

## Annex 2, Technical Specification

**Client:** \_\_\_\_\_,  
represented by Mr. \_\_\_\_\_.

**Project designer:**

**Consultant:** \_\_\_\_\_

**Name of investment:** *Construction of Jointly-operated Border Crossing Point  
"Palanca", Republic of Moldova*

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## **A. GENERAL DISPOSITIONS**

### **A.1.General description of the project**

**1. Address of the (building site) object:** Palanca village, district - Ștefan Vodă, Republic of Moldova.

**2. Objective of the works:** Construction of Jointly-operated Border Crossing Point "Palanca", Republic of Moldova

**3. Location of the object:** Construction of Jointly-operated Border Crossing Point "Palanca", Republic of Moldova is located on the right side of Nistru river on RM territory. For the time being, «Palanca» border crossing point with Ukraine is situated on this location. The project

itself foresees the partial demolition of some existing constructions of «Palanca» border crossing point with Ukraine. The existing objects from the location - administrative block and heating station, recently built, will be reconstructed, but water tower, antenna tower and waste-water treatment plant will be kept for being included in the new project. The project foresees the essential extension of the «Palanca» border crossing point with Ukraine, which will be jointly operated with Ukraine on the basis of European principles.

#### **4. Project components:**

In the project components of the Construction of Jointly-operated Border Crossing Point "Palanca", Republic of Moldova it is foreseen the following important objects:

- a) Entrance checkpoints (1A, 1B);
- b) Administrative block (4);
- c) Outdoor washroom (3A);
- d) Vehicle checkpoint (5A,5B,5C,5D,5E,5F);
- e) Heavy vehicle checkpoint (6A,6B);
- f) Pedestrian checkpoint (9);
- g) Thorough vehicle inspection booth (7);
- h) Auxiliary building (24), reconstruction;
- i) Vehicle scales (8E);
- j) Infrastructure objects and outdoor utility networks.

### **A.2 Information about the project**

#### **a) General Layout**

The Project "Construction of Jointly-operated Border Crossing Point "Palanca", Republic of Moldova" is being made in the phase - „Execution project”, according to the instructions concerning the elaboration procedure, advice note, approval and the contents – part of the project documentation for constructions (NCM A.07.02-99).

The following normative characteristics are accepted in the project:

- wind pressure - 0.3k Pa (30 kg/m<sup>2</sup>);
- weight of the snow layer - 0.5 kPa (50 kg/m<sup>2</sup>);
- seismic degree of the construction terrain and seismic calculation of the building – of magnitude 7.

According to the conclusions of geotechnical report, made by SCPC SA in the year of 2015, there are embankments soils on the construction terrain, which will be removed and instead, a sand-argil bed compacted in layers of h=0,3m and optimal humidity W=0,18, characteristics of the soil (in a saturated state):  $\gamma_{II}=1.78 \text{ t/m}^3$ ;  $C_{II}=16 \text{ kPa}$ ;  $\phi_{II}=18^\circ$ ,  $E=9\text{Mpa}$ , see the plate - PG- compartment 04/2015-PG, will be set up/placed.

Ground water was found on a depth of 1,5-2,0m from the soil level/topsoil; this water doesn't have any aggressive properties towards concrete.

Ground works and construction works at foundations will be executed according to NCM F.01.03-2009 2009" Execution rules, quality control and final reception of the ground works and of construction works at foundations".

Brickworks/masonry will be executed according to the requirements of NCM. F.03.02-2005 "Design and planning of the buildings made from brickworks/masonry".

The anticorrosive protection of the constructions will be made according to CP E.04.03-2005" Anticorrosive protection of constructions and installations".

Quality control of some determined works and of the hidden works will be made according to CP A.08.01-96" Quality control instructions and final reception of hidden works and/or of works which are in determined phases at constructions and installations".

#### **b) Entrance checkpoints (pos. 1A, 1B)**

The constructive solution itself is/represents a steel-made structure/frame (metallic pillars and girders) and exterior walls made from panels/boards "sandwich" type.

Foundations are designed as reinforced cast-in-place-concrete of continuous type and waterproof isolated. Anticorrosive and fireproof protection of the steel-made frame elements will be executed by means of priming/primer paint ПФ-020 type and painting with fireproof paint.

#### **c) Outdoor washroom (pos. 3A)**

Resistance structure/frame of the building is designed as reinforced brickwork and cast-in-place concrete. The walls will be executed from brickwork M 35 and cement-sand mortar M 25.

The platform is designed as reinforced cast-in-place concrete. Foundations are designed as reinforced cast-in-place concrete of continuous type. The roof is designed to be a terrace type construction with covers made from bitumen membrane.

#### **d) Administrative block (pos. 4)**

Construction of the building is designed as P+2E. The resistance structure/frame is designed as/is made from reinforced cast-in-place concrete columns with walls embankment made from masonry (autoclaved-concrete-product) BCA with  $\gamma < 600 \text{ kg/m}^3$ . Foundations are designed as/are made from reinforced cast-in-place concrete of continuous type and waterproof isolated. The platform and interior staircase are designed as/made from reinforced cast-in-place concrete. The roof is designed as a terrace type construction with covers made from bitumen membrane.

#### **e) Awning (pos. 4a, 4b)**

Constructive solution of the dome represents a resistance frame, made from steel poles and steel frame works. Foundations are designed as/made from reinforced cast-in-place concrete and waterproof isolated of socket type. Anticorrosive and waterproof protection of the resistance steel-made structure elements will be executed by means of priming/primer paint GF-021 type and painting with email PF- 115 paint.

**f) Vehicle checkpoint (pos. 5A, 5B, 5C, 5D, 5E, 5F)**

Constructive solution of the vehicle control post represents a resistance frame, made from steel poles and girders, exterior walls made of "sandwich" type panels/boards. Foundations are designed as/are made from reinforced cast-in-place concrete of continuous type and waterproof isolated. Anticorrosive and waterproof protection of the resistance steel-made structure elements will be executed by means of priming/primer paint GF-021 type and painting with email PF- 115 paint.

**g) Heavy vehicle checkpoint (pos. 6A and 6B)**

Constructive solution of the vehicle control post represents a resistance frame, made from steel poles and girders, exterior walls made of "sandwich" type panels/boards. Foundations are designed as/are made from reinforced cast-in-place concrete of continuous type and waterproof isolated. Anticorrosive and waterproof protection of the resistance steel-made structure elements will be executed by means of priming/primer paint GF-021 type and painting with email PF- 115 paint.

**h) Thorough vehicle checkpoint booth (pos. 7)**

Foundations are designed as/are made from reinforced cast-in-place concrete of continuous type and waterproof isolated. The poles of the resistance steel-made structure/frame are designed as/made from HEA type profiles, but the girders – from IPE type profiles with vertical and horizontal windproof device/facility. The joint facility between poles and foundations is a rigid one, made by means of anchorage bolts into/connected to foundations. The joint facility between poles and girders is made by means of high resistance connection bolts (tension control inside the bolts).

Walls and the roof are designed as "sandwich" type panels/boards mounted on supporting elements made from galvanized profiles "C" and "Z" type.

Anticorrosive and waterproof protection of the resistance steel-made structure elements will be executed by means of priming/primer paint GF-021 type and painting with email PF- 115 paint.

**i) Pedestrian checkpoint (pos. 9)**

The resistance structure of the pedestrians control post is designed as/made from metallic poles and girders and the exterior walls – from "sandwich" type panels.

Foundations are designed as/are made from reinforced cast-in-place concrete of continuous type and waterproof isolated. Anticorrosive and waterproof protection of the resistance steel-made structure elements will be executed by means of priming/primer paint GF-021 type and painting with email PF- 115 paint.

**B. EXECUTION OF CONSTRUCTION WORKS**

## **B.3 Foundations**

### **B.3.1 Earth digging for foundations**

The terrain for the foundation will be executed according to regulations CP F.01.02-2008 "Design and construction of the basements and foundations for buildings and installations" and NCM F.01.03-2009 "Execution rules, quality control and the reception of foundation terrains"

While making the digging for foundations, the following things should be taken into consideration:

- maintaining the natural balance of the terrain around the hole of the foundation or around the existing foundations on a sufficient distance, in order not to risk the neighboring installations and constructions;
- when the pouring of the concrete is not done immediately after digging, in the terrains which are sensible to water, the digging process will be stopped at a quota higher than the final quota by 20 – 30cm in order to stop modifying physical-mechanical characteristics of the terrain which is under foundation.

In case when there are more appropriate constructions (which are executed) in the same building, the works will be done in a way that first the foundations situated in the deepest place will be done, but the digging should not influence constructions or installations executed before and should not affect the foundation terrain of the future neighboring construction work.

In case when the objects are relatively close to each other, but their digging works meet/are crossed, digging plans as well as the digging itself will be done as for a single object.

The digging works which are executed by means of an excavator should never exceed the designed profile of the digging.

Dimensions from the plan, quotas and the smoothness degree or working out of the digging surfaces will ensure technological conditions for safe labor and quality of works done.

If it's not specified, then not a single point from the surface of the finished works will be placed higher than +0,05m or below -0,05m from the designed surface. Between these limits of tolerance the surface will have to be flat and normal.

In case the terrains are sensible to water effect, the digging of the foundation will be stopped at a level which is more superior than the quota foreseen in the project, as follows.

- for sand (fine) 0,20 ... 0,30 m
- for clay soil 0,15 ... 0,25 m
- for soil which is sensible to humidity 0,40 ... 0,50 m

The digging and finishing of this last layer will be done immediately before starting to make the foundation.

If there are cracks on the bottom of the hole (at the foundation altitude), the necessary actions concerning foundation will be taken by the Project Designer.

If there is slight humidity because of unexpected precipitations/rainfall, the bottom of the hole should be dried out before starting the foundation works (concreting), but if it's too humid/wet, the mud layer will be taken away.

Changing the bottom altitude/height of the foundation hole during the working process can be done only after an agreement of the Project Designer, taking into consideration the following:

- placing up the altitude/height of the hole bottom, is being done if during digging works for the foundations a good terrain for foundation is determined/found at a more superior altitude/height than the one mentioned in the project.
- placing down the altitude/height of the hole bottom under the one foreseen in the project, is being done if there is a disaccord between the terrain and geotechnical study done on the location/site (a disaccord was determined/found...).

Any change of the altitude/height towards the project will be registered in a report of hidden works which will be signed by the Building Contractor, Beneficiary and Project Designer.

Pouring of the concrete will be executed as a rule immediately after reaching the foundation altitude from the project or of a layer (concerning the possibility of making the foundation for this very construction) determined by the Project Designer.

During construction works, the contractor is obliged to ask for the presence of the Project Designer on the building site when the foundation altitude/height is reached.

The results of the additional geotechnical studies made during the works by the Project Designer will be attached at the terms of reference.

### **B.3.2 Foundations made from reinforced cast-in-place concrete**

Foundations made from reinforced cast-in-place concrete will be done in accordance with norms/regulations NCM F.01.03-2009 "Execution rules, quality control and reception of the foundation works".

Foundations concreting works can start only if the following conditions are fulfilled:

(i) a control tag/technological card for foundations concreting on Construction of the Jointly Operated border crossing point which is operated in "Palanca" village on the territory of Republic of Moldova, made by the contractor which should include the following:

- precision of the object (from the technological card);
- preparation works which are going to happen;
- necessary facilities, their reserves, necessary materials;
- fazes, range/order and the dynamics of the execution;
- technological details which are necessary for the quality of works, technological planning/organizing of the working point/place;
- additional technical-planning measures in case of special climate weather conditions;
- the way of monitoring/supervision of working process;
- quality control program of the works done in phases;
- managing/controlling place/post of the possible transportations of the rejected concrete;
- fire protection measures and labor safety norms.

(ii) the working teams according to regulations mentioned in the technological card are trained before they start the working process by site construction manager;

(iii) the digging works, boarding and reinforcing bars works are being accepted if they are done in a qualitative way, as it follows:

- *after finishing the digging works for foundations*, a distinct site-meeting minutes of hidden works with the presence of project designer and project manager (consultant) will be elaborated, after this it can be accepted (or not) and the contractor can (or not) pour the concrete into foundations.

- *after finishing the boarding works*, it will be verified:

- \*building up the supporting elements;

- \*the right/correct connection of the boarding elements and their tightness;

- \*internal dimensions of the boarding in regard to those of the elements which will be poured with concrete;

- \*position of the boarding in regard to the one of the elements which are situated on inferior levels;

- \*position of the empty spaces.

- *at the end of reinforcing bars mounting*, it will be verified:

- \*number, diameter and the position of the reinforcing bars in different transversal sections of the structure elements;

- \*distance between clamps, their diameter and fixing way;

- \*length of the segments between bars which exceed the supports or which are going to be buried into the elements which are being poured after;

- \*position of the bindings/joining and the length of the reinforcing bars;

- \*quality of the welding;

- \*number and quality of the bindings between bars;

- \*maintenance appliances for position of the reinforcing bars during concreting process;

- \*the way of fixing a certain depth of the concrete covering layer and it's dimensions;

- \*position, way of fixing, dimensions of the buried parts.

**(iv)** the concrete surfaces (which are already poured and reinforced) which will come in contact with the fresh concrete, are being prepared; a necessary roughness will be made in order to have a good connection between these two concretes, depends on the case, and necessary measures will be prepared in case of some accident situations (concrete making station, extra transport, power supply source, materials for protecting the concrete, good conditions to create a working post, etc.).

**(v)** it's not foreseen the possibility to have special climate (atmospheric) conditions (cold weather, freezing, heavy rain, storm).

**(iv)** in case of foundations, water (which comes from precipitations) controlling measures are foreseen in order not to let it accumulate in places where concrete is going to be poured.

In order to verify if all the above mentioned conditions are executed, the approval for concreting will be made by project manager (consultant) and project designer according to regulations from the control program of the constructions quality and durability.

The approval for concreting should be confirmed on the basis of new verifications in cases where:

- nature events/changes intervened to modify the constant situation on the fixed date;

- concreting didn't start during 10 days after the fixed date;

- before concrete pouring, the correct functioning of the facilities/equipment for local transportation and for concrete compaction should be verified.

It's forbidden to start concreting before verifications and measures mentioned above.

*The foundations works will start after:*

- presenting the lab-test certificates of the foundation terrain, which will confirm the results foreseen in the execution project;
- perfection of the site minutes of the hidden works according to the regulations from the terms of reference of the construction object;
- perfection/revising of the ground survey of the foundation terrain with real dimensions.

Foundations are designed from reinforced cast-in-place concrete (class B15), with vertical waterproof isolation from 2 bitumen-mastic layers and horizontal waterproof isolation made from cement-mortar M100.

Under foundations a ballast layer and a concrete blanket B3.5 of 10cm depth. For a more exact position of the anchorage bolts into the foundations a special form made from profiled steel boards (which will be recovered after reinforced concreting of the foundations) will be made. Digging and pouring the concrete into foundations are considered classical works; the concrete will be poured obligatory by means of a pump (special one for pumping the concrete). Some special things while pouring the concrete into foundations should be considered and they are the following:

\*first of all, all the foundations should be perfect (should have perfect shape) horizontally, and this can be done by means of a special tool equipped with a laser, taking into consideration that each pole will have a foundation;

\*secondly, the bolts which come out from foundations and to which the poles are connected (made from euro-profile) should be perfectly centered on the axes, if not then the walls will not be straight.

## **B.4 Elements of the resistance structure/frame**

### **B.4.1 Concreting works of the resistance structure elements**

#### **a) Planning works for concrete casting**

Concreting works of the resistance structure elements will be executed according to the regulations NCM F.02.03-2005 "Execution, quality control and reception of concrete works and cast-in-place reinforced concrete". The Norms refer to the execution of the elements or structures made from simple concrete or reinforced cast-in-place concrete for industrial constructions, civil constructions, social-cultural, agricultural and zoo technical.

Conformation to these norms is obligatory for the contractor and for the investor/capital provider as well.

Execution of the concreting works can start only if the following conditions are being done:

a) a technological log-book concerning the concreting of the object, made by the contractor should exist; it should contain the following:

- precision of the object from the log-book;
- planning works which have to be executed;
- necessary facilities, their reserves, necessary materials;
- fazes, range/order and the dynamics of the execution;

- technological details which are necessary for the quality of works, technological planning/organizing of the working point/place;
- additional technical-planning measures in case of special climate weather conditions;
- the way of monitoring/supervision of working process;
- quality control program of the works done in phases;
- managing/controlling place/post of the possible transportations of the rejected concrete;
- fire protection measures and labor safety norms.

The working staff members which are involved in the execution of the works will train the working teams according to regulations mentioned in the technological log-book before they start the working process itself.

b) Boarding and reinforcing bars works are being accepted if they are done in a qualitative way, as it follows:

(i) *At the end of the boarding works*, it will be verified:

- building up the supporting elements;
- the right/correct connection of the boarding elements and their tightness;
- internal dimensions of the boarding in regard to those of the elements which will be poured with concrete;
- position of the boarding in regard to the one of the elements which are situated on inferior levels;
- position of the empty spaces.

(ii) *At the end of reinforcing bars mounting*, it will be verified:

- number, diameter and the position of the reinforcing bars in different transversal sections of the structure elements;
- distance between clamps, their diameter and fixing way;
- length of the segments between bars which exceed the supports or which are going to be buried into the elements which are being poured after;
- elements which are poured after
- position of the bindings/joining and the length of the reinforcing bars;
- quality of the welding;
- number and quality of the bindings between bars;
- appliances which maintain the position of the reinforcing bars during concreting process;
- the way of fixing a certain depth of the concrete covering layer and it's dimensions;
- position, way of fixing, dimensions of the buried parts.

c) It will be verified if the concrete surfaces (which are already poured and reinforced) which will come in contact with the fresh concrete, are a kind of mixture of milk and sand; a necessary roughness will be made in order to have a good connection between these two concretes. It will be verified if necessary measures are being prepared in case of some accident situations (concrete making station, extra transport, power supply source, materials for protecting the concrete, good conditions to create a working post, etc.).

d) It will be verified if necessary measures are being prepared in case of some accident situations (concrete making station, extra transport, power supply source, materials for protecting the concrete, good conditions to create a working post, etc.).

e) It's not foreseen the possibility to have special climate (atmospheric) conditions (cold weather, freezing, heavy rain, storm).

In order to verify if all the above mentioned conditions are executed, the approval for concreting will be made by project manager (consultant) and project designer according to regulations from the control program of the constructions quality (essential part of the terms of reference).

The approval for concreting should be confirmed on the basis of new verifications in cases where:

- nature events/changes intervened to modify the constant situation on the fixed date;
- concreting didn't start during 10 days after the fixed date;
- before concrete pouring, the correct functioning of the facilities/equipment for local transportation and for concrete compaction should be verified.

**Note:** *It's forbidden to start concreting before verifications and measures mentioned above.*

## **b) General rules for concreting**

The concreting process of resistance structure elements will be directly watched by construction manager and he/she will stay permanently at the place of concrete pouring and will keep to the rules and norms NCM F.02.03-2005 and to the technological log-book.

The concrete should be poured in maximum 15 minutes from the moment it was brought to the place of pouring (only in case if the transportation time is less than one hour). At concrete pouring the following general rules should be kept:

- boarding works which will come into contact with the fresh concrete will be watered immediately before concrete pouring, but the water which remains will be evacuated/removed;
- the discharging of the concrete from the vehicle will be done by means of pumps through spouts or directly into constructions;
- if the concrete which was brought to the construction object doesn't come into the working limits or presents segregations, then it will be rejected and it will be forbidden to put it into constructions;
- the height of the concrete free fall should be not more than 1,50m; the concrete should be spread alongside the element, making some horizontal layers of max. 50cm height and pouring of the new layer before starting the concrete setting from the previous layer (which was poured earlier);
- measures will be taken to avoid deformation or moving of the reinforcing bars towards the estimated position, especially for the bars fixed on the superior; if such malfunctions appear, they will be corrected during pouring process;
- much attention will be paid to the complete burying of the reinforcing bars into the concrete, keeping the depth of the covering layer according to regulations of the project;
- it's not allowed hammering or agitation/shaking of the reinforcing bars during concreting and placing the vibrator on the bars is not allowed too;

- in sections with dense reinforcing bars, it will be paid much attention to filling up of the section through lateral beatings of the concrete by means of iron bars together with vibration.
- in case if these measures are not sufficient, possibilities to have a lateral access for the vibrator will be created;
- the conduct and maintenance of the initial position of boarding and supporting elements will be watched, taking quick actions to repair in case of their (boards) movements or rejection;
- circulation of the workers during concreting process will be done by means of special foot walks not to modify the position of reinforcing bars;
- it's forbidden to move/walk directly on reinforcing bars or fresh concrete;
- the concreting will be done continuously up to the working joints which are foreseen in the project;
- the admitted duration of concreting cut-offs for which there is no need to take some special actions, should not exceed the starting time of concrete setting;
- in case when a longer (time) cut-off happened, the concrete pouring is allowed after preparation of joints surfaces according to points mentioned above;
- installation of foot walks on concrete panels for workers' circulation, as well as storing some scaffolds, boarding, reinforcing bars is allowed only after 24-48 hours depending on temperature and type of the used cement.

During concreting of construction elements, it will be verified if:

- data written in delivery certificate of the concrete corresponds to the order and the admitted duration of transportation is still valid;
- working conditions of the concrete corresponds to the one which is foreseen in the project;
- conditions of pouring and compaction avoid any defects;
- test are being made and samples are taken;
- methods and adopted measures of supporting the position of reinforcing bars are adequate/appropriate;
- dimensions and the form of boarding;
- protection measures of the fresh concrete surfaces are applied correctly.

*The following will be mentioned in the concrete registry-book:*

- certificates which correspond to the concrete which was used for construction works;
- location where it was poured/used;
- time – of starting and finishing the concreting;
- concrete samples – taken;
- adopted measures for the protection of fresh concrete;

- unpredictable events (weather conditions, cut-offs/breaking of concrete pouring);
- outside temperature;
- staff who watched/took care of concreting process.

During concreting of different elements or construction part, except general regulations mentioned above, the following additional regulations will be kept (depending on the case):

a) In case of elements with a height of max. 3,0m, but the vibration of concrete is not stopped by the reduced depth of the elements and by density/number of reinforcing bars, boarding is allowed to be made on all the surfaces, but the concreting from the superior part of the element.

b) Pouring of concrete into the girders and panels will start after 1-2 hours from the finishing of concrete pouring of poles' or supporting walls, if the technological book doesn't contain other specifications. Girders and panels will be poured with concrete, as a rule, on the same time.

In case of some lengths, large surfaces, it's allowed some working joints formation at  $1/5 \dots 1/3$  from openings. Before concrete pouring into the girders, the position of the separators will be verified (placed at max. 2m distance).

### **c) Compaction of concrete**

Mechanical compaction of concrete will be done through vibration.

For mechanical way of concrete compaction an internal vibration procedure will be used.

Type of the vibrator will be chosen taking into consideration dimensions of the elements and the possibility of introducing the head of the vibrator/jolter in reinforcing bars.

Duration of the optimal vibration is between min. 5sec. and max. 30sec. depending on working conditions of concrete and type of the vibrator; it's finished when the following conditions are fulfilled:

- \*concrete cannot be settled anymore;
- \*surface of concrete becomes horizontal and slightly shining;
- \*air balls do not appear on the concrete surface anymore.

Distance between two successive points of introducing the vibrator on interior side is max. 1,0m, it can be reduced depending on characteristics of the section and density/number of reinforcing bars.

### **d) Working joints (concreting)**

Working joints will be avoided planning the execution in a way that concreting will be done without stopping (without cut-offs) on the respective level or between two expansion joints. While fixing the position of working joint, the following regulations will be kept:

- at poles, working joint of the element will be foreseen;
- at girders, if the cut-off cannot be avoided because of justified reasons, this one will be done in the minimum moment;

- in case the girders are poured with concrete separately, the working joint is being made by 3 - 5cm under the inferior level of the panel;
- at panels/boards, the working joint will be placed at 1/5-1/3 from the opening of the panel/board.

Working joints will be made taking into consideration the following regulations:

- surfaces of the working joints of poles and girders will be right-angled on their axe, but of panels, walls will be right-angled on their surface;
- surface of working joint will be well cleaned, taking away the concrete which was not well compacted and milk-sand membrane/cover as well, forming like this a rough/rugose surface and a better connection with the concrete which is going to be poured;
- before pouring the fresh concrete, the surface of the joints will be washed and watered.

### **e) Treatment of the concrete after pouring**

For creating good conditions for concrete consolidation and to reduce the deformations from contraction, the concrete will be maintained humid only 7 days after pouring it, protecting the free surfaces through:

- \*covering by means of protection materials;
- \*periodical watering;
- \*applying protection membranes.

Covering with protection materials will be done by means of concrete protection tents, prelates, membranes.

This operation will be done immediately when concrete is well consolidated and the material will not adhere to/stick to the covered surface.

Protection materials will be permanently maintained in a humid stay. Watering will start after 2-12 hours from the moment the concrete was poured depending on the cement used and outside temperature, but immediately as the concrete is sufficiently consolidated and by these operations parts of cement should not be involved.

Watering will be repeated in intervals of 2-6 hours in a way that the surface of concrete will be maintained permanently wet/humid.

If outside temperature is less than 5°C the watering will not be done, and protection materials will be applied. When it's raining, fresh concrete surfaces will be covered by means of prelates or polyethylene foil/cover.

### **f) Shuttering removal**

Lateral parts of the shuttering/boarding will be removed when concrete reached a consolidation of min 2,5 N/mm<sup>2</sup>, and surfaces and edges of the elements will not be destroyed.

Shuttering of inferior surfaces on panels and girders will be removed when consolidation of concrete reached 70% from mark (safety poles will be maintained and will be removed when consolidation/resistance of concrete reached 95% from mark).

To establish the consolidation/resistance of construction elements for shuttering removal, proof samples made and kept in similar conditions will be taken.

The following will be taken into consideration during shuttering removal:

- \*the construction manager will be present during the operation;
- \*shuttering removal will be done in a way to avoid a quick removal of loads by elements from which shuttering is taken away, breaking of concrete edges or deterioration of shuttering material or supporting elements.

#### **g) Reception of concrete constructions of resistance structure**

Reception of concrete constructions of resistance structure of administrative block will be done according to regulations of the quality control program, established by project manager (consultant), project designer and contractor.

Supplementary can be verified:

- \*certificates of conformity for delivered concrete and reinforcing bars;
- \*delivery coupons for concrete;
- \*existence and content of site meeting minutes of hidden works concerning shuttering, reinforcing, the aspect of the elements after shuttering removal, appreciation of concrete quality (test coupons/certificates), as well as the existence of site meeting minutes for determined phases.

Verifications made and results from reception of concrete constructions of resistance structure are being registered in a site meeting minutes made by project manager (consultant), project designer and contractor, specifying in conclusion if the structure is accepted or rejected.

In case if deficiencies/failures in execution of structure are determined, measures of reparation will be established, but after their execution a new reception procedure will be made.

#### **h) List of possible deviations**

The list of possible deviations on concrete works is the following:

Deviations - limit at dimensions of the elements executed from cast-in-place concrete:

Lengths (openings) of girders, panels, walls;

\*up to 3,00m  $\pm 16$ mm

\*3,00 ... 6,00 m  $\pm 20$  mm

\*above 6,00 m  $\pm 25$  mm

- dimensions of transversal section:

\*depth of walls and panels  $\pm 3,0$  mm

- at 10 cm including

\*above/over 10 cm  $\pm 5,0$  mm

- width and height of section of girders and poles:

\*up to 50 cm  $\pm 5$  mm

\*over 50 cm  $\pm 8$  mm

### **B.4.2 Metallic constructions of resistance structure**

### **a) General regulations/general layout**

Resistance structure of the objects:

*\*Control points at the entrance (poz. 1A, 1B)*

*\*Dome (poz. 4a, 4b)*

*\*Control posts for vehicles (poz. 5A, 5B, 5C, 5D, 5E, 5F)*

*\*Control posts for TIR-s (poz. 6A și 6B)*

*\*Control post for pedestrians (poz. 9)*

Is foreseen to be made from profiled steel and fixed poles by means of anchorage bolts into concrete foundation and steel made girders or frameworks on the Dome (poz. 4a, 4b).

Metallic structure will be executed from folded profiles, assembled in specialized workshops, sandblasted, (priming layer was applied) and painted, transported and after mounted on the building site.

First the metallic structure is being made in a specialized workshop whichever:

- folded profiles are being debited at dimensions and angles which are foreseen in the project;

- holes are being made in folded profiles;

- flanges and supports of different dimensions made from sheet-metal and cut preliminary by means of a plasma device and holes are made by means of a drilling machine are being welded,

- after all the parts were welded on folded profiles (poles and girders), they are being cleaned by sandblasting and anticorrosive protection is being executed/applied on them.

Ready-made subassemblies, which come into metallic resistance structure, will be transported to the building site where the mounting itself starts by means of a trailer; the mounting can be done by a special working team specialized in working at high points and of course by means of associated equipment/machines like cranes, screw driving machines, welding devices, etc.

Resistance structure will be done on subassemblies, which will be welded totally in a mechanical way at factories, being assembled right on building site by means of mounting bolts and welded by qualified personnel/workers.

### **b) Requirements concerning mounting and reception on building site**

Storing and transportation of subassemblies or detached parts, will be made in specialized workshops and on the way to the building site; parts will not be disfigured, water will not stay on metallic parts, and unprotected parts will be painted in order not to get rusty.

The enterprise which makes the mounting will elaborate the technical mounting documentation which should consist of:

- mounting technology;

- assembling technology – welding on the building site;

- technological execution of the joints.

All these technologies should be used according to regulations from the present terms of reference and standards, norms, instructions and regulations which are up-to-date and should be reported to project designer and to project manager (consultant).

Discharging and storing of parts, elements and subassemblies on the building site will be done in a way to avoid their deterioration and as well to identify them easily while mounting. Girders and frameworks should be fixed only at bindings in order not to destroy/brake the

shape of reinforcing bars. While lifting and operating the elements during mounting process, these (elements) will be fixed in hooks, chains or cables by means of bolts or other similar parts.

Welding at temperature below 5°C is forbidden. In case it's necessary to weld on low temperatures, the mounting company will elaborate (having an agreement with project designer) a special welding technology for this very case.

It's forbidden the welding of auxiliary mounting parts (hangers, hooks, etc.) on resistance parts and subassemblies of the structure or drilling without a written approval of the project designer.

Before mounting a part, a correct measurement of the distance between parts on which it should be fixed, will be made in the position of the project and it will be compared with a part which is going to be mounted. In case they do not coincide, the mounting company can make necessary adjustments, only if they do not affect the resistance of the part or of the structure and if it is necessary the notice of advice will be requested from project designer. Correct position of the parts which are going to be mounted as well as the dimensions of the structure are being verified during mounting process by repeated measurements.

Welding works on the building site will be assisted and verified permanently by an accredited engineer as a responsible man for welding works or by building-site manager if he/she is accredited to be responsible for welding works.

The welders which will weld/connect sections on the building site, mounting welds will have to be trained and after tested (they will pass practical exams) in the same position of making the welds on building site, and after they will be accredited to execute only those welding works which they proved to know (theory and practice as well). Each welder will have an authorized certificate with a number registered by the contractor and by means of this certificate the welder will mark each section of welding executed by him/her.

It's forbidden to use unauthorized welders or those who do not use their stamps to mark welds on the building site.

Welders who will execute welded joints on the building site should be able to make welds in good conditions and in any position of welding for each type of welding as well as to work at high points on scaffolds. For this, and taking into consideration the importance of works done, it's recommended that the welders should be recruited from the range of best ones who welded constructions with welds in position.

Welders should be verified and authorized for applied welds procedures, without paying attention to where they weld – on building site or in the workshop. Verifications of the quality of works will be done according to assembling technology – welding done by welder and authorized by the project designer.

Joining the elements of the structure will be done in knots with an angle weld of  $0.7t_{\min}$ , where  $t_{\min}$  is minimum depth of the joining elements. Welding will be done by means of electrodes by authorized staff/workers. The welds will be verified qualitatively by means of methods fixed by norms from the domain.

Anticorrosive protection will be realized through "thermic Zinc coating" procedure on all the folded profile surfaces and sheet-metal. Surfaces affected by welding will be protected through cold galvanization by means of *zinc pasta* applied on these surfaces. Anticorrosive

protection will be done after a preliminary cleaning through sandblasting of all surfaces. Anticorrosive protection will determine protection duration of 25 years.

Reception of the structure will be done according to CP A.08.01-1996 "Verification Instructions of quality and reception of hidden works and/or in phases determined at associated constructions and installations".

#### **B.4.3 Walls made from panels «sandwich» type**

Exterior closures for the objects:

- \* *Control posts at the entrance (pos. 1A, 1B);*
- \* *Control posts for vehicles (pos. 5A, 5B, 5C, 5D, 5E, 5F);*
- \* *Control posts for TIR-s (pos. 6A și 6B);*
- \* *Control post for pedestrians (pos. 9);* are designed from isolated panels sandwich type – isolation from foamed isophenic (IPN), certificates FIRE safe, EI -15, C1 with  $q=40 \text{ kg/m}^3$ , type KS 1150,  $d=80\text{mm}$ , covered with polyester paint (interior polyester paint, for alimentary usage).

Fixing the sandwich panels will be designed on a frame made from steel profiles. Sandwich panels will be designed with longitudinal joints through profiled joint system, but in transversal direction through partial cut-out of inferior metallic panel and of thermic isolated layer, overlapping of the panels and fixing by means of self-cutting screws.

The roof and walls are fixed on some wedges which can be made from euro profile U, I or Z, placed at the distance by constructor of the panels. These panels are fixed by means of wedges with the help of self-cutting screws, which have a kind of filet, make holes and remain there fixed definitively.

The Contractor will use prefabricated panel systems, which will correspond to the following characteristics:

- \*non-harmful material;
- \*constant value of thermic resistance guaranteed on the whole duration of usage.
- \*high degree of sealing (according to standard EN12114:2001);
- \*excellent thermic abilities and isolation without discontinuities, without empty spaces, without free spaces or without any danger of condensation;
- \*prefabricated system – low weight, one single component – one single fixing system;
- \*structural integrity of the building covering;
- \*approved product fabricated according to EN ISO 9000;
- \*guaranteed performances on a long range/term, without being necessary to make maintenance operations for 25 years and with an estimated life duration of 50 years.

The Contractor will present the characteristics of the panels which are confirmed by conformity certificate or declarations of the producer; the contractor will present them from the producing company.

The dividing walls from the other rooms will be executed from isolation panels for walls isophenic isolated (IPN), certificate FIRE safe, with  $q=40\text{kg/m}^3$ , with  $d=80 \text{ mm}$ , painted with polyester paint, interior profiled wall F (flat) easy to wash.

All the joints between wall – wall, wall – ceiling, windows – wall will be well covered by means of covering elements made of sheet-metal according to the catalogue of the producer.

#### **B.4.4 Walls made from autoclaved cellular concrete blocks**

1) Masonry works will be done according to requirements NCM. F.03.02-2005 "Designing of the buildings made from masonry walls" and NCM F.03.03-04 «Execution and reception of masonry works».

2) Materials used for masonry made from autoclaved cellular concrete (a.c.c.) blocks should correspond to standards, and to the other up-to-date prescriptions.

3) The most important conditions which masonry from (a.c.c.) has to fulfill are the following:

- masonry is executed from entire/full blocks or from parts of blocks, which appear by cutting the entire ones;
- it's forbidden to change them with bricks in case of external walls;
- cutting and scabbling of the blocks.
- masonry made from a.c.c. blocks will be done by means of special tools.

4) Before laying the a.c.c. blocks they will be watered in order to obtain a better adherence between blocks and mortar. The watering can be done by means of a water bucket or by sinking them in and taking out immediately from water;

5) Much attention is paid to the decisional importance which these measures have for a good adherence between block and mortar and through this on resistance and stability of the masonry;

6) Consistence of masonry mortar (lime - cement) determined by cone etalon, will be of 10 - 11cm. Mortars on the basis of activator will have to fulfill the conditions of quality and consistence foreseen in technical regulations;

7) Masonry bond is being done obligatory on each row on masonry height; joints will be staggered with  $\frac{1}{2}$  up to  $\frac{1}{4}$  block;

8) In case of supporting walls, the blocks are being laid obligatory in a way that the direction of loading has to be right-angled to the expansion direction of the cellular concrete mass (rugose longitudinal surfaces of concrete, which result from cutting in fabrication, should be in a horizontal plan);

9) Joints between a.c.c. blocks will be of 8mm depth; they should be filled up with mortar or other materials which would be able to some supporting elements in the joints – masonry and joint embankment are connected on poles, diaphragms and reinforced concrete are connected by means of binds of 6 – 8 mm in diameter, connected to poles at 60cm height or by anchorage, which is fixed in vertical position on a.c.c. blocks from 60 to 60cm;

10) Masonry will be connected with embankments of external and internal walls on the superior part. In case of binding with bricks walls or small blocks made from autoclaved cellular concrete, which cannot be connected, having another height of layer, the connection will be done with the help of metallic elements – in case when height of layer is the same at

connection between supporting walls with dividing walls stainless nails will be fixed for a better reinforcing.

11) At the inferior part, dividing walls will be executed on a mortar bed, but with the ceiling they will be reinforced, according to regulations from execution project.

It's recommended to do the covering of connection joints (walls made from different material) by zinc rabbit grate in order to avoid cracks.

12) Velocity/speed of masonry execution will not exceed  $\frac{1}{2}$  level in 24 hours.

13) It's forbidden to execute channels for internal installations of heating, sewerage, water supply, gas, etc., in the walls made from a.c.c. small blocks. Radiators, washbasins and washstands will be mounted on vertical supports or on consoles fixed in the masonry.

14) It will be avoided mounting of heavy objects on consoles; they will be placed only on supports fixed on the floor or on platform.

15) Masonry works made from small blocks of a.c.c. will be made during period when the temperature for the next 3 - 4 days will not go under  $+ 3^{\circ} \text{C}$ .

16) For having a precise execution, the norms for masonry made from blocks of autoclaved cellular concrete will not be exceeded as it follows:

a) at the dimensions of walls, buildings, rooms, etc.:

- at the depth of the walls  $\pm 8 \text{ mm}$ ;
- at empty spaces  $\pm 20 \text{ mm}$ ;
- at horizontal dimensions of the rooms (with a condition not to be reduced under 15cm the length of supporting prefabricates on the platform)  $\pm 30 \text{ mm}$ ;
- at vertical dimensions for different floors  $\pm 20 \text{ mm}$ ;
- at the height of 2 levels for buildings executed from small blocks  $\pm 30 \text{ mm}$ .

b) At the surface and edges of walls and poles:

- at the verticality of surfaces and edges  $\pm 5 \text{ mm/m}$ ;
- deviation from horizontal part of superior surfaces of each row of the block  $\pm 7 \text{ mm/m}$ ;
- idem at the whole length of masonry  $\pm 20 \text{ mm}$ .

c) At the depth of joints:

- at horizontal joints  $\pm 3 \text{ mm}$ ;
- at vertical joints  $\pm 3 \text{ mm}$ .

#### **B.4.5 Walls made from limestone blocks**

Masonry works will be executed according to NCM F.03.03-04 «Execution and reception of masonry works». Dimensions, mark and quality of the lime blocks (limestone), as well as mark of masonry mortar will be obligatory those which are foreseen in the project.

Consistency of the mortar which is determined by etalon cone for masonry made from lime blocks (limestone) will be of 7-8 cm.

Lime blocks (limestone) will be well watered, before putting them into operation. During heat/hot weather, the watering should be done more often. The humidity of the lime blocks (limestone) should be under 20%, and those which are more humid will be stored in dry

places until they reach the right humidity degree; the limestones will be stored on the building site from very beginning in dry and covered places.

While making the masonry from lime blocks (limestone), the horizontal and vertical joints will be filled up well with mortar. The depth of all horizontal and vertical joints is of 10mm. The joints will be straight, parallel and of equal depth. For this, an iron ruler of the joint's depth will be used and placed on the edge of the masonry row which is inferior to the one (joint) which is being executed. The jointing is being made with mortar foreseen in the project and by means of a special steel-made tool for jointing. The extra mortar which is on façade and spots left will be removed with the help of diluted acids and will be washed by means of water.

The rightness of the rows of blocks is being obtained by means of wooden or steel rulers which are graduated as well at equal intervals with the height of masonry rows. Rulers are being fixed on the corners of the masonry. Verification of rightness will be done by means of a cord which is well extended between these rulers.

Cutting-off/stopping of masonry execution is being made in steps, interruption of battled walls making is forbidden.

Beveling of the vertical joints of one row is being obtained through their displacement of  $1/2$  up to  $1/4$  of the block, towards vertical joints of the neighboring rows.

There should be no height differences more than 1.5m on some sections of the walls while executing the walls.

Connections between masonries, at the corners, intersections and bends are being made alternatively depending on the type of used lime blocks (limestone): first row of lime blocks (limestone) is being made continuously at one of the walls and will be interrupted at the second one on the intersection. The second row from the second wall is being made continuously and it will interrupt the one from the first row, etc.

Reinforcing of the walls is being made by means of iron reinforcing bars of 6mm in horizontal joints at distances of 4 rows (at aprox. 80cm) – a more uniform distribution of reinforcing bars will be obtained. While executing the reinforcing masonry, much attention will be paid to correct position of reinforcing bars and to the necessary depth of the covering mortar on the horizontal joints.

Cutting the lime blocks (limestone) which are necessary for connections at the corners, intersections, bends, etc., will be done by means of an electrical tool with abrasive wheel. It's forbidden to cut the blocks by means of a hammer.

Direct verifications are being made through probes at the end of each phase; based on these probes, the reception commission will make a site meeting minutes of hidden works and all the verifications, obtained results and conclusions regarding the possibility to continue the works will be indicated there.

#### **B.4.6 Walls made from brick masonry**

Masonry works will be executed according to NCM F.03.03-04 «Execution and reception of masonry works».

Dividing walls in the rooms with a humid working regime will be executed from full bricks M75 on mortar of cement-sand M50. At these works, the internal walls made from bricks masonry will be resistant to heavy things, to loads given by finishing layers and to any lateral load in normal exploitation conditions. Only certified bricks will be used.

Bricks for the masonry will be resistant and without cracks, braking or other defects which could affect their (bricks) laying, resistance, aspect or durability of the construction. The bricks will not have any materials which could deteriorate the plastering or corrode steel parts.

The complete quantities for all types of bricks will be delivered from the same producer.

Surfaces of the walls and their internal and external corners will be constructed at the plumb; admitted deviations + 4 or - 6mm.

Sections and conditions where the masonry is put into operation will be examined. The works will not start if unsatisfactory conditions are not solved/repared.

Before closing the empty spaces or inaccessible spaces by means of masonry, all the waste will be removed and the sector which has to be closed will be cleaned.

Walls from a single row of bricks will have the depth of bricks using the elements of indicated depth.

During masonry works, empty spaces will be left in order to install different equipment. These empty spaces will be filled up after mounting the equipment which is adequate for the masonry.

The bricks will be watered before installation. Each row will be fixed in a continuous layer of mortar, the vertical joints of the superior row in the row which is under at the middle of the brick (interjectional joints). Horizontal and vertical joints will be of approximately 8mm depth. Vertical joints will be filled up on the whole height of the brick. Each row will be well fixed at corners and intersections.

The bricks will be placed with the help of plummet, keeping to lines, distances and the level of each layer. The joints on each brick row will correspond to the middle of bricks from the row which is under and will keep to the plummet.

Reinforcing bars are buried into the mortar, but the covering of the joint by means of mortar of the reinforcing bar will be minimum of 2 cm. Reinforcing bars will overlap each other minimum 150 mm. The anchorages of dividing walls made from bricks will be executed according to regulations from the project and to requirements foreseen for these seismic zones.

Works will be done and the place will be kept clean, removing extra materials and mortar. Waste of mortar will be removed from the neighboring works before it becomes consolidated. The masonry should stay clean, without any spot of mortar and the mortar from joints should be consolidated.

Surfaces of the masonry will be protected during construction works when there is no work directly on them. During rain or when the works are stopped, the walls will be protected at superior parts by means of waterproof membrane which doesn't leave any spots and it's well fixed.

The defects are considered things which should be repaired by partial or total redoing of works, depending on how the project manager will decide; they are the following:

- inobservance of the present terms of reference;
- using inappropriate bricks;
- wrong lay-out of some defective laying of the walls;

- empty spaces in the masonry in other places or in places with deviations more than 2cm on horizontal part towards how is specified in the plans.

Verifications of the works during working process as well as after finishing works will be done concerning what was mentioned above. Verification of dimensions and quantity of materials used will be done according to specifications and standards for each material and product apart.

Used materials for which documentation foresees special quality and which presents doubts have to be tested in the laboratory. Verification of the depth of walls is being done only at walls without plastering layer on them between two straight layers of 1m placed on surfaces of the walls.

Verifications of correct wall bond, reinforcing, connection at corners, anchorage are being done during execution by visual examination. Verification of superior surfaces smoothness of bricks laying is being done by means of water level on leveling board of 2.0m length. Verification of surface and edges verticality is being done by means of a plummet and leveling board of 2.0m.

#### **B.4.7 Compartment walls made from gypsum board panels**

Light dividing walls with a simple or double frame and gypsum-board panels are mounted on the building site. Resistance construction functions result from co-operative work of frame made from sheet-iron profiles and gypsum-board panels and isolation layers.

Supplementary, they can support the loads of hanged objects.

Mounting will start with measuring and laying of walls axes on supporting panel, of self-supporting frames, of the doors and other openings. After this the operation of mounting will continue on walls and ceilings.

Profiles UW are being used to fix the profiles at ceilings and floors, but in case of lateral connections of the walls – frame profiles CW type are being used.

Before starting the mounting, jointing bands are being stick to these profiles or other jointing materials are attached as well.

Resistance panels which present big subsidence will be equalized before mounting the profiles. Vertical profiles of the frame should enter/come into minimum 15mm and should present tolerance on the superior part of aprox. 1cm.

Mounting of gypsum-board panels will start on one of the walls' surfaces. The first gypsum-board panel is being laid partially on the frame and is fixed with the help of bubble level.

After this, the panel is fixed on the supporting frame by means of easy-mounting screws.

The next panels are going to be mounted in the same way. The distance from supporting frame of the elements to completion elements from the edge zone of the ceiling should not exceed 62,5 cm, but in case of sound-proof isolation, this distance should not be less than 50 cm. In case of double panels, the second row of panels will be screwed after the first one through displacement of joints.

At slide connections on ceilings, on UW profiles from the superior part, the panels will not be screwed.

After mounting the installations in the empty spaces/openings, the necessary layer of mineral wool will be fixed, placed.

The normal depth of isolation should not be bigger than the empty space between wall panels and should not be reduced under the necessary dimension from the conditions of hydro-thermic dimension. After, the second surface of the wall will be boarded.

The joints of the panels are out of position towards the position of the joints of panels from the opposite site.

In case of high walls, at the panels' connection - horizontal profiles are necessary; these walls will be staggered, on the contrary the stability of the wall will be reduced.

If doors are being mounted, it's necessary to mount special additional profiles on both sides of the door. These profiles are being mounted on the whole height of the walls and are fixed tight on the inferior and superior UW profile. By entering one into another, CW profiles can support a weight of 25kg of the door leaf at 2,80m height and as well as for weights of the door leaf up to 60kg.

Filling of gypsum-board panels can start only after the consuming of all significant tensions/pressures, like for example humidity or temperature.

The right temperature for mounting and construction should be minimum 5° C.

Exaggerated humidity of the air (in comparison with undermentioned conditions) during filling, as well as quick dewatering in order to dry out the filling, can form cracks. In case of introducing some covering bends paper made or fiber-glass on the joints, it's possible the filling with filler for joints.

Gypsum-board panels are compatible with almost all types of covering layers for inside/interior rooms as they are the following: lacquer finish, dispersion paints, wall papers, boarding, textile layers, etc. It's not indicated to use coloring agents on silicate or lime basis.

Verification of works quality is being made at each phase apart:

- \*verification of the way how the steel frame is executed;
- \*verification of steel frame in the door openings;
- \*verification of panels fixing on gypsum-board and of general smoothness;
- \*verification of the durability of edges.

#### **B.4.8 Execution of plates/boards made from reinforced cast-in-place concrete**

Concreting works of the plates/boards are being made according to regulations NCM F.02.03-05 «Execution, quality control and reception of the works made from concrete and cast-in-place concrete», as well as regulations from point. B.4.1 from the present terms of reference. Supplementary to those foreseen in point. B.4.1 during plates/boards concreting, the following will be done:

##### **a) Concrete formworks and their supports**

Concrete formworks and their supporting elements should fulfill the following conditions:

- to make the form/shape, dimensions and finishing degree according to admissible deviations;
- to be sealed/leak-proof in order not to lose the milk-cement;
- to be stable and resistant to loads which appear during execution process;
- to provide the established mounting and dismounting order without deteriorating the concrete elements;

Concrete forms/shuttering of «lost concrete form» type will be made from panels on metallic structure.

Mounting of scaffolds for concrete form supporting for plates (girders, ribbings, boards) is being done in the following order:

- lay-out of supporting vertical elements;
  - supporting vertical elements are being installed and are being braced temporary;
  - horizontal elements of the scaffolds (rulers, extensible girders, etc.) are being mounted;
  - position and dimensions are being verified and the corrections are being made as well.
- Final fixing of braces is being made after last verification which is being done after concrete forms/shuttering mounting.

Mounting of concrete forms/shuttering will include the following operations:

- lay-out of concrete forms/shuttering
- assembling and temporary support of panels
- verification, connection and final fixing of concrete forms.

Reception (made by building-site manager, project manager and project designer) of concrete forms will be done at the end of concrete forms installation; the results will be fixed in a site-meeting minutes of hidden works.

### ***b) Reinforcing the platform***

Reinforcing bars should fulfill the technical conditions foreseen in standards for iron concrete with profile and flat-round iron concrete.

For each quantity and sort of delivered iron concrete, the quality control operation will consist of:

- the existence of confirmation certificate;
- examining the aspect;
- verification through bending at cold;

Forming/shaping of the bars, making and mounting of reinforcing bars will be made according to regulations from the project. Reinforcing bars which are formed should be straight and clean. All the impurities will be taken away from their surfaces. It's forbidden forming of reinforcing bars at temperatures under  $-10^{\circ}\text{C}$ .

Mounting of reinforcing bars can start only after a qualitative reception of concrete forms. Reinforcing bars will be mounted in a position which is foreseen in the project, taking measures for maintaining them during concrete pouring (distance pieces, clips, etc.).

Mounting of the reinforcing bars on boards will be done in the following order:

- making notes on the concrete forms for bars positioning;
- laying of straight bars and connecting them by means of wire rod to reinforcing bars of girders and concrete belts;
- bars (lifted ones) are being mounted later (which can be brought already figured/profiled or can be figured by a special appliance);
- reinforcing repartition bar is placed on and it is being tight by means of wire rod;

In case of reinforced plates on two directions which do not have repartition bars, straight and lifted bars from the downside row on the direction indicated in the project on which the second row is placed and tight, are first mounted.

Maintaining the distance to the concrete form is being made by distance pieces (for the first row) and by a chock (for the second row).

Circulation on the mounted section is being done on special flooring or on cupboards fixed on chocks as well.

Buried Metallic parts will be fixed in welding points or connections/tights of wire rod and reinforcing bar element, or will be fixed in concrete forms in order to maintain their position during concrete pouring.

Concrete covering layer of iron-concrete bars will assure protection of reinforcing bars against corrosion and a good compound effect of them with concrete. The necessary depth of concrete layer for covering the reinforcing bars will be the one indicated in the project. Mounting of reinforcing bars will be made according to positions which are foreseen in the project, assuring the maintaining of these positions during concrete pouring. While mounting, at least 3 distance pieces on each square meter of board will be foreseen. For maintaining the reinforcing bars in position from the superior part of the board, iron-concrete chocks fixed at concrete forms with a distance between them of 1m (1 piece per 1 square meter), will be used.

At the end of mounting works of reinforcing bars, the reception of board reinforcing will be made; the reception will be done by project manager, building-site manager and project designer; they will form a reception site-meeting minutes of hidden works.

***c) Quality control of concreting works (applied on concrete boards)***

Quality control is being made according to NCM F.02.03-05 «Execution, quality control and reception of works concerning concrete and cast-in-place concrete works», as it follows:

a) Before starting concreting works, concrete surfaces which were poured before and which are going to come into contact with the new concrete, will be verified, respectively if:

- milk-cement layer was removed;
- uncompact concrete zone was removed;
- surfaces show necessary roughness for a good connection between the old and new layers of concrete. These verifications will be written in the site minutes of hidden works.

b) During concreting of construction elements, it will be verified if:

- the written/registered data from delivery bill/certificate of concrete corresponds to what is foreseen and duration of transportation was not overpassed;
- concrete workability corresponds to the one which is foreseen;
- conditions of pouring and compaction assure the avoiding of any defects/mistakes;
- tests and sample taking are being made;
- maintaining the position of reinforcing bars and of buried parts is assured;
- maintaining the dimensions and shapes of the concrete forms as well as of supporting elements is assured;
- protection measures of open spaces of fresh concrete surfaces are being applied.

c) In the registry book of concrete works, the following things will be recorded:

- delivery bills of the concrete which was put into operation;
- time of starting and finishing concreting works;
- temperature (during cold weather);
- adopted measures for protection of fresh concrete;
- intervening event (interruption of concrete pouring, etc.);

d) While shuttering removal of any construction part, it will be verified and registered in the site minutes of hidden works:

- the aspect of the elements, it will be announced if there are inappropriate concrete sections (uncompact, empty spaces, joints, etc.);
- dimensions of transversal sections of elements;
- distances between different elements;
- position of vertical elements (poles, diaphragms, walls) towards to those situated on the immediate inferior level;
- position of passing empty spaces;
- position of reinforcing bars which are going to be buried into the elements which will be poured later.

e) Quality of concrete put into operation is considered to be good if:

- there are no defects of pouring or compaction (empty spaces, interruptions of concrete, etc.);
- while hammering/knocking, an adequate and uniform sound is being registered;
- quality of delivered concrete is good;
- results made on test bars/proof sample which are made on building site are good;

f) The results concerning concrete quality for each part of the structure are recorded in a site-meeting minutes made by the beneficiary and executor. If the quality conditions are not fulfilled, then they will be analyzed by the project designer.

- in conclusion – the structure is certified or rejected.

## **B.5 Roofing works**

### **B.5.1 Roof-framing works**

Roofing and coating works will be undertaken in accordance to the project's provisions NCM C.04.03-2005 "Coating, Designing norms" and СНиП II-25-80 "Wooden constructions".

The provisions of this chapter, further on, refer to the quality verification and acceptance (receiving) of coating works, made of corrugated tin, as well as installation of drainage channels, drainpipes and coating-related tinker elements. During the execution of coating works, at each stage, thoroughly will be verified the following:

- a) Verification of materials to be brought into the operation, is performed by the project supervisor and refers to:
  - \* Availability and content of the certificates of compliance upon receiving of the materials on site;
  - \* In case of lack of the certificates of compliance, a technical approval will be requested;
  - \* Introduction of materials into the operation, whether from storage and handling, the materials were not damaged or incorrectly replaced.
- b) Continuous quality assessment of performed works in accordance to the project's provisions, performed by the project supervisor during the entire operation.
- c) Verification during the work phases (including wooden decks, roof boarding/revetment, anti-condensation foils, fireproof and antiseptic treatment of the wooden elements) of the work quality, which is performed in accordance with approved regulations and refers to the correspondence with the provisions of the project, in terms of quality and

compliance and, also, to the acceptable limits of deviations stipulated above. This verification covers the entire category of roofing works and each section individually, and is compiled in “Minutes regarding verification of works that will become covered/hidden”, which will be respectively registered.

d) During coating works the following will be verified:

- \* Compliance of works to the provisions and details provided by the project (including coating/roofing type, gradient, connections, details, ridge, ruptures, bodywork, etc.);
- \* Availability and correctness of the tinker works related to roofing works in accordance with the project's details and catalogues associated with detail types: basket sorts, valleys, fascia, and coating, as well as ventilation ridges;
- \* Availability of supports and the gripping method of the tinker-related elements.

e) During the installation of drainage channels and drainpipes the following will be verified:

- \* Drainage channel slopes (min. 0.5%) as indicated in the project's provisions;
- \* Drainage channel should be installed with minimum 1 cm and maximum 5 cm under the eaves (gutter) drop;
- \* Location, type and number of hooks to match the provisions of the project;
- \* The outer edge of the drainage channel to be installed with approximately 2 cm below the inner edge;
- \* Drainage channels' hooks and drainpipes bracelets to be protected against corrosion.

Prior to coating and roofing works, preparatory works will be undertaken in the following sequence:

- On-site identification of the roof-framing elements to be mounted, in accordance with the project's provisions;
- Establishing the consequence of the works to be performed, together with the designer;
- Supply of timber and metal seam elements required for the execution of works (beams, strips, rods, planks, nails, staples, bolts, etc. in accordance with project details);
- Fir or spruce timber with moisture level of  $\approx 12\%$  (however not exceeding 18%) will be used for the operations;
- Provision of materials and devices necessary to achieve provisional (temporary) support (props, beams, etc.);
- Preparing the working place by removing any unnecessary element that can hinder the execution of works;
- Provision of training for the working personnel on specific measures of labor and fire protection according to the approved execution technologies;
- Provision of labor protection equipment and devices;
- Fencing the construction site and signaling dangerous places with respective signs and posters visible during both, daylight and night;
- Prohibiting the storage of materials and machinery on passages dedicated for people circulation or working platforms;
- Ensure installation of lightning rods on rooftops exposed to lightning strikes, provided that the coating/roofing elements are metal sheets;
- Any special electrically operated equipment will be put into operation only after the execution of connection to the ground.

## **B.5.2 Fireproof and antiseptic treatment of the wooden elements**

### ***a) General conditions regarding fireproof products***

For fireproof treatment of the combustible materials and other construction elements it is mandatory to use only those products approved by the Civil Protection and Emergency Situations Service, and – where appropriate – with technical approval.

Fireproof products will be used only if they:

- have the technical approval for the new products or if there are modifications regarding characteristics of the existing products;
- are approved by the Ministry of Health with regard to their toxicity level.

After fireproof treatment of the timber, wooden elements (wood chips plates, wood fiber boards, etc.) and textiles, it is mandatory to reduce their ability to easily ignite and continuously burn.

Since the fireproof treatment delays the ignition of the combustible materials, but does not eliminate the possibility of burning of the protected materials, additional fire protection measures can be undertaken.

Fireproof products are stored sealed, until the moment of their usage, in the manufacturer's original packaging. In case the warranty period has passed through storage, usage of the fireproof products is only permitted with the manufacturer's resolution. Fireproof products are stored in places protected from rain, direct sunlight and frost, at a temperature between +5°C and +30°C, preferably in dry storage rooms.

Fireproof solutions (products) are delivered by the manufacturer in ready-to-use condition. With the approval of the manufacturer, they can be prepared at the place of use by the person who will apply them.

### ***b) Conditions regarding preparation of the surface***

Preparation of the surfaces for fireproof treatment refer to:

- cleaning the surface (removal of dust, mud, lime (whitewash), paint, dirt, including previous layers of fireproof treatment) by brushing, scraping, etc.;
- luting (with putty mass containing the respective fireproof product and chalk powder) all existing cracks, joints and voids on the surfaces to be protected (fireproofed).

For fireproof treatment by impregnation, the timber must satisfy the following conditions:

- the bark/shell should be removed;
- should not be treated/processed in depth or on the surface with chemicals that could hinder the penetration of the fireproof product into the material.

To ensure better protection, the humidity level of the material to be fireproofed shall not exceed 18% in case of fireproof treatment and 25% in case of in-depth fireproofing by impregnation. In places of paneling and other decorative elements for interior design, the humidity level of the timber before fireproof treatment shall not exceed 10% to avoid joints after drying.

### ***c) Conditions for fireproof treatment (fireproof products usage)***

Upon selecting products and methods for fireproof treatment the following aspects are taken

into consideration:

- material essence and its impregnation peculiarities;
- special conditions in which the material is used (indoor or outdoor);
- existence of visible or non-visible (hidden) material and its role in construction/on the site (strength, finishing, decorative, etc.).

Fireproofing works are performed in places that ensure a minimum temperature of +10°C.

Water-based fireproof products are not applied on surfaces where condensations occur or areas that are not protected from the rainfalls, or which require to be washed regularly, etc. In such cases, water-soluble fireproof impregnation products can be used, if these areas are protected by waterproof finishing coatings (paints, varnishes, etc.).

Fireproof treatment of the construction outer surfaces is achieved by means of approved waterproof products of fireproofing.

Fireproof treatment of the surfaces is executed only after final processing of the construction elements, excluding any further processing that can remove the fireproof layer (planing, severing, chopping, splitting, etc.).

Fireproof treatment of the surfaces can be executed on both, products before installation and already installed constructions: in the first case, damages of the fireproof layers caused by the products and/or construction usage will be rectified by additional treatment of the damaged areas after complete installation, whereas in the second case, it is recommended to apply fireproofing during the performance of works, in order to ensure the fullest possible coverage of the entire wooden surfaces that are used in construction.

Fireproofing by impregnation is carried out upon the molded timber sized for usage, in case when on the construction site, during installation, emerges the necessity for minor processing, and respective areas will be double fireproofed with the same product, applied by brushing to achieve the specific consumption established by the manufacturer. The process of fireproofing by impregnation is executed only in special installations. Usage in production of wooden elements fireproofed by impregnation is carried out on dry surfaces, under conditions of construction installation.

Upon expiration of the fireproof period specified by the manufacturer, in order to maintain the fireproof quality (on surface or by impregnation), it is mandatory to repeat the fireproof treatment onto the entire previously protected surfaces and, respectively, the entire material fireproofed by impregnation.

Fireproofed surfaces can be coated with oil-based paint, alkyd varnishes, washable paint, etc., only if a prior fire test was undertaken for these types of finishing layers and in case of manufacturer's special instructions.

In case of applying fireproof products on surfaces of PAL, PFL, PAL-CON, PAF and other similar materials, the following aspects are taken into consideration:

- fireproof treatment is performed following the same procedures as in case of solid wood (timber), respecting the consumption instructions specified by the manufacturer for each fireproofing product;
- fireproof materials' drying process will be undertaken in the shortest possible period of time, so that the products are not damaged by moisture.

#### ***d) Labor protection measures during fireproof and antiseptic treatment***

Upon preparation and application of fireproof products, special fire prevention, firefighting rules and measures, as well as labor protection norms and standards shall be respected.

During the fireproofing works the following general measures shall be taken into account:

- \* during fireproof and antiseptic treatment of the wooden elements and preparation of all necessary substances, as well as during the loading and removal of chemicals from the packaging, only those workers with special training shall be allowed. No working personnel with skin abrasions, burns, cracks, irritations, etc., shall be authorized for such type of works;
- \* during the working process, personnel shall wear protective goggles, boots, rubber gloves and apron. Upon completion of works, the personnel involved shall wash their hands and apply lanolin based ointment;
- \* fungicidal wood processing works must be performed under the direction and supervision of a specialized technician;
- \* personnel who is authorized to work with antiseptic and fireproof substances must have a separate locker-room for changing and storing of working and personal clothes. After completion of work, personnel shall be directed to the site's bathroom/showers;
- \* packaging of chemicals for fireproof and antiseptic treatment of the wood must be removed or burned;
- \* preparation of the fungicidal and fireproof substances must be carried out outdoors, on isolated platforms (areas) or separate rooms equipped with ventilation systems. Trespassing is forbidden in such areas. In the process of the preparation of admixtures measures against spreading of toxic substances must be taken (either spraying or dusting);
- \* compressor hose connections shall be tight, in accordance with technical norms.
- \* pools (bathtubs) for storage of solutions with fungicidal substances should be equipped with protective lids (covers). Movement on the edge of such pools or on the surface of submerged parts for impregnation is forbidden. Upon completion of wood impregnation works the antiseptic solution must be drained from the pool;
- \* proper placement on site of the areas and/or platforms dedicated for storage and preparation of fireproof and antiseptic substances, as well as special pools for executing fireproof and antiseptic operations of wood must be authorized/agreed with sanitary and firefighting institutions, and State Inspection for Labor Protection;
- \* wood treatment with undissolved powder (dry) antiseptic substances must be performed, preferably, on days without wind, and in conditions that exclude drafts;
- \* after completion of wood fireproof and antiseptic treatment works, all areas of storage and preparation of these substances should be cleaned and neutralized;
- \* trespassing is strictly forbidden in areas of antiseptics preparation;
- \* after completion of works, the platforms (areas) where antiseptics were prepared to be thoroughly cleaned;
- \* antiseptic preparation materials must be kept under lock in special storage rooms;
- \* equipment and devices that are used for antiseptic treatment should be properly washed (cleaned) and stored together with antiseptic materials. Vessels (containers) where antiseptics are kept must be properly covered with lids;
- \* antiseptic transportation means shall be properly cleaned and washed, whereas empty

containers shall be detoxified or destroyed;

- \* it is strictly forbidden to perform antiseptic treatment of construction objects, both under or above the them, during the working process;
- \* after completion of antiseptic treatment, the personnel is obliged to wash with soap and warm water all uncoated/uncovered parts of the body.

Upon fireproof treatment by impregnation under pressure, measures of labor protection shall be respected, as specified in the technical description of the utilized devices under pressure.

Personnel involved in fireproof treatment, including workers authorized to prepare fireproof solutions shall comply with specific norms of labor protection and fire prevention rules, in accordance with conditions and site of operation.

### ***e) Supervision of fireproof and antiseptic treatment process***

Fireproof treatment shall be performed by trained and certified personnel for this purpose, with strict compliance of manufacturer's instructions (application technology, specific consumption, etc.).

Contractor undertaking the fireproof treatment is obliged to certify the quality of the fireproofing works by test reports issued by authorized laboratories.

Verification of protection quality by applying fireproof products upon surfaces consists of:

- integrity and uniformity verification of the protective film, which is spread over the entire treated area;
- quantity verification of used fireproof products.

The work is deemed appropriate if the protective film is continuous and uniform and if the specific consumption, as indicated by the manufacturer or in accordance with technical approval of the respective product, was respected.

Verification of impregnation quality is made by controlling the absorption and depth of penetration of the solution, as well and by verifying the impregnation solution against existing standards.

The specimens for testing shall be prepared and shall comply with characteristics specified in the standards of applied method. Preparation of specimen will be performed under the supervision of the beneficiary of works, simultaneously and on the same conditions as those used on the protected object.

The specimens are packed, in the presence of the beneficiary, without damaging the fireproof layer, then sealed and labeled. The label will specify: name of the objective where the fireproof treatment was performed, name of the fireproof product, date of application, method of application, name of the contractor (responsible for fireproof treatment).

The specimens shall be accompanied by a report (minute) of provisional acceptance, which confirms that they have been prepared by the contractor in presence of the beneficiary, and a

respective documentation on the usage of the product (certificate of compliance or technical approval for new products). The laboratory that performs the tests shall issue a provisional bulletin in accordance with the method of standard.

#### **B.5.4 Installation of coating (covering) using profiled metal panels**

Coating (covering) works, using metal panels of galvanized corrugated profile, is performed on cotters (cleats) with calculated openings, according to the geometry of compliance and physical and mechanical characteristics of the panels, as well as the loads that they bear, as specified by the provisions of the project.

The coating slope will meet the requirements of the project's provisions and the manufacturer's recommendations. Generally, the minimum slope for the profiled panels is 10% (for a single side panel the minimum slope can be 5%). Installation is done by overlapping the longitudinal profiled panels and by simply overlaying the panels along the slope line.

Panel manufacturer, system manufacturer, as well as system suppliers will provide details and conditions for installation and the necessary accessories (tinker elements, fasteners, sealants, paint finishes, etc.).

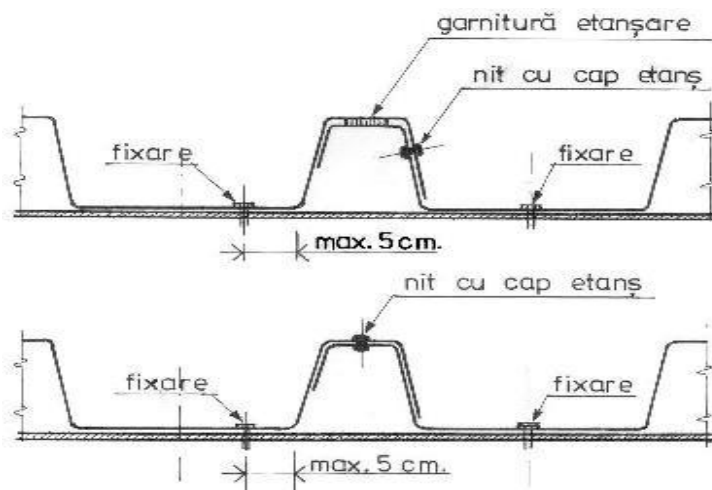
Profile metal coating panels are mounted either on metal rods (cleats) (usually from pressed galvanized profiles) or wood. Contact (support) surface shall be at least 50 mm wide.

The distance between rods (interax) varies for the profiled metal panels, depending on the physical and mechanical characteristics of the panel (profile type, panel thickness), on the slope and uniformly distributed loads, whereas for the pressed panels the distance between the rods is constant, according to the geometric compliance.

The fastening (fixing) is undertaken according to the manufacturer's specifications, by means of mechanical equipment with sealing and protective elements. Longitudinal stitching of the panels, normally, is done using tight cap (brazier-type) rivets.

Bodywork (tinker) elements shall have wrought (zigzag, rabbet/seamed/welt) edges; the mere overlapping of non-processed elements is forbidden, as wrought edges are designed to strengthen and protect the margins (edges).

Bodywork (tinker) elements, designed for coating protection, are overlapped minimum 20 cm over/under metal profiled panels and shaped profiles, fastened with tight cap rivets, and/or indirectly, by means of wide steel clips (galvanized).



Fastening (fixation) of metal profiled panels is done by means of specific fixing devices (screws) provided with sealing gasket and safety cap, typically in the lower fold, as specified by the manufacturer (in some cases, where corrugated panels are mounted, over areas/spaces without thermal conditioning, the manufacturer may also provide fixing screws with collar, sealing gasket, bolt nuts and protective cap).

Metal profiled panels, shall not be fastened with screw hooks. The fastening means are protected against corrosion (galvanized, covered with cadmium layers or stainless steel, etc.). During the longitudinal connection of the panels, fastening of the upper panels will be performed eccentrically, on the lower curl, so the overlapping is pressed (tightened).

### **B.5.5 Installation of coating using sandwich-type panels**

Installation of coating using sandwich-type panels shall be executed in accordance with project's provisions related to sandwich-type panels with isophenic (IPN) foam, FIRE safe certificate, with  $d=100$  mm, which are fastened on the Z-type euro profile cleats (gibs/fids) with self-tapping screws.

Prefabricated insulated panels are used by mounting a single panel alongside the slope's length (usage of more panels alongside the slope's length are not allowed, with exception of the specially designed and manufactured panels with edge connecting system).

Positioning (routing) is made by cleats with calculated gaps, depending on physical and mechanical characteristics of panels provided by the manufacturer (uniformly distributed load, slope).

Prefabricated insulated panels are routed (positioned) on elements that form plane (even/smooth) surfaces without slope breaks and bends.

Fitting will be executed by combining the panels in various ways, by hermetically joining them, by overlapping the upper profile surface over the bottom side or, in case of the panels with waterproof membrane on the upper surface, by waterproof sealing of the longitudinal connection between panels with cuffs or waterproof stripes. During installation sealing gaskets in stripes and fastening elements could be provided. Sandwich-type panel roofs is laid in slopes ensuring outer water flows, designed and organized by means of galvanized drainage channels and drainpipes, coated with a layer of weather resistant polymer.

### **B.5.6 Installation of coating using waterproof membranes**

The roof of the administrative block is designed with coating using 2 layers of waterproof membrane.

Waterproof membranes shall be applied upon rigid, reinforced poured concrete surface.

Waterproof membranes shall meet the following minimum levels of qualitative performance:

- waterproof level: resistant at minimum 6 m water column/24 hours;
- static drilling resistance: resistant at minimum load of 15 kg using Ø10 mm drilling cap/24 hours;
- dynamic drilling resistance: resistant at downfall/drop of hammer cap (head) from a minimum height of 1000 mm;
- behavior at increased temperatures: movement of < 2 mm at +20°C;
- flexibility at decreased temperatures:
  - with respect to climatic zone of the Republic of Moldova for winter time I and II: -12°C;
  - with respect to climatic zone of the Republic of Moldova for winter time III and IV: -18°C;
- tensile rupture force: longitudinal > 3,5 Nmm<sup>2</sup>; transversal > 3,0 N/mm<sup>2</sup>;
- tensile rupture elongation: longitudinal ≥ 2%; transversal ≥ 1,5%;
- dimensional stability: < 0,5%;
- nail (hook) breakdown resistance: ≥ 200 N (Ø3 mm nail).

The installation process consists of applying the waterproof membrane perpendicularly to the slope, with complete adhesion or solder in strips and mechanically fastened along the upper edge of the membrane at least 12 cm of the upper margin and, depending on the case, alongside the bottom lateral margin.

The support will be rigid, made of cement mortar screed, trowelled (smoothed), with surface that does not produce cracks > 0,2 mm. The support shall be dry (maximum 10%) and clean (free of grout, oil, etc.) to ensure a proper adhesion of the waterproof membrane.

Longitudinal overlaps (transversal to the membrane strips) shall be at least 12 cm, glued and sealed by welding (or with specific cold adhesive). Transversal overlaps (alongside the membrane strip) shall be at least 10 cm, glued and sealed by welding (or with specific cold adhesive).

Items that exceed the coating plan, as well as puncturing elements, will be sealed with joints of waterproof membrane welded or sealed with specific cold adhesive.

Warm and/or hot perforations (punctures) shall be properly insulated.

Bordering elements and waterproof membranes that define the roof's perimeter or plan shall be glued at minimum 1 m width to prevent any eventual degradations as a result of the environmental effects (especially wind).

## **B.6 Insulation works**

### **B.6.1 General provisions**

All materials and blanks (semi-products) to be applied for insulation works cannot be used unless the following conditions are respected, prior to their usage:

- the project supervisor verified if these materials were supplied with a certificate of

compliance (technical approval) confirming the fact that they meet the respective norms and project provisions. Replacement of materials is not allowed, with exception of written authorization of the project supervisor (consultant) and designer;

- storage and handling facilities were provided to ensure the quality and integrity of supplied materials;
- project provisions and respective technical specifications were met;
- humidity measurements of the dimensions and shapes of materials were carried out.

Verification of characteristics and quality of the support where the insulation is applied shall be performed during the performance verification of the respective support (plateau, walls, etc.).

In case if the technical project for isolation works requires special conditions of isolation flatness, shape of connectors, humidity, etc., as well as installation beforehand of some parts, devices, etc., these conditions shall become subject to additional verifications before starting insulation works.

All verifications carried out during entire or partial insulation works, which ultimately are covered/become hidden (e.g. successive layers of prior insulation, connections, embedded parts, etc.), become part of the minutes related to hidden works, in accordance with respective instructions.

### **B.6.2 Waterproof insulations**

Verifications to be carried out during the waterproof insulation works, besides those stipulated in B.6.1, are the following:

- surface roughness, for which deviations are allowed of maximum 12 mm, as well as flatness deviations (acceptable deviation  $\pm 5$  mm for a straight edge routed towards any direction);
- existence of expansion joints of 2 cm wide contour- and field-wise, at 4-5 m distance for both directions, in screeds over the thermal insulations;
- compliance with recipes and process of on-site mortar preparation (sealants, solutions, etc.) according to current standards;
- adhesion ability of the waterproof insulation primed substrate (for each 1000 square meters 5 samples of each detachment of bituminous membrane strips 5 x 20 cm are done);
- correct adhesion of sheets, where detachments and blisters are not permitted to occur, otherwise their repair is mandatory;
- width for the strips' crossing passage (longitudinal: 7-10 cm, frontal: minimum 10 cm), where 10% of the passage is allowed at minimum 5 cm longitudinally and minimum 7 cm frontally; if these values are not respected the respective layer must be re-applied;
- compliance with the installation direction of the sheets (up to 20% can be installed in any case, whereas over 20% must be parallel to the slope).

During the verification of the work phases, the project manager (consultant) the frequency and content of the prepared verification documents, comparing data with the project provisions, current standards and admissible deviations. When the verifications are concluded, minutes of hidden works are prepared, in accordance with the instructions related to hidden works verification.

### **B.6.3 Thermal insulations**

During the execution of works, apart from the aspects mentioned in B.6.1, also the condition of continuous vapor barriers is verified. All these verifications shall be recorded in the minutes of hidden works. Thermal insulations are executed with insulation materials, such as either extruded or expanded polystyrene, mineral wool or gas-formed concrete blocks. Packaging, delivery, labeling and verification of product's quality is performed in accordance with the specification of each manufacturer.

Regardless of the product supplier, during handling, transportation and storage, it is important to avoid damage of the material overall integrity by mechanical shocks or any other aggressive actions of different nature that could lead to plastic deformation or loss of any other basic qualities.

Storage and transportation of polystyrene blocks and mineral wool must be carried out in conditions that ensure protection against moisture and compaction. Transportation of materials is carried out by means of covered vehicles.

#### **B.6.4 Basic labor protection measures during roof insulation works**

During waterproof insulation works the following basic safety measures shall be respected:

- prior to roof insulation works, it will be verified that all roof gaps are surrounded or covered with protective nets;
- around workplaces (cca. 2 m wide) shall be forbidden, using warning signs, access of the personnel not authorized for insulation works;
- it is forbidden under other construction scaffolds, in case they do not ensure the necessary protection for accident prevention;
- prior to initiation of works, the technical condition of the screed will be verified;
- the amount of materials stacked on the roof shall not exceed the load capacity for which it is calculated;
- it is forbidden to throw off the roof any materials or tools.

In case if the technological process requires overlapping works on several levels, additional safety measures will be coordinated to prevent accidents.

During works that require usage of flammable or toxic materials, project supervisors must remind, on daily basis, to all workers the basic safety measures specific to this type of works.

### **B.7 Finishing works**

#### **B.7.1 Woodworks**

The designed windows are double glazed, of the highest quality, equipped with 5 room noise protection system and galvanized steel core (with thermal bridge on outer doors and windows), including sills, hardware, necessary accessories, thermal and waterproof casement insulation.

Stained glasses include aluminium thermal bridge.

Inner doors are either solid or with glass (Horman-type, wooden doors with medium density fiberboard (MDF) sides, metal-based laminate of superior quality), depending on the construction specifications.

Windows and doors must meet the following requirements:

- closing tightness must be ensured all around the mobile frame with two layers of gaskets and silicone or gaskets on the double glazed window;

- double glazed window with float glass shall be used, with thermal transer coefficient according to the standards for laboratory rooms;
- hardware with side opening and folding options to achieve a proper distribution of sealing force.

## **B.7.2 Flooring**

### **a) General provisions**

No flooring works shall be initiated until verification and receipt of the surface, operations that are undertaken and recorded according to the respective chapters.

Particular attention should be paid to the verification and receipt of installations that must be completed prior to flooring works (e.g. channels, installations, perforations, insulations) and of works whose subsequent execution could degrade the flooring.

All materials, semi- and pre-fabricated elements, which represent parts of the flooring, shall not be used until the following is performed:

- verification of the delivered supplies, by the technical supervisor, including certificate of compliance confirming that these materials meet the respective characteristics;
- storage and handling of the materials in conditions avoiding their damage;
- quality tests, if specified by technical requirements.

Concrete and mortar materials originated from decentralized stations, located on-site, can be used for works only if the delivery is accompanied by documents proving their physical, mechanical and composition characteristics.

The main quality verification, common to all flooring types are:

- general condition and aspect;
- elements of geometry (thickness, flatness, slope);
- support pavement fixing;
- joints;
- connection with other construction elements or facilities;
- project compliance.

### **b) Equalizing substrate (screed)**

Equalizing substrate represent the basis of a flooring. Analysis and thorough preparation are essential an appropriate substrate for flooring. Therefore, sustainable collaboration between support and coverage aspects should be ensured. This requires a clean and dry surface, without defects, residue or other impurities before applying the flooring system.

Cohesion – concrete substrates, are in fact grout with reduced resistance of the first few mm. The tension caused by contraction of thermal fluctuations or loading cycles, can lead to lower cohesion force. Minimum limit should be  $\geq 1,5$  N/mmp.

Substrate moisture – humidity measurement is of maximum importance, as concrete substrates may not be applied (covered) when himidity level exceeds 4% of its weight. The best approach of measuring humidity is the Rubber Test (i.e. a polyethylene foil of 1m x 1m sticked to the concrete surface. The foil shall be kept in such position for at least 24 hours

then is being removed. Any emanation of vapors will condense and, thus, can be easily detected).

Substrate moisture > 4% indicates the necessity of additional drying time.

Climatic should also not be ignored, as this may lead to:

- poor (weak) adhesion;
- water traces;
- air gaps;
- irregular surfaces;
- inappropriate drying.

The following data should be verified several times a day:

- environment temperature;
- substrate temperature;
- dew point.

*Substrate cleaning and preparatory works.* Ferro-concrete plates' surfaces shall be cleaned of all residues, dust and waste (debris). In order to achieve proper adhesion of the flooring screed, ferro-concrete plates' surfaces must be dry and rugged, whereas their flatness deviation will not exceed permissible values indicated in the current technical characteristics. Deviation exceeding the admissible degree will be modified by either carving of projections or by covering large inlets, so that the ultimate thickness of the support screed is 2 cm. Impregnation with grease, oils, organic or non-organic acids and/or grout may compromise the adhesion characteristics of any system applied or lead to the complete system removal. Therefore, mechanical processing of the surfaces is recommended to obtain flawless surfaces and verified and, also, verification by cohesion force is undertaken.

Execution of screed support. After verification and preparatory works of the ferro-concrete plates' or any other substrates where screed is to be applied upon, the level line for screed mortar shall be drawn with a pencil along the longitudinal walls of the room. For screed support application also mortar landmarks (guiding strips) can be used with side width of 15-20 cm. Circulation on the surface screed shall be allowed only after its strengthening, so no traces are left. Prior to coating works, the screed humidity shall be measured using the Higromette-type device or other, less sophisticated methods, available on-site (e.g. litmus paper, screed humidity shall not exceed 5%).

Technical conditions of quality. Screed support, being substrates of whose surfaces become hidden after applying the coating, it is necessary that eventually minutes of hidden works are prepared taking into account that it requires a certain degree of quality of the substrate surface and a certain level of resistance for the operating conditions.

Prior to screed support reinforcement, it will be verified if all protective works were provided and received (e.g. coating, carpentering, etc.) or other works that become hidden (e.g. pipelines, pegs, sills, corners, etc.).

Screed support will be performed only after completion and testing of sub-flooring system , as well as upon completion of all construction and assembling works in the respective room. Prior to execution of screed support, in those rooms will be installed windows, glasses, doorposts and planking.

In case that the neighboring rooms are designed with different flooring, the marking line between them shall be centered against the door thickness, in closed position. All the interior plaster works shall be completely accomplished. Installation of heating systems, including their testings shall also be completed. Additionally, conductors for the electrical systems shall be installed.

Substrate must be adherent to the surface it is applied upon. A light hammering with the mason should produce an imbued (solid) sound.

Finishing conditions of the equalizing screed surface are as follows:

- surface must be flat and smooth, in case of a 2 m straight edge two waves are allowed with maximum arrow of 1 m;
- during installations, painting and other finishing works, measures will be taken to ensure protection of the equalizing screed, in order not to be damaged or soiled with clay, paint, etc., which would prevent adhesion of plaster or adhesive layer upon the substrate.

### ***c) Ceramic tile flooring works***

Ceramic flooring tiles will be mounted on a mortar substrate by means of adhesive for interior works (Ceresit).

Prior to usage, ceramic tiles should be washed to remove dust and residues from the surface.

Arrangement of tiles shall start from mounting the benchmark tiles.

The respective adhesive solution shall be prepared on-site in necessary quantities and should look pasty-like.

The tiles will be mounted onto the mortar layer, prepared in regular rows, with gaps not exceeding either 1,5 mm or 2 mm, in case of square tiles with side-width of 300 mm, and respectively of maximum 3 mm, in case of rectangular tile with side-width of 400 mm.

After placing the tiles on a surface corresponding to the action range of the worker's hand (approximately 60 cm), tiles where unevenness is detected will either be smoothed by either adding or removing adhesive. Afterwards, verification of surface flatness is undertaken by means of a straightedge placed on executed diagonals and guided by the flooring portions mounted earlier. This is done by carefully stuffing the tiles upon mortar surface, and slightly hammering over the slats, so that the surface on the back of the tiles deepens in mortar, thus ensuring flatness of the surface. Such operation is carried out upon the entire surface that is performed during working day.

The coating of ceramic tiles will not be rubbed at finishing operations, but rather after cleaning them with sawdust and will be wiped using textile (cloths) soaked in water and then waxed.

***d) Flooring works using PVC (polyvinyl chloride) carpets (layers)***

- \* In rooms where PVC carpets will be mounted, a temperature of minimum 16°C and a relative air humidity of maximum 65% shall be ensured with 48 hours prior to initiation of flooring works. This regime will be maintained throughout the works and at least 30 days after their completion.
- \* Substrate moisture shall not exceed 3%.
- \* The substrate shall be thoroughly verified and cleaned, removing and correcting any possible defects and impurities and shall be cleaned of dust by brushing.
- \* Before gluing PVC carpet, where after cleaning the substrate is found that its surface contain frequent irregularities, a correction by means of thin plastering (maximum 1.5 mm thickness) shall be executed.
- \* 24 hours prior to gluing, the PVC carpet shall be brought into the room for acclimatization, also it will be cut and placed in the position it should be glued.
- \* Simultaneously, a thin layer of adhesive shall be applied on both upon substrate and PVC carpet.
- \* After approximately 20-40 minutes after applying adhesive (or, otherwise, in accordance with manufacturer's specifications) manual pressing operation shall be undertaken, avoiding air gaps beneath the material.
- \* After gluing all the pieces of the PVC carpet or tiles, the flooring shall be pressed with a long-handled metal roller (25-30 kg) with a soft elastic rubber bandage on the outside.
- \* Adhesive residue shall immediately be removed from the carpet surface and joint shall be verified to ensure a perfect gluing (bonding).
- \* Where indicated by the project documents, the joints shall be welded, applying a string of plasticized PVC. Such operation shall be performed with a Zinser-type welding machine.
- \* The flooring surface of the PVC carpet shall be cleaned of any adhesive residues, by rubbing it with a rugged and dry cloth.

During execution of these operations the will be verified if the following conditions are met:

- compliance with the project in terms of quality of materials and design (model) for mounting the PVC carpet;
- if carpet is glued upon the entire surface, avoiding unglued corners, edges and swellings;
- if joints between strips of carpet do not exceed the permitted size, specifically 0,5 mm along carpet length and 0,4 mm along its width;
- if surfaces are completely smooth and flat, ensuring lack of bumps and gaps;
- if PVC profile still is glued properly in a straight line upon the walls;
- if flooring surface is clean and polished, no stains are allowed.

### **e) Parquetry flooring works**

Prior to initiate flooring works, the following operations must be completed:

- interior plastering, including repairs of walls and ceilings, as well as thresholds between rooms;
- painting works;
- execution of carpentry installation door frames and windows;
- installation of electrical cables for heating and ventilation (including pressure tests);

Mounting of parquetry shall be undertaken in the following subsequence:

- parquet borders will be fixed along the walls with a distance of 10-15 mm from the walls;
- vertical borders will be glued upon the wall using cleats at a distance of 0,5 m;
- parquet blocks will be glued starting with the piece opposing the door. Parquet blocks will be properly glued ensuring tight connection between each other;
- design of the parquetry flooring shall be done in accordance with project documents.

Finishing works of the parquetry flooring shall respect the following sequence:

- cleaning of the floors shall be done after any repairs and painting works;
- mechanized cleaning shall be done using a sander. This operation is allowed only after 4 days after parquetry mounting;
- wooden plinths will be mounted using screws;
- after sanding, the flooring shall be covered with two layers of specific polish for parquet floors.

During the works the following shall be verified:

- compliance with the project regarding the quality and design (model) for parquetry mounting;
- the quality of substrate.

### **B.7.3 Plastering works**

#### **a) Cement (mortar) rendering**

Taking into account that plastering are visible works, their quality may be verified at any time after completion of the whole project. Verification of substrate quality upon which the plastering is applied, is performed during the verification of the given substrate. It is completely forbidden to apply plastering of the substrate that has not been received in accordance with specific instructions.

Prior to cement rendering it is necessary to verify that all protective works were received or subsequent works, execution of which may lead to damage of the plastering: coating, flooring, balconies, plumbing, carpentry, etc. Additionally, is verified if all other elements necessary for carpentry works are mounted.

Prior to usage of materials the project supervisor (building engineer) will verify they were supplied with certificate of compliance, confirming the current operational standards.

During the works it is necessary to verify that the execution technology, using mortar type and composition, as well as application of subsequent layers will be performed without exceeding maximum allowed thickness.

Actions will be taken to prevent swift drying (wind, sunlight, rain, freezing, etc.).

For existing bearing walls additional coating works shall be performed. Coating will be done according to known technology: cleaning the substrate, opening of joints, fixation of nets with spacers, applying the cement by spraying subsequent layers until a thickness of 5-6 cm is achieved, double or simple coating. Prior to initiation of any intervention works, the cement residues with stone dust must be removed all across the building surface.

Any existing (emerged) cracks masonry will be covered with grout to restore continuity.

It is absolutely necessary to reduce the general humidity level of the building, which can negatively affect its structure.

### **b) Plastering**

Plaster coat layer will be applied as support to achieve high quality of finishing works (e.g. painting of the ceilings and walls with washable paint).

Plaster layer will be applied by spreading the smooth paste (mass) over the surface using a steel trowel of maximum 1 m long, in order to achieve smoothness before hardening (drying). Thickness of the plaster layer of 1÷3 mm will be achieved by applying two or three subsequent layers. Flatness will be verified using a metal lute (leveling board).

Obtained surface must be perfectly smooth at touch, any roughness will be cleaned and smoothed with flint glass (glazed) paper. For wall surfaces built of bricks or or gas-formed concrete blocks with 2-3 mm thin joints, specific plaster will be applied containing glue and sand, respecting the following proportions 1:2:0,5 (25 DP glue; 0,2 mm sand; water).

Application of smoothing plaster will be done with skim float in layers of 1 mm or using manual or electric painting devices or plaster gun.

Smoothing will be done by hand or using a steel trowel.

The following defects are not allowed:

- swellings, bulges, shrinks, pinching, stains, cracks, crevices, gaps in window sills, plinths and plumbing elements;
- large elements of roughness (up to maximum 3 mm) and deep scratches formed in the coating.

As defective elements will also be classified works that do not comply with the current standards and those with following irregularities:

- if works do not comply with the project provisions regarding thickness, lofting, covering, flatness, uniformity (as a result of works) connection edges between ceilings and walls, window and door sills and recesses;
- if verticality and horizontality aspects of the surfaces and edges, as well as flatness of plastered surfaces, are not met;
- if specified working technology has not been respected, which led to damage of executed works;
- if approved project recommendation regarding finishing works have not been followed.

### **B.7.4 Ceilings**

In places with increased humidity level suspended ceilings will be designed, using water-resistant plasterboards, installed upon the metal structure of galvanized steel profiles. In other places, the ceilings will be done using suspended mineral fiber tiles mounted on 15 mm thick metal structure (galvanized steel) and weight of 4.5 4.5 kg/m<sup>2</sup>. the ceilings shall be installed

according to the plan of suspended ceiling works and supportive metal structure, including execution specifications.

Suspended ceilings will be done using gypsum boards, cardboard, or 13 mm thick acoustic panels. Metal structure supporting the suspended ceiling will be mounted using semi-apparent profiles that support the mounted panels at 1,20 m (1,25 m) interax, suspension parts that are inserted in profiles, supporting rods with suspension loop, secondary profiles closing panel side along the contour (interax 60-62.5 cm).

Soundproof panels will consist of perforated plates, mineral wool and aluminum foil behind the plate.

Plates can deviate from the pla dimensions with  $\pm 1$  mm; thickness with  $\pm 2$  mm; flatness  $< 1$  mm; angles  $< 1$  mm.

Plasterboard panels a stored horizontaly and isolated from the ground, in dry and sheltered places.

Installation of suspended ceilings are executed in the following order:

- installation of the edge profiles at 30-40 cm distance by using a system (method) adapted to the nature of profiles or vertical closures;
- installation of suspension rods, which must be adapted to the mounting bracket: metal roof structure.
- installation of supporting profiles at 120 m interax. If room size is larger than the length of supporting profiles, these will be extended by matching ends using clips provided at the profile ends. The edges will be cut with scissors;
- verification of edges, if the first one corresponds to the profile support slot for positioning the secondary profile;
- installation of all supporting profiles at the same level;
- installation of secondary (side) profiles, thus creating a grill;
- installation of secondary profiles, in pairs, in the supporting profile slots, using an eclipsing system;
- installation of plasterboards panels placing them on the diagonal grid, which are rotated and routed on profiles afterwards;
- edge panels will be altered and properly sized by cutting additional panels with a cutter.

Verification and receiving of ceiling installations shall be performed as follows, if they:

- correspond to the thermal, soundproof and fire resistance standards;
- correspond against the samples provided by the employer;
- comply with the quality certificates, operating specifications and approvals for utilized materials;

Failure to comply with these specifications, technical drawings or approved samples, the consultant may decide to replace (redo) these works with others, in order to meet these requirements.

#### **B.7.5 Plywood using crockery and floor tiles (hones)**

Plywood, are designed to remain visible, hence verification of quality in terms of appearance can be performed at any time, even after the completion of all operations and, thus, there is no necessity to prepare minutes of hidden works but only related to working phases.

The tiles will have either square or rectangular shapes, according to the dimensions, colors and quality specified in the project provisions. The tiles will have the following physical and chemical characteristics:

- *water absorption coefficient*: maximum 18% for the crockery and maximum 2.5% for floor tiles;
- *fine (minor) cracking resistance test*: the result must show no such cracking;
- *chemical resistance test*: the surface will remain wholesome after testing procedures.

The tiles will have no dark spots with an area exceeding 1,5-2 mm, cracks on the surface, glaze roughness or poorly glazed areas, crystal- and frozen-like areas, at maximum range of 2% of the entire construction site.

Maximum admissible deviations from normal manufacturing standards for crockery and floor tile will be:

- at nominal thickness:  $\pm 10\%$ ;
- at nominal length and width:  $\pm 0.6\%$ ;
- arrow: maximum 0.5% of the large side length.

Installation is performed with plywood using crockery and floor tiles with adhesive paste, as specified by the manufacturer (consultant).

Preparatory works. Prior to initiating plywood operations using crockery and floor tiles, other finishing works shall be performed, such as:

- coating of the building, install drainage system in such a way that ensures protection against rainfalls (snow);
- mounting window and door frame and linings, except window sills that will be mounted after completion of plywood procedures;
- plastering of ceilings and other surfaces where plywood will not be applied onto,
- installing plumbing, electrical, heating elements hidden beneath the plywood and undertaking respective pressure tests.
- installation of anchors or supplementary devices for fixing plumbing elements and any holes (gaps), only subsequent perforations shall be allowed;
- mounting of the cold flooring (poured mosaic, mosaic tiles, floor tiles, marble, etc.);
- mounting of the warm flooring (parquet, PVC carpets, etc.), which can be damaged at high humidity.

No works shall be initiated until the flooring works are sufficiently protected. Prior to starting plywood works an inspection of the surfaces (where plywood is to be applied) shall be performed. No works shall be initiated until all irregularities are cleared (vertical and horizontal deviations or any other visible defects).

Plywood works using crockery and floor tiles will be performed only onto dry surfaces, prepared in advance, and that comply with the deviation standards between 3 mm/m vertically and 2mm/m horizontally.

Any other local irregularities shall not exceed 10 mm (bumps or gaps).

In case these deviations are exceeded, respective areas shall be completed with supplementary mortar and/or grout fillings. Thickness of the mortar layer shall not exceed 1-2 cm.

Prior to initiating plywood works, the following operations shall be performed:

- removal of mortar, dust, grease, oil residues;

- cleaning of masonry residues (1 cm in depth), so that adhesive mortar shall properly stick onto these surfaces;
- onto the monolithic concrete surfaces or surfaces of large concrete panels, a specific paste shall be applied to ensure a greater roughness required for proper sticking of the panels' fixing mortar.

During plywood works using crockery and floor tiles, the following requirement shall be respected:

- no plywood works will be undertaken in areas with temperature below +5°C;
- ensuring evaporation of water from the mortar bed;
- mortar bed shall not be processed prior to plywood work and in no case the tiles shall be mounted on dry mortar;
- avoiding at maximum cutting of tiles, so that by their correct alignment the tiles will be cut no more than into halves;
- edges of cut tiles will be smoothed with carborundum stone;
- tiles with cracked or jagged edges shall not be mounted;
- the joints between the tiles will respect a continuity design, both vertically and horizontally and will have the same dimension of 2 mm on both directions;
- admissible deviations for finished surfaces will be  $\pm 2$  mm under the screed of 1.20 m long.

Checking of the surfaces where plywood works are to be performed will be done both vertically and horizontally. Checking shall be done using a levelling board with maximum length of 2 m and with elements of crockery or floor tiles, provisionally fixed with plaster mortar on the respective surface of the plaster, in the immediate vicinity of the area where plywood is to be applied.

Lead wire, mounted upon the surfaces of the provisionally fixed elements of crockery or floor tiles, shall represent the plywood surface level.

Plywood works shall meet the following conditions (requirements):

- upon finishing checking operations plywood works can be initiated in the following subsequence:
- crockery and floor tiles shall be cleaned of dust and dirt, will be held in water for 10-15 minutes and 5-10 minutes to drain prior to application;
- wet tiles shall not be used;
- mounting of tiles shall start from the flooring level taking care to match the flooring and plywood joints, if it is not specified otherwise, and correlating the plywood (perfectly horizontally adjusted) with the flooring level where plywood is applied;
- mounting of tiles will be performed by applying mortar or adhesive paste on the back side of the trowel and pressing the tile against the supporting layer (substrate). Upon mounting each row of tiles the rest of the left mortar (grout) shall be applied onto the gaps on the back side of the tiles;
- applied plywood is verified every time with the leveling board.

After approximately 5-6 hours from completion of plywood works the joints between tiles shall be cleaned by rubbing. After this operation, the joints are filled with white grout, if not specified otherwise, at an interval of time of 6-8 hours after finishing the plywood works upon the entire surface of the respective area (room).

The following plywood protection measures shall be taken into account:

- the areas where plywood works were performed shall be kept close until the surfaces are completely dry;
- the plywood shall stay protected against damage until receiving of works;
- during warm season, surfaces exposed to sunlight will be covered with sackcloth strips or sheets that will be permanently moistened during 2 days.

Upon receiving of works the following shall be performed:

- plywood surface shall be verified with a 1.20 m long levelling board, the admissible wave arrow shall not exceed 2 mm;
- the plywood must be uniform in terms of color on the entire surface; shade deviations, dirt stains, visible defects, etc., are not allowed;
- tile rows must be regulated with rectilinear joints or altered by uniform width and properly filled with white grout;
- the following aspects shall be considered as deviations (defects) that require local repair works:
  - failure to comply with technical specification of the bill of quantities;
  - defective positioning of the tiles with vertical and horizontal deviations;
  - failure to maintain the continuity and dimensions on both directions;
  - mounting on the wall or column edges of regular tiles instead of special tiles with glazed edges or profile plinths;
  - the level of the surface does not comply with the specification of the project plan (provisions);
  - plywood damages resulted from failure to protect the finished works until receiving phase: rupturing of the tiles, separation s of substrate tiles, stains, etc.

### **B 7.6 Painting works**

Painting works, are designed to remain visible, hence verification of quality in terms of appearance can be performed at any time, even after the completion of all operations and, thus, there is no necessity to prepare minutes of hidden works.

Verification of substrate upon which painting works are to be performed is done during the verification of execution of the respective substrate (plastering, masonry, concrete, joints, carpentry elements, installations). It is forbidden to start execution of any painting or wallpaper works, until the substrate is properly checked by the project supervisor regarding compliance with the existing quality conditions of the surface.

Quality verification of painting works is performed only after the painting (surface) is completely dry and aims to detect defects that exceed the permissible deviations norms for identification and performance of eventual repairs.

Prior to initiation of painting works, it is required to verify if all previous preparatory works intended to ensure protection or other subsequent type of works (e.g. pipeline installations, carpentry) can cause damages to the painting layers. Also it is verified if all supplementary elements have been mounted (i.e. screws, brackets, supports for plumbing and sanitary or heating elements).

Project supervisor should check all the applicable materials before being used for painting works. The materials must be supplied with a certificate of compliance, confirming to the current respective standards.

During the execution of works it is necessary to double check the execution technology, stipulated in technical provisions, compliance with respective recipes and compositions of the indicated mixtures, as well as application of subsequent layers in the order and at prescribed intervals. The protection measures against sudden (instant) drying (e.g. wind, sunlight, rainfalls or frost) shall be respected.

Verifications that are performed at certain working phases should be done at least once for every room and for every 100 square meters. Upon preliminary receiving of works by the commission, same procedures shall be respected but with a frequency of at least 1/5 of the previous frequency.

By visual examination of the painting works the following elements are verified:

- compliance with the project provisions for interior painting, as well as subsequent provisions;
- appearance of the water-colored painted surfaces (uniformity of the color, lack of stains, splashes, blisters, peels, brushstrokes, etc.);
- corrections upon the sprayed surfaces are forbidden, the drops must be evenly spread.

Adherence of interior painting is performed (checked) by slightly rubbing the wall with the palm.

### **B.7.7 Outdoor finishing works**

Exterior finishing works will be executed according to the project provisions related to facades finishing works. Upon foundation (base) and external access stairs porcelain tiles shall be applied. Upon the stair steps corner protectors shall be mounted, whereas railings will be made of stainless steel with a height of 100 cm.

## **C. UTILITY SYSTEM**

### **C.1. Water and sewage system**

The construction project of the jointly operated state border checkpoint „Palanca” on the territory of the Republic of Moldova, a water and sewage system is also designed, with hot water and sewage standards of the following specifications.

Water supply is provided via existing pipeline network Ø 110 mm of the pipes, available in close proximity of the water well and tower with the volume of  $V=25 \text{ m}^3$  and height of  $H=25 \text{ m}$ , executed according to the previously elaborated 612-0-ACE project with connection to the designed manholes.

For tracking the joint (common) water consumption the existing evidence knot, with „C” condor class, will be used. Knots of evidence are designed in all buildings equipped with water and sewage systems.

Exterior water networks, designed inside the establishments, are designed using polyethylene welded pipes with  $d = 63 * 3.0 * 3.6$   $d = 75$ ,  $d = 90 * 4.3$  and PN8. in the proximity of the building the pipelines must be protected with polyethylene pipes  $d = 160 \text{ mm}$  with NP4. At turns, the pipelines will be executed according to the bend radius of respective pipe types. Exterior firefighting system is provided with extinguishing means of the Palanca village and a МП-800Б type mobile power pump, previously designed of fireproof tanks ( $2 \times 200 \text{ m}^3$ ) by

means of designed manholes CP/1, CP/2. Direction towards location of the fireproof tanks will be marked with signs or fluorescent illuminators („RI” type) mentioning the water reserve in m<sup>3</sup>. Water consumption for firefighting necessities is designed at 15l/sec, whereas the fire extinguishing duration is 3 hours. Supply of water into the fireproof tanks will be undertaken by transporting the water from the nearby lakes. The volume of water in tanks shall be restored within 48 hours.

Extinguishing in the administrative block (picture 4) is provided by an internal fire extinguishing system separated from the drinking water supply system with the water jet of 2.5l/sec. For each firefighting tap will be installed buttons activating the firefighting power pumps (1 operation and 1 reserve), which will be installed in the existing technical building (picture 24). The pump DAB JET 300M (Q=9.0m<sup>3</sup>/h, H=33.0m; N=2.7kwt) will pump the water out of the fireproof tanks (picture 12) inside the fire extinguishing system (picture 4).

For each firefighting tap will be installed 2 ОП-5 type fire extinguishers with foam. To extinguish the fire in the boiler room, it is intended to install an additional firefighting faucet. Interior fire extinguishing system is made of galvanized steel pipes d=65 mm and d=50 mm, with protection against corrosion and heat. Firefighting in other existing and/or designed buildings (where construction volume of the building does not exceed 5,000 m<sup>3</sup>) will be done by means of extinguishers.

Water consumption for the jointly operated state border “Palanca” is planned at a rate of 19.15 m<sup>3</sup>/day, 3.31 m<sup>3</sup>/hour 3.10/sec. based on the analysis of water quality in the existing building (picture 24) will be installed a water treatment system type CUSTOMS-MO-24L to ensure supply of water into the administrative block, which includes: mechanical treatment filter BBD-Matrix, complex treatment system, , Lindosfer EKL 12/1.5-3/52 Twin, osmo-inverted module 24L and ultraviolet irradiation block УФО Bitron Eco-ET240.

The administrative block is provided with separate water supply systems with steel pipes according to ГОСТ 3262-72 standard with Ø 50...25mm, with installation of pipelines under the 1st floor's ceiling. Steel pipes will be primed and covered with a layer of corrosion protector and, also, insulated with mineral wool Heralan-LAM 040 Ø 20 mm and aluminum foil.

Indoor water distribution network is made of polyethylene pipes PPRC-3 with Ø 25 mm and Ø 20 mm with thermal insulation of expanded polymers. Hot water supply is provided from boiler installed in the boiler room incorporated at rate 6.930. indoor water distribution network is designed in the corridor (hallway) at rate 3.630 with thermal insulation similar to cold water. Boiler pipes will be made of galvanized steel pipes. In other building equipped with systems of water supply pipes are made of polypropylene PPRC-3 with Ø 20-50 mm with polymeric insulation „Armflex”, whereas hot water in these buildings will be supplied from the local electric boilers.

Evacuation of residual waters out of all buildings (except toilet from picture 3) will be ensured by free falling into the external sewage network to the existing pumping station, whereas once reaching the pumping station the residual waters are pumped further to the nearby water treatment station (612-0-ACE). Residual waters from the toilet in picture 3 will be pumped with the pump installed in the dormitory next to the building through the pipes under the pressure of d=63 in the pressure arching chamber and further through the projected sewage system. Indoor drainage system of the building with made of polypropylene pipes with Ø 50 mm and Ø 100 mm with special rubber gaskets for connectors' sealing. Accidental spillages from the boiler room are provided in the floor drain after cooling of water up to 60°C. Sewage

columns will rise with 0.5 above the coating surface. Metal fireproof sockets will be installed in the platforms (plateau) to ensure crossing of sewage pipes.

Given the high level of groundwater, exterior sewage network of the site is made of welded polypropylene pipes under pressure PN4 with Ø 160 mm and Ø 200 mm. Rainwater from the site territory will amass in special reservoirs. Polluted rainwater (in the beginning of heavy rains) will be channeled the rainwater treatment station Alfa-GSJ-15 Q=15l/sec, via distribution chamber (2 stations located at both entrances). In case of heavy rainfalls, rainwater drain through the bypass gutter (through concrete lenses) of the water treatment stations together with conventional clean waters off the roofs.

Rainwater drainage networks are provided in welded polypropylene pipes under pressure PN4 with Ø 200 mm ... Ø 5,000 mm. Sewage chambers are made of prefabricated elements of reinforced concrete (annular tubes) with waterproof exterior insulation using two outer layers of asphalt mastic and installation of waterproofing sealing gasket between the annular tubes.

Existing networks must be removed prior to digging works and top caps shall be removed from the existing sewage homes, shall be cleaned of debris, be disinfected and be filled with compacted soil.

During receiving of water and sewage systems works, minutes of hidden works will be prepared: (i) sealing of gaps for pipelines and sewage crossing through the homes' walls; (ii) support layer under the pipelines; (iii) joints sealing; (iv) corrosion protection of the pipelines; (v) compacting the filling after laying pipelines.

Upon completion of works, before receiving procedure, pressure tests will be run to verify the condition of pipelines under pressure, as well as tests checking sealing of joints without pressure. After testing, washing and disinfection procedures will be undertaken according to the sanitary norms.

## **C.2. Heating, ventilation and air conditioning systems**

### **C.2.1. Administrative block**

#### **a) Air conditioning systems of A+/A+ class**

air conditioning system is centralized for the entire building. Conditioning equipment consists of:

- ventilation system (discharge and suction fans 0-100% fresh air);
- freon cooling system (built-in heat pump, compressors are located inside the ventilation machine);
- heating systems with 1 step freon (built-in heat pump, compressors are located inside the ventilation machine);
- heating system with gas, burner with modulated rotations (ensure 100% heating of the building at the outside air parameters);
- heat recovery system H1 class;
- recycling system 0-100%;
- air distribution system;
- the body of the device made of galvanized steel Zn-200 of 0.9 mm with thermal insulation using mineral wool of 50 mm (categorically excluding aluminum carcass system with built-in panels);

- repression and aspiration is performed through additional rooms with exits at the bottom.
- Inox chimney with 3000 mm height

#### **b) Distribution system**

The distribution system is conducted by means of metal circular and rectangular channels with rubber insulation (indoors) and mineral wool (outdoors), with vortex type terminal distribution elements, with chamber for uniformity of air jets and flow control system.

#### **c) Automation system**

The automation system is centralized, one piece for the entire air conditioning system supplied by the ventilation equipment manufacturer (processor with free programming, temperature and pressure sensors, frequency converters, safety systems). All ventilation equipment are unified into a single processor that is programmed for managing all systems micro-conditioning processes (ventilation equipment, toilet fans, working areas). Each area is equipped with separate control cabinet. The automation system is connected to the internet to be remotely accessed and managed. Wiring for automation of the ventilation equipment, toilet fans is built-in in the control panel.

#### **d) Local conditioning system**

Centralized conditioning system for certain room types is accompanied with a SPLYT type local conditioning system. SPLYT system consists of:

- exterior block;
- interior wall type blocks;
- wall control panel;
- wiring

#### **e) Heating systems with radiators**

Heating system with radiators is designed to maintain optimum temperatures in rooms in case of disconnections from the centralized conditioning system. MC 140 type radiators of the system maintain a set temperature in the room. Heating bodies are calculated to operate at low temperatures (condensation heating system).

#### **f) Thermal system**

The thermal system is designed with two cast iron flooring condensate boilers operating in cascades. Switchgear is supplied by the same manufacturer as the thermal system and consists of:

- cascade operation block;
- digital boiler units;
- pumping system connection and managing block;
- mixture circuit connecting block;
- temperature sensors (outdoors and indoors temperature sensors, boiler sensor and return flow heat agent);
- internet connecting block for remote managing.

Pumping groups are supplied by the same manufacturer and are provided with relevant devices and accessories (refer to specifications). Pumps are selected to operate in a medium regime. The possibility of adapting those pumping groups to respective systems can be

achieved by equipping them with frequency convertors. The hot water system for households is based on a boiler with two serpantines with maximum insulation. Chimneys are made of stainless steel. The exterior side of every chimney is insulated with mineral wool.

Automation system wiring is delivered as built-in element of the control panel.

All items of the thermal system shall be supplied by the same manufacturer:

- cauldrons;
- boiler;
- pumping groups;
- collectors;
- pressure equalizing vessel;
- chimneys;
- expansion vesels;
- automation elements;
- water softening system;

The pipe system inside the boiler room is made of metal pipes GOST 10704-91 \* with RockWool 150 insulation 50 mm thickness.

### **C.2.2. Thorough vehicle inspection booth**

#### **a) Heating system**

Heating system of the box for detailed verification of vehicles consists of four installations with radiant tubes with natural gas combustion. Each of the infrared installations is equipped with stainless steel screen insulated with mineral wool. Indoors radiant tubes are equipped with gas burning turbulence increase devices. The burner is modulated (subsequent change of power). Gas evacuation and fresh air suction system is performed through a set of stainless steel chimneys insulated with mineral wool (flexible aluminum channels are excluded).

#### **b) Delamination system**

Hot air delamination system consists of four axial fans with the possibility of adjusting the direction of air flows. The machines are equipped with a temperature sensor for automatic switch on.

#### **c) Automation system**

There is only one switchgear for the equipment with radiant tubes and delamination system. The automation system is produced by the same manufacturer as heating equipment and consists of a processor and temperature sensors for individual adjustment of each infrared heating equipment. The control panel is connected to the internet for remote management of the heating system. The wiring from the control panel to the equipment is part of the automation system and is delivered at the same time.

#### **d) Ventilation system**

The ventilation system is performed through natural type deflectors. Exchange rate for this room is 1/h. Deflectors' exterior side must be thermally insulated with a metal casing on top of the insulation. Deflector cap must be also insulated on the inner side to exclude condensation. Deflector must be equipped with a condensate drain outside.

### **C.2.3. Outdoor toilet**

#### **a) Heating system**

Heating of the outdoors toilets is achieved by means of wall-mounted electric convectors. Each convector is equipped with a digital thermostat. Connection to the power supply will be centralized in control panel installed in the room for disabled persons (see section EL).

#### **b) Ventilation system**

The ventilation system of the outdoor toilet is mechanical (fan, air ducts, deffusers). The fan will be installed externally on the rear wall. Noise level will be reduced by installing a muffler. The system of ventilation channels will be lined with aspiration elements from every toilet cabin. The channels will be opened with no insulation applied. Fresh air suction will be performed through aluminum grills mounted in the entrance doors.

#### **c) Automation system**

The control panel of the ventilation system will be installed in the rrom for disabled persons (see section EL). Automation will be of ON/OFF type with no rotation changing options.

### **C.2.4 Pedestrian checkpoint**

#### **a) Heating system**

Heating of the pedestrian checkpoint room is performed by means of a wall-mounted electric convector. Each convector is equipped with a digital thermostat. Connection to the power supply will be performed locally (see section EL).

#### **b) Cooling system**

Cooling of the pedestrian checkpoint room is performed by means of a split type air conditioning on the window. Connection to power supply is performed locally (see section EL). Evacuation of condensation will be achieved through PVC PN6-10 pipes (plastic-coated pipes are excluded).

### **C.2.5. Vehicles checkpoint**

#### **a) Heating system**

Heating of the vehicles checkpoint space is performed by means of a wall-mounted electric convector. Each convector is equipped with a digital thermostat. Connection to the power supply will be performed locally (see section EL).

#### **b) Cooling system**

Cooling of the vehicles checkpoint space is performed by means of a split type air conditioner installed on the wall. Connection to power supply is performed locally (see section EL). Evacuation of condensation will be achieved through PVC PN6-10 pipes (plastic-coated pipes are excluded). External block will be mounted at the soil level. Freon route will be installed in the flooring construction.

### **C.2.6. Long vehicles checkpoint**

#### **a) Heating system**

Heating of the long vehicles checkpoint space is performed by means of a wall-mounted electric convector. Each convector is equipped with a digital thermostat. Connection to the power supply will be performed locally (see section EL).

#### **b) Cooling system**

Cooling of the vehicles checkpoint space is performed by means of split type air conditioners installed on the wall. Connection to power supply is performed locally (see section EL). Evacuation of condensation will be achieved through PVC PN6-10 pipes (plastic-coated pipes are excluded). External block will be mounted on the roof top upon a metal casing (see section ARH).

Cooling of server room will be performed by means of a split cooling system on the inverter wall that consists of one working and one spare units. Installation of the spare unit will be done by the maintenance personnel.

### **C.2.7. Entry control point**

#### **a) Heating system**

Heating of the entry control point is performed by means of a wall-mounted electric convector. Each convector is equipped with a digital thermostat. Connection to the power supply will be performed locally (see section EL).

#### **b) Cooling system**

Cooling of the entry control point is performed by means of split type air conditioners installed on the wall. Connection to power supply is performed locally (see section EL). Evacuation of condensation will be achieved through PVC PN6-10 pipes (plastic-coated pipes are excluded). External block will be mounted on the rear wall (see section ARH).

Cooling of server room will be performed by means of a split cooling system on the inverter wall that consists of one working and one spare units. Installation of the spare unit will be done by the maintenance personnel.

### **C.3. Power supply system**

The power supply system is designed to match Category 2, according to NCM G.01.02:2015 "Design and mounting of electric installations in dwelling and social buildings". The calculated charge is 300KWT, voltage  $U=0.4KV$ . The project specifies the following:

- Installation of a transformer station type КТПН with 400KVA capacity;
- Installation of PY-0,4KV type distribution device in the room from picture 24/2;
- Installation of an electric diesel generator with a capacity of 400KVA;
- Installation of АПвзБбШп type cable fitted into pipes and ditches.

The outdoors illumination system on the territory of the checkpoint is equipped with C2XY-F type cables, fitted into pipes, and Eco-Street type luminaires mounted on CC7m and CC11m metal poles.

The power supply system also presumes installation of grounding sockets and lighting rods, according to the current regulations.

When establishing distribution solutions for the indoor electricity the following main considerations were taken into account:

- ensure optimal conditions for checkpoint personnel;
- ensure technical conditions for power supply for equipment and machinery;

- avoid interdependence regarding the power supply to areas of movement of parking, such as a fault in the power supply system designed for one area will not affect the work in other areas;
- mark evacuation routes, indoors fire hydrants and illumination of the evacuation walkways in case of emergency;
- connection to the grounding system of equipment and machinery, electrical panel, luminaires, and also by equipping with devices of differential protection with high sensibility level (30mA) against residual fault streams on distribution channels.

Artificial illumination must comply with quality requirements, adapted to the intended room. In rooms with various visual applications will be used local source illumination (e.g. balanced mobile lamps with LED bulbs, special lamps for local illumination) depending on the activity type. General illumination will be done as follows:

- considered illumination level is 200Lx. This served as basis for calculating the number of luminaires required;
- purchase order for the luminaires will be done including normal, buried, installed at entrances and walkways switches and interruptors.

In this way can be achieved a differential illumination level in each separate zone, depending on the activities performed at the moment.

Office, corridors, staircases are provided with fluorescent illumination and FIDA-12-2x36W COMPACT (SR EN 60598-1) type opal lens.

Their location will be on the ceiling, along central axis, so as to ensure a minimum level of illumination of 200 Lx. The toilets are provided with DUAL-01 type wall-mounted luminaires, equipped with LUXOMAT type 18 W compact energy saving lamps.

For provision of power supply for equipment and devices were designed and planned bipolar sockets with protective contacts, located in all the offices, halls, corridors and auxiliary rooms. Also, in order to provide power supply for equipment and devices for routine maintenance of public spaces and walkways, bipolar sockets with protective contacts are installed at distances corresponding to the equipment autonomous radius. Outlets will be monopolar, of ordinary design, with protective contacts connected to the grounding sockets. Electric circuits of sockets will be achieved with FY 2.5 mmp copper wires retardant to torch flaming (SR EN 60332-1-2) protected in IPEY tubes, as displayed in picture.

Powerful electrical installations include power supply channels to fixed or mobile receivers, other than those covered by other strictly specialized projects. When designing electrical installations a technological plan of equipment locations has been developed, specifying the machinery type (fixed or mobile), power supply method (single-phase or three-phase), and connection points, working regime (with shocks).

Electric circuits of sockets will be achieved with wires or cables protected in IPEY tubes, pictured buried, or copper reinforced cables mounted in visible places and protected with

metal gutters. Reinforcement of cables will be connected to inner grounding installation. All equipment will be connected to power indoor grounding installation.

Protection against accidental contact voltage is done according to the regulations in force (ПУЭ). Protection is achieved by binding to protective null-phase as the main supply mean, as well as connection to the grounding installation of metal parts that may come accidentally energized due to faulty insulation.

**\*NOTE**

*After installing the indoors and outdoors electrical systems, checking, testing and adjustment works shall be performed, according to the current standards, elaborating respective execution documentation for each system. Checking, testing and adjustment of the indoors and outdoors electrical systems will be performed by a specialized laboratory and coordinated with project supervisor.*

#### **C.4. Fire signaling and extinguishing system**

Fire signaling system (SI) is designed (for all the objects of the checkpoint) according to the project specifications (tender book) and, also, sections regarding architecture, resistance, indoors electrical system, plumbing systems, technological solutions, as well as according to the following normative acts:

- СНиП 2.04.09-84 "Fire automation of buildings and structures";
- МД СНиП 2.08.02-89\* "Buildings and public spaces";
- НСМ Е.03.03-2003 "Equipment of buildings and structures with alarm and firefighting systems";
- НПБ 104-03 "Warning and evacuation system in case of fire inside buildings and structures";
- НСМ Е. 03.05-2004 "Automatic extinguishing equipment and fire alarms".

The project includes also the function principle of the fire alarm systems designed to detect fire, locate the fire, switch on the warning system, disconnect ventilation system, command for smoke evacuation process, and transmit the fire signal by ATS-100 radio transceiver and telephone informant C2000M to СУПП Palanca.

This system provides non-stop operation of fire detectors to ensure the appropriate level of fire protection and fire propagation and timely warning people about the danger of fire. For distribution network cable of CQR-6 type is used, coated with corrugated pipe Ø16 mm, mounted under the ceiling in the office space, whereas in closed walls in plastic channels and metal cable channel in the corridor. Installation of RS-485 device is performed using fireproof КПСВВ 2x2x0.75 type cable.

Fire alarm control panel C2000M20 is installed on the wall at a height of 1.5 m from the floor level according to the project provisions for each system. To indicate fire the area of fire alarm a C2000-BIC device will be installed. For timely transmission of the signal to rack alert 3 modules of C2000-СП1 relay are installed.

Operational buttons are installed on the wall at a height of 1.5 m from the floor level along the entire length of evacuation routes. The case of the firefighting system is installed in low voltage compartments, being power supplied according to the first category. Signaling devices will be installed at a height of 2.5 m from the floor level.

Power supply for the firefighting system equipment is implemented in accordance with the "Rules of electric installations" of the first category, (after ABP) from the designed alternative power supply network, with voltage of 220V and frequency of 50Hz.

Electrical equipment of the firefighting system must comply with ГОСТ 12.2.007.0 standards. It is necessary to install the table in compliance with the "Rules for electrical installation", СНиП 3.05.06.85 "Electrical installations", ГОСТ 12.1.30-81 requirements and technical documents of the manufacturer.

Installation of table system will be executed in compliance with "Instructions for executing grounding processes for electrical installations" СН 102-76. Contracting company to perform installation works, prior to initiation of works, must get familiarized with the project documentation and examine the equipment to be used. The equipment is installed after input controlling with agreement of the project supervisor (consultant), preparing a formal (written) report.

Installation must be performed in the following order:

- verification of pipes during wiring installation;
- fixing of boxes and PVC pipes in determined locations;
- wiring installation, including marking and pinging;
- installation of detectors;
- installation of power supply equipment;
- connection of the signal circuit conductors;
- verification of connection correctness.

Installation works must be carried out by specialized organizations in strict accordance with the rules and regulations applicable for the installation, testing and initiation of firefighting system ПД 78145-93.

Installation, assembly and initiation will start after the implementation of all security measures according to СНиП 111-4-80 entry control report. When working with power tools, it is necessary to ensure compliance with the requirements of ГОСТ 12.2.013.0-91 standards.

Installation and maintenance of the system will be executed only by persons that have been instructed on labor protection measures. Their trainings are duly documented. The execution of installation, will meet the СНиП 111-4-80 requirements regarding "Labor protection at construction sites", "Exploitation rules of consumers' installations", "Labor protection during operations of electrical installations". Installers' workplaces must be equipped with devices that ensure safety. During electrical installations warning signs must be used. Works in such

places should begin only after disconnecting them from power supply. Commissioning of the system is performed in accordance with the СНП 03/05/06 requirements.

### **C.5. Low currents and IT systems**

Compartment (SCS - low current system) Palanca checkpoint project provisions, developed on the basis of project tasks and current normative documents, provides specification for the execution of local area network (LAN) for organizing a single information network space through the internet.

Active equipment, to which all the Palanca checkpoint workplaces will be connected, will be installed inside control station at the entrance A1. At the beneficiary's requests, the phone system is designed based on IP technology, provided in the SCS section. Local IT network has a hierarchical star-shaped structure, where the role of the "center/base" for the entire checkpoint is a Gigabit Ethernet type commutator with high port density.

The technical drawing of the administrative block includes an "ETX-1300" type commutator produced by "RAD" company, with 32 SFP / UTP users of the interface Fast Ethernet, with 4 Gigabit Ethernet ports combined and remote management possibility. The project also includes the distribution network with 4 workplaces: 2 workplaces are connected to the Moldovan border police and other 2 workplaces to the Ukrainian border guard service. Every workplace will be equipped with three RJ-45 sockets for connecting to the local network user IT equipment.

For each workplace, the distribution network will run from router with UTP type cables with copper conductors of category - 5 in plastic channels and outlets will be installed at a height of 300mm from the floor level. Exits of the RJ-45 terminal modules will be executed according to TIA / EIA T568B standards. The distribution network will be executed using:

- PVC pipes with Ø 110mm - outdoor underground network;
- PVC pipes with Ø 25mm – floor substrate;
- Plastics channels.

The table, is important to be installed according to the "Rules for electrical installations", СНП 3.05.06.85 "Electrical installations", ГОСТ 12.1.30-81 requirements and technical specifications of the manufacturer. Local low current and IT networks will be installed using exclusively copper conductors.

### **C.6. Installations and equipment**

#### **C.6.1 Road blocking device**

### **a) Operation and installation principles**

- The road blocking device is meant for the forced vehicle stop as well as unauthorized access control onto the Customs territory;
- The attempt to go over the operated device (the vertical platform) will cause damage to the suspension and front axle, causing the vehicle to stop suddenly without the possibility of further movement;
- In a normal state (non-operated) the device represents an artificial, sloped obstacle with a lift height of 11 cm (bumpy road) which serves as a speed reducer;
- The device platform is remote-control driven through a modular programmable automaton (powered by electricity or on accumulator). This ensures a safe functioning of the device at the specified parameters;
- In case all power sources are missing, the device shall be turned-on manually;



- The road blocking device is a reinforced metallic structure, mounted by welding along with the anti-shock platform. It is driven by a built-in mechanism;
- For additional grip, the top part of the anti-shock platform shall be made of diamond-shaped profile sheet;
- The distance between the command unit and the road blocking device shall be 25 m or calculated depending on the operator location;
- The road blocking devices' structure provides a manual shift mode from the normal to the operated state by means of a lift/lower lever of the anti-shock platform (with a counterweight);
- The road blocking device installation shall be made according to the Site Plan and the manufacturers' installation and operation manual;
- The width of the road blocking device is 3 m.

### **b) Characteristics, equipment set**

The road blocking device shall be delivered with the following equipment:

- Road blocking device-1 unit;
- Cables- 25 m;
- Modular programmable command panel- 1 unit;
- Accumulator battery- 2 units;
- Dual aspect traffic light- 1 unit;
- Remote controller- 1 unit;
- Lift/lower lever (with a counterweight)- 1 unit;
- Anchor bolts- 4 units;
- Installation and operation manual- 1 unit.

#### **C.6.2 Vehicle scales position 8E (for information only; not included in this tender)**

##### **a) Characteristics**

- Max weight limit- 80 tons;
- Division value- 20 kg (from 0 to 40 t), 50 kg (from 40 t to 80 t);
- Precision, according to RGML 14 NML R76-1- medium;
- Number of sensors- 8 units;
- Number of platforms (load receptors)- 3 (6x3 m);
- Voltage- 220 V-15 % +10%, 50 Hz;
- Operation temperature:
  - a. electronic unit: from 0°C to +40°C;
  - b. charge receptor: from -30°C to +45°C;
- Water and dust safety-IEC 529 (ГОСТ 14254-80);
  - a. electronic unit: IP-67 execution;
  - b. charge receptor: IP-68 execution

##### **b) Delivered equipment set**

- Weighing platform (load receptors)- 3 units;
- Mechanical tension sensors- 8 units;
- Control unit- 1 unit;
- Operation manual- 1 unit;
- Verification bulletin- 1 unit.

##### **c) Operating principles**

- BSA- 40/80 D1.4T-1 electronic vehicle scales are made for the static weighing of the cargo transported by road, with an overall weight of 80 tons and a length of 18 m. Out of technical and space requirements, an underground auto scales version was designed.
- The structure of this type of scales was designed in such a way as to ensure a maximum resistance and a minimum profile that could facilitate transportation, operation and installation. This reduces the amount of time required for maintenance and also ensures a uniform charge distribution onto the weighing deck.
- The installation system is basic- at driveway level, using the metal charge receptor (platform). The light weight of the weighing system causes it to require minimal foundation type works.
- The charge receptor is the scales part onto which the vehicle moves and as such is an integral part of the auto scales structural strength. The project provides the metal charge receptor's structure.
- The auto scales shall be delivered fully equipped with compression charge cells made of stainless steel (available in analog version as well as digital one), junction boxes, cables and digital weight indicator, PC, printer and acquisition software for scales ticket distribution.
- The package will include installation services and weighing system commissioning as well as metrological verification services and system certification.
- For underground auto scales the following are to be taken into consideration:
  - Maintenance and renovation services are much more complex given the confined spaces these operations are taking place;
  - The weighing device inspection needs to be undertaken from within the foundation pit;
  - Intervention teams for this kind of weighing devices need to comply with the protection and safety requirements which refer to work within confined spaces;
  - Water drainage must be ensured in order for its accumulation within the foundation pit to be avoided. This exhaust system must be cleaned constantly;
  - In case the structural strength doesn't allow transverse traffic, prevention methods need to be taken so that the side vehicle access can be restricted and controlled (arm barriers, etc.).

### **C.6.3 Vehicle scales position 8A and 8B (for information only; not included in this tender)**

#### **a) Characteristics**

- Max weight limit- 15 tons;
- Division value- 20 kg;
- Precision, according to CT51845-2008;
- Number of sensors- 4 units;
- Number of platforms (load receptors)- 1 (0.8x3 m);
- Voltage- 220 V-15 % +10%, 50 Hz;
- Operation temperature:

- a. electronic unit: from 0°C to +40°C;
- b. charge receptor: from -30°C to +45°C;
- Water and dust safety-IEC 529 (ГОСТ 14254-80);
- a. electronic unit: IP-67 execution;
- b. charge receptor: IP-68 execution

**b) Delivered equipment set**

- Weighing platform (load receptors)- 1 unit;
- Mechanical tension sensors- 4 units;
- Control unit- 1 unit;
- Operation manual- 1 unit;
- Verification bulletin- 1 unit.

**d) Operating principles**

The operating principles are identical to those mentioned above for position 8E.

### C.6.4 Mono-beam overhead crane

**Characteristics**

- Lifting capacity (working load)- 1 ton;
- Length- 7.80 m;
- Opening- 6.0 m;
- Lifting height- 6.0 m;
- Voltage- 380 V;
- Execution- type “U”;
- Location- category 3 room;
- N=2.42 kW



**a) Operation principles**

- Overhead cranes are complex lifting machines which have one or several mechanisms with the help of which load movement takes place.
- Overhead cranes are equipped with chain or cable based hoists, depending on the operation technical requirements and may have one or two lifting speed options.
- The movement takes place with the help of frequency variators thus ensuring a non-shock acceleration.
- Hoist speed can vary up to 20 m/min and the bridge speed up to 40 m/min or higher.
- The bridge control takes place with the help of a button based unit, independently moved along the bridge opening or by means of radiocontrol.

#### **b) Electrical installation description**

- All mechanisms' operation is carried out by synchrone triphase mounting, powered at 380 V, 50 Hz.
- Movement control and surveillance is carried out by a modular programmable automaton thus ensuring the functionality at required parameters and in safe conditions.
- For exceptional type situations the following is to be provided: an emergency stop-button, overstroke limiters, overspeed limiters that lead to the installations' total disconnection or the affected mechanism if activated (these elements are hard cabled).
- With information from within the process, a fault state viewing monitor is connected to the programmable automaton. Being located in the equipment command booth, the crane can easily be warned when a fault occurs as well as see on the monitor the message in regards to the fault and its location on the installation.
- The goal is to quickly remediate faults and mistakes so as to minimize the non-function period of the machinery. This fault location system is possible thanks to the remote communication system from within the automaton structure. The data regarding the status of the electrical equipment from the load cart (limiters, motor thermo control, brake position, protection automatons, tension presence etc.) are also collected through the remote communication network.

#### **c) Installation requirements**

- The mono-beam overhead crane will be installed according to the manufacturers instructions;
- The manufacturer has to deliver all the technical documentation, including the installation and operation manual and instructions of the Mono-beam overhead crane;
- During the mono-beam overhead crane installation all legal provisions of Republic of Moldova legislation regarding industrial safety shall be strictly complied with;
- During the mono-beam overhead crane reception a representative of the State Inspectorate for Technical Supervision of Dangerous Industrial Objects (IPSSTOIP) shall be present;
- **Note:** The technical documentation for the overhead crane shall be delivered by the manufacturer or his authorized representative and shall combine:
  - Technical characteristics;
  - Overhead crane tracking notebook;

- Instructions for use, service and installation;
- A short job description for the staff;
- Warnings and contradictions regarding the overhead crane use;
- Instructions on staff training and protection equipment where needed;
- Overhead crane operational mode in case of an accident or a malfunction;
- Adjustment and maintenance operation description.

### **C.6.5 Two column hydraulic lift device**

#### **a) Characteristics**

- Lifting capacity- 4 tons;
- $N=2.20$  kW;
- $U=380$  V;
- Motorization- 2 three-phase motors with a 230-400 V, 50 Hz, 3.5 kW each;
- Sound level-  $<70$  dB (A);
- Overall dimensions- 3500x2900x2760 mm;

#### **b) Operating principles**

The two column hydraulic elevator is intended to lift vehicles. Only vehicles with the following characteristics can be lifted:

- Weight must not exceed the lifting capacity;
- Weight distribution on suspension points (reversible)- 1:2 or 2:1 (reversible);
- Minimal distance between suspension points- 1000 mm. For lower values, the lift device capacity is reduced;
- The lift device can be used only in enclosed spaces where there is no fire or explosion risk;
- The lift device can not be used for vehicle washing.

#### **c) Location**

The location of the lift device must have the following characteristics:

- Sufficient lighting (without being overpowering);
- Area mustn't be exposed to bad weather conditions;
- Area must be aired accordingly;
- Unpolluted environment;
- Sound level under the one imposed by legal norms  $\leq 70$  dB (A);
- There mustn't be any dangerous movements in the area due to the presence of other operational vehicles;
- No flammable, explosive, corrosive or toxic materials must be stored in the equipment installation area;
- The distance between columns and walls/other equipment has to be minimum 70 cm;

- The location must be chosen in such a way as to ensure that the operator will maintain visual contact with the installation and the surrounding areas from his command station. The operator must avoid access of foreign people or potentially dangerous objects in the work area. All mounting works regarding outdoor energy type networks (especially electric ones) shall be executed by qualified and authorised staff according to the legislation.

**d) Installation requirements**

- The lift device must be mounted onto a smooth, plane surface able to withstand the loads transmitted to the support surface;
- The base minimal requirements are as follows:
  - B20 or higher class concrete;
  - Base minimal thickness without covering or bed layer- 15 cm;
  - Reinforcement made of two meshes (top and bottom) from AIII D=8 mm, an eye of 150x150 mm;
  - Concrete protection layer not thicker than 25 mm;
  - Load-bearing surface not smaller than 1.8 kg/cm<sup>2</sup>;
  - These characteristics must be ensured onto a minimal surface of 4.00x3.50 m without expansion joints or cuts able to ruin the top reinforcement continuity.

**e) General safety measures**

The lifting device can be used only by qualified staff who was trained accordingly and only after the complete understanding of the operation manual. The operator must be authorized by the employer. Any intervention or modification of the safety devices is prohibited. In case of breach of this provision the manufacturer declines any responsibility regarding installation faults and their consequences. The following instructions shall be respected:

- Only accessories and spare parts produced by the manufacturer shall be used;
- The installation shall be performed by qualified and authorized staff only;
- Any dangerous situations must be avoided at all costs during up-down movements of the lift device; in case that happens stop the lift device immediately and repair the fault;
- Arms shall be positioned at set points on the vehicle. Before lifting check the vehicle stability. During up-down movements check the load support point;
- Sitting on the lift device is prohibited;
- After lifting, position the switch at “0”;
- Before lifting, check the accuracy of the load according to the label “load chart”.

### **C.6.6 Electrohydraulic scissor lift**

**a) Characteristics**

- Lifting capacity- 5 tons;
- Overall dimensions- 3000x4000x1200 mm;

- Foundation beam loading- 60% from the loading capacity;
- Race to 3100 mm- one hydraulic piston;
- Race to 5300 mm- telescopic piston;
- Max number of stops- 3;
- Output landings- max 6 through the booth;
- Hydraulic unit- submersible unit, including a screw pump;
- Speed- 0.28 m/s.

#### **b) Operation principles**

The electrohydraulic scissor lift that quickly and safely transports vehicles shall be mounted according to the EN81 Part 2 Lift device Directive.

The machinery room shall be located onto the lowest stop level in the immediate vicinity of the lift shaft.

#### **c) Location**

The electrohydraulic scissor lift shall be mounted onto a platform that needs to have the following characteristics:

- Sufficient lighting (without being overpowering);
- Area musn't be exposed to bad weather conditions;
- Area must be aired accordingly;
- Unpolluted environment;
- Sound level under the one imposed by legal norms  $\leq 70$  dB (A);
- There musn't be any dangerous movements in the area due to the presence of other operational vehicles;
- No flammable, explosive, corrosive or toxic materials must be stored in the equipment installation area;
- The location must be chosen in such a way as to ensure that the operator will maintain visual contact with the installation and the surrounding areas from his command station. The operator must avoid access of foreign people or potentially dangerous objects in the work area. All mounting works regarding outdoor energy type networks (especially electric ones) shall be executed by qualified and authorised staff according to the legislation. The electrohydraulic scissor lift must be installed onto a smooth concrete platform (4x5 m), able to withstand the loads transmitted to the support surface. The minimal requirements for the platform are as follows:
  - B20 or higher class concrete;
  - Concrete layer minimal thickness- 25 cm;
  - Reinforcement made of two meshes (top and bottom) from AIII D=8 mm, an eye of 150x150 mm;
  - Concrete protection layer not thicker than 25 mm.

#### **d) Installation requirements**

- The basic requirement that the installation of the lift devices and their security components must comply with is to ensure a safe operation throughout the period of use that is specified in the technical documentation of the lift device;
- Installation of lift devices and their components must be executed by technically qualified staff who have the necessary technical means in accordance with the legislation. The installer will develop an accompanying technical documentation of the lift device and also the lift device manual. The device manual has to comprise the lift device characteristics and has to be developed before lift device commissioning. This manual must contain:

- A technical part, named “lift device manual-technical part” in which the following are stated:

- Lift device identification data;
- Basic lift device characteristics;
- Cables or/and chains characteristics;
- Components whose characteristics verification of conformity is required:  
Lock devices; landing doors (fire attempt certificates); device that prevent falls;  
speed limiters; energy dissipation units (or energy accumulation units with rebound damping movement); security circuits; protection devices for the booth ascent speed limitation.
- Within the building mounting plans;
- Hydraulic schemes;
- Electric schemes.

The electric schemes can be limited to only the essential circuits for a general overview of the security components. A legend must explain all the symbols used;

- A part named “lift device manual-operation part” in which verification, inspection protocols and observation are included.

## **D. TECHNICAL REGULATIONS, APPLICABLE MATERIALS AND QUALITY STANDARDS**

### **D.1. Requirements for materials to be used**

a) All the materials used during the construction works of the jointly operate state border checkpoint "Palanca" situated on the territory of the Republic of Moldova must be accompanied with certificates of compliance. Compliance certificates will be handed in together with the Invoices for the respective materials.

b) New materials that do not have a valid standard on the territory of the Republic of Moldova must have technical approvals.

c) The bidder shall submit copies of the technical approvals for the following materials:

- Sandwich panels;
- Corrugated galvanized sheet (board).

- d) The bid shall include technical characteristics of the materials (i.e. marks, symbols, manufacturer, etc.). It is forbidden to replace materials mentioned in the bidder's offer without prior coordination with project manager (consultant).
- e) Guarantee certificates for machinery and equipment will have the warranty period equal to or greater than the warranty period determined after final acceptance.
- f) All Installations and equipment shall conform to ISO standards of quality, including, but not limited to design, manufacture/assembly, sale, installation, service, technical assistance and support.

## **D.2. Legislation and applicable technical regulation**

- a) For the construction operations of the project the following will apply:
  - Moldovan law regarding quality in construction No. 721-XIII as of 02.02.1996 and its subsequent amendments;
  - Moldovan law regarding authorization to execute construction operations No. 163 as of 09.07.2010;
  - Government Decision No. 285 as of 23.05.1996 and its subsequent amendments;
  - Standards and technical regulations in construction, applicable in the Republic of Moldova;
  - Metrologic System accepted in Republic of Moldova.
- b) The Contractor executing construction operations must have ISO 9001 certificate on "quality management system";
- c) The Contractor is responsible to fill in the Construction Technical Book (section "B"), in accordance with the law.

## **F. TESTING AND DOCUMENTS OF EXECUTION**

### **F.1. Testing**

The Contractor shall perform the following tests indicated in the execution project, according to the following sections:

#### **a) "Architecture and Resistance" section**

- Laboratory tests of the cement-sand mortar screeds equalizers;
- Laboratory tests of the poured concrete into constructive elements.

#### **b) "Heating and ventilation" section\***

- Individual testing of the equipment;
- Leakage testing of the heating system (hydrostatic and gauge testing);
- Heating system testing (thermal and pressure resistance testing);
- Low pressure boilers testing;
- Indoor ventilation and air conditioning system testing.

#### **c) "Water and sewage" section\***

- Testing and commissioning of the indoor water and sanitation systems;

- Testing and commissioning of the outdoor water and sanitation systems.

**d) “Power supply” section**

- Measuring insulation resistance (megging) of cables under 1000V;
- Measuring insulation resistance (megging) of electrical equipment, electrical receivers (luminaires, technological equipment, heating, ventilation and conditioning, refrigeration receivers, etc.);
- Measuring resistance of the grounding socket;
- Verifying continuity links between grounding socket and equipment connected to it;
- Verifying the effect of protective devices on electrical installations with neutral grounding.

**e) “Gas supply” section**

After installation, gas pipes will be tested for leaks according to the NCM G.05.01-2012 requirements in the following subsequence:

- Underground steel gas pipes: - up to 0.005 MPa: testing pressure – 0.6 MPa: duration – 24 hours;
- Interior gas pipes: - up to 0.005 MPa: testing pressure – 0.01 MPa: duration – 1 hour.

**e) “Low currents” section**

- Testing and commissioning interior low current system, including respective reports and documentation;
- Testing and commissioning of indoor fire signaling system, including respective reports and documentation and beneficiary staff training.

**F.2. Reports of execution**

During receiving of completed works, the Contractor will submit the following documents:

- Topographical record, which will include (drawings “according to execution of works”) for external water and sewage systems, external gas supply networks, electricity grids and effective spatial planning;
- Operational and maintenance manuals (instructions) of the ventilation, air conditioning and fire signaling systems.

**G. SITE ORGANIZATIONAL WORKS**

**G.1 Site preparatory processes for construction works**

Within three days after signing the contract, the Contractor will receive the construction site (including existing buildings) based on a Handover document transmitting the site at Cahul Customs Office.

In site handover document will provide the following:

- Outline of the site;
- The existing buildings that require to be reconstructed.

The construction planned territory of the jointly operated state border “Palanca” checkpoint located on the territory of the Republic of Moldova must be entirely fenced according to ГОСТ 23407 – 78. Site fencing must be performed at the same time as construction works, for each separate stage (see “site organization” section).

Access to site will be made through two gates, one from the unincorporated area of Palanca village on a paved street and a second one from the existing street on the Ukrainian territory. Access to site must be carried out according to the provisions and schemes developed in the project. At the site entrance, on the right side of the gates, should be installed warning-prevention signs “Caution: site under works. Access denied” or similar).

For construction of access roads on the territory of the site, see figure 2 and 3. Temporary roads within and outside the site must be covered with gravel (24 - 40mm) in order to ensure cleaning the wheel of transportation units of mud, at site exiting. The land near the site gates and perimeter of the site constantly needs to be cleaned of mud, garbage and construction debris.

On the territory of the site must be provided places for smoking and recreation of the workers, hence protective roofs (sheds) must be mounted, according to Scheme 4.

Workplaces, personnel rest rooms, dwelling spaces, toilets or other spaces where there might be people during construction works must be placed outside hazardous area. It is recommended placing them in inventory wagons (see “organization of site” section).

Ensuring the site with electricity and water supply will be done by connections to local networks, based on prescriptions issued by master or institution that operates these networks.

Prior to construction works, by order of the project supervisor, a person is assigned responsible for the fire protection. The construction site must be equipped with (landline) telephone communications, which will have a person in charge at the reception throughout the entire duration of the construction works.

Construction site must be provided with fire protection panels, according to the project provisions and submitted scheme, firefighting hydrants, provisional aqueduct (water conduit), sewage networks (as required), provisional electricity grids, boxes of power distribution, crates and panels for power supply control, lever switches, etc.

Informative panel must be mounted at the site gate mentioning entrepreneur’s and beneficiary’s names and, also, indicating: starting date of the works; completion date of the works; telephone number and name the project supervisor.

The Contractor will install an on-site firefighting picket according to applicable norms and rules and a billboard with the size 600x1200mm.

All expenses connected to organization of the work site, specific security measures and power consumption will be borne by the Contractor, which must be part of the bid/offer.

## **G.2. Organization of construction works**

The project for organization of construction works for jointly operated state border "Palanca" checkpoint located on the territory of the Republic of Moldova includes execution of works with no seasonal interruptions (winter-summer), with maximum use of the Contractor's inventory and rational use of materials and equipment.

### **a) Phase 1**

Prior to construction works, within the framework of preparatory operations, Phase 1 will include:

- Arrangement of auxiliary spaces for workers (inventory wagons shall be brought and mounted according to the site organizational plan);
- Concreting or gravel (40-70 mm fraction) covering of the entrance pathways onto the site in order to clear wheels of the transport units, according to the POS;

### **NOTE (FOR INFORMATION)**

1. *Upon the entire surface of the border crossing "Palanca" checkpoint must be executed embankments of compacted soil in layers up to  $\gamma=1.65\text{t}/\text{m}^3$ , compacted soil layer must be  $\approx 1500\text{mm}$ , using soil surplus and heavy compactor rolls. Afterwards, upon the compacted soil is spread a layer of gravel (40-70 mm, thickness 150 mm) compacting it into soil (for more details see PG and organization of site sections).*
2. *Execution of embankment must be done together with quality verification of compaction procedures, density of compacted soil must be  $\gamma = 1.65\text{t} / \text{m}^3$ , according CHuП 3.02.01-83 "Substructures and foundations". Compaction process must be accompanied with quality verification of compacted soil (based on laboratory data) for each layer (300 - 400mm) and verification of optimum soil humidity.*
3. *If during execution of embankment process emerge fluid lands, as a result of rise of the groundwater or heavy rains, forced drainage measures should be taken onto these sectors of work. Evacuation water channels should be located at a distance of not less than 5000mm from the pathways of transport units (access roads) and / or buildings under construction.*
4. *The following results should be achieved in the category of construction works, including execution of embankments, of phase 1:*
  - *Accumulation channel excavation and drainage of rain- and ground-water across the entire length of the border crossing checkpoint;*
  - *Embankment over the entire surface of the border crossing "Palanca" checkpoint;*

### NOTE (FOR EXECUTION)

- *Foundations and infrastructure of positions 11A, 11B, 3B, 2C, 2D, 6B, 8E, 7, 4, 5A-B-C-D-E-F and 6A, from the general plan, in the indicated order of the site organization project in stages of execution.*

### **b) Phase 2**

the 2<sup>nd</sup> phase of works includes work cycles to be performed after completion of works in phase 1. In this cycle of works the Contractor must perform the following:

- Completion of infrastructure construction of positions 11A, 11B, 3B, 2C, 2D, 6B, 8E, 7, 4, 5A-B-C-D-E-F and 6A, from the general plan and superstructures;
- Masonry works of positions 3B and 4, concreting of platforms (plateau), roofing works including metal constructions of positions 5A-B-C-D-E-F and scanners 2C and 2D;
- Execution of long vehicles checkpoints (positions 6A and 6B);
- Land arrangement, execution of road coating, plating of surfaces;
- Installation of illumination poles and external aerial networks;
- Routing of external and internal engineering networks, as well as finishing of interior and exterior works for positions listed in phase 1 and 2.

### NOTE

*In order to ensure border traffic during phase 1 and 2 Palanca village residents, as well as from the nearby villages, must travel on the provisional road previously executed for this purpose.*

### **c) Phase 3**

The works phase 3 will start only if the volume and quality of the works described in phases 1 and 2 were documentary confirmed according to the local legislation. Works planned for phase 3 must be executed in the following sequence:

- Ensuring small border traffic (see step three), by opening access for transport units onto the arranged territory of the state border crossing "Palanca" checkpoint;
- Completion of interior and exterior finishing works of the positions listed in phase 1 and 2;
- Completion of infrastructure of the positions 3A and 9 and execution of reservoir as per position 12 from the general plan;
- Wall masonry of the position 3A, concreting of platforms (plateau), roofing works including metal constructions of positions 1A, 2A, 2B, 8A, 9, 10, B-C-D-E-F and scanners 2C and 2D;
- Routing exterior and interior engineering networks, finishing of interior and exterior works of the positions listed in phase 3;
- Land arrangement, execution of road coating, plating of surfaces, installation of illumination poles and external aerial networks;
- Removal of protective fencing from site and mounting of permanent fencing, execution of adjacent spatial arrangements, restoring road surface coating and green spaces.