

Research Article

Characteristics of Sand at Major Quarrying Areas around Addis Ababa

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This study focused on the measurements of physical and chemical characteristics of sand samples taken from Atayie, Je-wuha, Ziway (4 quarrying sites), Mekie (4 quarrying sites), and Soderie (2 quarrying sites) were analyzed by conducting different tests, such as silt content, moisture content, bulking, sieve size, unit weight, specific gravity, water absorption, and organic impurities tests. After conducting those tests, the results of sand samples taken from Atayie, Je-wuha, Alagie, and Bosat Fokie sites satisfied 100% test standard requirements. In the same way, Kiera and Atie leman sand sample satisfies the 90% test requirement while Lolie basuma sand satisfies 80% test requirements and Endala chebie satisfies 70% among 10 tests with respective requirements. However, the result of sand samples taken from Langano, Godo, Melka Jelo, and Dehera Degaga satisfies below 50% of the tests among the 10 test parameters.

1. Introduction

The construction industry in Ethiopia has been providing a wide variety of buildings, ranging from houses to high-rise buildings, transport and communication, water structures, road, energy construction, and building other physical infrastructure construction. These construction projects have structural parts with greater quality requirements and different sizes of load carrying designed with concrete [1, 2]. Concrete is a construction material produced by mixing fine and coarse aggregates, cement, water, and additives. Natural sand and river sand are major aggregate materials for the production of concrete and blocks. Mechanical properties of modern and conventional concrete yielded products are also dependent on the characteristic of sand behind economical saving issue [3]. However, strength (in terms of compressive and flexural) and durability aspect are expected to be tested and analyzed experimentally for the quality check of mechanical, physical, and chemical properties [4, 5]. Research results by examining the characteristics of sand are the most important for successful implementation of projects with

acceptable concrete strength [6, 7]. Kasalya and his friend (2022) have conducted a comparative study of four different quarry site's sand for block production at difference composition proportions of 0%, 33.3%, 66.67%, and 100% and concludes that lesser cost and justifiable benefit can be obtained through. Aggregates, both sand and coarse take about 65–75% by the volume of concrete and research results on examining the characteristics of sand are the most important, which play a vital role in a successful implementation of construction projects with acceptable concrete strength and durability [8, 9]. In fine aggregate to coarse aggregate (S/A) ratio, the study of Ting Lin investigated that 52% of aggregate occupation is covered by sand with S/A ratio can improve bonding capacity of products by enhancing roughness and strength [10, 11]. In fact, the production of reinforced materials (like; concrete) has bounded with the problem of properly mixing procedures of aggregate and cementing materials [12]. Sand-related tests; environmental conditions, formation of sand, and tests on physical and chemical properties of sand can be discussed to have good information for manual preparation for users,

check list production, and on guideline construction work [8, 13]. It was a general fact that the compressive strength of the concrete increases in direct proportion to the workability of the aggregate, and if the workability declines, the specific gravity declines, yet, the aggregate segregation rises, and vice versa [14]. On the other hand, the achievement of these goals and objectives are always constrained by various factors. Among those factors, one is the lack of using of sand to properly determine the measurements. Sand in construction is affected by:

- (i) Natural formation of sand around quarrying areas
- (ii) Method of quarrying and its gradation size for required work nature.
- (iii) Physical properties and chemical properties of sand [9, 15].

Considering the above-mentioned factors, this proposal will be a design to compare the best quality sand by studying the detailed characteristics of sand at each quarrying area. The natural river sand is a non-renewable resource, which is a worrying truth that should never be ignored [16, 17]. It is a crucial issue to use appropriate construction materials for the right type of structure with minimum cost. The success of soil stabilization depends on soil testing because the qualities of soil vary greatly between locations, and in certain situations, even within one location [3].

2. Statement of the Problem

As the study of Torres and his friends found that due to changes in lifestyle and infrastructure development, aggregate mining has rapidly increased since the 1950s [3, 11]. Similarly, sand production is undesirable which needs engineers concern to minimize the cost and increase the quality of productions. Two factors, such as particles strength and fluid flow can affect the tendency of sand [16]. Understanding this global issue, some researchers tried to replace sand with alternative materials in partial proportions (Ozioko and Ohazurike, 2020).

Sand takes a high percentage in the concrete production and this strongly influences the concrete's freshly mixed and hardened properties, mixture proportions, structural service period, durability, and economy. The importance of using the right type and quality of sand around Addis Ababa is not studied for the quality of sand, and there is huge gap/lack of clear information about the physical and chemical properties of sand.

3. Research Objectives

The key objective of this study is to determine which sand is of good quality comparing the character or physical properties of sand from major quarrying areas around Addis Ababa. It also involves to show different considerations in studying the characteristics of sand that affect the chemical and physical properties of sand, to be aware the most quality sand for all users by comparing the research results of sand taken from those quarrying areas and to put an important solution by filling the gap of selecting sand.

4. Scope of Work

This research addresses the laboratory tests and results of different sand samples with discussion and comparison according to [1, 18–21]. Standards and Ethiopian standards: Sand test data on its physical and chemical properties were supplemented with laboratory testing to provide essential features of sand to give a response for the required quality modeling. These essential features include silt content, modulus, moisture content, sieve size analysis, unit weight, specific gravity, and organic impurities of sand (Figure 1).

5. Research Methodology

This research study on the physical and chemical characteristics [22, 23] of sand around Addis Ababa passed different tasks of studying. Initially, after proposing, it started by collecting sand samples from Atayie, Je-wuha, Ziway (4 quarrying areas), Mekie (4 quarrying areas), and Soderie (2 quarrying areas). During sample collection (Figure 2 and Table 1), different professionals like local municipality officer, local area mining and energy officer, architects, engineers, and experienced people helped us to take or collect the correct representative sample for each site, and the sampling technique followed the standard sampling system. Transporting samples is also keeping good handling to protect any loss because of weather conditions and movement effect toward long distances. The possible related written documents and standards available were taken for the review of literature of the study. All tests regarding the respective procedures, materials, and equipment were carried out in Dire Dawa University. Most of the tests were conducted in Construction Technology and Management laboratory room, but organic impurities of sand were examined in Chemical Engineering Department laboratory room due to its requirement of the base raw material (sodium hydro-oxide) with proper preservation. For analysis, discussion, and comparison of results, we used appropriate ASTM, AASHTO, BS, and Ethiopian standards.

6. Site Description

7. Investigation & Analysis

7.1. Silt Content Tests

7.1.1. Both Field Test and Laboratory Test Results. 7.1.2. Discussion of Silt Content Results. Silt content limit according to ASTM C 33–86, ASTM destination D-2419, and Ethiopian Standard. If the silt content exceeds a value of 3%–5% and 6%, respectively, it is recommended to wash the sand or reject. Particles finer than 75- μm sieve may be present in the aggregate in different forms. They may be dispersed in the aggregate in the form of clay, silt, or stone dust. The presence of fines or silt reduces the permeability of the concrete. Moreover, an excess of silt causes reduction in the workability, increases the shrinkage of concrete, and reduces the entrained air content. According to the above limit and effects of silt content, the sand of our research



FIGURE 1: Quarry sites captured overview (source: captured during sample collection from source).

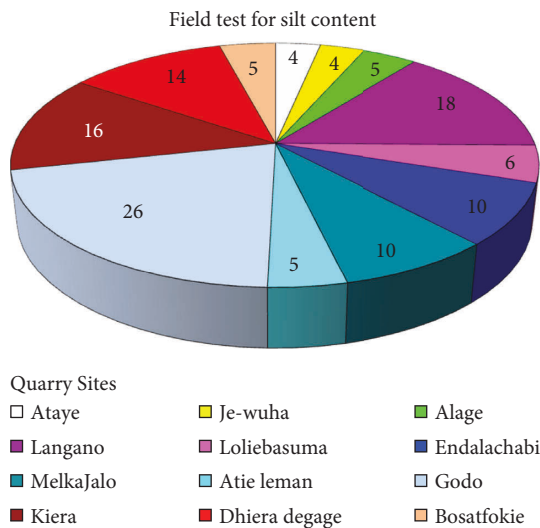


FIGURE 2: Silt content (source: during field study).

areas, such as Ataye, Je-wuha, Ziwayalagie, Ziway Lang-ano-Lolie basuma, Ziway Endala chebie, Mekie Mel-ka-Kjelo, Mekieatie leman, Mekiekeira, Soderie bosat fokie can be used without any difficulty and any modification, because those sands satisfied silt content standards fully and tolerating partially. Some quarrying area sand found in Ziway langano, Mekie Godo, and Soderie Dehira degage required to be used after washing or if not possible to be rejected as

their silt content is greater than 6% which is above the maximum limit in both laboratory and field tests of silt content (Figures 3 and 4).

7.2. Moisture Content of Sand

7.2.1. Results and Discussion for Moisture Content of Sand. As shown in Figure (Figure 5), the effective water/cement ratio and the free water content can be determined by the moisture content of sand. When the fine aggregate is dry or has low water content, sand particles quickly get coated with cement paste and require high water/cement ratio for mix design. On the other hand, the moisture content of sand is important to calculate the amount of water required for the design of water/cement ratio. According to the moisture content determination in ASTM C 127, C 70, C 128, C 566, and AASHTO T 255, fine aggregates will generally have moisture contents required to SSD in the range of 0.2%–2%, the free water contents will usually range from 2% to 6%, fine aggregates can maintain maximum moisture content of about 2%–8%. Based on the above description and moisture content results, sand quarried from Atayie, Je Wuha, Alagie, Lolie Basuma, Atie Leman, Godo, Keira, and Bosat Fokie has satisfied the normal free water content standard described above. However, the result of langano, dehira degage, and Mel-ka-Jelo showed that the sand has moisture content above the standard limit (>8%) and those sand samples are

TABLE 1: Site description of quarry area.

No	Name of place	Spec. name of places	Quarry code	Far from AA (km)	Formation	Weather
1	Ataye	Ataye	01	263	Moist river bed	Hot
2	Je-wuha	Je-wuha	02	233	River bed	Hot
3	Ziway		03	163		
3.1		Alage	001	223	Moist due to river	Hot
3.2		Langano	002	201	Moist field	Hot
3.3		Langano lolie basuma	003	199	Dry river	Hot
3.4		Endala chabie & korme	004	185	Below loam soil	Hot
4	Mekie		04	132		
4.1		Melkajalo	001	135	River bed	Hot
4.2		Atie leman	002	150	River bed	Hot
4.3		Godo	003	139	River bed	Hot
4.4		Kiera	004	133	River bed	Hot
5	Soderie		05	122		
5.1		Dhiera degage	001	147	Dry river	Very hot
5.2		Bosat fokie	002	160	Dry river	Very hot

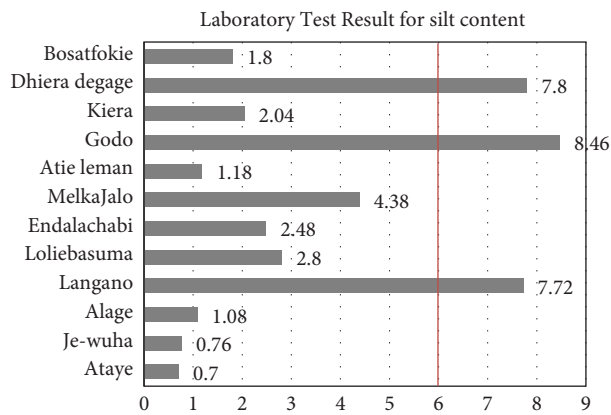


FIGURE 3: Silt content (source: laboratory study).

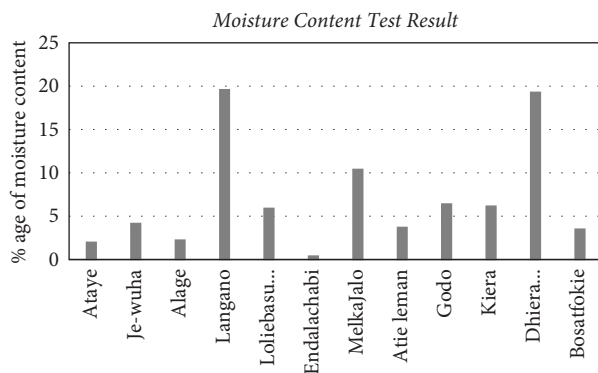


FIGURE 4: Moisture content (source: during study).

not recommended to design their water/cement ratio without considering their moisture content. The result showed that sand sample of Endala Chebie has moisture content of 0.4% which is between 0.2% and 2%. This implies that this sand must be changed to SSD condition before use for any concrete structure mix.

Unit Weight Test Result

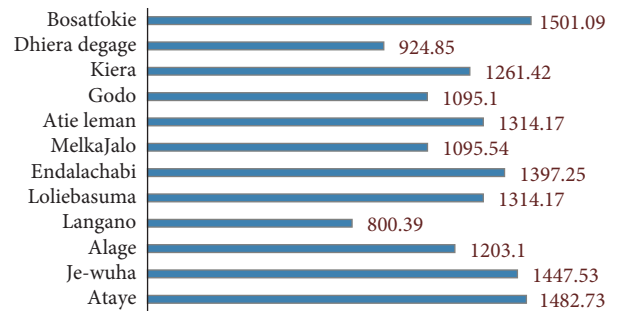


FIGURE 5: Unit weight (source: test during this study).

7.3. Unit Weight of Sand

7.3.1. Results and Discussion of Unit Weight Analysis. The bulk density or unit weight of fine aggregate (Figures 6 and 7) is required to fill the container to the specified unit volume. The bulk density of fine aggregate commonly used in normal weight concrete is ranging from 1200 to 1750 kg/m³. According to Standard ASTM C-29/AASHTO T19, our test results from representative sand samples Ataye, Je-wuha, Alage, Endala chebie, Lolie basuma, Melka jelo, Atie leman, Godo, and Bosatfokie satisfied the standard unit weight of fine aggregate at compacted unit weight condition. However, in the case of the resting Dehira degage and Langano sand compacted unit weight, these sands did not satisfy the normal unit weight limit in both loose and compacted conditions. However, Langano, Dehira degage Godo, and Melka Jelo satisfied to be light weight sands by loose weight of sand method, but Langano and Dehira Degaga satisfied both methods of light unit weight of sands. The measurement of loose uncompacted unit weight of fine aggregate is described in ASTM C 1252, and the sand of Godo and Melka Jello did not satisfy the unit weight standard limit in loose condition and this is because of the presence of void between sand particles.

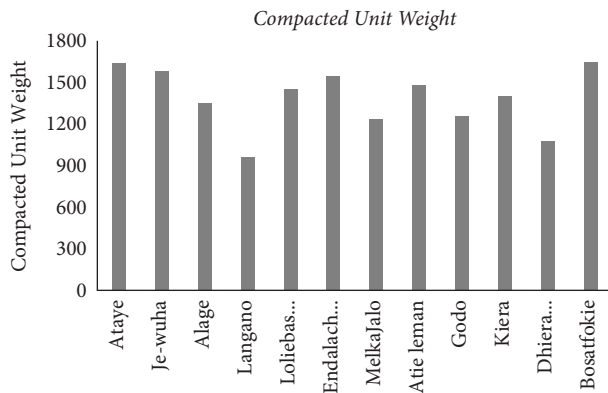


FIGURE 6: Compacted unit Wt. (source: test this study).

7.4. Bulking of Sand

7.4.1. Results and Discussion of Bulking of Sand. The amount of bulking of fine aggregate varies with the moisture content of particles and grading. Since most fine aggregates are delivered in a dump condition, wide variation can occur in the batching of mix quantities if the batching is by volume. For this reason, good practice of testing the bulking of sand has long favored weighing the aggregate and adjusting for the bulking effect of sand when proportioning. According to the above bulking of sand results, Alagie, Je-Wuha, Atayie, and Bosat fokie representative sand has the most acceptable percentage of bulking. It means that sands taken from those sites have the minimum void content implied by the minimum bulking percentage (<5%). However, when we were looking other sample results, they have a higher amount of bulking percentage that shows the presence of higher amount of void content between sand particles (see Figure 8 above). Therefore, that is recommended to highly consider the number of void leads to reduce the volume of sample per measurement and to determine the amount of additional sand required to replace the reduced volume of sand.

7.5. Sieve Analysis

7.5.1. Discussion for Concrete Production from the above Results. As shown above in Table 2 and Figure 9, the sieve size discussion for concrete according to ASTM C-33 and Ethiopian standard or AASHTO M 6-93: Sand grade of Je-Wuha, Lola Basuma and Bosat Fokie satisfied 100% all standard requirements at all sieve sizes. Atayie satisfies most standards almost above 85%, but its size at sieve size 4.75 mm is below the limit of standard size and this shall be correctly considered when this size or grade of sand is very essential since its coarser particles above 4.75 mm are around 8%. In the same thing, both Alagie and Atie-Leman did not satisfy the standard sieve size of 1.18 mm and 600 μm with greater size of the determined value. Langano sand satisfies most sieve standards (57.1%), but it has sand particles above 9.75 mm sieve and finer particles below 300 μm and 150 μm sieve with standard. Similarly, the sand of Endala chabi is coarser than 600 μm grade according to standard. Mekie keira and soderie dehiera degaga also have coarser sand

particles above 9.5 mm. Generally, except Mekie MelkaJalo and Mekie Godo, all sand samples satisfied the sieve analysis standard above 50%. When we are looking the results of sieve 1.18 mm, 600 μm , 300 μm , and 150 μm , both Mekie Mel-ka-Jalo and Mekie Godo have high finer sand than that of the standard determined. This implies that those two site sands are not satisfying the sieve standard (both satisfied $42.8\% \leq 50\%$) and that is not recommended to use these sands for concrete production.

7.5.2. Discussion for Mortar Production from the above Results. Sieve size discussion for masonry or mortar According ASTM C: 144-99: The grade of sand sample taken from Alagie satisfies all standard requirements for mortar work at all sieve sizes 100% while both Mekie Melka Jalo and Atie-Leman satisfied the standard almost above 85.7%. In the same thing, Soderie, Bosat-fokie, Ziway, Lolie Basuma, and Je-wuha satisfied the determined standard sieve size 71.3%, while Mekie Kiera, Mekie Godo, and Atayie satisfied 57.1% for material of mortar production. When we are looking the results of sieve analysis, both Mekie Godo and Soderie dehera degaga sand is high finer graded sand comparing to the standard determined. This implies that sands quarried from these sites were not satisfying the sieve standard for mortar (both satisfy $28.6\% \leq 50\%$). Similarly, the sand of Endala chabi satisfies the sieve analysis standard below 50% (42.8%). Therefore, those three samples have a fill standard below 50% and these sands are not recommended for use for masonry mortar production.

7.5.3. Discussion of Fineness Modulus of Sand. According to ASTM Designation C 33, the fineness modulus of sand shall be not less than 2.3, not more than 3.1. However, according to Ethiopian standard ES.CD 3.201, the fineness modulus of sand shall not be less than 2 and more than 3.5 with a tolerance of ± 0.2 . For analysis, if the fineness modulus of sand is 2.0-2.6, the sand is fine sand, if it is between 2.6 and 2.9, the sand is medium sand, and if between 2.9 and 3.5, it is coarse sand. However, if the fineness modulus is greater than 3.5, $FM > 3.5$, the sand is not acceptable. In our country, according to Ethiopian standard and looking the above fineness modulus result of sand, the sand samples taken from Alagie, Langano, Atie-Leman, and Kiera are satisfying with the standard in the class of finer sand, while the sand of Je-wuha, Lolie-basuma, Dehera Degage, and Bosat fokie satisfies the standard in the class of medium sand. In the same way, the sand of Atayie and Endala chebie satisfies the class of coarser sand. The rest sand samples (sand of Melka-jello, and Godo) are not satisfying any class in both ASTM and Ethiopian standards. As the result implies that the two samples of sands are finer than the expected requirements.

7.6. Specific Gravity

7.6.1. Discussion of Specific Gravity and Absorption. According to ASTM C 128, D 854 and Ethiopian standard ES.CD₃,201, the specific gravity limitation for fine sand is

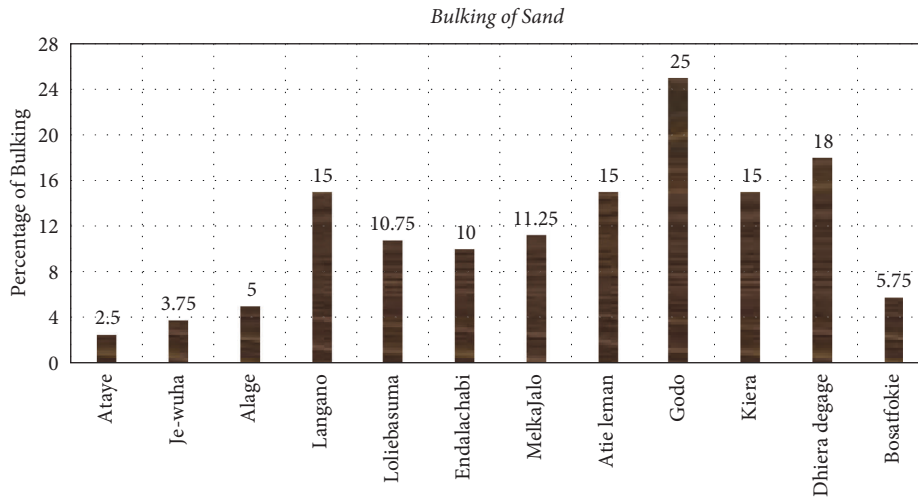


FIGURE 7: Bulking of sand (source: test results conducted during this study).

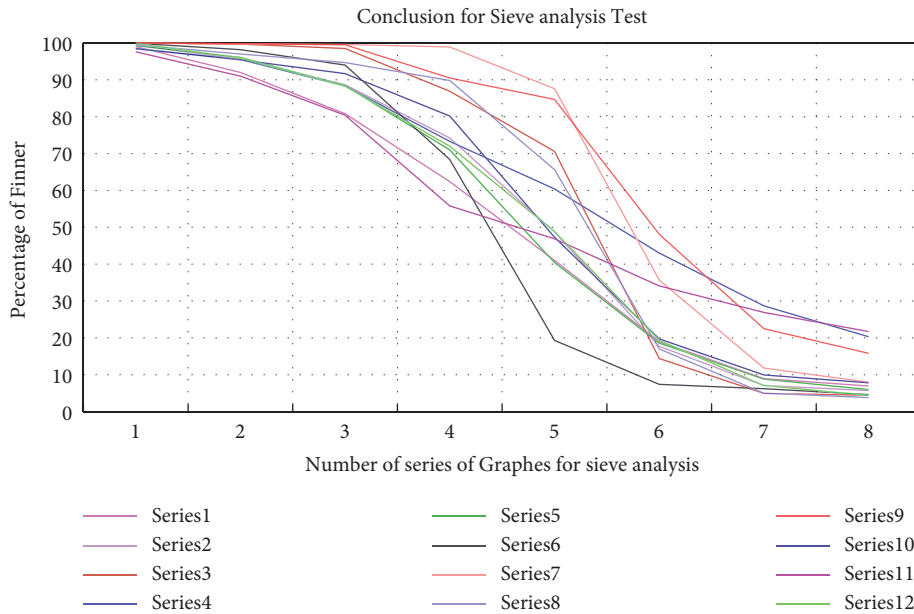


FIGURE 8: Sieve analysis test (source: test results conducted for this study).

TABLE 2: Sieve analysis results and finesse modulus.

Series numbers	Sieve standard for concrete production ASTM C-33 AASHTO M 6-93	Percentage of finer at each (mm) size of sieve (%)								% age satisfy	Grading zone	Finess modulus ASTM C-33
		9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 μm	300 μm	150 μm	0-10			
Series 1	Ataye	99	92	80.8	62.4	41	19	8.95	85.7	II	2.97	
Series 2	Je-wuha	99.4	95.4	88.7	74.2	48.7	17.7	7.08	100	II	2.68	
Series 3	Alage	100	99.7	98.5	86.9	70.6	14.4	4.95	71.3	III	2.25	
Series 4	Langanano	98.4	95.5	88.3	73.3	60.4	43	28.7	57.1	IV	2.17	
Series 5	Loliebasuma	99.3	96.1	88.4	71	40.4	18.6	8.8	100	II	2.77	
Series 6	Endalachabi	99.9	98.2	94	68.4	19.3	7.39	6.21	85.7	I	3.05	
Series 7	MelkaJalo	100	99.8	99.6	98.9	87.6	35.7	11.8	42.8	IV	1.67	
Series 8	Atie leman	99.5	97	94.7	89.8	65.6	17	4.96	71.3	III	2.31	
Series 9	Godo	100	99.8	99.5	90.5	84.7	48.1	22.5	42.8	IV	1.55	
Series 10	Kiera	98.5	95.4	91.7	80.2	47.3	19.7	9.96	85.7	II	2.56	
Series 11	Dhiera-deg	97.6	91	80.4	55.8	46.9	34.1	26.9	85.7	III	2.65	
Series 12	Bosatfokie	99.9	95.9	88.3	72	48.9	19.3	7.05	100	II	2.68	

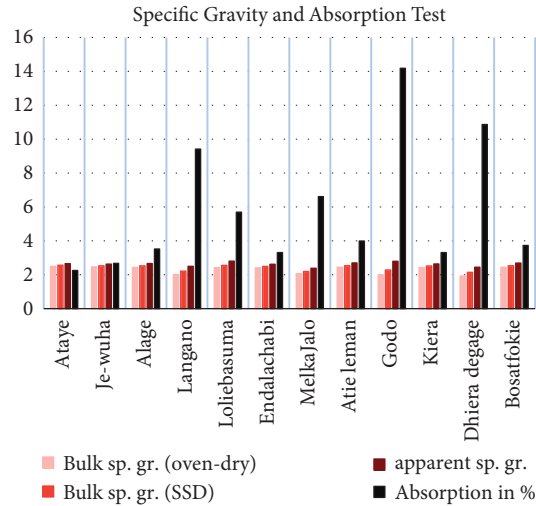


FIGURE 9: Specific gravity and water absorption (source: test results for this study).

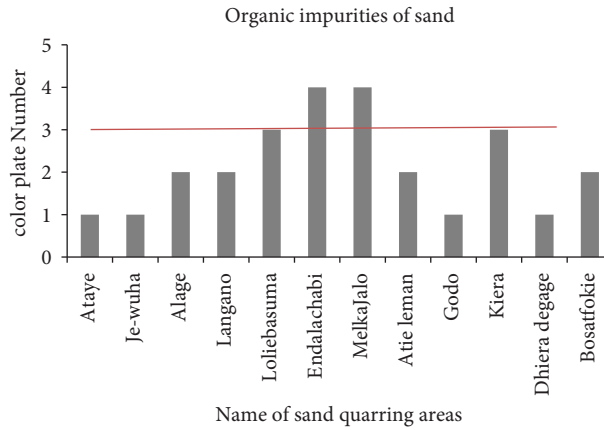


FIGURE 10: Organic impurities (source: test results).

TABLE 3: Organic plate number

Gardner color standard no.	Organic plate no.
5	1
8	2
11	3 (standard)
14	4
16	5

TABLE 4: Color value of sand at each quarry site.

No.	Sample name	Organic plate no.
1	Ataye	1
2	Je-wuha	1
3	Alage	2
4	Langano	2
5	Loliebasuma	3
6	Endalachabi	4
7	MelkaJalo	4
8	Atie leman	2
9	Godo	1
10	Kiera	3
11	Dhieradegaga	1
12	Bosatfokie	2

determined to be between 2.4 and 3.0. Absorption, according to ASTM C 70, C 566, and AASHTO T 255 standards of fine aggregate, means the tendency to capture water and it may be ranged from 0.2% to 4% for an acceptable absorption tendency. Bulk specific gravity is used for calculation of the volume occupied by the aggregate in various mixtures such as concrete. As the results presented above (Figure 10), sand taken from Langano, MelkaJalo, Godo, and Deheradegaga do not satisfy the standards provided for bulk specific gravity (SSD), bulk specific gravity (oven dry) and absorption. Exceptionally, Mel-ka-Jelo does not satisfy the apparent

specific gravity and the sand of Lolie-basuma has high absorption capacity above the standard limit. The rest seven (7) sand sample results show that they satisfy all specific gravity and absorption normal standard limits.

TABLE 5: Summary of experimental result.

Name of places	Silt content	Bulking of sand	Moisture content	Unit weight	Silvana	Silvana for mortar (%)	Fineness	Impurity	Sp.gr. (SSD)	Absorption	% of satisfaction
Atayie	0.7	2.5	2	1641.01	85.7	57.1	2.97	1	2.56	2.25	100
Je-wuha	0.76	3.75	4.17	1584.61	100	71.3	2.68	1	2.52	2.67	100
Alagie	1.08	5	2.25	1353.96	71.3	100	2.25	2	2.52	3.52	100
Langano	7.72	15	19.6	963.27	57.1	28.6	2.17	2	2.21	9.41	30
Lolie basuma	2.8	10.75	5.9	1454.96	100	71.3	2.77	3	2.55	5.69	80
Endala chebi	2.48	10	0.4	1544.38	85.7	42.8	3.05	4	2.49	3.31	70
Melkajelo	4.38	11.25	10.4	1238.08	42.8	85.7	1.67	4	2.19	6.61	30
Atie leman	1.18	15	3.7	1481.64	71.3	85.7	2.31	2	2.53	3.99	90
Godo	8.46	25	6.4	1258.85	42.8	57.1	1.55	1	2.28	14.2	40
Kiera	2.04	15	6.16	1400.52	85.7	57.1	2.56	3	2.51	3.31	90
Dhera-deg	7.8	18.57	9.3	1078.71	85.7	28.6	2.65	1	2.14	10.9	30
Bosatfokie	1.8	5	3.5	1649.54	100	71.3	2.68	2	2.53	3.73	100

7.7. Organic Impurities of Sand

7.7.1. Discussion about Organic Impurities of Sands.

According to Designation, as shown in the tables above (Tables 3 and 4 and Figure 10) C 40-04 or ASTM C 0040-04 standard, when a sample is subjected to this test procedure, produces a color darker than the standard color, or Organic Plate No. 3 (Gardner Color Standard No. 11), the fine aggregate under test shall be considered to possibly contain injurious organic impurities. It is advisable to perform further tests before approving the fine aggregate for use in concrete and other construction structures. Therefore, from the above results, most sands have a color plate number less than or equal to plate No 3. That means someone can use that sand without any fearing of high impurity content. The other two sand samples (Endal chebi and MelkaJello sands) have impurity color indicator number 4 which is greater than 3. The presence of organic impurities in fine sand affects the concrete setting time, creates efflorescence, deposit of white salts on the surface of concrete structure, and corrosion of reinforcement. Therefore, it is advisable to perform further tests for those sands to reduce the content of impurities by using different admixtures or other organic impurities reduced before using for construction.

8. Summary of Tests

9. Conclusion

In Ethiopia, even though the government and the people are deeply involved in reconstructing and development of the country, construction project activities are limited and require professional studies. From our study on the characteristics of sand and as generalized above with Table 5, the following conclusions are drawn based on the main points of research.

- (i) Sieve size analysis determines the grade size of sand to show the compliance of particle size distribution with applicable specification requirements, to

develop relationships concerning porosity and packing and to determine the zone grade of sand type. Fineness Modulus is the measurement of the grading of sand that represents the mass average size of the sieve required for mix proportion since sand gradation has the largest effect on workability. Organic impurity of sand is the quantity of deleterious substances in sand and the test leads us to determine the acceptability of impurity content by standard color indicator plate that do not delay the setting and hardening of concrete or affects the strength of mortar.

- (ii) Unit weight of sand is the weight of a given volume of sand measured and shows the volume sand will occupy in concrete and includes both the solid sand particles and the voids between them. The specific gravity of a substance is the ratio between the weight of the substance and that of the same volume of water to determine the water absorption capacity and permeability of the particle.
- (iii) Silt content is the number of finer particles in natural sand and a test for silt content is used to determine the extent of finer particles and the measurement of contented. The moisture condition of sand refers to the presence of water in the pores and on the surface of sand particles, and it determines the consistency at which the solids content of the paste and the paste content of the mix are such that they produce the maximum solids content possible with the given materials. Bulking of sand is delivered under the dump condition of sand in which a wide variation can occur in the batching of mix quantities if the batching is by volume.

Generally, there are different characteristics of sand which require their own separate tests and standards. However, the major and most important tests are examined in this research for the samples taken in the study. As shown in the discussion and tables above, sand of Atayie site, Je-wuha, Alagie, and Bosat Fokie satisfies 100% all test

standards. In the same way, Kiera and Atie-Leman sand sample satisfies the 90% test requirement, while Loliebasuma sand satisfies 90% test and Endala chebie satisfies 70% tests among 10 tests with respective requirements. However, the result of sand samples taken from Langano, Godo, Melka-Jelo, and Dehera Degaga satisfies below 50% of the tests among the 10 test parameters. This implies that those sands require different professional measurements regarding their characteristics or they are approached to be rejected if someone cannot prevent their failure character.

10. Recommendation

This research that we conducted had passed many obstacles and we were taking time, cost, and energy. The researchers' recommendations are: to use the most appropriate sand for different works based on this research finding and to use appropriate correction measurements for the failed character of sand at its natural condition. In addition to this, giving proper attention in quarrying and transporting sand with good quality to customers, keeping non-exertion of any affects is very helpful to get sand without losing its natural characteristics and to apply possible measures where necessary for failure properties. Further study of organic impurities, geological characters, environmental factors, and chemical compound contents of sand is highly recommendable for researchers. Generally, all peoples have been responsible to put their own role on the development of technology and construction industry in our country, Ethiopia. Especially on-site professionals and academicians are expected to participate in new investigations of technology and reduction of weak usage of available resources and technology using their own different skills, knowledge, and any other performance.

Data Availability

The summarized experimental investigation data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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