

Retrofitting of a Recurrent Swelling Clay Soils

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Abstract: Certainly enhance the strength of the earthquake resistance of structural components to improve performance, but the force of earthquakes. For this reason and in particular for improving the earthquake, seismic improvements is correct. Soil erosion is still in America and many tropical and semi-arid regions of the world is problematic in countries with temperate climates. Including England, Belgium and Germany, as one of the issues to be considered dangerous. Retrofitting in this paper, the soil contains soluble solids, soils and erosion, methods such as the hollow block making, sewing the back, diaphragm wall, inhibiting the cross, carrying the candles, shield tattoo methods, techniques, and the truss with sand.

Key words: Retrofitting, Soil Erosion, Control Building, Earthquakes, Structural

INTRODUCTION

To enhance the resistance against the forces exerted on a structure, more force is used in earthquake resistant construction. Certainly enhance the strength of the earthquake resistance of structural components to improve performance, but the force of earthquakes. For this reason and in particular for improving the earthquake, seismic improvements is correct.

The buildings are divided into four categories. The first buildings that are critical for the type and use of equipment that are not possible and the party should maintain its performance after the earthquake. These buildings include clinics, telecommunications and television stations, and refineries are security centers. The second category consists of buildings that already have certain conditions, but after the earthquake as the services are needed and help is needed and you are standing. In some niches, mosques, schools, centers of macro management and crisis management centers are included. The buildings that are important before and after the earthquake, but the serious damage will result in great loss of life, such as public institutions, stadiums, towers. Four categories of conventional buildings which are not included in any of the above, such as houses, office buildings and commercial medium.

Macro view of the importance and need for retrofitting of buildings to the beginning of the first and fourth categories decreases. But the first and second hand almost no direct impact on reducing the direct toll of earthquake retrofitting and only the third and fourth categories, the direct reduction of earthquake losses involved. Cost and time required for retrofitting the third and fourth categories are so large that it practically made impossible. However, retrofitting old buildings and textures in both the old and new buildings are proposed.

2 Soil Containing Solids:

Many soils contain solids are dissolved. Located on the ocean floor soil, water between the solid particles of soil will probably have the same concentration of salt in sea water. Cation of clay particles is inclined surfaces. When drying the soil, the minerals and ions in solution, part of the mass of solids (MS) are. It works on most soils, at least make the changes in moisture content.

The standard temperature for drying the soil is 110 degrees Celsius. In this case we have:

A - Sand Ottawa:

The soil moisture content is approximately 24 percent.

B - Boston Blue Clay:

The soil moisture content is approximately 33 percent.

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C - Leda Clay:

The soil moisture content during drying at temperatures of 110 degrees Celsius, the temperature under 200 degrees Celsius and 45 percent to 46 percent increase. The temperature sensitivity of soil under test exceed 110 degrees Celsius, slightly increased.

D - Mexico City Clay:

The soil moisture content is very sensitive to temperature tests. For example, at a temperature of 110 degrees Celsius, humidity of 345 percent. While the temperature under 190 degrees Celsius, humidity of 380 percent. Mexico has a porous structure of the clay minerals, clay, and Diatoms are micro-fossils. Diatoms are basically skins that contain water, are hollow silica. At higher temperatures, so more water comes out of the Diatoms and micro-fossils, which led to the moisture content is higher.

E - Diatom Soil:

The soil moisture content is very sensitive to temperature. Temperature under 110 degrees Celsius, the humidity percentage is 620 percent, while the temperature of 200 ° C, moisture content is 800 percent. soils are usually fine silica powder and white, mainly of Diatoms and their remnants have been made up. At higher temperatures, more water comes out of the Diatoms, which leads to higher moisture content.

3 - Soil and Erosion:

Soil erosion is still in America and many tropical and semi-arid regions of the world is problematic in countries with temperate climates. Including England, Belgium and Germany, as one of the issues to be considered dangerous. The problem is that in the vast desert in the soil and have not had much of a good cover is obvious and dramatic.

Prevent soil erosion, which means it has reduced mortality, natural mortality rate nearly equal to the extent that soil erosion rates will depend on the choice of appropriate strategies to protect the soil. This requires understanding the processes of erosion. Only to areas where soil erosion by wind and water and rock or soil below the exposed surface and is cut by water cuts are not related, but low wind areas and valley floors where the ground was covered with sand and sediment from canals and streams that have been filled in on the take. Rate of erosion at various times and locations vary. Deposits in the event that weather conditions are determined by topography, soil type and land use change depends on the position will be eroded. Since the climate is composed of a series of events with different severity of the most important factor in long-term changes in climate, erosion can be considered. However, the characteristics of climate, particularly rainfall, rainfall intensity and wind speed varies in different places. Moreover, when long-term changes may also occur Astdr erosion. Thus, the interaction changes when and where erosion is greatly complicated. Vegetative cover in the shadow of the support (mass of trees or other plants) has been very slow degradation and soil erosion in the formation and equilibrium is established. Favorable natural conditions that affect the balance of the sentence was valid, Rapid population increase and lack of proper utilization of land, steep slopes and heights of the people on the large farming and cattle to roam their pastures because of the excessive and inappropriate cases occur. The operation that caused him to lose his strength soil and due to heavy rainfall and excess irrigation and high winds, erosion is severe, so that erosion on land, in many cases lost their fertility or was completely destroyed. This situation led the people to understand how their actions led to the indiscriminate destruction and soil erosion is. Erosion, although less than in the beginning to be felt, but over time the damage is large it may after several years in a generation is thirty years, the soil to a depth of 30 cm from the ground killed be. Soil erosion has been offset, to nature, especially in dry areas where soil conditions are very unfavorable for the formation is very difficult and long. According to calculations, 500 to 800 years to form one inch of soil is necessary, and if we have an agricultural soil depth of 25 cm is the thickness of the soil, over 20 thousand years there has been an ongoing nature. The loss of soil by a destructive agent such as erosion, flooding or reckless, the thousand-year struggle for human nature is wasted and the other takes thousands of years, the soil may be lost , should be compensated. The main cause of erosion of the differences between the dry and wet there, too much vegetation in wet areas that may play a major role in soil conservation. In areas where forest and pasture vegetation covered the surface of the soil erosion is less effective. In these areas, water, rain and snow on the ground is stored by plants. Plants with water and its penetration in the soil, prevent water flowing on the surface, resulting in soil erosion can be prevented. Vegetation, the soil against wind erosion must also be maintained.

4 - Good Variety of Methods:

4-1 - the Building Block:

To control soil movement and landslides, with specific measures, the walls of your soil to be taken. Marginal land that is to be taken in the first pit, we drilled periodically. The depth of the wells with the depth of the pit, plus some extra for these wells is lower ends of concrete piles.

After drilling, shape or form, put in their profiles. Got stuck and to provide for the inhibitory profiles, the profiles of the pit depth of 0.25 to 0.35, below the pit floor in the digital sector and continue to pile at the end of the dendritic profiles also consider take.

Then, the lower end of the pile, the reinforcement before it has run out and we're concrete. Thus, the steel profiles and steel profiles are contained in the pile, with piles of soil are blocked. After performing the above steps, take the ring to run up. At each step, the step of removing the soil, prevent soil loss, using machines, drilling, particularly in the sump pit where the body of horizontal or miles, about 10 to 15 cm in diameter, excavated pit, the walls are Let. Then placed into the wells to eat together and then we inject into the concrete. During these wells, the soil type and its mechanical and physical parameters, and also depends on the depth of the pit, and its value is about 5 to 10 meters.

After this stage, the prefabricated concrete panels in a vertical profile and put their hand out to the bars of the wells are properly connected and the other hand, the panels are attached to the vertical profiles. Instead of using the prefabricated panels can run them in situ. We also classified the armature on the wall and then onto the wet concrete.

Bars for connecting the panels to come out of the wells we head into the threaded bars made using the perforated anchor plates and nuts, they're involved with the panel.

All the above operations, the stage, we run from top to bottom. Mortar or paste that is used for injection, is a mixture of cement and water or sand, cement and water and that it may also make use of additives. We also of polymeric materials and other than Portland cement-based grout with certain compounds can also be used for injection. Injection with the use of Portland cement, water cement ratio is about 1.5 initially and gradually reduce it to 0.5've. Planning and operations should be injected by specialists familiar with the subject and the use of special devices and standards and specific criteria will be done. It should also be noted that if the pressure used for injection is unnecessary, may cause instability and failure in the soil.

The inhibition of the benefits include:

A - Profile of soil mechanics of concrete injected into the sink can be improved, so that the addition of soil around the wall to help contain the dust drift, drift rate of the soil, improving soil profile is reduced.

B - Structural guard is stuck inside the scoop here.

C - the control of soils used in hollow walls.

And disadvantages of control methods include:

A- The body of the adjacent soil pit wall is necessary. Therefore, in cases where the adjacent soil pit in a neighboring building, or the privacy or personal space and facilities are city streets, this method cannot be used or its use is restricted.

B- as long as necessary to perform the operation stage, to take considerable time. This course may not be raised in large projects, but unlike the general run-time may also work, especially with proper management, be reduced.

C - Cost of operation, because more advanced technology, compared with more simple methods. But in large projects and high volume may not have realized it would reduce the overall cost.

D - devices such as special equipment for drilling wells, injection, transport and panels ... Needs.

E - People with higher qualifications in the different categories of technical operations, compared to simpler methods are needed.

4-2 - Stitching Method to Back:

To dig up and top-down run deep. At every stage to help with special drilling machines, horizontal wells are drilled or miles deep in the body wall. Then, pre-tensioned cables are put into the wells, and sink into the concrete at the end, these cables are fully in control soil. Then the cables to help kill a special jacks and the cables come out the bottom of the pit wall on the surface are inhibited. The wells are injected into the concrete. After hardening of concrete and gain sufficient strength, the cables are free from the jack. Stress can be caused by this force in Kabul to compact the soil, resulting in a denser and more compact the soil and reduce the drift, while the deep layer of soil into the soil Propulsion body wall and into the soil at the end of the body, acts as guardian of the structure and drift wall adjacent soil body can tolerate. Deep pit, taking each step, depending on soil type and the distance between wells is usually about 2 to 3 meters.

Stitching method to back benefits include:

A - Profile of mechanical soil injection wells and pre-tensioned concrete into the soil improves. As a result, the soil around the wall to control the amount of drift and drift are used clay soil to improve the soil profile is reduced.

B - Structural guard is stuck inside the scoop here.

C - the control of soils used in hollow walls.

And sewing methods to the disadvantages are:

A - The body of the soil adjacent wall is hollow. Therefore, in cases where the adjacent soil pit in a neighboring building, or the privacy or personal space and facilities are urban streets, the entire procedure cannot be used or its use is restricted.

B - as long as necessary to the operation stage, to take considerable time. However, large projects may be considered contrary it may well do the whole time, especially with proper management, be reduced.

C - cost of operations, due to more advanced technology, compared with more simple methods. But in large projects and in this volume may not be raised. Contrary to reduce overall costs.

D - devices such as special equipment for drilling wells, injection, before cable and Stress ... Needs.

E - People with higher qualifications in the different categories of technical operations, compared to simpler methods are needed.

4-3 - The Diaphragm Wall (Diaphragm Wall):

Special drilling machines in the first place to help guard the wall we dug. Then place simultaneously drilled with bentonite slurry and a high cement wall, where we dug the soil to prevent loss. Chest wall and the reinforcement of Guardians, who have already built and ready, the place where we drilled the wall. Then do the concrete wall. Concrete commonly used type of concrete is very smooth and efficient.

If the diaphragm walls (precast diaphragm walls) and then stretched (post-tensioned diaphragm walls) can also be implemented.

Diaphragm wall and the benefits include:

C - the speed is very high.

B - very high degree of safety.

F - guard ring structure acts as a diaphragm wall and during the operation it is used as a retaining wall.

D - diaphragm wall, to dig deep and very good length.

Disadvantages of the diaphragm wall are:

A - in size, the labor cost is very high in volume but the overall cost of the simpler methods can be less sharp.

B - In this method, drilling machines, the need for more work space and the space of two side walls have limitations, the work would be impossible, or it can be difficult.

C - this method requires a special drilling device.

D - This forces the device to work with top experts and others is needed.

4-4 - The Mutual Inhibition:

This method is suitable for low pit width. The first in the pit, we dug up periodically from each sink. The depth of the sump pit, plus the additional amount of about 0.25 to 0.35 times the depth of the pit. It got stuck at the bottom to provide additional depth profiles that are put in the sink.

Then within the wells or steel profiles, calculations and drawings in accordance with the Executive, will be. These profiles are usually over the upper end so that we consider them to be somewhat higher than the upper ring.

The upper two vertical profiles to help the cross beams or trusses are connected to each other. This causes both vertical profiles of the cross, to help sustain each other.

Then, gradually, we do capture pit operations. If necessary, in other parts of the height of the vertical profiles of mutual containment system will run.

If the soil is really falling in between the vertical members of the wooden timbers or other suitable members to use.

Mutual containment system above in the direction perpendicular to the frame system, the length of the pit, as well as the proper bracing.

Inhibition of the mutual benefits include:

A - Within the pit, taking with it many advantages, including low-speed, higher-cost

Less and less of it can be named.

B - This method of operation, especially in the channel can be very beneficial.

Inhibition of the mutual disadvantages include:

If the width of a pit, for example, more than 10 meters, and the depth of the pit may be a lot of cross bracing and controlling the number of different levels of red tape, and it causes problems in the work.

4-5 - Using the Candle:

In this way, the ground around the pit to be taken at certain intervals of time, we'll run Shmhayy. These plugs can be of different types of structural materials such as steel, concrete and wood are. Concrete piles can also be performed in situ or prefabricated.

In this way, the pile-soil lateral pressure to a head tangly beams to bear. Tangly need something at the end of the pile is about 0.3.

After the candles, take deep operations can be performed. Necessary to pile up along the pit wall was bracing.

The advantages of the pile are:

A - very high speed operation.

B -no system and no red tape.

C - In volume, reduced operating costs.

D - Sometimes you can pile as permanent guardian of the structure (including retaining walls) or be used as part of it.

E - after collecting pre-made candles can also be used in other projects.

And - in the pit to about 5 meters deep, are often economic.

The pile of flaws include:

A - If the height is too deep imaging, distance must be subtracted from candles and stronger structural sections must be used to run the business.

B - in many civic projects, due to problems with piling, cannot use pre-made candles and the candles should only be performed in situ.

4-6 - The Kobe Shield:

In this way, the sides are hollow and then start the excavation. After the excavation was sufficiently elastic in the waist and on their bumpers, the back of the horizontal beams are installed. The constraints of vertical compression (struts) in the direction perpendicular to the back page of the bumpers are attached to the horizontal clauses. Bumpers and behind the dams and pressure constraints in low-latitude and non-poor soils, usually of wood and the soil is loose, but more latitude than the bumpers and the metal bands and pressure constraints are inevitable.

Kobe shield the benefits include:

C - the speed is very high.

B - very high degree of safety.

C - for the channel, especially with the large, is very good.

Kobe shield the disadvantages are:

A - This Kobe shield devices, however, that a special device is needed.

B - This forces with greater expertise than simpler methods, it is your ancestor.

C - enough to run a business need to Kobe shield devices.

D - This method is more suitable for low latitudes.

4-7 - The Truss:

In this way, one of the best and most common method is the structure of the guard in urban areas. It was simple to implement and requires no highly specialized equipment, and yet a lot of flexibility is applied in different situations.

This type of structure for the Guardian, the first vertical truss members in place, the adjacent walls are hollow, the wells are drilled. The depth of the wells with the depth of the pit, plus some additional plugs for the lower end of the truss members. The candles (length of pile), which is shown with the get through. The reinforcement within the pile and put candles inside the vertical member and the concrete piles are. After hardening of the concrete, acting as a member of the lower end of the candle will be tangly.

The soil along the pit wall with a slope that we can. The foundation's members are willing to run. The foundation is square in plan form. Or within the foundation (Breadth of foundation) and the thickness or height

of the show. Then, like a member of a party member and the vertical column to the bottom plate attached to the foundation.

The operation of the truss structure for all the guards along the wall to run concurrently.

Territory enclosed between vertical and horizontal members running across the truss along the wall, we come to the stage and each horizontal and diagonal truss members are gradually installing the truss to be completed.

The truss benefits include:

- A - suitable for open pit, located in urban areas.
- B - Implementation of the various conditions, is very flexible.
- C - There is a possibility of reuse of the truss.
- D - is simple and requires no special expertise and equipment.

The truss disadvantages include:

- A - Speed run, compared with more advanced method is relatively less.
- B - trusses are stuck here.
- C - likely to be required to hand harvesting methods are part of the soil.

5 - Technical Basis:

The General with a mountain of sand and broken stones or materials or rubble Technical specifications must be broken down as follows:

- A - Aggregation of interests, according to local conditions, with an aggregation Compliance is contained in Table 1. And if possible, aggregate gradation curve slope, Proportional to the slope of the middle curve is continuous and selective aggregation.

Table 1: Aggregation of interests

Type of aggregation Sieve No.	The weight percentage of each sieve				
	I	II	III	IV	V
50 mm (2 inches)	100	100	100	-	-
5 / 37 mm (inches)	100-95	-	-	100	-
25 mm (1 inch)	-	-	95-75	100-70	100
19 mm (inches)	92-70	-	-	90-60	-
5 / 9 mm (inches)	70-50	65-30	75-40	75-45	85-50
75 / 4 mm (No. 4)	55-35	55-25	60-30	60-30	65-35
2 mm (No. 10)	-	40-15	45-20	50-20	50-25
6 / 0 mm (No. 30)	25-12	-	-	-	-
425 / 0 mm (No. 40)	-	20-8	30-15	30-10	30-15
075 / 0 mm (No. 200)	8-0	8-2	8-2	8-2	8-2

- B - Resistant and durable materials used in class according to the specifications contained in Table 2 contains the.

Table 2: - Profile of materials based

Description Row	The profile	Test methods	
		Shtv / BSD	You have a T
1. Mark paste	Up to 4	90 T	4318 D
2. The psychological	Maximum of 25	89 T	4318 D
3. Sandy worth the drive	40	176 T	2419 D
4. Percent with the Los Angeles abrasion	Maximum of 45	96 T	535 C
5. Percentage of weight loss with sodium sulfate	Up to 12	104 T	131 C
6. The CD-R - percent	80	-	88 C
7. Of fractures on two fronts - remain on the sieve 5 / 9 mm	75	812. BS	1883 D
8. Percent interest rate flexibility	Maximum 35		2158 D

- C - Materials used for the coarse and fine aggregates Makadamy of the following Used (Table 3)
- D - Fine grain size materials, which fill the space group of And squash players are taking, including washed sand or gravel or a mixture of broken and they must Table 4 below and be compatible with aggregation.
- A - the mental, to Shtv 89 - T: Up to 30%
- B - Domain paste, to Shtv 90 - T: up to 6%
- C - the sand, to Shtv 176 - T: At least 30%

Table 3: Coarse aggregate gradation

Sieve size	Percent by weight of the sieve (Shtv 92 - M)	
	An aggregation	Size 2
75 mm (3 inches)	100	-
63 mm (inches)	100-90	100
50 mm (2 inches)	70-35	100-90
38 mm (inches)	15-0	70-35
25 mm (1 inch)	-	15-0
19 mm (inches)	5-0	-
5 / 12 millimeters (inches)	-	5-0

Table 4: Fine aggregate gradation

The Elks	Rdshdh percent by weight of the sieve
Alec 5 / 9 mm (inches)	100
Elks 75 / 4 mm (No. 4)	100-85
Elks 15 / 0 mm (No. 100)	30-10

6 - Effect of Particle Components of Soil Properties and Soil Behavior:

Particle components of the overall effect on soil properties and behavior of soils is as follows. (Table 5). The six criteria for determining soil texture class is as follows (Table 6).

Table 5:

Characteristics and behavior	Sand	Sludge	Clay
Ventilation	Good	Average	Weak
Compressibility	Low	Average	High
The amount of organic matter	Low	Moderate to high	High to moderate
Drainage rate	Fast	Slow, medium	Very quiet
Warming in spring	Fast	Average	Calm
Water holding capacity	Low	Moderate to high	High
Resistance to change PH	Low	Average	High
Decomposition of soil organic matter	Fast	Average	Calm
Potential for expansion and contraction	Very little	Low	Moderate to high
Power washing of water pollutants	Top	Average	Low (except with leave)
The ability to store nutrients	Weak	Moderate to high	High
Susceptibility to water erosion	Low (very fine sand)	Top	Low aggregate
Susceptibility to wind erosion	Medium (very fine sand)	Top	Low
Fit for tillage after rain	Top	Average	Low (with a high left)
Cover swimming pools, dams and embankment in the land	Weak	Weak	Good

Table 6:

Diagnostic criteria	Sand	Sandy loam	Loam	Silty loam	Clay loam	Clay
Roughness and soft goal in the fingers and the visible appearance	Flowers in between the fingers seems to be quite rough and the sand is quite tangible	Roughness is less and less coarse grains is seen in the	The average roughness	Coarse particles are small and relatively soft soap and flowers	Soft and coarse particles have a negligible	Quite soft and the sand is soft and glossy surface looks
Stability nodule dry	Does not form	Does not form	Easily Break Down	Relatively easy to Break Down	Firm and stable	Very firm and stable
Stability of wet hunk	Unstable	Low stability	Moderate stability	Stable	Very stable	Very stable
Stability in the bar between the thumb and index fingers	The bar is not	The bar is not	The bar is not	Cut into strips to be formed	Bar is composed of thin and fragile	Bar too long and is made up of resistant
Tube in the palm of both hands	Tube is not	Tube is not	Tubes can be hard to	But the tube was left in the dough	Tube, but it does not ring	And easily rolled up to ring
Adherence	Completely non-sticky	Almost non-adherent	Low adhesion	Medium viscosity	Relatively high viscosity	Psbndgy high
Effect on the remaining	No effect on hands remains	Little or no effect on the color remains	Some color on the left hand	Some color and some mud on the left hand	Some mud remains on the finger	Lots of flowers on the fingers remain

Conclusion:

Many soils contain solids are dissolved. Located on the ocean floor soil, water between the solid particles of soil will probably have the same concentration of salt in sea water. Cation of clay particles is inclined surfaces. When drying the soil, the minerals and ions in solution, part of the mass of solids (MS) are. It works on most soils, at least make the changes in moisture content. Rate of erosion at various times and locations vary. Deposits in the event that weather conditions are determined by topography, soil type and land use change depends on the position will be eroded. 500 to 800 years to form one inch of soil is necessary. Way truss

In this way, one of the best and most common method is the structure of the guard in urban areas. It was simple to implement and requires no highly specialized equipment, and yet a lot of flexibility is applied in different situations.

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