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A CONCEPT OF USING LOCAL MATERIALS IN ROAD CONSTRUCTION

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Abstract : *Roads are the backbone for the development of any country. Now days good quality of roads like Expressway, National highway, state highway etc has been constructing in our country. These networks of roads are providing speed in development. The study of advance construction materials a highway engineer tries to achieve these requirements by numbers of laboratory tests and finalize the best result obtained. This presentation tries to identify to achieve best quality in materials locally available for construction of roads.*

In this presentation I have focused on the highway construction materials its characteristics and qualities etc. Sub grade soil, fly ash, stone aggregates, bitumen etc has been fully discussed. During construction of roads soil is very important material for construction of sub grade because the loads which come on the roads are ultimately transferred on sub grade. Fly ash is also very important materials for construction of roads. Huge quantity of fly ash is accumulated by thermal power plants. The use of fly ash is very good material for construction of roads. Its consumption for road construction protects the environment also. Stone aggregates and bituminous materials has also fully discussed. The testing of materials, its quality standards and specifications are useful for construction of highway project.

The treatment has made possible to use locally available in situ material. It also replace the granular material i.e. GSB material in sub base course, and also consolid system reduces the demand for heavy wearing course save resources and construction time. " A Study on Soil Stabilization through Innovative Material for Construction of Rural Roads A Case Study of East Gujarat ByUjjvalJ. Solanki , Dr. N.C. Shah, R.G. Dhamsaniya, M.D. Barasara ".

In this presentation I have focused on the local available material (silt) to be used as highway construction material at appropriate layer specially in sub base layer.

Key Words : **Stone Ballst1, Stone Dust2, Silt3, Morth4, Subgrade5.**

INTRODUCTION: Transportation is an important mode for development of any country. The adequate transportation facilities/system helps in the development in the economical, industrial and social and over all development of the country.

There are four major modes of transport.

Roadways and Highways

Railways

Waterways

Airways

Construction of road pavement, its drainage system, development, planning, alignment, geometric design, highway traffic operation and its control, pavement design, construction and maintenance materials, economic consideration finance and admin systems are deals within the highway engineering. Indian Road Congress has divided the roads in different categories like village road, Major district road, Other district road, State highway, National highway and express way. Development of any country greatly depends upon road network development. Now a days our government has focused for the construction of roads .For the construction of roads many materials are uses,it depends the type of road and available fund for construction of that road. IRC –SP 72 Clause 5.2 presents the guideline for construction of roads with locally available materials like selected granular soil for sub grade, stabilization of local soil, bricks and overburden brick metal, industrial waste, stone metal, naturally occurring softer metals like kankar, mooram etc.

Literature Review : Various materials are used in the construction of roads but it is an intelligence of a highway engineer to select an appropriate material suitable for a particular road project which is also be locally available and should be cheap. Prominent engineers and researchers made a no of research work to explore the construction materials for roads situated at different locations. By studying the works carried by the intelligent researchers will be helpful to study and make understanding about the highway construction materials.

*[1]***A Study on Soil Stabilization through Innovative Material for Construction of Rural Roads - A Case Study of East Gujarat ByUjjvalJ. Solanki , Dr. N.C. Shah, R.G. Dhamsaniya, M.D. Barasar .** *The study area is selected by NRRDA at East Gujarat–Rural road to check the improvement in soil parameter useful for rural road construction. The soil in East Gujarat contain Gravel with marginal proportion of clay particles. For efficient performance Consolid system demand equal proportion of Gravel, sand and silt & clay particles. One study stretch of length 1 Km is constructed by locally available in situ clay with treatment by Consolid system and CBR, UCS and Capillary rise tests are performed. Soak CBR is improved 18.55% from 3.2% and UCS is improved 2000 kPa from 250 kPa. which shows significant improvement in engineering properties of soil.*

The treatment has made possible to use locally available in situ material. It also replace the granular material i.e. GSB material in sub base course, and also consolid system reduces the demand for heavy wearing course save resources and construction time

*[2]***Analysis of Control Measures for Settlement of Differences on the Problems of Highway Subgrade Widening Yuyan Wang Chongqing Transportation University, Chongqing, China .** The general methods of subgrade compaction are static compaction, vibratory compaction, tamping compaction and impact compaction . For widening subgrade, construction of static rolling and vibration road roller in existing objectively are hard to fully meet the requirements of widening subgrade and to overcome differences in deformation. While the impact compaction has great impact energy, it can increase the influence of depth, improve soil compaction, and achieve the soil elastic state more easily. Therefore, in widening engineering, improvement of subgrade impact compaction can not only have a better compactness and integrity, but also can accelerate the speed of new subgrade settlement.

*[3]***Use of Locally Available Materials in Pavement Sub-BaseBarik , Shubhakanta** An attempt has been made to utilise two types of materials such as the slag, a waste material from the steel industries and locally and abundantly available gravel (moorum) in the road sub-bases. The chemical composition, phase composition, toxic and heavy metals present in both the slag and its leachate water are studied. Its gradation and other physical properties are studied by using suitable tests and techniques. Conventional crushed aggregates are also used in conjunction with the slag or moorum to satisfy the desired grading for use in a particular layer as per the specifications of the Ministry of Road Transport and Highways. The optimum percentage of the slag and moorum that can be used in sub-base layer is found to be 80% and 50% respectively. In case of moorum, cement has also been used in required quantity to get the desired strength. The physical properties have been studied. It is observed that both the slag and hard moorum have excellent properties as road aggregates and can be used in the road base and sub-base applications.

*[4]***Evans and Hicks (1982)** Tried excellent basalt, two low quality marine basalts, and a fine grained hill sand. The blend properties assessed which incorporate dia. metral versatile modulus and a dia. metral weakness life for both as compacted example and example moulded by dampness introduction. Layered versatile outline standard were utilized with the dynamic test results to create layer equivalencies for emulsion treated negligible total contrasted and hot blend black-top cement. The outcomes show that that beneficiation of minor total with black-top emulsion ought to make satisfactory clearing quiets, especially for low volume streets.

*[5]***Al-Abdul Wahab and Asi (1997)** utilized moderate setting emulsified black-top and medium curing lessening black-top to settle both marl and rise sand. Lime and Portland bond (2% and 4%) were added to the settled soils to quicken the curing procedure and to lessen strength misfortune because of water harm. It was found that balanced out operators enhanced both shear quality and imperviousness to the broke down soils to water harm. It was watched that Portland concrete was more compelling than lime.

*[6]***Asiet al. (1999)** completed test to explore the practical utilization of frothed black-top innovation in Saudi Arabia to enhance the common ridge sands for conceivable use as a base or sub base material. A few variables were explored to assess the relative change of ridge sand and to allow the improvement of outline methodology for the future utilization of 9 frothed black-top innovation in the cruel climatic states of eastern Saudi Arabia. Measurable examination of the outcomes was utilized to confirm the impacts of emulsified black-top and frothed black-top treatment, with and without the expansion of Portland concrete, on the quality attributes of the treated blends, top blends, when contrasted with that of the emulsified black-top blends.

*[7]***Nageim et al. (2012)** led different tests which went for growing new icy bituminous emulsion blends (CBEM) containing fly slag from burned residential and mechanical byitems contrasted and those after effects of customary control frosty containing OPC and hot blend black-top. The principle targets of the analyses were to examine the change in mechanical properties of CBEM‟s because of consolidating

OPC, and recognize the likelihood of supplanting the OPC with waste fly fiery remains materials. The blends mechanical properties explored were; ITSM, creep firmness. Toughness in term of water affectability was examined as well.

*[8]***Khadijeh Moosavi, Behzad Kalantari (2011)** directed examinations to enhance bearing limit of wind-blown sand. The change in the mechanical quality of settled examples was contemplated by California Bearing Ratio (CBR) test. The curing period utilized are 7, and 28 days for both, un-drenched and splashed specimens. The got results demonstrate that CBR estimations of windblown sand treated with concrete fundamentally increments by rate of bond increments. Imperviousness to disappointment because of forced heaps of this kind of sand treated with concrete increments with time. 1%, 3%, 5%, 7%, 9%, 11%, and 13% of the mounts of concrete was added to the dirt and it was turned out to be clear that if under (100 kg/m^3) of customary bond Portland is blended with wind-blown sand and compacted at their ideal dampness content, following 28 days of curing expand the CBR of in-situ wind-passed up more than 23 folds (from 7.2% to 172%) for un doused examples,

[9] **Brown and Needham (2000)** measured the rate at which mixture of bitumen beads created and stuck to the total particles, since this is the beginning instrument by which mechanical properties of the blend are produced. The study was then stretched out to get a comprehension of the properties of emulsion mixed with OPC, hydrated lime or limestone filler. This was done since it was felt that a commitment to "tying" of the total in blends originated from the hydration of bond and from the blended bitumen. Element Shear Rheometer tests were utilized on different mixes exhibiting the solidifying impacts of both OPC and hydrated lime and that filler had little impact. The emulsifying procedure was additionally indicated to have no impact on the qualities of the base bitumen. Electron microscopy was utilized to study the crystalline structures of completely cured blends with and without OPC expansion. Master translation considered that a percentage of the qualities of concrete hydration impacts were available in those blends consolidating OPC. The study inferred that the enhancements to key properties of icy blend by the expansion of OPC can be clarified by a scope of components, including enhanced rate of emulsion mixture after compaction, concrete hydration and upgrade of cover thickness.

*[10]***Yan et al. (2010)** decided the weakness properties of black-top emulsion and froth black-top frosty reused blends utilizing the Nottingham Asphalt Tester (NAT) (Cooper NU-14 analyzer). In this examination, froth and emulsion cool reused blends were assessed for backhanded rigidity, firmness modulus at three temperatures and four anxiety levels, and exhaustion life at 15 _C and four anxiety levels. Furthermore, the law of dislodging and split improvement were additionally investigated amid the exhaustion testing. The outcomes demonstrated that solidness modulus diminished with expanding temperatures and anxiety levels.

*[11]***Through circuitous tractable Mofreh F. Saleh (2007)** made an expense examination activity looking at the capital expense of eight base course adjustment choices notwithstanding hot blend black-top (HMA). Bond, 11 lime and froth bitumen adjustment versus HMA plan options were analyzed. The froth settled blend speaks to a great base course material balanced out with 2.0% concrete and 3.5% froth bitumen. The consequences of this examination demonstrated that froth bitumen adjustment utilizing excellent totals and around 2% bond is aggressive contrasted with unbound materials in light of the fact that a diminished layer thickness is needed.

*[12]***Sariosseiri and Muhunthan (2009)** investigated the utilization of Portland bond in the adjustment and adjustment of soils in the condition of Washington, USA. Concrete was included rates of 2.5, 5, 7.5, and 10%, by dry weight of the dirts. Research facility tests to focus the drying rate of the dirt, Atterberg limits, compaction attributes, unconfined compressive quality, and united un depleted tri hub conduct were performed. Aftereffects of the examination indicated huge change in drying rate, workability, unconfined compressive quality, and shear quality.

*[13]***Niazi and Jalili (2009)** utilized Portland concrete and lime as added substances in Cold InPlace Recycling (CIR) blends. The Portland concrete was presented in powder shape and lime used as hydrated lime in powder frame and lime slurry, and the impacts of every added substance on properties of CIR blends has been assessed. The outcomes demonstrated that both lime and Portland concrete can build Marshall Stability, flexible modulus, rigidity, imperviousness to dampness harm and imperviousness to changeless misshapening of CIR blends. Utilization of Portland concrete and lime slurry would be advised to results than hydrated lime however because of the challenges in creating lime slurry by and by, the utilization of Portland bond is prescribed.

*[14]***Zhao et al. (1998)** probed a three-stage bond black-top emulsion composite (CAEC), in which black-top was presented as a pad layer in the middle of coarse totals and concrete mortar network by scattering black-top emulsion-covered coarse totals into concrete mortar framework. Lab

tests on exhaustion, quality, unbending nature, temperature powerlessness, 12 and anxiety strain relationship were actualized to assess the mechanical properties of the CAEC. The preparatory test outcomes demonstrated that CAEC had the greater part of the qualities of both bond and black-top, specifically the more extended exhaustion life and lower temperature powerlessness of concrete cement, and higher sturdiness and adaptability of black-top cement.

*[15]***Cha vez -Valencia et al. (2007)** included polyvinyl acetic acid derivation emulsion (PVACE) was added to a cationic brisk set emulsified black-top to get an altered black-top emulsion that was blended with a neighbor hood total keeping in mind the end goal to set up two sorts of CMA. In the sort I blend, totals were covered by a film of asphalt–polyvinyl acetic acid derivation (A–PVAC) folio. In the sort II blend, before the A–PVAC folio was layered, the total was secured with the polymer by blending the total in a weakened PVAC-E. Since the small scale particles of the polyvinyl acetic acid derivation were all around scattered in the black-top clearing blend lattice for changed CMA sort II, the compressive qualities of test examples were enhanced by 31% contrasted with the qualities acquired with the unmodified

*[16]***Pereza et al. (2013)** explored the mechanical properties of in situ materials with bitumen emulsion. A portrayal is given of the sorts of materials that are settled with bitumen emulsion shortly accessible and diverse theories about their conduct and distinctive properties are set forth. The two primary classifications of mechanical properties researched in the research facility by method for mechanical test are tended to: (a) properties like those of granular materials as per their anxiety subordinate conduct and (b) properties taking after hot blend black-top materials as per their temperature and time-subordinate thick versatile conduct.

*[17]***Liebenberg and Visser (2004)** tested to give some knowledge into the conduct of emulsiontreated materials which has prompted the improvement of interval exchange works that may be utilized as a part of a robotic examination. Emulsion-treated materials act in two stages, a pre cracked and post broke stage. In the pre cracked stage, the material has a firmness that is 13 like that of gently solidified material, while in the post-split stage it has a solidness that is practically identical to that of the untreated material.

*[18]***Ahlrich and Rollings (1993)** assessed the usage of substandard or negligible totals in adaptable asphalt development of air terminal asphalts. This examination was embraced to assess the impacts of utilizing lower quality totals, for example, adjusted uncrushed rock and sands on the rutting of adaptable asphalts. The extent of this exploration study incorporated a survey of accessible writing and existing information (Phase I), a lab assessment composed to focus the impacts of minor totals and potential procedures to redesign these substandard materials (Phase II), and a field assessment including test areas using the most encouraging methods.

*[19]***Pinard and Obika (1997)** plot the outline and development points of interest of reviewed total bituminous seals in light of broad experience of this kind of surfacing in Southern and Eastern Africa. Specific consideration is paid to the properties and qualities of the totals and bituminous fasteners utilized as a part of the development of the seal in connection to its execution and expense adequacy. The paper infers that the utilization of evaluated total seals empower more broad utilization to be made of normally happening, frequently peripheral quality, and materials contrasted with the more ordinary bituminous surface medicines. In positive circumstances, the utilization of these seals can make a noteworthy commitment to the monetary reasonability of up-evaluating rock streets or developing, amazing failure volume streets to bitumen surfaced standard, especially in the remote ranges of creating nations.

Results and discussions : By Reviewing of the findings and conclusions of the various reputed researchers, it could be understand the importance of selection of appropriate materials for the construction of a road and the construction may be made cheaper by mixing locally available materials.

The guidelines laid down by **Dr. N.C. Shah, R.G. Dhamsaniya, M.D. Barasar** road to make improvement in soil parameter useful for rural road construction. The soil in East Gujarat contain Gravel with marginal proportion of clay particles. For efficient performance Consolid system demand equal proportion of Gravel, sand and silt & clay particles. One study stretch of length 1 Km is constructed by locally available in situ clay with treatment by Consolid system and CBR, UCS and Capillary rise tests are performed. Soak CBR is improved 18.55% from 3.2% and UCS is improved 2000 kPa from 250 kPa. which shows significant improvement in engineering properties of soil.

The treatment has made possible to use locally available in situ material. It also replace the granular material i.e. GSB material in sub base course, and also consolid system reduces the demand for heavy wearing course save resources and construction time.

*By studying the topic "*Use of Locally Available Materials in Pavement Sub-BaseBarik, Shubhakanta" the writer had utilised two types of materials such as the slag, a waste material from the steel industries and locally and abundantly available gravel (moorum) in the road sub-bases. The optimum percentage of the slag and moorum that can be used in sub-base layer is found to be 80% and 50% respectively. In case of moorum, cement has also been used in required quantity to get the desired strength. The physical properties have been studied. It is observed that both the slag and hard moorum have excellent properties as road aggregates and can be used in the road base and sub-base applications.

The study of work carried out by Evans and Hicks (1982) made possible to understand the mixing of excellent basalt, two low quality marine basalts, and a fine grained hill sand. The blend properties assessed which incorporate dia. metral versatile modulus and a dia. metral weakness life for both as compacted example and example moulded by dampness introduction. Layered versatile outline standard were utilized with the dynamic test results to create layer equivalencies for emulsion treated negligible total contrasted and hot blend black-top cement. The outcomes show that that beneficiation of minor total with black-top emulsion ought to make satisfactory clearing quiets,

As concern to the dam construction without diverting the water from the river as if specific conditions compel is yet to be explored. I would find perhaps useful the geo textile bags discussed by Rajendra Deshpande, Hindustan Construction Co. Ltd. Mumbai, India on the topic of ''Geo-Textile Sand Container Mattresses (GSCM) Lining For Temporary River Diversion Channels. As A challenge was arisen before us to construct a dam in river Gomti at Lucknow without diverting the water from the river as the specific conditions compel and we found a way to design the same and construct it by using geo bags along with clay and materials required to lay down the filter at the toe of the dam.

By reviewing a no of literature and research papers it could be understand that the scope is always remain to further explore the judicial assessment of mixing any other locally available materials by which the cost of construction could be reduced considerably.

Conclusion : - By studying a no of researches carried out by the learned researchers we found that understand that the scope is always remain to further explore the judicial assessment of mixing any other locally available materials by which the cost of construction could be reduced considerably.

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