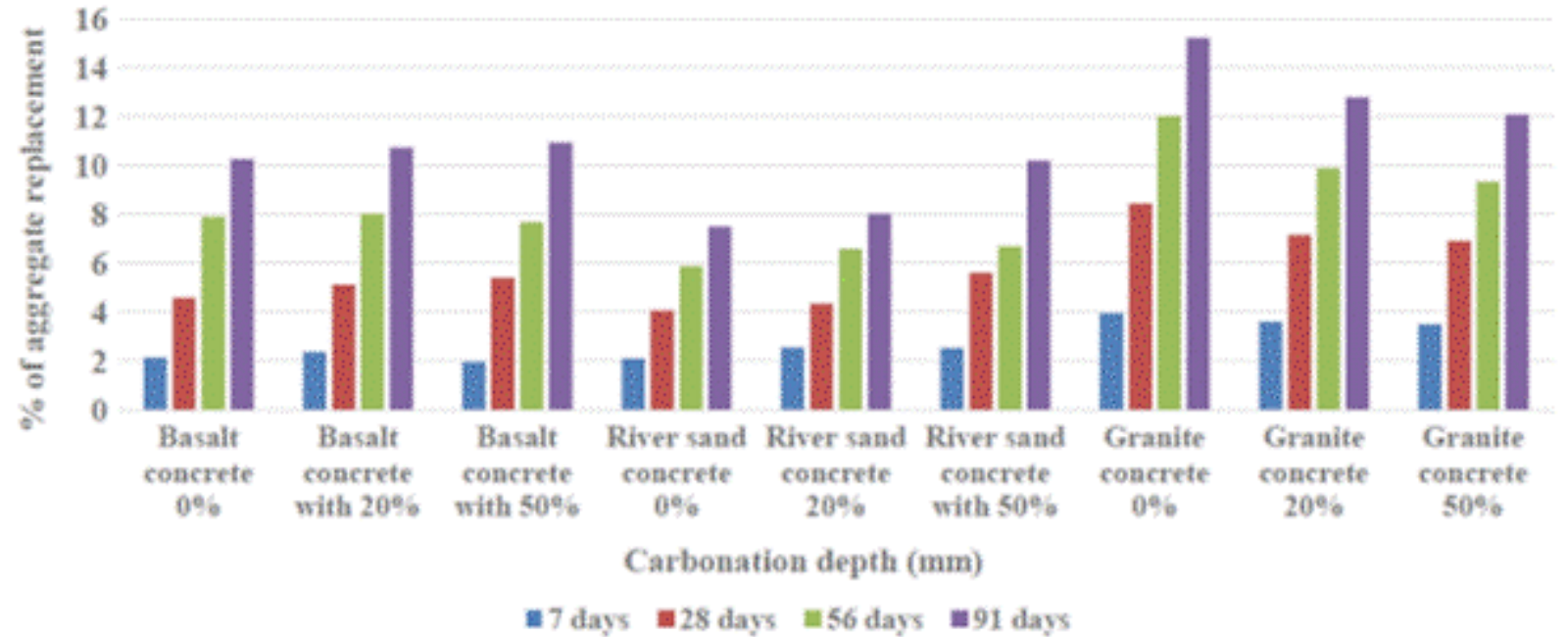
Physical and Chemical Properties

Mechanical Properties

- **Carbonation:**

Carbonation is another factor influencing the auxiliary execution of cement.

- Porosity
- water absorption
- shape and sizes of aggregate



In The End:

1. Performance of various types of marble dust such as basalt concrete, river sand and granite concrete which is compiled in this study is suitable substitution of fine aggregates or cements. However, marble debris needs suitable treatment before its use.
2. When replacement is 50%, basalt and river sand concrete produce better slump value.
3. The mechanical properties of marble dust, for example, compressive strength and tensile strength, affect the replacement of fine aggregates. Strength of marble dust specimens reduces with the increase in percentage of fine aggregates.
4. The durability properties such as water absorption and carbonation depth affect the performance according to the substitution of fine aggregates.

Thank You

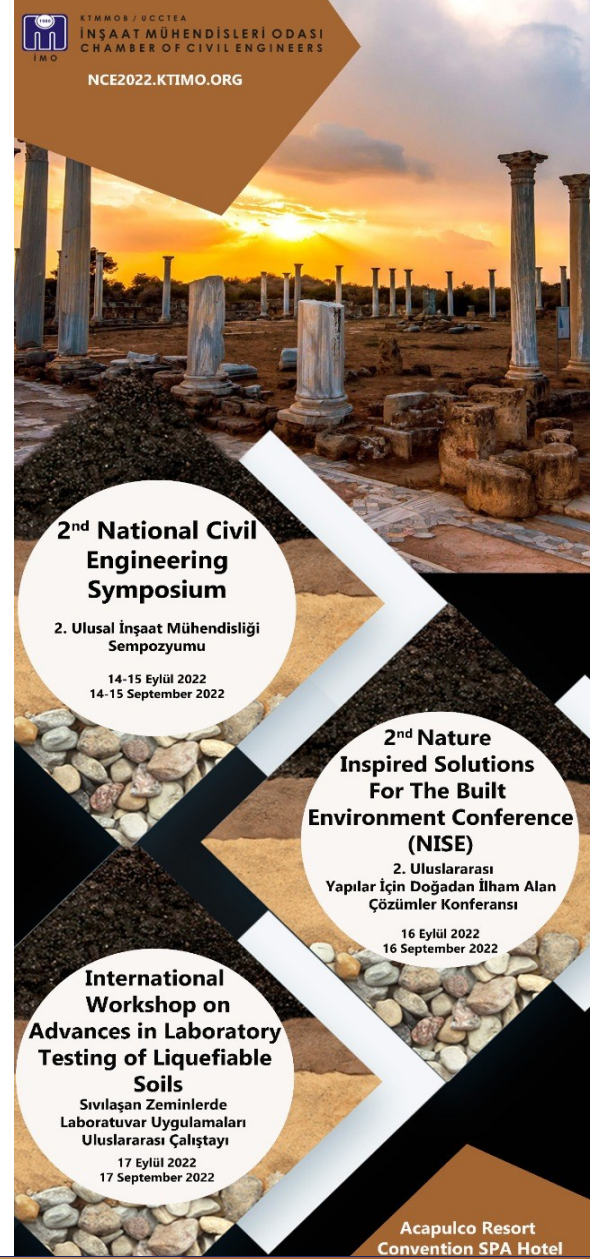
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