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Engineering of the Geometrical Hydraulic Construct of the Dam Location: A Case study of Darian Dam

[1]Mohsen Ketabi, [2]Mahmood shafaei-bajestan, [3]Mahsa Ketabi

[1]Hydraulic Structure Department, Islamic Azad University, Kish International Branch, kish, Iran.
[2]Assistant Professor, Civil Engineering Department, Shahid Chamran University, Ahvaz, Iran.
[3]Drainagr and Irrigation Department, Islamic Azad University, Khozestan Branch, Ahvaz, Iran.

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ABSTRACT

Construct of the Drian Dam on the river Sirvan is in Kermanshah state. The location is about 7.5 kilometer lower than the cross section of two main branches of the river Sirvan (Grdlan and Zhave). The geographical location of the construct is 46 degree and 18 minutes and 27.07 seconds eastern length and 25 kilometer on the west north of Paveh. Access to the construct is provided through the cities of Pave, Noudshe and Nosoud. The widths of the construct are in the zone of Zagros and in the south it is in the main Zagros reverse fault and the main zagros fault. The construct limit is very complicated and the existence of pressed faults and specially a lot of moving ones are the signs of this complication. Based on construct geology, three different important constructs exist in the design limit and near it. The most important fault is the Darian fault. Darian fault is the most important fault on the construct limit. The movement of this fault is the west north and east south and its length is about 35 kilometer which is about 10 kilometer on the land.

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INTRODUCTION

The construct place of the Darian dam is in the area of height zagros and up the Darian fault. Considering the demographic information, the place of the dam is V form and is nearly symmetrical. The general slope of the right lean of the dam is about 763 meter and 36 degree. After this symmetry the slope becomes sharper and reaches 74 degree. In the left lean the slope is about 34 degree and after that the slope becomes sharper and reaches 48 degree. So, generally, the slope of the domain in lower parts is less than the upper parts. The most important reason for this is the presence of weaker layers among the lime in the lower layers which causes the erosion process and reducing the slope of the domains in the axis of the dam.

In the distance of 160 meters at the lower part of the dam the width of the valley is tightened and its walls reaches 120 meters higher than the river level which has the slope of perpendicular. In this limit there are ticker limes which have higher purity and main important layers are not seen.

Geomorphology:

In a general conclusion, the dam construct is divided into three main parts geomorphologically.

1.1. Within the axis and upstream of the dam:

This part includes the formation of the mountain slope and mostly moderate slope.

1.2. Scope downstream axis:

This part has the formation of almost vertical rocky slope at the edge of the river, which is the slimmest and most narrow section across the valley forms.

1.3. Valley Junction area of Sirvan and Noudshe:

This range is low slope and elevation is further apart at the river sides.

At the limit of the dam axis the width of the valley is about 40 meter in the river bed elevation and about 368 meter in the head of the dam. Around the dam construct the river Sirvan has the continuity of east north,

Corresponding Author: Mohsen Ketabi, Hydraulic Structure Department, Islamic Azad University, Kish International Branch, kish, Iran.

west south and elevation of 684 meter over the sea level. At this part the public constructions are cut in width since the river is along the cutting gaps with the east-west straights.

Robar:

By digging the discovering bores at both sides and river bed the thickness of the roubar in different parts if the dam strait was measured. These residuals include the following form the oldest to the newest:

3-1 - alluvial Quaternary Terraces:

Recent deposits usually occur in the maze of rivers and their margins. Exit stairways are found in form of stepped buildings of Dam terraces and on the right bank of the river. Depositions are mostly sand and rock and a low percent of the materials are fine grained which are focused on the surface. In the geological maps the materials is called Qt (1).

3.2 fine grained basalt materials:

Fine grained materials are in form of thin layers covering the split basalt lava. In the geological maps the materials are called Qb. The shape of these materials is mainly on the left side and over the lime edge of Lk (1).

3.3 slope washes:

Slope washes are formed due to mechanical destruction and the movement of the separated parts based on the gravity force on the domain and finally the accumulation of the materials. The slope washes are seen in both sides and a range of the rocks in square meters. These materials are mostly lime, plutonic and radiolarite. The mentioned materials have a thickness of less than 3 meters. Development of these materials is mainly on the left side and is called as Qs in the geographic maps.

3.4 Rock Fall:

These materials are the stones which usually fall due to the performance of the faults and cracking of the rocks in upper levels and accumulated. Development of these materials is mainly seen at the right side and down the F1 fault. In geological maps the materials are called Qr.

3.5 Delta Sediments:

These materials are seen at the lower parts at the cross of two valleys of Sirvan and Nadoushe and include the sediments of Nadoushe. In the DB32 thickness of these materials was moer than 20 meters and mostly includes the sand and fine grained sediments in which a little big grained material is seen. In the geological maps these materials are called Qf (1).

3.6 The river sediments:

According to the turns of the river the sediments also follow the factor in different points of the river and are mainly a combination of sand and rocks along with silt and big rocks. In addition, these materials are seen in some parts of the sediments in form of sand and fine grained sand.

Generally these depositions are formed due to destruction of the stones in the resource of the Leylan River. Due to the material of the sediments stones and the source of them, they include the lime and radiolarite stones (2).

Stratigraphy:

According to the stratigraphy the stone units in the dam construct are varied and can be divided into the following units (3):

Kfl:

This unit is the oldest stone in the construct and mainly consists of volcanic lava cuts and split basalt and limestone rocks. Pillow lavas are dark in color and texture.

The most extensive lava on the left abutment of the dam site and downstream of the dam is seen as a monolithic igneous intrusion but in other areas of the layers of limestone and radiolarian and sometimes grains of igneous rock is found in the other layers.

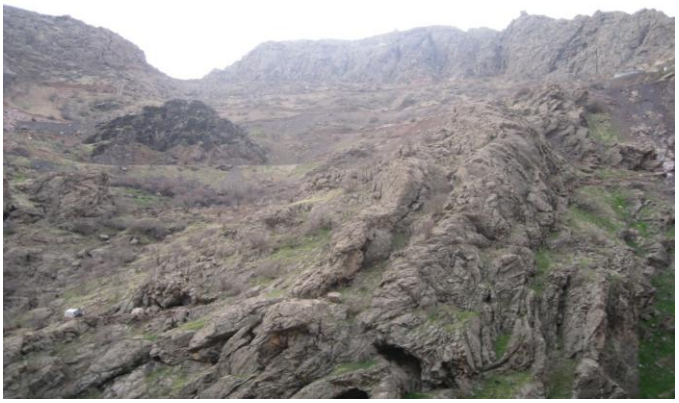

Fig. 4.1: A view of the unit kfl left (dark outcrop of basalt rocks split)

Lk limestone units:

This unit is located directly on kfl set and includes limestone karst. This unit outcrops on the left and can be seen in two places:

A - The upper level of the overflow area at the location of the blade exposed and vertical wall is thickened.

B - On the western slopes of the Hankkov valley and range of diversion tunnel inlet

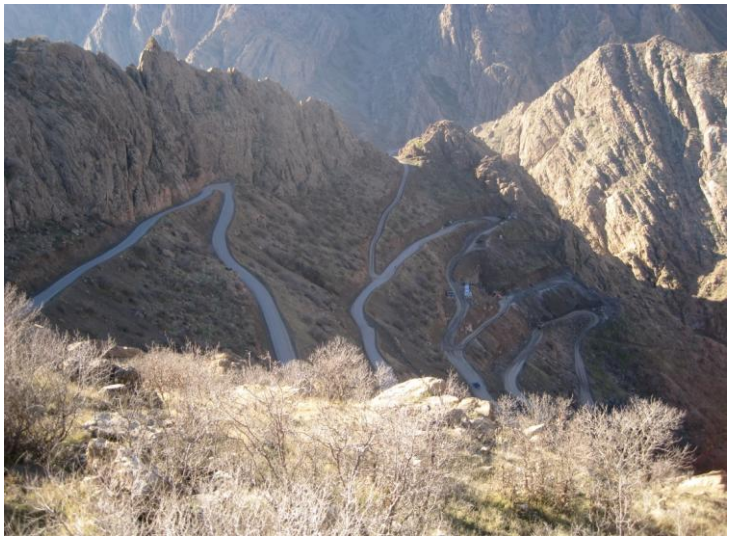

Fig 4.2: View of Lk limestone units were placed on the unit Kfl

limestone units Lll:

This unit outcrops are seen at parts of the diversion tunnel outlet. This unit consists of thick-bedded limestone with low weathering tightly between layers of radiolarian. In areas that these units are located in the vicinity of kfl sometimes the intrusion of igneous rocks and limestone also be seen locally.

The Lime - Lime Radiolarite Lrl:

The stone is composed of middle layer of gray fine-grained limestone, radiolarian limestone and of a number of layers radiolarite. These rocks are tight and due to weathering are in the spectrum of normal to slightly weathered stones.

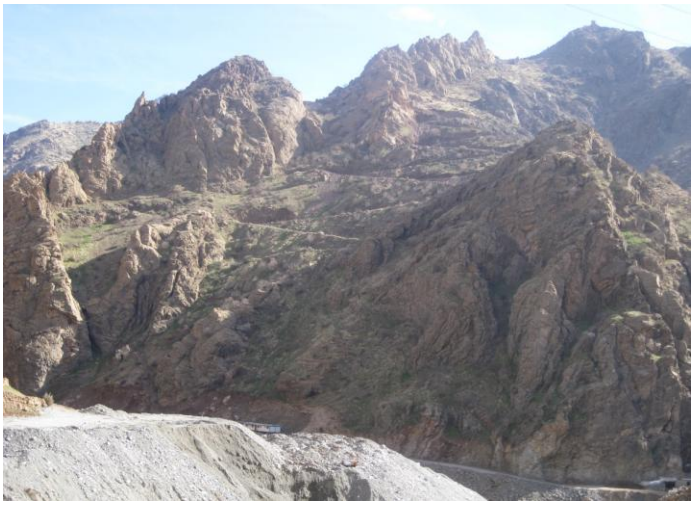

Fig. 4.3: A view of the limestone units in the exit tunnel Lll

The radiolarite unit Rl:

This unit consists mainly of radiolarian rocks in thin purple and lime radiolarite but among them there are also thin bands of limestone. This unit outcrops is seen within the power structure and the spillway chute.

Lime Unit Lml:

This unit is located on the Rl unit and consists of medium to thick layers of destroyed fine-grained limestone. These rocks are resistant to weathering and are normal to slightly weathered. These rocks form the strongest rocks of Sirvan Valley area.

This unit is at the left and right side of the area overlooking a range of plants in different areas of the output of the edge of the river Sirvan. A part of the valley has steep walls of rock that are formed in this unit. [1]

The Lbc:

The unit contains abundant lime stone rocks and is cut with the grain. This unit has a relatively small thickness (less than 20 meters) and has a relatively narrow band of outcrops that usually can be seen on Lml subunit at both abutments.

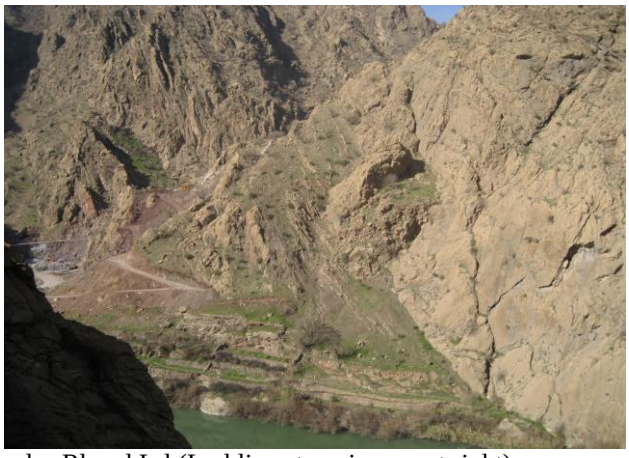

Fig. 4.4: View of outcrop samples Rl and Lrl (Lml limestone is seen at right)

limestone units Lmr:

This unit consists of medium to thick-bedded limestone rocks that there is also a small number of layers of radiolarite layers. Some of these units can be seen between the layers.

Overally, this unit is made of resistance units within the site and along both abutments Heights Lml unit. This unit outcrops occurs on both sides, and especially the area around Oji overflow. [1]

Unit Lrb:

Thin to medium bedded limestone layers is radiolite. This unit outcrops can be seen within the dam on the right.

Unit Lbl:

Includes Radiolite shear limestone outcrops grain igneous and is observed on the left side near the access tunnels deviation.

Unit Lbr:

This unit consists mainly of shales, limestones with the number of layers. The Unit is above the right abutment downstream of F2.

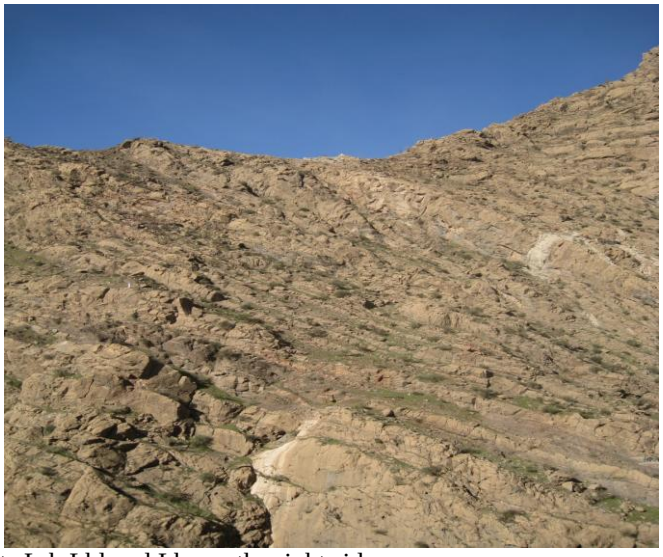

Fig. 4-5: A view of the units Lrb Lbl and Lbr on the right side

Argillaceous limestone unit - Ll:

This unit makes up the youngest rocks in the site and consists of thin to thick layers of tightly folded limestone layers of clay and sometimes cherty limestone with thick bands of rock.

Extensive outcrops of these units can be seen above the fault F2 . A small part of the dam, power plant, as well as much of the water curtain tunnel entrance section is located on the right side of the unit. [1]

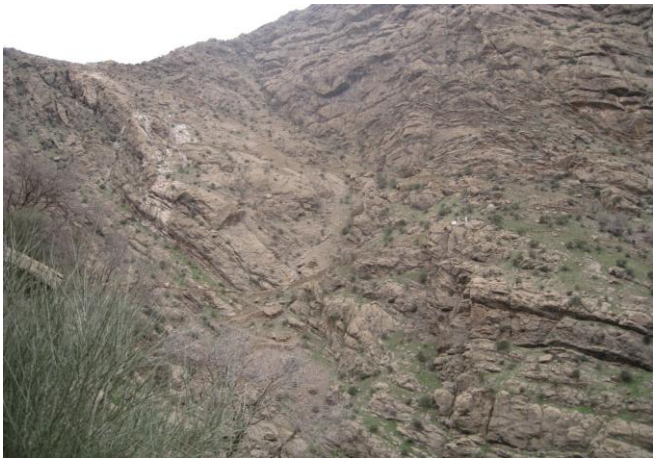

Fig. 4.6: A view of the Ll unit on right side

Results:

The purpose of the geotechnical studies is to investigate the subsurface geology and geotechnical parameters for designing the dam and related structures. This study is a way that we can properly evaluate the geotechnical properties of Robar materials and bedrock structure.

in general, the geotechnical investigation done in this stage include: drilling, exploration, field tests and laboratory tests on samples of rock and water.

Exploratory boreholes in the wings and geotechnical characteristics of the bedrock riverbed have important information about the dam site. The most important data includes permeability and density alluvium, rock permeability, the flow behavior of the joints and rock mass quality.

In this section of the report in order to evaluate the geotechnical parameters of the dam and related facilities, the information obtained from boreholes is analyzed. Darian dam is located in the High Zagros zone.

This zone is characterized by severe and intense folding and numerous thrust faults. This characteristic also applies to the site Darian. Site area is very complex. Very compact fold with multiple faults particularly abundant and thrust faults Vera and also large landslide dam in the gorge outlet downstream are signs of the complexity. From Geological Engineering viewpoints there are three main structures within the site and adjacent to it. A - Faults, b - folding, C - turning stone blocks.

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