

Appendix 6

Photos collection of Training of Minimum Requirements for Safer Housing through Construction of Scale Model House

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M.R. : Minimum Requirements for Safer Housing on Confined Masonry.



UNIT 1: KNOWING YOUR LAND AND READING THE DRAWINGS

Before the start of Works, the Municipality provided the site to implement the Project measuring 20.0 m x 28.0 m. (marked in white). The area marked in red corresponds to the limits of the Cut Model House.



Participants in the course outlining the area of work for the Cut Model House.



Final outline (white lines) of the Cut Model House working area. A security zone is limited with yellow tape.

Cut Model House working area



UNIT 2: CLEANING, LEVELING AND TRACING ON YOUR LAND

Before tracing the foundation.



The picture shows the setting of trig beacons; strings are tied to them, to proceed to trace the foundation.



Ending of foundation trace. After that, the strings are untied from the trig beacons.



UNIT 3: EXCAVATING THE FOUNDATION

Start of excavation following the tracing.



Minimum Requirements 2.1
In the picture, the excavation is 0.60 m.
wide and final depth will reach 0.80 m.



End of excavation, according to the
sizes specified in the minimum
requirements.



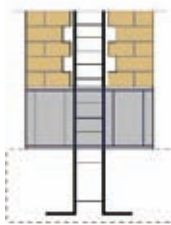
UNIT 4: MAKING FRAMEWORK FOR CONFINED COLUMNS

Before installing the column framework, a poor concrete paving, 0.10 m. thick is set.



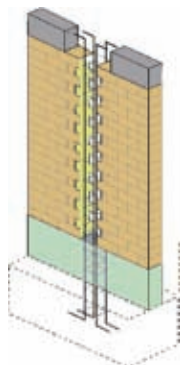
Minimum Requirements 3.1.

The four (4) steel bars of the column are anchored to the foundation and are bended to 90° and 7.5 cm. from the bottom of the foundation, and extend 25 cm.



Minimum Requirement 2.2.c.

Column will have four (4) steel bars 3/8" diameter with 1/4" diameter hoops from the joint reinforced tie beam joint up in direction to the collar beam at intervals of: one (1) at 5 cm, four (4) at each 10 cm and the others at 25 cm.



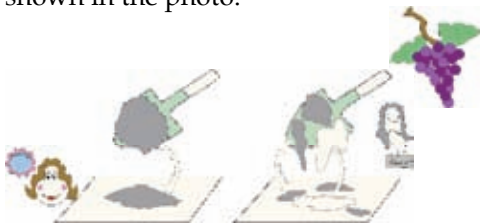
UNIT 5: BUILDING THE FOUNDATION

Before foundation concrete pouring.



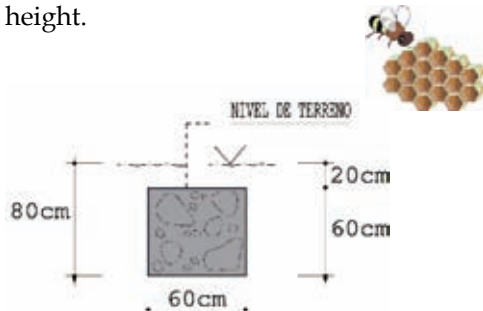
Minimum Requirements 1.1.b.

Materials are properly mixed obtaining a mixture which the aggregates are not noticed. Mix is poured directly to the foundation as shown in the photo.



Minimum Requirements 2.1.

Cyclopean concrete is poured to the foundation 0.60 m. wide and 0.60 m. of height.



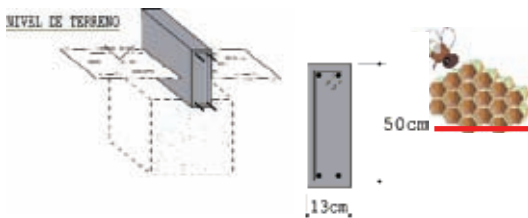
UNIT 6: MAKING FRAMEWORK FOR REINFORCED TIE BEAM

Start of the tie beam reinforcement installation.



Minimum Requirement 2.2.a.

Tie beam is reinforced with four (4) steel bars $3/8''$ diameter, with $1/4''$ diameter hoops at intervals of 20 cm. This reinforcement is set because the soil is mainly sandy



Tie beam reinforcement installation is finished.



UNIT 7: MAKING FORMWORK FOR REINFORCED TIE BEAM

Wood is prepared for the formwork of reinforced tie beam setting crosspieces every 0.50 m. in the posterior portion to the wooden boards.

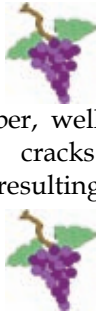
Crosspieces

Wooden board



Minimum Requirement 1.1.c.
Formwork is prepared to be resistant and so the mixture did not spread out.

Minimum Requirement 1.4.
The wood was hard, dense fiber, well dried, straight and without cracks. Under said conditions, the resulting concrete is of good quality.



Formwork woods are fastened with crosspieces. This form is reinforced with diagonals nailed to cross beams that are fastened with stakes.

Crosspieces

Diagonal

Cross beams

3/8" stakes



UNIT 8: BUILDING THE TIE BEAM

Before concrete pouring in the reinforced tie beam.



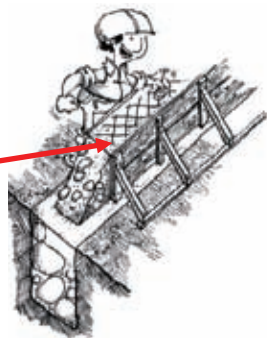
At the moment of pouring the concrete is mixed with a steel bar, as seen in the picture.

Mixing steel bar



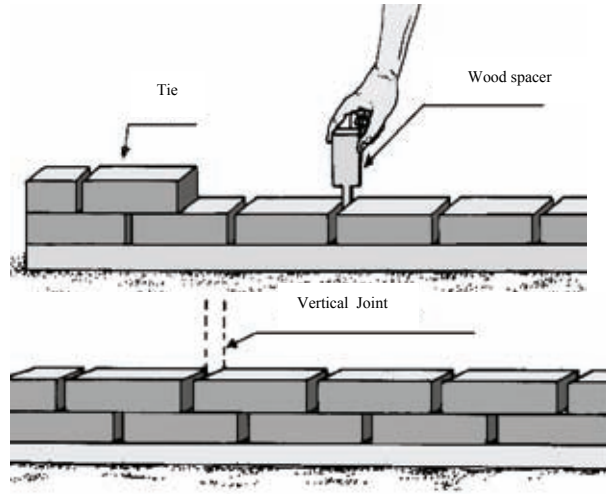
After stripping off the formwork of the reinforced tie beam.

Surface scratching



UNIT 9: INSTALLING THE FIRST BRICK LAYER

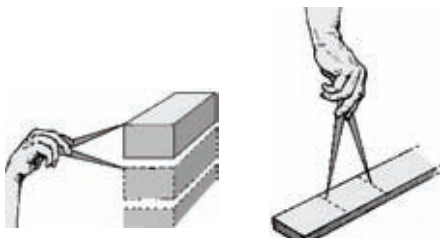
Two layers of bricks without mortar are set to see if the vertical joints are uniform and to see the type of connection to join the wall to the confined column.



Two layers set without mortar



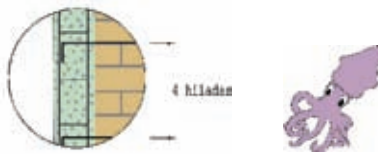
The height of the layers are marked on a vertical template



UNIT 10: BUILDING THE WALLS

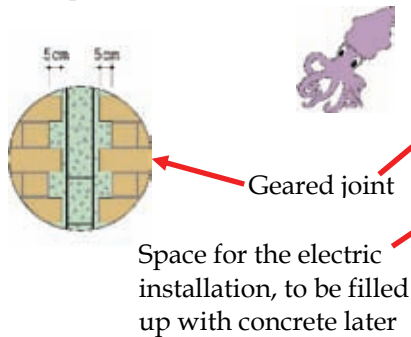
Minimum Requirement 3.2.

Some walls are connected to the confined columns at the edge, anchoring at least two (2) steel bars of 1/4" each 4 rows, 40 cm. inside the brick wall. In case two walls are not continued in the column, two (2) steel bars of 1/4" each 4 rows are inserted 12.5 cm. in the column, bending 10 cm. at 90°.



Minimum Requirement 3.2.

Other connection method used between walls and confined columns is the "geared" type, consisting in retrieving 5 cm. each two bricks, as seen in the picture.



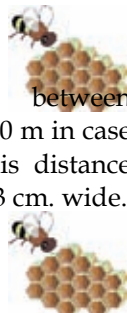
After the construction of the walls:

Minimum Requirement 2.2.b.

The maximum area of the confined wall between the tie beam, confined column and ring beam will be 12.0 m².

Minimum Requirement 2.3.

The maximum distance between confined columns will be 5.0 m in case of 24 cm width walls. This distance will be 3.5 m if the wall is 13 cm. wide.

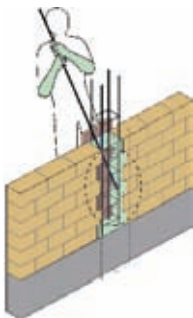


UNIT 11: MAKING AND FILLING THE CONFINED COLUMNS

After the walls are built, the column formworks are installed.



Minimum Requirement 1.1.d.
Any air bubble is eliminated using the steel bar to mix the concrete during the pouring.



After concrete pouring in the column, formwork is taken out.



UNIT 12: MAKING THE RING BEAMS FORMWORKS

Ring beams formworks are prepared, after removing the formworks of columns



Minimum Requirement 2.2.e.
Concrete coating in the ring beam is 2 cm. because walls will be threaded.



Final condition of ring beams formwork.



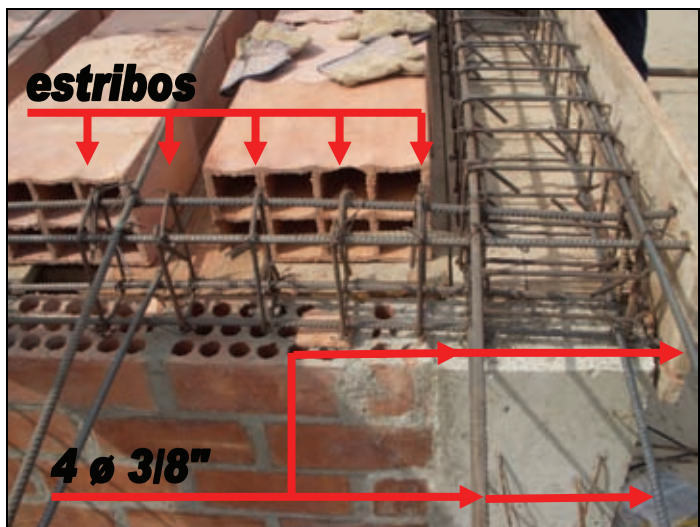
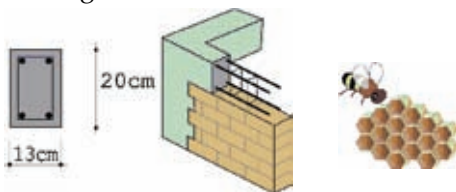
UNIT 13: MAKING THE RING BEAMS FRAMEWORKS

After taking away the formwork from columns, ring beams frameworks are prepared and installed.



Minimum Requirement 2.2.d.

Ring beam has four (4) steel bars 3/8" diameter with 1/4" diameter hoops set from the joint of the confinement column at intervals of: 1 each 5 cm, 4 each 10 cm and the rest at 25 cm. Likewise, hoops at the other side of the ring beam will be set



The picture in the right shows the ending of the installation of the ring beam framework.



UNIT 14: MAKING THE LIGHT SLAB FORMWORKS

Participants prepare the lateral border and vertical support of the light slab formwork.

Minimum Requirement 1.4.
Wood should be hard, dry, dense fiber, well cured without cracks and straight.

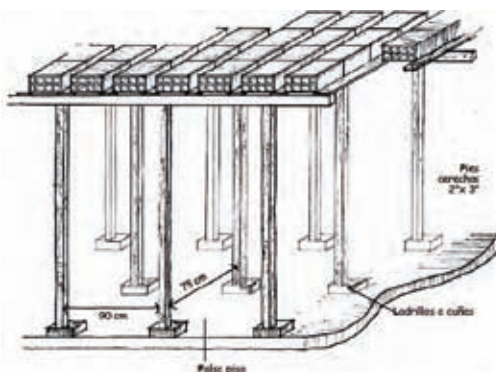


The picture shows the bottom of beams, rings and walls. It is important to mark the center of the beam to have exact sections.

Bottom of small beam
Longitudinal support
Vertical support



Ending the roof brick setting.



UNIT 15: MAKING LIGHT SLAB FRAMEWORKS

Participants finishing to set roof bricks.



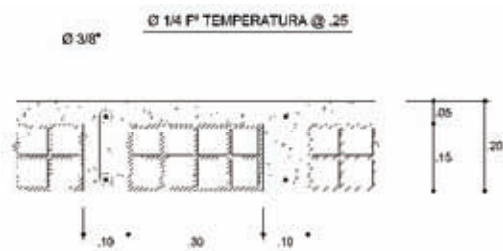
Setting the light slab framework and the temperature reinforcement steel.

Setting of positive reinforcement of the light slab

Setting the temperature reinforcement steel



Final setting of the light slab frameworks.



UNIT 16: BUILDING THE LIGHT SLAB

Selection and preparation of the mixture to be used in the concrete for light slab.



Before starting the concrete pouring in the slab, the area has to be wet.

Filling the concrete in small beams and ring beam



Final pouring process in the light slab.



Appendix 7

VIDEO

CONCIENTIZACION ACERCA DE VIVIENDAS MAS SEGURAS

Screenplay of “Cut model house construction applying Minimum Requirements”

<p>Scene</p> <ul style="list-style-type: none"> - JICA mark is observed - A cut model house can be appreciated (could be a picture or an autocad figure - SENCICO’s logo can be seen - Minimum requirements poster is observed - Pueblo Nuevo Municipality logo. -Picture about the convoking and SENCICO interview to candidates to the training course 	<p>JICA STUDY TEAM and SENCICO (National Service for Construction Industry Training) developed the Course “Awareness-rising Concerning Safer Housing Against Earthquake” directed to 20 people living in Pueblo Nuevo District-Chincha Province that received basic knowledge named “minimum requirements for safer housing” that are written down on Peruvian regulations and are useful to build safer housing. Training consisted in the building of a cut model house where participants learn the use of “minimum requirements for safer housings. SENCICO direct the course under JICA STUDY TEAM supervision.</p> <p>“Minimum requirements for safer housing” are divided in three sections: Quality of Materials, Structural section of Main Members and connection of Structural Members. Quality of materials refers to good characteristics that cement, aggregates, wood, bricks, water, etc. as well as the correct concrete mixing and manipulation. Section of structural elements refers to the minimum size of foundation, tie beam, column, ring beam and wall. Connection of structural elements considers the adequate joint among the different structural elements for an adequate seismic behavior.</p> <p>The cut model house building is divided in 16 units in relation to the constructive process. Next, these steps are described.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants are setting the borders of the land. - Participants are making an excavation or a round whole - Participants are manipulating a bottle with soil simple. - A bottle shows the result that soil is sandy. 	<p>Unit 1: Knowing your land and Reading the drawings: Borders of the site, which is provided by Pueblo Nuevo Municipality, are marked.</p> <p>Soil type is very important in construction. So, soil type is determined after obtaining a sample from 1 metre depth. The sample is put inside a plastic transparent bottle until the sample occupies one third of the bottle volume. Then the same volume of water is added with a tea spoon of salt. After shaking very well, the bottle is left to settle overnight. On next day soil type can be seen. In our case is predominantly sandy.</p>

<p>Scene</p> <ul style="list-style-type: none"> - Participants are cleaning the cut model house site. - Participants are doing some exercises of leveling with a hose filled with water (The instructor is giving some important recommendations). - Participants are preparing and installing trig beacons - Participants are exercising about obtaining 90° angles. - Participants are installing cords. - Participants are tracing the foundation. 	<p>Unit 2: Cleaning, leveling out and tracing on the land: Participants clean the construction area taking out any strange element.</p> <p>Exercises about land leveling are performed using of a half inch diameter transparent hose filled with water.</p> <p>Wood trig beacons are prepared by participants.</p> <p>Using a triangle with 3, 4 and 5 meter side participants learn how to obtain a 90° angle with accuracy.</p> <p>Trig beacons are leveled out using the pipe with water. Cords are installed on the trig beacons. These cords are the guides for foundation tracing.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants are receiving lesson on minimum requirements - Participants are doing an excavation, wetting the sides of the excavation and verifying the verticality of excavation 	<p>Unit 3: Excavating the foundation:</p> <p>Excavation of the foundation begins taking into account that its width is 0.60 m and the depth is 0.80 m, according to minimum requirements</p> <p>As excavation is progressing, excavation lateral walls have to be wetted because the sandy condition of soil provokes some landslide</p> <p>At the same time, excavation wall verticality is being verified.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants bend steel hoops. - Participants prepare longitudinal reinforcement steel -Participants are installing hoops in the reinforcement steel. - Participants are pouring a poor mix in the places where columns are going to be fixed. - Participants are installing column framework. 	<p>Unit 4: Making the framework for columns:</p> <p>¼” diameter steel is prepared for hoops, and 3/8” diameter steel bar is prepared as the longitudinal reinforce steel. Each framework has 4 reinforce steel with a bending at 25 cm in the bottom end.</p> <p>Framework section for cut model house is 21 x 11 cm² and could vary according to column section, that in this case is 24 x 15 cm².</p> <p>Column hoops are made with ¼” diameter steel bar and are distributed in the following way: 1 at 5 cm., 4 at 10 cm. and the rest at 25 cm., distances measured from the tie beam upper surface.</p> <p>Then the whole framework is installed over a 10 cm thick poor concrete base.</p> <p>Additionally, two hoops are installed in the foundation zone and three more hoops are installed every 15 cm in the tie beam zone</p>

<p>Scene</p> <ul style="list-style-type: none"> - Participants are mixing concrete materials. - It can be observed the minimum requirement poster part that shows the minimum requirement for foundation dosification, dimensions, etc 	<p>Unit 5: Building the foundation.</p> <p>Cyclop concrete is prepared by mixing 1 part of cement, 10 of hormigón, 3 of large stone and 1.5 of water.</p> <p>Foundation area is wetted so soil does not absorb water from the concrete mix.</p> <p>Foundation is 0.60 width and 0.60 m. depth. Concrete pouring is made with buggies and large stones are placed as the mix is being poured.</p> <p>Some minutes later, and before that concrete begins to forge, cross lines are drawn on the foundation upper surface in order to have a better adherence with tie beam. Concrete curing proceeds by wetting the foundation</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants prepare stirrups and horizontal reinforcement steel. - Participants install additional steel bars to improve connection between tie beam and column. - Participants install the horizontal framework and then install stirrups. 	<p>Unit 6: Making the framework of reinforced tie beam:</p> <p>Participants prepare tie beam stirrups and then the tie beam longitudinal reinforcement steel.</p> <p>Additionally, in order to improve tie beam and column connection, L-shaped 3/8" steel bars are prepared. These 4 bars anchor in the tie beam.</p> <p>After that, the horizontal tie beam reinforcement, consisting of 4 steel bars of 3/8" and the corresponding stirrups prepared with 1/4" steel bar are installed every 20 cm.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Wood is cut in several sizes and shapes. <p>Wood preparation</p> <ul style="list-style-type: none"> - Participants prepare wood and joint with stakes. - horizontal stakes are placed in order to secure the formwork. - Framework dimensions, horizontality and verticality is verified. 	<p>Unit 7: Making the tie beam formwork.</p> <p>Participants prepare the wood for formwork, check for defects, verifying its resistance, density, cracks, curing, according to minimum requirements.</p> <p>Then wood is installed in the final position in the tie beam having in mind that concrete covering should be at least 2 cm.</p> <p>Formwork is secured with horizontal and diagonal stakes. Tie beam dimensions are: 13 x 50 cm. and 24 x 50 cm. Finally, formwork verticality is also verified.</p>

<p>Scene</p> <ul style="list-style-type: none"> - Participants wet the formwork. - Participants prepare the concrete mix for tie beam. - Concrete is poured and homogenized. - Lines are drawn on tie beam upper surface. <p>Tie beam formwork is taken out</p>	<p>Unit 8: Building the tie beam:</p> <p>Formwork wood is wetted in order not to absorb concrete mix water.</p> <p>Tie beam concrete mixture is: 1 part of cement, 2 of coarse sand, 4 of crushed stone about ½” and 1 of water.</p> <p>Concrete mixture is carefully mixed, showing a uniform and workable mass.</p> <p>In order to avoid honey crumbs, concrete is homogenized immediately after pouring.</p> <p>Lines are also drawn on tie beam upper surface so it can have more adherences with the wall.</p> <p>Form work is taken out 24 hours after pouring.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants install wall brick templates, that is they install two layers without mortar in order to determine the connection between column and wall. - Vertical template ruler is prepared. - Exercise of brick installation in wall Wall using sand and bricks 	<p>Unit 9: Wall brick template:</p> <p>Participants make the brick template of the cut model housing wall. This template will be helpful to determine connection type between wall and column.</p> <p>At the same time, the vertical template ruler is prepared and used to orientate wall brick layers.</p> <p>Participants practice wall building taking care about horizontality, verticality and vertical and horizontal joint dimension</p>
<p>Scene</p> <ul style="list-style-type: none"> - Bricks are wetted one day before its installation - a mix of cement and water is poured on tie beam upper surface. - Wall is building, it could be any layer, but it is important to show the vertical ruler. - Wall and column on a level connection should be showed, and the steel reinforcement in the corner of wall-column and in the joint of wall-column-wall. - Geared joint between wall and column should be showed. 	<p>Unit 10: Building the wall:</p> <p>For wall building, bricks are wetted for 20 minutes one day before. Bricks should be well baked, without spots, dust free, without cracks or bending, according to minimum requirements.</p> <p>On next day, tie beam is wetted with a mixture of cement and water, and the vertical template rulers are installed at both sides of the wall. To install the first layer, a cord is tied to both vertical template rulers, and the same is repeated for all the subsequent layers, having in mind that horizontal and vertical mortar joints should be in the range of 1 to 1.5 cm.</p> <p>There are two cases for wall and column connection.</p> <p>One of them is the dented joint where every two layers bricks are installed up to 5 cm before reaching the column.</p> <p>In the other method wall and column are connected on a level with reinforcement of two ¼” steel bars every four layers.</p> <p>Both types of connection are required by minimum requirements</p>

<p>Scene</p> <ul style="list-style-type: none"> - Wood is cutted in several sizes and shapes. <p>Formwork is installed in columns</p> <ul style="list-style-type: none"> - Column concrete mixture preparation is seen. Dosification. - Concrete pouring and homogenizing - Formwork is taken out and columns are cured 	<p>Unit 11: Making the formwork and pouring concrete in columns.</p> <p>Wood employed is according to minimum requirements: dry, hard, dense, well cured, without cracks and straight</p> <p>Participants prepare wood for formwork that is composed of lumber reinforced with stakes.</p> <p>Concrete materials proportion is 1 part of cement, 2 of sand, 3 of crushed stone and 1 of water.</p> <p>Concrete is well mixed so a good mass is obtained in which aggregates are not distinguished. Concrete is homogenized immediately after pouring to avoid honey crumbs.</p> <p>After 24 hours, formwork is taken out and the concrete is wetted.</p> <p>No honey crumb should appear.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Wood is cut in several sizes and shapes. <p>Participants are making the ring beam formwork taking into account that the reinforcements have to cross the formwork.</p>	<p>Unit 12: Making the ring beam formwork</p> <p>Land soil is prepared and compacted to build a 10 cm thick slab.</p> <p>The same wood employed in column formwork is prepared for the ring beam formwork.</p> <p>Formwork for ring beam is made having in mind that steel bars cross out the formwork.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants prepare stirrups and horizontal steel reinforcement for ring beams -Participants install the additional reinforcement steel 	<p>Unit 13: Making frameworks for ring beams</p> <p>Participants prepare ring beam stirrups and then the longitudinal reinforcement.</p> <p>Then 4 horizontal reinforcement 3/8" steel bar are installed. The reinforcement is completed with stirrups prepared with 1/4" steel bars that are spaced 1 at 5 cm, 4 at 10 cm. and the rest at 25 cm.</p> <p>Ring beam dimensions are 13 x 20 cm and 24 x 20 cm.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants prepare wood for formwork: lumber, bottom of small beams, vertical supports, lateral border, etc. - Roof bricks are installed. 	<p>Unit 14: Making the concrete light slab formwork</p> <p>Wood is prepared for concrete light slab formwork: lumber, bottom of small beams, vertical supports, and lateral border.</p> <p>Small beam bottom is located by its axis and leveled to secure slab horizontality.</p> <p>After the formwork is ready, roof bricks are installed.</p>
<p>Scene</p> <ul style="list-style-type: none"> - Participants prepare the steel for small beams - Participants install small beam reinforcements. 	<p>Unit 15: Making framework for light concrete slab:</p> <p>3/8" Steel reinforcement bars are prepared for small beams of the light concrete slab framework..</p> <p>The small beam framework are installed and after that the 1/4" steel bar temperature reinforcement is placed every 25 cm.</p>

<p>Scene</p> <ul style="list-style-type: none">- Concrete is prepared and poured in the light concrete slab	<p>Unit 16: Building the Light concrete slab:</p> <p>Participants prepare the concrete mix for light concrete slab that include 1 part of cement, 2 of sand, 3 of crushed stone and 1 of water.</p> <p>Fresh concrete is well mixed and poured, according to minimum requirements.</p> <p>Before it begins to become hard, the respective curing process is performed.</p>
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Appendix 8

Examination Sheet prepared by SENCICO

Appendix 8

Examination Sheet Prepared by SENCICO

COURSE:

**AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA**

DIDACTIC UNIT 01 (Knowing your land and reading the drawings)

Last names and names:.....

Date:

01.- If the municipality where you live does not have soil study, what steps do you have to do to know the type of your land ?

02.- What are drawings and what do they represent?

03.- What do you understand by: Tool, Instrument, Equipment and material.

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 02 (Cleaning leveling and tracing on your land)

Last names and names:.....

Date:

- 01.- Is it organic type soil good for construction? Why?**
- 02.- Which is the procedure to determine level and what importance does it have?**
- 03.- Prepare a graphic to find a 90° angle.**
- 04.- Why is it important to install trig beacons?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 03 (Excavating the ditch)

Last names and names:.....

Date:

- 1.- What are the minimum requirements to have a safer housing?**
- 2.- What is the width and height of foundation (minimum requirement)**
- 3.-How much is the foundation depth in the minimum requirement?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 04 (Making the framework for columns)

Last names and names:.....

Date:

- 1.- The minimum section of a column is:**
- 2.- How many steel bar form a column and what diameter do they have?**
- 3.-How is the distribution of hoops and from where are they installed?**
- 4.- The anchor of the column to the foundation and to the ring beam is....**
- 5.- How many additional steel bars are installed? And what diameter do they have?**
- 6.- In reinforced concrete elements, the overlapping of the steel bars should be as a minimum....**
- 7.- What is the process to prepare a framework?**
- 8.- Which is the procedure to settle a framework?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 05 (Building the foundation)

Last names and names:.....

Date:

- 1. What is the proportion of materials to be used in foundation?**
- 2. What is Cyclops concrete**
- 3. Why are large stones not distributed near a column? and, at what minimum distance from a column they have to be?**
- 4. Which are the minimum requirements (quality of materials) to build a good foundation?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 06 (Making the framework for RC tie beam)

Last names and names:.....

Date:

- 1. Which is the minimum width and height of RC tie beam.**
- 2. How many steel bars will be necessary to reinforce a tie beam? What diameter are the bars.**
- 3. How are the stirrups distributed in RC tie beam?**
- 4. When is steel reinforcement used in tie beam? and, when is not steel reinforcement used in tie beam?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 07 (Making the framework for RC tie beam)

Last names and names:.....

Date:

- 1. Which are the minimum requirements (materials quality) to make the framework of RC tie beam?**
- 2. What is the procedure to make the formwork of a RC tie beam?**
- 3. What tools, instruments, equipment and materials are employed to make the formwork of a RC tie beam?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 08 (Building the RC tie beam)

Last names and names:.....

Date:

- 1. What is the proportion of concrete for RC tie beam?**
- 2. What is the proportion of concrete for tie beam without reinforcement?**
- 3. What are the minimum requirements for materials and formwork to build a tie beam?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 09 (Installing the first brick course)

Last names and names:.....

Date:

- 1. What are the characteristics that bricks should meet to fulfil minimum requirements.**
- 2. How thick should be the vertical and horizontal mortar joint?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 10 (Building the walls)

Last names and names:.....

Date:

- 1. Mention the mortar material proportion to build a wall.**
- 2. What characteristics does a housing confined masonry wall should meet?**
- 3. What is the wall maximum area inside RC tie beam, columns and ring beam**
- 4. When the wall is not dented, what type of reinforcement is used and How is the connection.**
- 5. What is the wall máximo height?**
- 6. What is the procedure to build a wall with bricks?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 11 (Making and filling the columns)

Last names and names:.....

Date:

- 1. The proportion of material for column concrete is:**
- 2. Maximum distance between columns is:**
- 3. How should the concrete be mixed for columns?**
- 4. How many days after pouring concrete is the column formwork taken out?
and how many days at least has it to be cured?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 12 and 13 (Making the ring beam formwork and the ring beam
framework)

Last names and names:.....

Date:

- 1. What is the minimum dimension of ring beam? and How is the stirrups distribution?**
- 2. What are the minimum requirements to make a framework for a ring beam (dimension, stirrup distribution, column anchor).**
- 3. What importance do ring beams have in a house?**
- 4. How many days after pouring concrete in a column is the formwork taken out? and how many days at least has it to be cured?**

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA

DIDACTIC UNIT 14 and 15 (Making the light concrete slab formwork and the
light concrete slab framework)

Last names and names:.....

Date:

1. What do you understand by small beam? and what importance does it have in the light concrete slab formwork?
2. What elements are the light concrete slab formwork composed by? Explain the function of each one of them.
3. Is it recomendable to pour concrete in the floor before making the light concrete slab formwork? Why?
4. What is the small beam steel bar diameter? and What is the temperature iron bar diameter? At what distance are the temperatura irons placed?
5. What are the components of a light concrete slab? What function do they perform?

COURSE:
AWARENESS – RAISING CONCERNING SAFER HOUSING AGAINST
EARTHQUAKES – PUEBLO NUEVO CHINCHA
DIDACTIC UNIT 16 (Building the light concrete slab)

Last names and names:.....

Date:

- 1. Which are the minimum requirements to build a light concrete slab?**
- 2. How many days does light concrete slab have to be cured.**

Appendix 9

Result of Examination made by SENCICO

Appendix 9 Result of Examination made by SENCICO

Training Course: Awareness-raising Concerning Safer Housing Against Earthquake

PUEBLO NUEVO - CHINCHA

EVALUATION BY LEARNING UNIT

Theoretical and Practical Evaluation

Name	Unit 01	Unit 02	Unit 03	Unit 04	Unit 05	Unit 06	Unit 07	Unit 08	Unit 09	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15	Unit 16	Mean score by trainee
1 CARPIO GARCIA CARMEN	12	12	14	14	14	12	13	13	13	13	13	14	12	14	12	13	13
2 CARRIZALES ROJAS HEINE	13	13	13	13	13	13	13	14	12	14	12	13	13	13	13	13	13
3 CCOCHACHI CANCHARI DANIEL	15	15	16	14	14	16	15	15	16	14	16	14	15	15	15	15	15
4 CHAVEZ ZAMBRANO MAYRE	14	14	15	13	13	15	13	15	14	13	15	14	14	14	14	14	14
5 CORDOBANUÑEZ JHONY	15	15	14	16	16	14	16	14	15	15	16	14	16	14	15	15	15
6 CRUCES HIJAR FLOR	13	15	13	15	14	14	14	14	14	14	15	13	15	13	14	14	14
7 DELGADO DE BARRIENTOS MARIA	15	15	16	14	16	14	16	14	14	16	15	15	15	16	14	15	15
8 FERNADEZ LUJAN LILIA	13	15	13	15	13	15	14	14	14	14	15	13	15	13	14	14	14
9 GARCIA DIAZ LUIS	15	13	15	13	14	14	14	14	14	14	14	15	13	15	13	14	14
10 GARCIA ZETA WILMER	15	15	15	15	16	14	16	15	16	14	16	14	15	15	15	15	15
11 MATTA YAACHI JESUS PABLO	16	14	16	14	16	14	15	15	15	15	15	16	14	16	14	16	15
12 PARIONA SALVATIERRA EUSEBIA	15	15	15	16	14	16	14	16	14	16	14	16	14	16	14	15	15
13 QUISPE CUBA GLORIA	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
14 QUISPE SOTELO PEDRO	16	14	16	14	16	14	16	14	16	14	16	14	15	15	15	15	15
15 ROJAS FLORES JORGE LUIS	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
16 SANCHEZ TRELLES MIGUEL ANGEL	14	15	13	15	13	15	13	15	13	15	13	15	13	15	13	14	14
17 TORRES SANTIAGO YANINA	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
18 VILLAVICENCIO RIVERA JAVIER	15	15	15	14	16	16	16	16	14	14	16	16	15	15	15	15	15
19 YEREN PARREÑA ALICIA	14	14	14	15	13	13	15	13	15	13	15	13	15	14	14	14	14
20 YUPA BAUTISTA LUCIA	13	15	13	15	13	15	14	14	14	14	14	13	15	13	15	14	14
Mean score by unit	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14	14	14

Mean score of correctly answered questions by unit (%)	71	72	72	72	72	72	72	72	71	71	73	71	72	72	70	72
	71	72	72	72	72	72	72	72	71	71	73	71	72	72	70	72

Note: 1) Total score for each unit is 20. A trainee should get a score of at least 12 per unit in order to pass.

2) Mean score of all the trainees is 71.578 %.

Appendix 10

Examination Sheet prepared by the JICA Study Team

Appendix 10

Examination Sheet prepared by the JCA Study Team

JICA STUDY TEAM

Av. Paseo de la República N° 3361 Primer Piso, Edificio Petroperú, San Isidro, Lima 27. Perú.

STUDY ON HOUSING RECONSTRUCTION WITH SEISMIC-RESISTANT HOUSE IN THE REPUBLICA OF PERU

AWARENESS – RAISING CONCERNING SAFER HOUSE

JST Project Site Office, Av. 12 de Octubre s/n, Pueblo Nuevo – Chincha – Ica – Perú

COMPREHENSIÓN PARTIAL TEST - PROYECTO PILOTO N° 2.1

Full Name:.....Date.....

Please mark with a circle the correct answer

1. What do you understand by safer houses?
 - a) they are more expensive
 - b) they can resist earthquakes and protect my life
 - c) they are more modern
 - d) Answers (a), (b) and (c) are all correct.

2. Which are the three major factors of minimum requirements for safer housing?
 - a) Good mason, good land and good material quality
 - b) Material quality, structure dimensión and connections
 - c) Structure dimension, good drawings and a good mason
 - d) Answers (a), (b) and (c) are all correct.

3. How important is the quantity of water in the safer house construction?
 - a) Very much, because a good concrete quality is obtained
 - b) It's indifferent
 - c) Little, because water is not important

4. Which type of soil is not good to build your house?
 - a) Sandy
 - b) Clayish
 - c) Organic and/or lime
 - d) Answers (a), (b) and (c) are all correct.

5. Which is minimum depth and minimum wide of the foundation?
 - a) 80cm / 60cm
 - b) 60cm / 60cm
 - c) 60cm / 80cm
 - d) 75cm / 75cm

6. Which is the minimum distribution of hoops in a column?
 - a) 1 at 5cm, 3 at 10cm, 2 at 15cm and the rest at 20cm
 - b) 1 at 5cm, 2 at 10cm, 2 at 15cm and the rest at 25cm
 - c) 1 at 5cm, 4 at 10cm and the rest at 25cm
 - d) All at 20cm

7. What is the correct concrete proportion for a foundation?
 - a) 1 (cement), 8 (hormigon), 3 (big stone less than 10") y 1.0 (water)
 - b) 1 (cement), 10 (hormigon), 3 (big stone less than 10") y 1.5 (water)
 - c) 1 (cement), 12 (hormigon), 3 (big stone less than 10") y 1.5 (water)
 - d) 1 (cement), 10 (hormigon), 4 (big stone less than 10") y 1.0 (water)

8. If the ditch bottom is difficult to level, which solution is correct?
 - a) Continue excavating until it can be leveled
 - b) To excavate 10 cm more and to pour a poor concrete mix(1:12 (cement : hormigon)
 - c) Add more water to the ditch bottom
 - d) Answers (a), (b) and (c) are all incorrect.

9. In case of which type of soil should a tie beam be reinforced?
 - a) Rockish soil
 - b) Gravish soil
 - c) Sandy and/or clayish soil
 - d) Answers (a), (b) and (c) are all correct.

10. What is the reason to draw cross lines on the foundation surface during forge (before hardening)
 - a) Because it's a traditional custom
 - b) It isn't important to draw cross lines on the tie beam surface
 - c) Foundation is going to be more resistant
 - d) In order to have better adherence with tie beam.

11. What is the correct concrete proportion for a RC tie beam?
 - a) 1 (cement), 2 (coarse sand), 4 (crushed stone 1/2") y 1.5 (water)
 - b) 1 (cement), 3 (coarse sand), 3 (crushed stone 1/2") y 1.5 (water)
 - c) 1 (cement), 3 (coarse sand), 4 (crushed stone 1/2") y 1.0 (water)
 - d) 1 (cement), 2 (coarse sand), 4 (crushed stone 1/2") y 1.0 (water)

Appendix 10 Examination Sheet prepared by the JCA Study Team
(Final test)

JICA STUDY TEAM

Av. Paseo de la República N° 3361 Primer Piso, Edificio Petroperú, San Isidro, Lima 27.
Perú.

**STUDY ON HOUSING RECONSTRUCTION WITH SEISMIC-RESISTANT HOUSE IN
THE REPUBLICA OF PERU**

AWARENESS – RAISING CONCERNING SAFER HOUSE

JST Project Site Office, Av. 12 de Octubre s/n, Pueblo Nuevo – Chincha – Ica – Perú

COMPREHENSIÓN FINAL TEST - PROYECTO PILOTO N° 2.1

Full Name:.....Date.....

Please mark with a circle the correct answer

1. **If the ditch bottom is difficult to level, which solution is correct?**
 - a) Continue excavating until it can be leveled
 - b) To excavate 10 cm more and to pour a poor concrete mix(1:12
(cement:hormigon)
 - c) Add more water to the ditch bottom
 - d) Answers (a), (b) and (c) are all incorrect.

2. **What is the reason to draw cross lines on the foundation surface during
forge (before hardening)**
 - a) Because it's a traditional custom
 - b) It isn't important to draw cross lines on the tie beam surface
 - c) Foundation is going to be more resistant
 - d) In order to have better adherence with tie beam.

3. **Which type of soil is not good to build your house?**
 - a) Sandy
 - b) Clayish
 - c) Organic and/or lime
 - d) Answers (a), (b) and (c) are all correct.

4. **In case of which type of soil should a tie beam be reinforced?**
 - a) Rockish soil
 - b) Gravish soil
 - c) Sandy and/or clayish soil
 - d) Answers (a), (b) and (c) are all correct.

5. **Which is the minimum distribution of hoops in a column?**
 - a) 1 at 5cm, 3 at 10cm, 2 at 15cm and the rest at 20cm
 - b) 1 at 5cm, 2 at 10cm, 2 at 15cm and the rest at 25cm

- c) 1 at 5cm, 4 at 10cm and the rest at 25cm
d) All at 20cm
- 6. What is the best procedure to prepare concrete?**
a) Mix cement with water and the the aggregates
b) Mix the aggregates with water and then the cement
c) Mix all the materials together
d) Mix cement with aggregates and then water
- 7. What is the correct concrete proportion for a RC tie beam?**
a) 1 (cement), 2 (coarse sand), 4 (crushed stone 1/2") y 1.5 (water)
b) 1 (cement), 3 (coarse sand), 3 (crushed stone 1/2") y 1.5 (water)
c) 1 (cement), 3 (coarse sand), 4 (crushed stone 1/2") y 1.0 (water)
d) 1 (cement), 2 (coarse sand), 4 (crushed stone 1/2") y 1.0 (water)
- 8. What is the correct concrete proportion for column, ring beam and light concrete slab?**
a) 1 (cement), 2 (coarse sand), 3 (crushed stone 1/2") and 1.0 (water)
b) 1 (cement), 3 (coarse sand), 3 (crushed stone 1/2") and 1.5 (water)
c) 1 (cement), 3 (coarse sand), 4 (crushed stone 1/2") and 1.0 (water)
d) 1 (cement), 2 (coarse sand), 3 (crushed stone 1/2") and 1.5 (water)
- 9. Why is it important to wet the concrete (curing) after the formwork is taken out?**
a) Because it is a costume
b) Because plaster adheres better
c) Because the concrete will have a better hardening (at least 7 days)
d) Because concrete will have a better finishing
- 10. Why is it important to homogenize the fresh concrete immediately after pouring?**
a) Because it is a tradition.
b) It is indiferent.
c) Because the honeycombs are avoided.
d) None of the previous stated answers is correct.
- 11. Complete the following sentence: Concrete pouring in a column shall be done from...**
a) the bottom of the foundation
b) the bottom of the tie beam (foundation and tie beam contact zone)
c) the bottom of the wall (tie beam and wall contact zone)
d) half of the foundation.
- 12. How thick is the correct mortar mix in a masonry wall?**
a) Less than 1.0 cm.
b) from 1.0 to 1.5 cm.
c) More than 1.50 cm.
d) All the previous stated answers are correct.
- 13. How long is the maximum distance between columns in case of bricks installed in the stretcher bond mode?**
a) 4.5 m b) 4.0 m c) 3.5 m d) 3.0 m
- 15. How thick is the correct concrete covering in structural elements when the finish is plaster or polished surface?**

- a) 2.0 cm / 2.0 cm b) 2.5 cm / 2.5 cm c) 2.0 cm / 3.0 cm d) 3.0 cm / 3.0 cm

16. Where is the critical zone for column in which hoops have to begin to be installed?

- a. In the foundation upper surface, that is in the foundation and tie beam contact zone.
- b. In the tie beam upper surface, that is in the tie beam and wall contact zone.
- c. From the half of the tie beam height, that is at the height of the floor level.
- d. None of the previously stated answer is correct.

17. Why is it important to lay brick row without mortar in a wall before constructing the wall?

- a. Because the quantity of rows in a wall can be determined
- b. Because it determines exactly the verticality of the confined wall
- c. Because it can be determined the uniformity of the horizontal joints.
- d. Because the uniformity of the vertical joints and how will be the joint of the wall with confined column can be defined.

18. What is the best connection system between a wall and a column?

- a. Dented connection.
- b. Connection at the same level with two 1/4" steel bars every four brick rows.
- c. Option b) is valid only when I need to make enlargements.
- d. Options a) and b) are equally valid

19. Is it possible to overlap steel reinforcement bars in a first floor column?

- a. Yes b) No c) It's indifferent d) Yes, but with conditions

20. Why is it important to pour concrete in the ring beam and light concrete slab together?

- a. Because the light concrete slab and the ring beams should form a monolithic element.
- b. The light concrete slab can be poured independently of the ring beams.
- c. Because the light concrete slab load is transferred better to the ring beams.
- d. Options a) and c) are correct.

Appendix 11

Result of Examination made by the JICA Study Team

Appendix 11 Result of Examination Made By the JICA Study Team

No.	Question	Ratio of correct answers	
		First examination	Second examination
1	What do you understand by safer houses?	100%	
2	Which are the three major factors of minimum requirements for safer housing?	95%	
3	How important is the quantity of water in the safer housing construction?	95%	70%
4	Which type of soil is not good to build your house?	5%	20%
5	Which is minimum depth and minimum wide of the foundation?	60%	
6	Which is the minimum distribution of hoops in a column?	100%	100%
7	What is the correct concrete proportion for a foundation?	95%	
8	If the ditch bottom is difficult to level, which solution is correct?	100%	95%
9	In case of which type of soil should a tie beam reinforced?	100%	100%
10	What is the reason to draw cross lines on the foundation surface during forge (before hardening) ?	100%	95%
11	What is the correct concrete proportion for a RC tie beam?	70%	95%
12	What is the best procedure to prepare concrete?		85%
13	What is the correct concrete proportion for column, ring beam and light concrete slab?		90%
14	Why is it important to wet the concrete (curing) after the formwork is taken out?		100%
15	What is it important to homogenize the fresh concrete immediately after pouring?		100%
16	Complete the following sentence? Concrete pouring in a column shall be done from-----		65%
17	How thick is the correct mortar mix in a masonry wall?		100%
18	How long is the maximum distance between columns in case of bricks installed in the stretcher bond mode?		95%
19	How thick is the correct concrete covering when the finish is plaster or polished surface?		90%
20	Where is the critical zone for column in which hoops have to begin to be installed?		90%
21	Why is it important to lay brick row without mortar in a wall before constructing the wall?		65%
22	What is the best connection system between a wall and a column?		100%
23	Is it possible to overlap steel reinforcement bars in a first floor column?		40%
24	Why is it important to pour concrete the ring beam and light concrete slab together?		95%

Appendix 12

Sample of Certificate of Completing Training of Minimum Requirements through Construction of Scale Model Housing

Appendix 12

Sample of Certificate of completing of minimum requirements through construction of cut model housing

OCUPATIONAL QUALIFICATION PROGRAM

CONSTANCY

ZONAL MANAGEMENT – ICA

Grants the present to: _____

In merit to have approved the: _____

With a duration of _____ hours; the result of evaluations are as follows:

C.U. N°	COMPETENCE UNITS	DURATION HOURS
TOTAL DURATION		
FINAL GRADE:		

ATTITUDES APPRECIATION:

_____ of _____ of 200 _____
