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Soil Stabilization Using Terrasil And Zycobond on Ijikoyejo Street Surulere Lagos State Nigeria

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ABSTRACT: Deep excavation of unsuitable soil in road construction have resulted in escalation of the cost of soil exchange and total project sum of construction, one of the possible ways of cost reduction is to stabilized the existing subgrade material (sandy silty-clay) by using the mixture of terrasil, zycond and water. Consequently, the objective of this paper is to investigate the application of soil stabilization with Terrasil and Zycobond on Ijikoyejo Street Surulere Lagos State Nigeria using approproitae standard procedures including collecting Three samples marked Ch.0+100, Ch.0+300 and Ch.0+550. Data obtained in the Engineering test show that the mixture of Terrasil/Zycobond /Water is able to increase the CBR values. In sample A, 11.5 to 64.4% with ratio 1:2:50, 11.5 to 49.3% with ratio 1:2:100, 11.5 to 33.9% with ratio 1:2:150, from 11.5 to 22.8% with ratio 1:2:200. In sample B, 13.8 to 67.6% with ratio 1:2:50, 13.8 to 48.4% with ratio 1:2:100, 13.8 to 31.3% with ratio 1:2:150, 13.8 to 22.3% with ratio 1:2:200. Ins sample C, 11.8 to 68.4% with ratio 1:2:50, 11.8 to 45.5% with ratio 1:2:100, 11.8 to 31.3% with ratio 1:2:150, 11.8 to 23.7% with ratio 1:2:200. The compaction results also show that the optimum moisture content (OMC) reduced after the mixture of the additive and in most cases the maximum dry density (MDD) increases. The results of the analysis show that the soil samples with additive improved the Engineering properties of the soil compared to the soil without additive, the higher the concentration of the additive the better the results obtained. Investigation reveals that the mixture of the proportions to sandy silty-clay showed significant improvement on the compaction and CBR values of soil. Therefore, these researches provide a sound platform for the use of terrasil and zycobond as auxiliary additives and reveal their full potentials in soil stabilization.

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Ijikoyejo street road subgrade layer is sandy silty clay soil, as a type of soil, it presents several challenges and considerations in road construction due to its unique properties. it has high plasticity index, meaning it can change shape without cracking. Its cohesive nature means particles stick together, which can be both beneficial and detrimental depending on the situation. Sandy silty clay soils have fine particles that retain water, leading to poor drainage, this can cause water to accumulate and weaken the soil structure, it is prone to significant volume changes with moisture content variations, it swells when wet and shrinks when dry, leading to instability, this soil type often has low shear strength, making it susceptible to deformation and failure under loads, Road pavements in Nigeria have a tendency to deteriorate rapidly due to increased traffic loads, high temperature, poor drainages as well as poor construction materials resulting in surface cracking, reduced skid resistance, rutting etc. Different grade of bitumen like 30/40, 60/70, 80/100 are available on the basics of their penetration values. The intense

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increase in commercial and non-commercial activities and increase in traffic in the road demands for improved roads. For the improvement of the roads, improved binder is needed (Naushad et al., 2017). Prior to the advancement of ground improvement techniques, transportation infrastructures were either redesigned or relocated whenever a soil profile was encountered on the project site. By then, there were many road pavements which failed or collapsed as a result of the foundation pressure exceeding the load bearing capacity of the soil and thereby causing extensive structural damage. Most commonly, damage is caused changes occur within the foundation soils that surround and support the road pavement. The behaviour of a road pavement depends on the properties of the soil materials upon which the structure rests. When finding another location, redesigning a road pavement or removing a troublesome ground at a project site are not practical options, prevailing ground conditions must be addressed. The important features of soil improvement include: improving the shear strength of soil, reducing the potential for total and differential settlement, reducing the time during which the settlement takes place, reducing the potential for liquefaction in saturated fine sand or hydraulic fills, reducing the hydraulic conductivity of soil, removing or excluding water from the soil etc. (Bamisaye and Komolafe, 2011). Conventionally, the norm is to replace low strength soil deposits with engineering fill. Presently, the use of chemical additives such as Portland cement, lime, asphalt, etc., is becoming increasingly popular owing to its economic benefit. While many of these additives have proven successful (Basha *et al.*, 2005), the additives often modify the pH of soils, and may contaminate the soils and groundwater (Dejong *et al*., 2006; Karol, 2003). In recent years, with increasing awareness of environmental issues, there has been a remarkable shift toward sustainable technologies, therefore, terrasil and zycobond can be used to replace old version stabilization chemical, terrasil and zycobond are considered environmentally friendly soil stabilization agents for several reasons, their formulations and application processes aim to minimize negative environmental impacts while providing significant benefits in terms of soil stabilization and infrastructure longevity, terrasil is formulated to be non-toxic to humans, animals, and plants. It does not contain harmful heavy metals or hazardous chemicals, terrasil's components are designed to break down over time, reducing the risk of long-term environmental contamination. Zycobond is made from polymers that are safe for the environment, these polymers are designed to be non-toxic and have minimal impact on soil and water quality, it has ability to bind soil particles helps reduce dust, which can improve air quality and reduce respiratory issues for nearby communities. Terrasil and Zycobond are environmentally friendly soil stabilization agents that offer numerous benefits for road construction and maintenance. Their non-toxic, biodegradable compositions, combined with their ability to improve soil properties and reduce the need for frequent repairs, make them a sustainable choice for infrastructure projects by enhancing the durability and stability of roads while minimizing environmental impact, these products contribute to more sustainable and eco-friendly construction practices. Civil engineers engaging in highway construction have several challenges in defining and improving the properties of the soil and stabilizing the soil to meet highway infrastructure design and construction requirements. Infrastructure according to Areola, (2017) refers to the basic systems and services that a country needs in order to function properly. The level of economic buoyancy of a nation largely depends on the condition of its infrastructural facilities (Ojoawo, 2016). Level of development is largely measured by the level of infrastructural facilities endowment as well as the condition (Pele, 2015). According to the research, the use of soil stabilization products for the improvement of problematic soils is quite widespread across the globe. Over the times, cement and lime have been the two main materials used for stabilizing soils. The high cost of these materials used for stabilization of soil for road construction has led to the need for cheap, available and better alternatives for soil stabilization. Lack of good road construction materials at the needed location also resulted in high cost of road construction in third world countries like Nigeria. Thus, there is need to avert the problems through cheapest, quick and available means in reduction of cost of road construction. Soil stabilization has largely relied on lime, cement, fibers, waste materials, and geo-synthetic materials in recent years. Although effective, many procedures are not environmentally friendly, and some are poisonous, pricey, and frequently contaminate ground water. Civil engineers are attempting to identify viable and cost-effective solutions for soil stabilization using alternative additive that are environmentally friendly in order to have a good approach to ground improvement. Soil stabilization techniques for construction are used in most parts of the world, although, the circumstances and reasons for resorting to stabilization vary considerably. Consequently, the objective of this paper is to investigate the application of soil stabilization with

Terrasil and Zycobond On Ijikoyejo Street Surulere Lagos State Nigeria.

MATERIAL AND METHOD

Description of Study Area: Ijikoyejo street is situated within Surulere Local Government Area, Lagos State, Nigeria. Accessibility to the general area is mainly through the popular Ijeshatedo pako Agunda. Ijikoyejo Street is also home to a mix of residential properties, ranging from single-family homes to multi-story apartment buildings, the street is easily accessible by both pedestrians and vehicles, serving as a crucial artery for transportation within Surulere and connecting to other streets in the area.

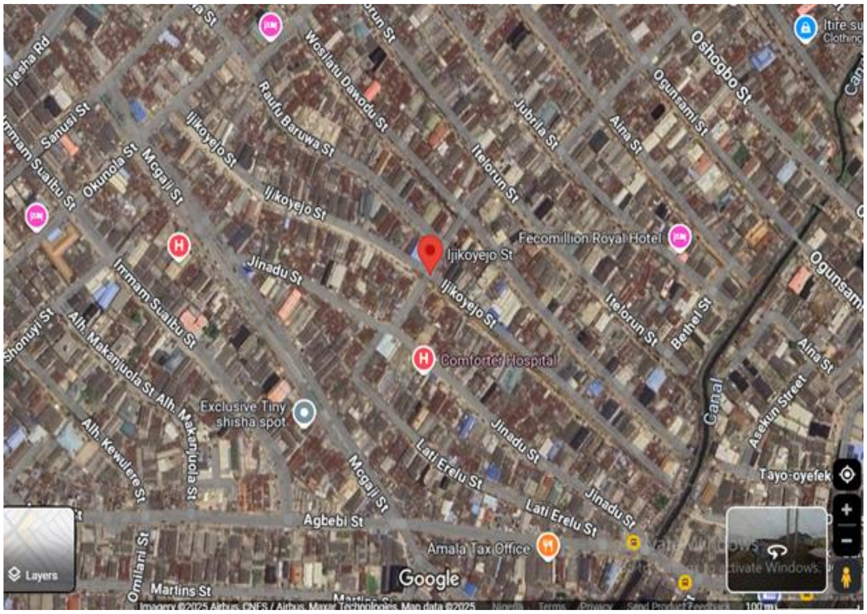

Fig 1: Ijikoyejo street is situated within Surulere Local Government Area, Lagos State, Nigeria (Google map)

Sample Collection and Treatment: The sampling frame for this study includes a comprehensive selection of soil samples from different sections of Ijikoyejo Street Road, Surulere, Lagos State.

Physical soil samples: Sampling site is Ijikoyejo Street Road, Surulere with total road length of 675 meters
Soil Sampling Points are Chainnage 0+100, 0+300 and 0+550, Sample was collected on subgrade layer (0.6meter) after removal of top soil, rubbles and unsuitable materials, three samples were collected at each location

Classification test: samples collected was air-dried and classification test which include Moisture content determination (MCD), Grain size distribution (sieve analysis) and Consistency limit (Atterberg limit) which include Liquid Limit (LL), plastic limit (PL), Plastic index (PI), Shrinkage Limit (SL) was conducted on all samples, after the initial test has been conducted on all the samples, Samples with the highest plasticity index (PI) out of each three from each location were considered for further engineering test in this research work

Moisture content determination (Standard Method): The oven-drying method is the most common and reliable method for determining the moisture content of soil.

Grain size distribution method (Sieve Analysis): The grain size distribution method is used to determine the proportions of different grain sizes within a soil sample. It helps in classifying soils for various engineering and construction purposes. This method involves sieve analysis for coarse-grained soils

Consistency limits (Atterberg limits): Atterberg limits test is used to determine the critical water contents of fine-grained soils, which help in classifying the soil and predicting its engineering behavior. The three main Atterberg limits are the Liquid Limit (LL), Plastic Limit (PL), and Shrinkage Limit (SL), though the Liquid and Plastic Limits are most commonly tested in practice

Laboratory Compaction Test: To determine the relationship between moisture content and dry density of a soil for a given compactive effort, and to establish the optimum moisture content (OMC) and maximum dry density (MDD) of the soil.

Laboratory California bearing ratio test (CBR): The California Bearing Ratio (CBR) test is a penetration test commonly used to evaluate the subgrade strength of roads and pavements. It is carried out in a laboratory to determine the strength of soil or aggregate by measuring the resistance to penetration under controlled moisture and density conditions.

Data Analysis: The preliminary test was analyzed using AASHTO classification and USCS classification

RESULTS AND DISCUSSIONS

The results of the soil samples before and after stabilization of the soil using terrasil and zycobond along the Ijikoyejo street road, Surulere, Lagos State, Nigeria are presented in Tables 1 to Table 10

Soil samples classification: In the classification of soils for use in highway design, the liquid limit and the plasticity index are the most important (Amu, 2010). Classification tests was carried out on the natural soil samples prior to engineering strength tests to classify the soil and to determine the best of the mix ratio for stabilization including the moisture content, particle size distribution and Atterberg limits in accordance with BS 1377 (1990). The results of the tests are presented in Table 1-3.

Table 1: Classification test of samples at location A (Ch 0+100) Ijikoyejo Street Road

Property	Number A1	Number A2	Number A3
%Gravel(<75mm - 4.25mm)	3	2	3
%Sand (<4.25mm to 2.00mm)	19	20	21
%Fine (<0.425 - 0.075mm)	43	43	42
%Silty clay(0.075mm)	35	35	34
Liquid Limit (%)	30	36	30
Plastic Limit (%)	15.1	19.6	19.4
Plasticity Index (%)	14.9	**16.4**	10.6
Linear Shrinkage Limit (%)	11	9.5	10
Colour	Dark brown	Dark brown	Dark brown
Average moisture content (%)	13.2	11.3	15.1
AASHTO Classification	A-2-7	A-2-7	A-2-7

USCS Classification : Classification test which include determination of moisture content, particles size distribution (sieve analysis) and consistency limit (Atterberg limit) was conducted on three soil samples at this location. The soil samples were classified as Sandy silty clay, AASHTO Classification for the three samples is A-2-7 and USCS Classification for the three samples is CL (sandy silty clay), Number A2 has the highest plasticity index (16.4%) and sample was subjected to compaction and CBR test.

Table 2: Classification test of samples at location B (Ch 0+300) Ijikoyejo Street Road

Property	Number B1	Number B2	Number B3
%Gravel(<75mm - 4.25mm)	3	3	3
%Sand (<4.25mm to 2.00mm)	20	20	21
%Fine (<0.425 - 0.075mm)	43	37	42
%Silty clay(0.075mm)	35	34	34
Liquid Limit (%)	26	28	31
Plastic Limit (%)	16.6	16	19.3
Plasticity Index (%)	9.4	**13**	11.7
Linear Shrinkage Limit (%)	10.7	9	9
Colour	Dark brown	Dark brown	Dark brown
Average moisture content (%)	13.1	14	12.2
AASHTO Classification	A-2-7	A-2-7	A-2-7
USCS Classification	CL	CL	CL

Classification test which include determination of moisture content, particles size distribution (sieve analysis) and consistency limit (Atterberg limit) was conducted on three soil samples at this location. The soil samples were classified as Sandy silty clay, AASHTO Classification for the three samples is A-2-7 and USCS Classification for the three samples is CL (sandy silty clay) Number B2 has the highest plasticity index (13.0%) and sample was subjected to compaction and CBR test.

Table 3: Classification test of samples at location C (Ch 0+550) Ijikoyejo Street Road

Property	Number C1	Number C2	Number C3
%Gravel(<75mm - 4.25mm)	3	4	3
%Sand (<4.25mm to 2.00mm)	25	24	22
%Fine (<0.425 - 0.075mm)	37	38	38
%Silty clay(0.075mm)	34	36	36
Liquid Limit (%)	34	36	37
Plastic Limit (%)	19	17.9	17.5
Plasticity Index (%)	15	18.1	**19.1**
Linear Shrinkage Limit (%)	9.3	9.7	10
Colour	Dark brown	Dark brown	Dark brown
Average moisture content (%)	15.1	11.1	10.8
AASHTO Classification	A-2-7	A-2-7	A-2-7
USCS Classification	CL	CL	CL

Classification test which include determination of moisture content, particles size distribution (sieve analysis) and consistency limit (Atterberg limit) was conducted on three soil samples at this location. The soil samples were classified as Sandy silty clay, AASHTO Classification for the three samples is A-2-7 and USCS Classification for the three samples is CL (sandy silty clay) Number C3 has the highest plasticity index (19.1%) and sample was subjected to compaction and CBR test.

Compaction and CBR test on the selected soil samples without additive

Compaction test results: Laboratory compaction tests (Standard Proctor tests) was conducted on natural samples and stabilized samples with different mix ratio as specified in this research and compare their results.

Table 4: Compaction test on selected samples without Terrasil /Zycobond/Water

	MDD (g/cm^3)	OMC (%)
Sample A	1.98	12.4
Sample B	2.07	11.2
Sample C	2.03	13.6

Key; *Number A2 = Sample A; Number B2 = Sample B; Number C3 = Sample C*

Compaction test are essential for determining the compaction characteristics of soils. They provide critical information on the optimal moisture content and maximum dry density, which are crucial for ensuring the stability and durability of soil structures in construction projects. Understanding these parameters helps engineers design and execute soil compaction processes effectively in the field.The compaction test was conducted using clean tap water without addition of Terrasil/ Zycobond, the optimum moisture content (OMC) is between 11.2 to 13.6% while the maximum dry density (MDD) is between 1.98 to 2.07g/cm^3

California Bearing Ratio (CBR) test results: California Bearing Ratio (CBR) test will be conducted on the natural soil samples also on stabilized samples with different mix ratio as specified in this research and the results will be presented below. The California Bearing Ratio (CBR) test is a penetration test developed by the California Division of Highways to evaluate the strength of subgrade soil, subbase, and base course materials. It is widely used in the design of pavement and road construction to assess the load-bearing capacity of the soil.

The CBR test is a vital tool in civil engineering for evaluating the strength and bearing capacity of soil used in road and pavement construction. It helps engineers design and construct more durable and efficient pavements by providing crucial data on soil performance under load. Understanding and interpreting CBR values enable informed decision-making in the selection and treatment of soil materials for various construction applications

Table 5: California Bearing Ratio (CBR) test on soil sample without Terrasil/Zycobond/Water

	Soaked CBR(%)	Dry density before soaked (g/cm^3)	Dry density after soaked (g/cm^3)	Average moisture contents Before Soaked	Average moisture contents after soaked
Sample A	**11.5**	1.9	1.9	9.3	13.4
Sample B	**13.8**	1.64	1.64	9.4	20.1
Sample C	**11.8**	1.84	1.84	8.5	16.4

Key: *Number A2 = Sample A; Number B2 = Sample B; Number C3 = Sample C*

Table 6: Compaction test on selected samples with mixture on Terrasil /Zycobond/Water

	Mix ratio of Terrasil/Zycobond/ Water	MDD (g/cm3)	OMC (%)
	1:2:50	2.05	7.0
Sample A	1:2:100	2.06	7.2
	1:2:150	2.03	7.9
	1:2:200	2.04	7.4
	1:2:50	2.09	10.0
Sample B	1:2:100	2.08	10.4
	1:2:150	2.07	10.4
	1:2:200	2.01	10.7
	1:2:50	2.04	8.3
Sample C	1:2:100	2.02	10.0
	1:2:150	2.07	10.6
	1:2:200	2.02	11.2

Key: *Number A2 = Sample A; Number B2 = Sample B; Number C3 = Sample C*

The soaked CBR of the three samples ranging from 11.5 to 13.8%, the soil samples were able to achieved this CBR values because of the sandy material present in the samples, clay material is the dominant and that was the reason of suggesting soil stabilization.

Compaction and CBR test on the selected soil samples with additive: The soil samples were compacted using different mix ratio of Terrasil/Zycobond/water from ratio 1:2:50, 1:2:100, 1:2:150 and 1:2:200, The OMC is ranges from 7.0 to 11.2% and MDD ranges from 2.01 to 2.09g/cm^3 this a proof that moisture content reduces while the maximum dry density increases, Sample A OMC reduce from 12.4 to 7.0% and MDD increased from 1.98 to 2.05g/cm^3.

Table 7: California Bearing Ratio (CBR) test on soil sample with Terrasil/Zycobond/Water

	Mix ratio of Terrasil	Soaked CBR(%)	Dry density	Dry density	Average moisture	Average moisture

	/Zycobond/ Water		before soaked (g/cm)	after soaked (g/cm^3)	contents before soaked	contents after soaked
	1:2:50	**64.4**	1.97	1.96	11.1	13.2
Sample A	1:2:100	**49.3**	1.91	1.93	13.1	14.5
	1:2:150	**33.9**	1.95	1.95	12.5	18.4
	1:2:200	**22.8**	1.94	1.92	11.6	14.1
	1:2:50	**67.6**	1.7	1.66	10	19.1
Sample B	1:2:100	**48.4**	1.66	1.72	13.1	14.5
	1:2:150	**31.3**	1.66	1.72	12.6	14.6
	1:2:200	**22.3**	1.66	1.76	10.7	12.8
	1:2:50	**68.4**	1.98	1.95	9.8	13.1
Sample C	1:2:100	**45.5**	1.9	1.89	13.1	15.1
	1:2:150	**31.3**	1.9	1.84	12.6	17.3
	1:2:200	**23.7**	1.87	1.84	14.4	17.3

Key: *Number A2 = Sample A; Number B2 = Sample B; Number C3 = Sample C*

CBR value of soil without additive in sample A is 11.5% after the mix ratio of Terrasil/Zycobond/Water (1:2:50) it increased rapidly from 11.5 to 64.4% when the dilution was increased from ratio 1:2:100 the CBR value is 49.3% when the dilution was increased to 1:2:150 the CBR value is 33.9%, when the dilution was increase to 1:2:200 CBR value is 22.8% For sample B, CBR value of soil without additive in sample B is 13.8% after the mix ratio of Terrasil/Zycobond/Water (1:2:50) it increased rapidly from 13.8 to 67.6% when the dilution was increased from ratio 1:2:100 the CBR value is 48.4% when the dilution was increased to 1:2:150 the CBR value is 31.3%, when the dilution was increase to 1:2:200 CBR value is 22.3%.For sample C, CBR value of soil without additive in sample C is 11.8% after the mix ratio of Terrasil/Zycobond/Water (1:2:50) it increased rapidly from 11.8 to 68.4% when the dilution was increased from ratio 1:2:100 the CBR value is 45.5% when dilution was increased to 1:2:150 the CBR value is 31.3%, when the dilution was increase to 1:2:200 CBR value is 23.7%.

Table 8: Summary of all Compaction test and California Bearing Ration (CBR)test

	California Bearing Ratio Modified AAHTO						Compaction test	
	Mix ratio of Terrasil/Zycobond /Water	**Soaked BR (%)**	**Dry density before soaked (g/cm^3)**	**Dry density after soaked (g/cm^3)**	**Average moisture contents before soaked**	**Average moisture contents after soaked**	**MDD (g/cm^3)**	**OMC (%)**
	Soil only	**11.5**	1.9	1.9	9.3	13.4	1.98	12.4
	1:2:50	**64.4**	1.97	1.96	11.1	13.2	2.05	7.0
Sample A	1:2:100	**49.3**	1.91	1.93	13.1	14.5	2.06	7.2
	1:2:150	**33.9**	1.95	1.95	12.5	18.4	2.03	7.9
	1:2:200	**22.8**	1.94	1.92	11.6	14.1	2.04	7.4
	Soil only	**13.8**	1.64	1.64	9.4	20.1	2.07	11.2
	1:2:50	**67.6**	1.7	1.66	10	19.1	2.09	10
Sample B	1:2:100	**48.4**	1.66	1.72	13.1	14.5	2.08	10.4
	1:2:150	**31.3**	1.66	1.72	12.6	14.6	2.07	10.4
	1:2:200	**22.3**	1.66	1.76	10.7	12.8	2.01	10.7
	Soil only	**11.8**	1.84	1.84	8.5	16.4	2.03	13.6
	1:2:50	**68.4**	1.98	1.95	9.8	13.1	2.04	8.3
Sample C	1:2:100	**45.5**	1.9	1.89	13.1	15.1	2.02	10
	1:2:150	**31.3**	1.9	1.84	12.6	17.3	2.07	10.6
	1:2:200	**23.7**	1.87	1.84	14.4	17.3	2.02	11.2

Key: Number A2 = Sample A; Number B2 = Sample B; Number C3 = Sample C

The table 8 show the summary of the Engineering test, mixture of Terrasil/Zycobond//Water is able to increase the CBR values. For sample A: From 11.5 to 64.4% with ratio 1:2:50, 11.5 to 49.3% with ratio 1:2:100, from 11.5 to 33.9% with ratio 1:2:150, from 11.5 to 22.8% with ratio 1:2:200. For sample B: From 13.8 to 67.6% with ratio 1:2:50, 13.8 to 48.4% with ratio 1:2:100, from 13.8 to 31.3% with ratio 1:2:150, from 13.8 to 22.3% with ratio 1:2:200. For sample C: From 11.8 to 68.4% with ratio 1:2:50, 11.8 to 45.5% with ratio 1:2:100, from 11.8 to 31.3% with ratio 1:2:150, from 11.8 to 23.7% with ratio 1:2:200. The compaction results also show that the optimum moisture content (OMC) reduced after the mixture of the additive and in most cases the maximum dry density (MDD) increases. This show that the CBR value of ratio 1:2:200 is good enough for Sub grade layer of the road according to the design, we can now choose the best proportion base on the project budget, mixture of Terrasil/Zycobond/water can also use to stabilized the other layers of the road in order to make it water proof (water would not able to percolate from above or below the pavement layers. Field compaction test on natural soil subgrade before and after application of the optimum mix ratio of the additive. After the investigation, the result achieves a suitable mixed proposition that can be used to achieve the optimum percentages of stabilization and the effectiveness of Terrasil and Zycobond on subgrade layer or other layers of the road, also it showed good compaction result, maximum dry density and other engineering properties. See Table 4.8 for the Engineering properties of the soil samples.

Field compaction test: Compaction test was conducted on natural subgrade and stabilized subgrade on the project site then compared and present the results to see the effectiveness of Terrasil, Zycobond and Water mixture using the selected mix ratio for the research work.

Table 9: Field compaction test on subgrade soil without stabilization using dynamic plate load machine

	Point 1 MN/m^2	Point 2 MN/m^2	Point 3 MN/m^2
Sample A	11.37	11.52	4.84
Sample B	12.16	10.31	10.70
Sample C	13.33	11.58	11.22

Key: Ch 0+100 = Sample A; Ch 0+300 = Sample B; Ch 0+550 = Sample C

Table 10: Field compaction test on stabilized subgrade soil using dynamic plate load machine

	Point 1 MN/m^2	Point 2 MN/m^2	Point 3 MN/m^2
Sample A	46.11	51.61	55.15
Sample B	47.57	49.23	52.82
Sample C	47.37	53.19	52.57

Key; *Ch. 0+100 = Sample A; Ch. 0+300 = Sample B; Ch. 0+550 = Sample C*

The mixture of Terrasil/Zycobond/water with ratio 1:2:50 was prepare and sprayed on Subgrade layer. At location A, point 1 the compaction results achieved using Dynamic plate machine are 11.37MN/m^2 before spraying and 46.11MN/m^2 after spraying the additive, at point 2, before result is 11.52MN/m^2 and after spraying 51.61MN/m^2, at point 3 before results is 4.84MN/m^2 after spraying 55.15MN/m^2. At location B, point 1 the compaction results achieved using Dynamic plate machine are 12.60MN/m^2 before spraying and 47.57MN/m^2 after spraying the additive, at point 2, before result is 10.31MN/m^2 and after spraying 49.23MN/m^2, at point 3 before results is 10.70MN/m^2 after spraying 52.82MN/m^2. At location C, point 1 the compaction results achieved using Dynamic plate machine are 13.33MN/m^2 before spraying and 47.37MN/m^2 after spraying the additive, at point 2, before result is 11.58MN/m^2 and after spraying 53.19MN/m^2, at point 3 before results is 11.22MN/m^2 after spraying 52.57MN/m. The rate of sprayed is 3 liters/m^2

Conclusions: Ijikoyejo Street Road, like many roads in Lagos State, suffers from poor soil conditions, leading to frequent maintenance issues and reduced lifespan of the road. The application of Terrasil and Zycobond has the capacity to address these shortcomings by enhancing the soil's engineering properties. The high plasticity index suggests that these soils may be more susceptible to changes in moisture content, potentially leading to issues like swelling, shrinkage, or reduced load-bearing capacity. Design measures should account for these potential challenges to ensure long-term stability and durability. It is therefore necessary to Develop a comprehensive plan that includes the selection of appropriate mix ratios for different sections of the project, ensuring that the most effective and economical solution is applied where needed. This approach will help in achieving the desired soil stabilization while managing costs effectively.

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Data Availability Statement: Data are available upon request from the corresponding author

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