ANNEX Nº13. WASTES MANAGEMENT
Annex nº13. Wastes management

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Annex nº13. Wastes management

1. Justification and scope

The research about the waste management of the current project was done following the Royal Decree 105/2008 (1st of February), that establishes and regulates the production and management of construction and demolition wastes.

Out of the numerous duties imposed to the producer, it must be highlighted the necessity of including in the construction project a research about the waste management. This research must follow the indications of the article 4.1.a) of the Royal Decree 105/2008, including the following:

- An estimation of the quantity – given in tonnes and m³ – of the construction and demolition wastes generated, and coded according to the European list published MAM/304/2002 (8th of February), which shows the valorisation operations, the wastes elimination and the European wastes list.

- The wastes prevention measures in the current project.

- The reutilisation, valorisation or elimination operations of the wastes generated.

- The measures taken to separate adequately the wastes during the works. In particular, for their accomplishment from the wastes’ owner point of view.

- The maps of the expected installations for the storage, holding, separating and other management operations affecting the construction and demolition wastes in the project area. Afterwards, these maps can be adapted to the particular features of the works done and its execution systems if approved by the faculty direction.

- The particular requirements affecting the current project given in the statement of technical requirements, related to the storage, holding, separation and other management operations affecting the construction and demolition wastes in the project area.

- A valorisation of the expected cost concerning the construction and demolition wastes management. This cost will be part of the project’s budget.
The wastes producer will attempt to accomplish the specific existing norms, promoting the prevention of the construction wastes, their reutilisation, recycling and other ways of valorisation, ensuring always their adequate treatment in order to be sure about the sustainable development of the construction works.

The contractor will submit to the promoter a Management Plan for the construction and demolition wastes generated, according to the content defined in the articles 4.1 and 5 of the Royal Decree 105/2008. This Plan will be based on the descriptions and contents of the research about the wastes management of the current project, and it will have to be approved by the project manager and accepted by the promoter. Once accepted, it will become part of the construction contract documents.

In case the contractor of the construction and demolition wastes is not able to manage them by itself, it will have to submit them to an authorized manager with the corresponding documentation, certificates and obligations determined in the article 5.3 of the Royal Decree 105/2008.

2. Legislative framework

For the preparation of this study the current legislation about wastes management described below is taken into consideration.

2.1. Governmental

- Royal Decree 833/1988 of July 20, by which the regulation for the execution of the Law 2071986 is approved. It is a basic Law about toxic and hazardous wastes.

- Order of October 13, 1989, by which the characterization methods of toxic and hazardous wastes are determined.

- Royal Decree 108/1991 of February 1, about the prevention and reduction of environmental pollution by asbestos.


- Royal Decree 952/1997 of June 20, by which the regulations for the implementation of Law 20/1996 of May 14 are modified. This Law is about toxic and hazardous wastes, approved by the Royal Decree 833/1998 of July 20.

• Royal Decree 782/1998 of April 30, by which the Regulation for the development and implementation of Law 11/1997 of April 24 about packaging and packaging wastes is approved.

• Order of June 13, 1990, by which the sixteenth chapter and the Annex II of the Order of February 28, 1989 about the used oils management are modified.

• Royal Decree 1481/2001 of December 27, by which the wastes elimination is regulated.

• 304/MAM/2002 Order of February 8, by which wastes valorisation and elimination operations and the European wastes list are published.

• Royal Decree 208/2002, of February 8, 2005, about Electrical and Electronic devices and their wastes management.

• Royal Decree 252/2006 of March 3, by which the recycling and valorisation objectives established in Law 11/1997 of April 24 are reviewed. This Law is about packaging and packaging wastes.

• Royal Decree 679/2006 of June 2, about the management of industrial used oils.

• Royal Decree 106/2008 of February 1, 2008 about batteries and accumulators and the Environmental management of their wastes.

• Royal Decree 105/2008 of February 1, about the production and management of regulated construction and demolition wastes.

• Royal Decree 975/2009, of June 12, 2009, about wastes management of extractive industries and the protection and rehabilitation of areas affected by mining activities.

• Royal Decree 1304/2009, of July 31, 2009, by which the Royal Decree 1481/2001 of December 27 is modified.

• Royal Decree 943/2010, of July 23, 2010, by which the Royal Decree 106/2008 of February 1 about batteries and accumulators and the environmental management of their waste is modified.

• Law 22/2011, of July 28, about wastes and contaminated soil.

2.2. Autonomic (Catalonia)

• Decree 64/1982 of March 9, about partial regulation of waste and residues treatment.
• Order / 1988 of September 6, 1988 about the treatment requirements and disposal of used oil.

• Decree 34/1996 of January 9, 1996, approving the waste catalogue of Catalonia.

• Decree 1/1997 of January 7, 1997 about the disposal of waste rejection in controlled deposits.

• Decree 92/1999 of April 5 modifying Decree 34/1996 of January 9, by which the waste catalogue of Catalonia is approved.

• Decree 93/1999 of April 6, 1999 about wastes management procedures.

• Decree 219/2001, of August 1, by which the Third Chapter of Decree 93/1999 of April 6 about wastes management procedures is modified.

• Legislative Decree 1/2009, of July 21, 2009, by which the revised text of the Wastes Law is approved.

• Decree 69/2009 of April 28, 2009, by which the criteria and procedures of acceptance of wastes at landfills are established.

2.3. Local (Barcelona Municipality)

• General Ordinance of the urban environment (Adopted on March 26, 1999).

3. Definitions

3.1. Scope

The scope of the Royal Decree 105/2008 (Article 3) for this project is the construction and demolition wastes defined in Article 2, except the land and stones not contaminated by hazardous substances reused in the same work, in a different work or in a restoration or filling, as long as it can be demonstrated without any doubt their destination.

3.2. Definitions

Law 22/2011, of July 28, about wasted and contaminated soil, defines the following concepts that are relevant to the realization of this Annex:
• Waste: any substance or object which the holder has discarded or intends or is required to discard.

• Household waste: waste generated by households as a result of domestic activities. Similar wastes generated in industries and services are also considered household wastes. In this category are also included the wastes generated in household electrical and electronic devices, clothing, batteries, furniture, etc. Other wastes coming from street cleaning, green areas, recreational areas and beaches, dead pets and vehicles abandoned will also be considered household wastes.

• Commercial waste: waste generated by the activity of trade, catering services and bars, offices and markets, and the rest of the services sector.

• Industrial waste: residues from the manufacturing, processing, consumption, cleaning or maintenance activity generated by industry, excluding emissions regulated by Law 34/2007 of November 15.

• Hazardous waste: waste which displays one or more of the hazardous characteristics listed in Annex III, and anyone that is approved by the Government in accordance with the provisions of European legislation or international conventions.

• Used oils: any mineral or synthetic lubrication or industrial oils, which have become unfit for the originally intended use, such as the oils used for engines combustion and gearbox oils, lubricating oils, the turbine oils and hydraulic oils.

• Bio waste: biodegradable garden and park waste, food and kitchen waste coming from households, restaurants, caterers and retail locals.

• Prevention: A set of measures taken in the design, production, distribution and consumption phase of a substance, material or product, in order to reduce:
  
o The amount of waste, including the reuse of products or the prolongation of their useful lives.
  
o Adverse impacts on the environment and human health, including the savings in the use of materials or energy.
  
o The content of harmful substances in materials and products.

• Producer of waste: any natural or legal person whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other, resulting in a change in the nature or composition of this waste. In the case of the goods checked
by the service control and inspection facilities in borders the representative of the merchandise, or its importer or exporter, will be considered the producer of the waste.

- **Holder of waste:** the waste producer or other natural or legal person in possession of waste.

- **Trader:** any natural or legal person acting on its own account in the purchase and subsequently sell of waste, including such dealers who do not take physical possession of the residues.

- **Agent:** any natural or legal person who organizes the recovery or disposal of waste on behalf of third parties, including agents who do not take physical possession of the residues.

- **Waste management:** collection, transport and treatment of waste, including supervision of such operations and the after-care of landfills, including actions taken as a dealer or agent.

- **Waste manager:** the person or entity, public or private, registered by authorization or notice to perform any of the operations that make up the waste management, whether or not the is its producer.

- **Collection:** collection of waste, including classification and initial storage for transport to a treatment facility.

- **Separate collection:** collection where a kind of waste is kept separately in order to facilitate a specific treatment.

- **Reuse:** means any operation by which products or components of products that are not waste are used again for the same purpose for which they were conceived.

- **Treatment:** the valorisation or elimination operations, including preparation prior to valorisation or elimination.

- **Valorisation:** any operation the principal result of which is that the waste replaces another material for a useful purpose.

In addition to the definitions contained in Law 10/1998, the Royal Decree 105/2008 defines the following:
• Construction and Demolition Waste: any substance or object that meet the definition of "waste" included in article 3) of Law 10/1998 of April 21, generated in a construction or demolition work.

• Inert waste: non-hazardous waste that does not undergo significant physical, chemical or biological transformations, that is neither soluble nor fuel, that does not react in any other way, that is not biodegradable and that does not affect adversely other matter with which it comes into contact in a way that can lead to environmental pollution or harm human health. The total leachability and the pollutant content of the waste must be insignificant, and in particular not suppose a risk to surface or underground water quality.

• Construction or demolition activity consisting of:
  
  o The construction, rehabilitation, reparation, alteration or demolition of a property, such as a building, road, port, airport, railroad, canal, dam, sport or entertainment installation.

  o The performance of works that modify the form and substance of the land or subsoil, such as excavation, injections, or other similar developments, with exclusion of activities to be covered by the Directive 2006/21/EC of the European Parliament and of the Council of March 15, about the management of waste from extractive industries.

Any installation that gives exclusive service to the work will be considered part of it, and as long as any assembly and disassembly process occurs during the execution of the work or at the end of it, such as: crushing plants, concrete manufacturing plants, gravel manufacturing plants, precast concrete manufacturing plants of bituminous mixtures, formwork manufacturing workshops, storages of materials, waste storages of the work and treatment plants.

• Minor construction or home reparation: construction or demolition works in a private home, business, office or services sector property, of simple technical, constructive and economic entity, which does not involve alteration of volume, the use of major equipment or a big number of workers, and that does not require the signature of a qualified professional.

• Manufacturer of construction and demolition wastes:
  
  o The natural or legal holder of the building permit in a construction or demolition work; in those works that do not require planning permission, the natural or
legal person holding the immovable property of the construction or demolition area will be considered the waste producer.

- The natural or legal person who carries out processing, mixing or other, resulting in a change in the nature or composition of the waste.

- The importer or purchaser of construction and demolition waste in any Member State of the European Union.

- Pre-treatment: physical, thermal, chemical or biological process including sorting, which changes the characteristics of construction and demolition waste reducing volume or hazardous nature, facilitate its handling, increasing its potential recovery or improve their behaviour in the landfill.

4. Reference documentation and methodology

The documentation used to prepare this Waste Management Study is indicated below:

- Recommendations for the writing of the Management Study of the RCD in construction projects belonging to the High Speed Projects General Directorate. ADIF. June 2009.

- Royal Decree 105/2008 of February 1, about the production and management of regulated construction and demolition wastes.


- Project-specific data:
  - Budget.
  - Maps.
5. Non-special wastes management

The objective is the collection, processing and storage, in selectively and safely way, of the solid or liquid wastes in order to prevent the contamination of soil and surface or ground water during the construction phase.

In this way the transfer of these wastes to recycling plants will be allowed, and in some cases, their restoring in the same work.

5.1. Applicable legislation

All waste generated on site must be delivered to a licensed waste authorized for recovery or disposal, as set out in Law 22/2011 of July 28, about wasted and contaminated soils.

5.2. Clean points system

Clean points are those areas of temporary waste storage or dirty water storage.

The recycling centres are designed according to the objective of executing a selective and safe storage of waste materials and waste water.

For each clean point an area of influence is defined and, if necessary, the corresponding collection service with sufficient frequency (daily, weekly, etc.) is organized.

At the end of the useful life of each clean point, or at the end of the works, the restoration of the areas used will be executed with the same quality criteria applied to all other areas.

As set out in Article 18 of Law 22/2011, the duration of non-hazardous waste storage at the site of production will be less than two years when destined for recovery and one year when intended for disposal.

5.3. Clean points for solid wastes

In the case of solid waste, the clean points system consists of a set of containers distinguishable by the type of waste. Each of these defines a zone of action or influence where a sufficient number of smaller deposits are distributed uniformly according to the requirements
of the work. The collection of accumulated debris and their transfer to the recycling centres is run by staff.

The proper functioning of this system includes an intensive cleaning at the end of the work of the entire affected area.

5.4. Containers

Containers are selected depending on the type, size and weight of the residue considered, the required conditions of isolation and the expected mobility. In principle each container material is chosen depending on the kind of residue, its volume and its terms of desirable isolation.

According to mobility two kinds of containers are distinguished: those located in the recycling centres, bigger and less mobile; and those located at the collection points, smaller and more mobile. Probably most containers may be selected from those designed for urban waste.

The correct operation of recycling centres suggests the visual distinction of containers according to the type of waste. For that purpose containers are painted in different colours, so that colours indicate the class of residue thrown:

<table>
<thead>
<tr>
<th>Container colour</th>
<th>Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Glass</td>
</tr>
<tr>
<td>Blue</td>
<td>Paper and cardboard</td>
</tr>
<tr>
<td>Yellow</td>
<td>Plastic and packaging</td>
</tr>
<tr>
<td>Red</td>
<td>Organic wastes</td>
</tr>
<tr>
<td>Black</td>
<td>Rest</td>
</tr>
<tr>
<td>Brown</td>
<td>Wood</td>
</tr>
<tr>
<td>Pink</td>
<td>Alkaline and button cells</td>
</tr>
<tr>
<td>Grey</td>
<td>Inert</td>
</tr>
</tbody>
</table>

Regardless of the type of waste, the bottom and the sides of the containers will be impermeable, and can be opened or sealed.

5.5. Clean points location

The following distribution of containers according to their location is suggested:

- Machinery park:
  - Prepared watertight tanks for toxic waste.
o Sealed container on ground prepared for metal packages.

o Tight container for packaging and plastic packages.

o Tight container for paper and cardboard packaging.

o Tight container for glass waste.

o Open container for wood.

o Prepared containers for inert materials.

• Offices:

  o Tight container for plastic and metal packages.

  o Tight container for paper and cardboard.

  o Tight container for glass waste.

  o Tight container for organic waste.

  o Closed container for alkaline batteries and button cells.

The development of the work may advise the enlargement of the amount of existing containers or the removal of some of them.

5.6. Collection points

The collection points are the group of containers that, strategically located, facilitate the separate collection of waste generated on site. Collection points are not permanent. Their location depends on the different areas of the project activity.

In general terms each collection point have a different container for each of the following materials: paper and cardboard, glass, light metals, plastics and packaging.

Containers are urban, easily downloadable and are strategically located in frequented areas where trucks can pick them up conveniently.

The other types of waste are probably uncommon areas different than the ones prepared for that purpose: oils, greases and other petroleum in the Machinery Park, etc. In unforeseen and
unavoidable situations, collaboration with the staff involved and, if necessary, support collection service, will be requested.

5.7. Collection service

There will be a daily and selective collection service. The most appropriate collection time will depend on the particular conditions of the work, the time of operation and the location of the collection points described above.

Regardless of the normal collection service, the Contractor shall provide the means and staff required for the collection, storage, treatment and / or transport to landfill or final location of those leftover materials that due to their weight, size or danger, are not able to be picked-up by the standard service.

6. Dangerous wastes management

6.1. Applicable legislation

The Contractor will have to request the administrative work authorization to produce hazardous waste activities, granted by Agència de Residus de Catalunya, and arrange with a Waste Manager the proper management of collection, transport and treatment of waste generated on site.

According to Article 21 of Law 10/1998 about Waste, the main obligations of the producers of hazardous waste are:

- Separate properly and not mix hazardous waste, particularly avoiding those mixtures involving an increase of the danger or an increase of the difficulty of their management.

- Packing and label the packages holding hazardous waste as required in regulations.

- Keeping track of hazardous waste produced or imported and destination.

- Provide all the necessary information for proper treatment and disposal to the authorized firms that will carry out the waste management.

- Submit an annual report to the competent public authority, which specifies at least the amount of hazardous waste produced or imported, its nature and its final destination.

- Immediately inform the competent public authority in case of disappearance, loss or release of hazardous waste.
Such obligations are developed in Articles 13 to 22 of Chapter II of Royal Decree 833/1988 and its modification of Royal Decree 952/1997, related to "Producers’ duties".

The environmental officer will ensure the accomplishment of the conditions defined above.

6.2. Separation

The conditions of storage of hazardous waste are defined in Royal Decree 833/1998, which establishes a maximum storage period of six months, and always in containers meeting strict security measures.

To simplify the collection and control methods groups will be made between homogeneous residues. The different types of hazardous waste that may appear in the works are generally the following:

- Waste oils.
- Hydraulic Fluids.
- Oil Filters.
- Solvents.
- Degreasers.
- Coolant and antifreeze.
- Batteries.

These groups should be described in detail in the information forwarded to the Waste Agency of Catalonia for the authorization to proceed as hazardous waste generating activity.

6.3. Packing

Article 13 of Royal Decree 833/1988 is about the packaging of toxic and hazardous waste.

- Packages and their closures must be designed and constructed so as to avoid any loss of content and made of materials not subjected to attacks by the content or form dangerous mixtures with it.
• Packages and their closures must be strong and resistant to respond safely to manipulations required and maintained in good condition, with no defects and without apparent structural leakage.

• The packages for hazardous and toxic waste that are compressed, liquefied or dissolved under pressure will meet the existing specified requirements.

• The packaging and storage of toxic and hazardous waste will be done so as to avoid heat generation, explosions, ignitions, formation of toxic substances or any effect that increases their danger or difficult its management.

Detailed instructions on how to prepare for the toxic waste transport are associated with the regulation about Dangerous Goods.

6.4. **Labelled**

Containers storing hazardous waste shall be classified and labelled in a clear manner, as specified in Article 14 of Royal Decree 833/1988. The label will have a minimum size of 10 x 10 cm and will include the following:

• Waste identification code.

• Name, address and telephone number of the owner of the waste.

• Packaging date.

• Nature and risk presented by waste through pictograms.

The label material is paper with outside lamination. The letters will be black with white background and pictograms will be black with yellow-orange background.
Oils and fats from maintenance of machinery will be arranged in suitable and labelled containers, according to the Article 5 of Royal Decree 679/2006 of June 2, about the management of industrial wasted oil.

6.5. Storage

The characteristics of the area chosen for the location of special waste will be the following:

- It will possess a roof to prevent solar radiation and water.
- The storage area will be completely separated from the sewage network to avoid contamination.
• It will possess a perimeter enclosure and will have restricted access.

• The distance between the enclosure and the ceiling will be between 70 and 120 cm in order to allow good indoor ventilation.

• The area will possess good ventilation and will be away from heat sources and electric circuits.

• The floor will be sealed in a closed room or outside with a leachate collection system.

• Special wastes will be totally closed in containers in order to prevent evaporations.

• Liquid waste will be located in holding tanks to prevent accidents. These must be able to contain a volume equivalent to the maximum of the biggest deposit volume and 10% of the total storage volume. This requirement is established for storage of hazardous waste in fixed deposits or any other container. Such systems receiving leaks will also provide the necessary pumping equipment for collection and storage.

• These storage areas will be different for each type of dangerous waste, especially in the case of physicochemical incompatibility and to avoid mixing of recoverable waste with those who can difficult their recovery if discharges or accidental situations occur.

The maximum storage period is 6 months in the installations of the producers of hazardous waste.

6.6. Registration

A record of management control and hazardous waste storage will be done. Its content will be according to Article 17 of Royal Decree 833/1988 of July 20, modified by the Royal Decree 952/1997 of June 20:

• Origin of waste, and whether they come from own generation or import.

• Number, type and identification code of the waste according to Annex I.

• Assignment date of the waste.

• Date and description of the pre-treatments performed, if any.

• Completion date and temporary storage, if any.
- Date and number of taxes for importing the toxic dangerous waste.

- Date and description of treatment and disposal operations.

- Collection frequency and transportation.

- Delivery to an authorised manager.

The producer of a toxic and dangerous waste before removal from the place of origin to a treatment or disposal facility, it must have as a prerequisite essential, with a documentary engagement acceptance by the manager.

The producer will have to request the manager to accept the wastes that will be treated. It will specify, besides the characteristics of the state of the wastes, the following data:


- Physic-chemical properties.

- Chemical composition.

- Volume and weight.

- The deadline for collection of waste.

Moreover, it also has to complete the control and monitoring documents about toxic and dangerous wastes from the production point to the collection centres.

6.7. Oil changes

Oil changes and other maintenance operations of the equipment will be done in the Area of auxiliary installations, specifically in an area specially fitted for it or in authorized stations.

Waste oil must be stored in satisfactory condition, avoiding mixtures until collected by an authorized manager, who will be responsible for the proper management of collection, transport and treatment of waste. In general, liquid waste will be stored in sealed containers until its evacuation, being necessary to project these areas away from environmentally sensitive areas. In particular, uncontrolled effluents from the storage of fuel and machinery maintenance products will be avoided.
7. Identification and estimation of construction and demolition wastes

According to the provisions of the Royal Decree 105/2008, a list of the wastes that would be generated during the construction is listed here.

The inventory has been made from MAM/304/2002 Order of February 8, by which valorisation and elimination waste operations are summarised together with the European list of published wastes.

The table summarizing the total waste generated in the construction is attached below:

<table>
<thead>
<tr>
<th>LER Code</th>
<th>Waste norm</th>
<th>Typology</th>
<th>Real volume (m$^3$)</th>
<th>Apparent volume (m$^3$)</th>
<th>Weight (tn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.01.01</td>
<td>Concrete</td>
<td>Inert</td>
<td>200,93</td>
<td>35,59</td>
<td>0,05</td>
</tr>
<tr>
<td>17.04.05</td>
<td>Iron and steel</td>
<td>Non special</td>
<td>7,31</td>
<td>12,43</td>
<td>57,39</td>
</tr>
<tr>
<td>17.05.04</td>
<td>Land and stones different from 17.05.03</td>
<td>Inert</td>
<td>612,00</td>
<td>856,80</td>
<td>1.040,40</td>
</tr>
<tr>
<td>17.02.01</td>
<td>Wood</td>
<td>Non special</td>
<td>8,02</td>
<td>16,04</td>
<td>3,21</td>
</tr>
<tr>
<td>17.02.03</td>
<td>Plastic</td>
<td>Non special</td>
<td>0,57</td>
<td>3,42</td>
<td>0,52</td>
</tr>
<tr>
<td>15.01.01</td>
<td>Paper and cardboard</td>
<td>Non special</td>
<td>0,14</td>
<td>1,71</td>
<td>0,11</td>
</tr>
<tr>
<td>17.04.07</td>
<td>Mixed metals</td>
<td>Non special</td>
<td>0,13</td>
<td>0,21</td>
<td>0,88</td>
</tr>
<tr>
<td>17.08.02</td>
<td>Building materials based on plaster different from 17.08.01</td>
<td>Inert</td>
<td>36,87</td>
<td>51,62</td>
<td>62,68</td>
</tr>
<tr>
<td>20.02.01</td>
<td>Biodegradable wastes</td>
<td>Inert</td>
<td>47,43</td>
<td>80,63</td>
<td>23,24</td>
</tr>
<tr>
<td>17.03.02</td>
<td>Asphalt mixes different from 17.03.01</td>
<td>Non special</td>
<td>597,13</td>
<td>955,40</td>
<td>624,41</td>
</tr>
</tbody>
</table>

8. Prevention and waste minimization measures
8.1. Actions and operations

Quantitative minimization is performed by two groups of parallel actions. On the one hand, those that aim to decrease the rejection of work products, and on the other hand, those trying transform a residue into a sub product, i.e. they are reused or recycled at work or at another outside activity. Increasing the quality of the waste is performed by decreasing its toxicity and hazard level for people and environment.

In this sense, the elaboration of this study and the Management Plan prior to the execution of the works is already a good tool for the prevention of waste.

Management operations and segregation actions at work are also preventive measures because within their objectives there is also the willing of conversion of waste products to sub products, as well as decreasing the danger of materials to be exported from the work in order to be managed externally.

Management alternatives are varied, but they will always be adjusted to the following hierarchy:

- Minimization of the resources used.
- Minimising waste production of each process.
- Reusing materials. In this case the priority is the reuse of materials in the own work rather than in an outside activity.
- Recycling materials.
- Energy recovery.
- Landfills. It is preferable to use only one, rather than many scattered.

The main preventive actions based on the materials used are:

**For all materials:**

- The amount of materials coming from loans must be adjusted to the work needs. A correct calculation of these needs will allow lower expenses and will help to reduce waste generation.
• The supplies will be purchased at the time that the work requires them. In this way, and with good storage conditions, spoilage and waste transformation will be avoided.

• Suppliers who possess ISO certification or EMAS 14001 will have priority. Thus the environmental impact of the entire production cycle is minimized.

• Proper management in the preparation of waste in the work serves to prevent losses production due to spills or contamination of materials.

• Segregation at origin is the most simple and practical economic minimization.

About the reception of construction materials, the following actions and measures will be taken:

• The state of the material will be reviewed to avoid problems of returns and losses.

• Areas of transport must be kept clean, lighted and clear to avoid spills.

• Material containers will remain closed to prevent spills in the transport.

• If leaks are produced, their causes will be analysed in order to take preventive measures.

• Incompatible substances will not be stored together; therefore products will have safety data sheets in order these incompatibilities to be consulted.

• Spill containment systems will be placed in storage tanks, containers, etc.

Packages and plastics:

The preferred alternative is the collection by the supplier of the material, because it has the best logistic conditions for reuse or recycling. In any case, removing the packing of the products will not be done until they are not used, and after use, it must be kept immediately.

Special Waste:

• The handling of certain materials, such as oils and batteries, produces potentially hazardous waste that will require particularly careful handling.

• Special wastes and their packaging will be separated and stored in separate containers, covered, ventilated and with the specifications discussed below.
• The most desirable solution is to not generate waste.

8.2. Recommendations for an efficient management

8.2.1. Recommendations for Construction Manager

• Minimize and reduce the quantities of raw materials used.

• The necessary materials on site will be kept packed until their usage time, in order to prevent waste from breakage parts.

• A plan for waste management that optimizes the recovery must be made for leftover materials.

• Foster the classification of waste produced so that its valorisation and management at landfill is easier.

• Develop criteria and specific recommendations for improving the management, i.e. enumerate a set of practices for good site management.

• Plan the work taking into account the expectations of waste generation and its eventual minimization or reuse.

• Have a directory of the closest buyers of waste materials, sellers of reused materials and recycling installations.

• Train staff in waste management related to administrative procedures.

• Reduce the volume of waste, which will derive in savings of managing it.

• In addition to accomplishing the rules and orders made in the work, also all the technical conditions which form part of the contract and installation of the work and have been expressly written for the improved waste management will have to be accomplished.

• By signing work contracts with subcontractors the following must be considered:

  o The definition of the maximum volume of waste that can be generated in each activity.
o The establishment of the financial penalties that will be applied if exceeding the previous volumes.

o The responsibility of subcontractors related to the minimization and classification of waste.

o The frequent meeting arrangements with subcontractors to coordinate the management of residues.

8.2.2. Recommendations for the manager in charge of the work

- Ensure that all those involved in the work are aware of their obligations in relation to waste and that they meet the standards and orders issued by the technical direction.

- Encourage staff to be interested in reducing the use of resources and residues volumes originated. Encourage active participation.

- Encourage applications on the own work of the waste generated.

- Provide a protected area for the collection of materials.

- Provide the most appropriate containers for each type of waste.

- Control the movement of the waste so that there are no remains uncontrolled.

- The generation of waste occurs in a scattered manner, so waste must be transported to its storage location. This tour must be planned so that there are minimum losses.

- Ensure that the liquid and organic waste is not easily mix with others.

- Avoid generation of dust due to the lack of foresight with materials arriving to work in powder form.

- Register each container that leaves the work and control both the nature and quantities of waste produced and its destination.

- Control the consumption of water and electricity.

8.2.3. Recommendations for the workers

- They must comply with rules and orders issued by the management of the work for the waste control.
Staff should actively participate to improve waste management. They should provide suggestions to improve processes to supervisor.

Selective removal of waste must occur at the time they are originated.

Waste should be placed in containers, bags or suitable deposits.

Containers should be transported covered.

8.2.4. Recommendations for the subcontracted companies

- Assume packaging waste, leftover materials and products put on works.

- Know and comply with the obligations relating to waste and the rules and orders dictated by the technical direction.

- Provide the maximum amount of waste that can be generated in their activity, in order to minimize them and classify them appropriately.

- Propose to the technical manager solutions to improve the chances of reducing, reusing or recycling construction media and leftovers.

8.2.5. Recommendations for demolition companies

- Collaborate in the development of a demolition project and a management plan for residues.

- Perform selective separation of waste that has to be recycled or reused.

- Always give importance to works on deconstruction rather than undifferentiated demolition. Deconstruction facilitates the separation of the reusable elements, recyclable materials – selected according to their nature – and, finally, those that will go to landfill.

- Preserve the products or materials which are reusable or recyclable during demolition work.

- Register the quantities and characteristics of waste transported from the containers to authorized operators.

8.2.6. Recommendations for waste manager
• Ensure that recycling operations and deposition of waste from construction and demolition are performed in proper environmental conditions.

• To compare the quality of the materials obtained after recycling according to the regulations.

• Establish a rigorous control of waste disposal in landfills.

9. Measures for the separation of wastes in work

9.1. Wastes management at work

A work has two types of RCD management. On one side is the internal management, which includes all logistics operations within the work, and secondly, the external management, which is the set of operations to export waste to external managers. For this reason it is essential to reflect on the different areas appropriate internal and external management according to the space available for selective removal of waste from the work, the ability to reuse and recycling, costs, economic partners, etc.

In any case authorized dumping at landfills is considered the last option in the RCD management, prioritizing reuse, recycling and recovery of any kind. In order to make it possible it is important to perform a selective separation, particularly that of special and non-special inert residues.

Sorting at origin of waste is the most influential factor in final destination of these. A container that holds mixed waste will have less recovery options than a homogeneous waste container.

When the selective sorting at origin is not possible, the mixed waste (inert and non-special) must be derived to a pre-treatment facility and then takes it to a licensed recovery manager for valorisation. In the worst case, they will lead to a controlled landfill.

To define the operations of waste management the following will be taken into account:

• The type of selective separation and the name of the containers as a function of their reusing possibilities, the feasibility of having a crusher plant, etc.

• The amount of material to be reused on site.

• Signalling models in containers according to the type of waste that they can contain.

• Data on the destination of the waste.
The contractor, waste holder of the work, will take into account the general objectives defined in the Waste Management Study for this project, consisting mainly on:

- Influence in the staff in order to improve waste management.
- Plan and minimize the environmental impact of waste from the work.

In this case the objective will focus on sorting at origin and proper external waste management.

### 9.2. Separation and storage of wastes at work

Containers and stockpiles needed for separation of generated waste by the execution of the work will be located in the proposed area of auxiliary installations. The location of these facilities is provided in a plot of 500 m² located at end of the exit ramp at Street 114.

In the designated area for auxiliary installations different houses for storage, dressing rooms and offices will be placed, in addition to the cleaning area of the concrete gutters and a cleaning point for the wastes collected.

The cleaning area of gutters will be waterproofed, and will be formed by slightly sloping walls, which will end in a draw centre. In it, the water from washing will be discharged to the network and will be collected by the existing sanitation, given that they meet the quality objectives established by the Barcelona City Council.

#### 9.2.1. Non-special wastes separation

Separation in origin and selective collection are actions aiming to classify waste by type. According to Article 5.5 of Royal Decree 105/2008, RCD will be separated into the following fractions, when, individually for each of these fractions, the expected amount accumulated for the whole work exceeds the following amounts:

- Concrete: 80 t.
- Bricks, tiles, ceramic: 40 t.
- Metal: 2 t.
- Wood: 1 t.
- Glass: 1 t.
• Plastic: 0.5 t.

• Paper and paperboard: 0.5 t.

### 9.2.2. Non-special wastes storage

A well-designed and well-dimensioned storage system derives into an optimised waste management system.

The RCD Management Plan stipulates the name and size of the containers. According to the phase of works, at least the following must be separated:

• Inert mixing container.

• Container of ceramic material.

• Container other inert.

• Metal container.

• Container of plastics.

• Wooden container.

• Containers of paper and paperboard.

### 9.2.3. Special wastes storage

The conditions of storage of hazardous waste are written in the Royal Decree 833/1998, which establishes a maximum storage period of six months, and always in containers meeting strict security measures. The competent organisation on waste management, in this case Agència de Residus de Catalunya, will expressly authorize an initial period of storage in the works before send them to the final destination. In the case of requiring storage for more than 6 months, the Project Manager must go to the same agency to complete the corresponding form and provide the requested information.

The environmental officer will ensure the accomplishment of the following:

• Supervision of the collection, packaging, labelling and storage of special waste.

• Completion of the Waste Registration Book.
• Request the managers’ service and authorized carriers.

• Save and record acceptance and tracking documents.

• Control of the removal of special waste.

The features that possess the chosen area for the location of special waste will be:

• Temporary structure with a minimum floor area of 20 m$^2$.

• It will possess a roof to prevent solar radiation and water.

• It will possess a perimeter enclosure and will have restricted access.

• The distance between the enclosure and the ceiling will be between 70 and 120 cm to allow good indoor ventilation.

• The enclosure will have good ventilation and will be away from heat sources and electric circuits.

• Special wastes will be placed in totally closed containers to prevent evaporation.

• Liquid waste will be located in holding tanks to prevent accidents.

• The maximum storage time is 6 months.

9.2.4. Special wastes packing and labelling

The packages will have the following characteristics:

• They have to avoid any loss of contents.

• Packages of hazardous waste liquid or paste will be located in bunds of retention to prevent spills.

• The materials will not be subjected to be attacked and will not form dangerous mixtures with the content.

• They will be strong and resistant to respond safely to handling.

In special waste packages mixing materials will be avoided in order to avoid heat generation, explosions, ignitions, formation of toxic substances or effects that increase their danger.
Packages storing hazardous waste will be classified and labelled in a clear manner. The label will have a minimum size of 10 x 10 cm and will include the following:

- Residue Identification Code.
- Name, address and telephone number of the owner of the waste.
- Date of packaging.
- Nature.
- Risks posed by waste through pictograms.

10. **Wastes reutilization, valorisation and elimination operations**

Depending on the wastes generated during construction, operations of reuse, disposal or valuation will be defined, encoding them as established in the 304/MAM/2002 Order - Annex 1 – (8th February), by which valorisation and wastes elimination operations are published together with the European list of wastes.
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</tbody>
</table>
For both land and stones that will be extracted in the excavation, as for other inert waste generated during construction, the closest Recycling Plant for Construction and Demolition Wastes is proposed. Its main details are given below:

RECYCLING PLANT PORT OF BARCELONA

Title: Gestora de Runes de la Construcció, S.A.
Address: C / Nàpols, 222, BX.
Location: Barcelona.
C.P.: 08013.
Phone: 93 4147488.

Installation:
Address: L’Estany the Port Avenue, 62.
Location: El Prat de Llobregat.
C.P.: 08820.
Phone: 93 4147488.

Figure 2. Location of the installation *(source: Esteyco)*

11. Planes
Auxiliary installations area where separation, classification, storage, handling and waste management operations within the work will be carried out are situated on a plot of 500 m² located at the end of the exit ramp at Street 114.

The situation may be altered in later stages of execution of the work in order to adapt it to the characteristics of the work, as long as there is an agreement with the Project Manager.

12. **Budget**

The costs of sorting at origin and transportation to the authorized installation are assigned to the corresponding units of demolition and excavation. Therefore in the PEM, as a unit of work for the purpose of waste management, only controlled deposition at a recycling centre of the different types of wastes generated is defined.
ANNEX Nº14. HEALTH AND SAFETY STUDY
Annex nº14. Health and safety study

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Annex nº14. Health and safety study

1. Purpose of the study of health and safety

This Health and Safety Study aims to establish the technical basis for setting the parameters for the prevention of occupational risks in the performance of Project works, as well as fulfill the obligations written in Law 31/1995 and Royal Decree 1627/1997, in order to facilitate monitoring and check the commitments acquired by the Contractor.

2. Legal framework

As mentioned above, this study is written in accordance to the provisions of the Royal Decree 1627/1997 of October 24 about safety and health minimum conditions in construction. Article 4 of this Royal Decree establishes all the requirements and specific regulations for technical construction projects.

Accordingly, this study must be complemented before the start of the work with the safety and health plan developed by the contractor. This plan will develop the preventive measures provided in the study, adapting the techniques and solutions to be finally applied properly.

Eventually, the health and safety plan may propose preventive alternative measures under the conditions written in Article 7 of the above mentioned Royal Decree 1627/1997. Overall, the safety and health plan constitute the set of preventive measures and actions arising from this study that the Contractor agrees to provide in the various activities and phases of the work, and also to changes and updates that may have place, under the conditions established by regulation.

2.1. Laws


• Law 24/1999 of July 6, by which the Workers’ Statute is modified as based on the extension of collective agreements.

2.2. Royal Decrees

• RD 1627/1997 of October 24, by which minimum safety and health conditions in construction are established.

• RD 39/1997 of January 17, by which the Preventive Services Regulation is approved.

• RD 604/2006, of May 19, by which Royal Decree 39/1997 and Royal Decree 1627/1997 are modified.

2.3. Hygienic risks

• RD 1995/1978 of May 12, which approves professionals’ diseases in the social security system.

• RD 286/2006, of March 10, about the protection of workers in terms of health and safety from the risks arising or likely to arise from exposure to mechanical vibrations. BOE 2650 of November 5.

• RD 665/1997 of May 12 about the protection of workers from risks related to exposure to carcinogens at work.

• RD1124/2000 of June 16, by which the RD 665/1997 of May 12 is modified, about the protection of workers from risks related to exposure to carcinogens at work. Its scope is extended to mutagens. BOE number 82 of April 5, 2003.

2.4. Pressure apparatus and equipment

• RD 1244/1979 of April 4, by which the Pressure Apparatus Regulation is approved. BOE number 128 of May 29.

• RD 507/1982 of January 15, by which the Pressure Apparatus Regulation is modified by modifying the Royal Decree 1244/1979 of April 4.

• RD 1504/1990 of November 23, by which the Pressure Apparatus Regulation is modified by modifying the Royal Decree 1244/1979 of April 4.

• RD 769/1999 of May 7, which dictates the rules for the application of the European Parliament Directive and the 97/23/EC Council about pressure equipment and also
modifies the Pressure Apparatus Regulation by modifying the Royal Decree 1244/1979 of April 4.

- RD 2549/1994 of December 29, by which the ITC MIE-AP3, that complements the RD 1244/1979 of April 4, is modified.

### 2.5. Lifting and handling loads apparatus and equipment

- RD 2291/1985 of November 8, by which the Regulation about Lifting and Handling Devices is approved. BOE number 296 of December 11, 1985.

- RD 1314/1997 of August 1 by which the Regulation about Lifting and Handling Devices is modified by modifying the RD 2291/1985 of November 8.

- RD 836/2003 of June 27, by which a complementary Technical Instruction "MIE-AEM-2" of the Regulation about Lifting and Handling Devices about tower-cranes for construction or other applications is approved. BOE number 170 of July 17.

- RD 837/2003 of June 27, by which the new modified text about the Technical Instruction "MIE-AEM-2" of the Regulation about Lifting and Handling Devices concerning propelled cranes is approved. BOE number 170, 17 July.

### 2.6. Machinery and working equipment


- RD 1215/1997 of July 18, by which the minimum safety and health requirements for workers for using the working equipment are established.

- RD 2177/2004 of November 12, by which the Royal Decree 1215/1997 of July 18 about the minimum safety and health requirements for workers for using the working equipment is modified. BOE number 274 of November 13.

### 2.7. Fire prevention and protection

- RD 1942/1993 of November 5, by which the Regulation about Fire Protection Facilities is approved. BOE. Number 298 of December 14.
2.8.  **Personal protective equipment**

- RD 773/1997 of May 30 about the minimum safety and health regulations concerning the use by workers of personal protective equipment.

2.9.  **Others**


- RD 485/1997 of April 14 about the minimum requirements for safety and health signaling at work.

- RD 486/1997 of April 14 by which the minimum health and safety requirements concerning the manual manipulation of loads implying a risk – particularly related to back injuries – are established.

- RD 488/1997 of April 14 about the minimum safety and health requirements for working with computers.

- RD 614/2001 of June 8 about the minimum safety and health conditions for workers against electrical risks. BOE number 148 of June 21.

- RD 842/2002, of August 2, by which the Council Regulation for Electrical low voltage is approved. BOE number 224 of September 18.

3.  **Details of the project**

3.1.  **Type of work**

Urbanization project.

3.2.  **Situation**

Connection between L’Estany del Port Avenue and Street 114, 08820, El Prat de Llobregat, Barcelona, Spain.

3.3.  **Supplies and services**

- Water: Aigües del Prat.
• Gas: Gas Natural.

• Electricity: Endesa Distribution.

• Sewerage: EMSSA.

• Others: Telefónica.

3.4. Project material execution budget

The Project material execution budget estimated, excluding Supplementary Health and Safety expenses, other general expenses and Industrial profit is 1.227.116,79 euros.

3.5. Period of performance

The estimated duration of the execution of the work is 6 months.

3.6. Expected labor

The estimated peak labor time is given in the fourth month, and it will be of 20 people that month.

3.7. Occupations involved in the development of the work

Head of group
1st Official
1st Official, expert of metals
1st Official, electrician
1st Official, plumber
1st Official, assembler
1st Official, public works
1st Official, gardener
2nd Official, gardener
Expert of metals assistant
Electrician assistant
Plumber assistant
Assembler assistant
Gardener assistant
Assistant
Mason
Mason specialist
3.8. Types of materials used in the work

SLOW DELIBERATION MINERAL FERTILIZERS
SOLID MINERAL FERTILIZERS
ACCESSORIES
GENERIC ACCESSORIES FOR PLASTIC PIPES AND DESGUES
GENERIC ACCESSORIES FOR POLYETHYLENE PIPES
CORRUGATED STEEL BARS
WIRE
DECIDUOUS TREES
SANDS
METAL CABINETS
SPRINKLERS
BEACONING
BARRIERS
HYDRANTS
GENERAL PROTECTION AND MEASURE BOXES
FUSE BOXES
LIMES
CEMENT
NAILS
COLUMNS
COPPER CONDUCTORS 0.6 / 1 KV
BARE COPPER CONDUCTORS
CONTACTORS
SOLENOIDS
AUXILIARY ELEMENTS FOR CONNECTION TO GROUND ELEMENTS
MOUNT ELEMENTS FOR PLASTIC DRAINS AND PIPES
SUPPORT ELEMENTS WITH INCORPORATED LIGHTING
SPECIAL ITEMS FOR CONDUCTORS
SPECIAL ITEMS FOR LIGHTING SUPPORTS
ELEMENTS FOR CATENARY SWITCHES
SPECIAL FORMWORKS
ENCLAVES EQUIPMENT
BP1 FAMILY
PHASE METERS
FILTERS
GRAVELS
STRUCTURAL CONCRETE IN MASS
CONCRETE WITHOUT ADDITIVES
MAGNETOMETRIC SWITCHES
SWITCHES
CERAMIC BRICKS
VAPOR HIGH-PRESSURE SODIUM LAMPS
CANS
HYDROCARBON BINDERS
CEMENT MORTAR TILES
SYMMETRICAL OUTDOOR LIGHTS WITH INCANDESCENT BULBS
ELECTRICALLY WELDED NETWORKS
AUXILIARY MATERIALS FOR MANHOLES
AUXILIARY MATERIALS FOR DRAINS
AUXILIARY MATERIALS FOR SHORINGS AND FORMWORKS
AUXILIARY MATERIALS FOR WELLS
AUXILIARY MATERIALS FOR ROAD PROTECTION
MATERIALS FOR REDUCING SPEED BANDS
MATERIALS FOR BOARDS FORMATION
MATERIALS FOR CIRCULAR WELLS
BIOLOGICAL MENTIONS
SYNTHETIC ORIGIN MENTIONS
CONTINUOUS HOT BITUMINOUS MIXTURES
MORTAR WITH ADDITIVES
MORTAR WITHOUT ADDITIVES
NEUTRALS
BINS
ACCESSORIES PROPORTIONAL PARTS FOR AUDIBLE WARNING DEVICES
ACCESSORIES PROPORTIONAL PARTS FOR BOXES AND CABINETS
ACCESSORIES PROPORTIONAL PARTS FOR TUBES AND CHANNELS
ELEMENT PROPORTIONAL PARTS FOR MOUNTING POLYETHYLENE TUBES
SPECIAL ELEMENT PROPORTIONAL PARTS FOR GROUND ELEMENTS
GROUND RODS
PIECES OF CEMENT MORTAR FOR TRENCH FOOTINGS
STRAIGHT CONCRETE PARTS FOR CURBS
MARKING PAINTS
GROUND CONNECTION PLATES
IRON AND STEEL PROFILES
PROGRAMMERS
OUTDOOR PROJECTORS
PROPS
SIGNS
4. Temporary installations

4.1. Provisional electrical installation

The appropriate arrangements will be made so that the company in charge of the electricity supply makes the connection from the supply line to the tables where the general enclosure and accountants are installed, from which the Contractor will proceed to mount the rest of the electrical installation of temporary supply on site, under the Low Voltage Electro technical Regulations as an authorized project installer.

A sectored distribution which ensures the correct supply to all consumption points of the work will be done by a V-750 copper conductor with proper sections channeled by a PVC pipe, rigid or flexible depending on its route but always with the enough resistance to the passage of vehicles and normal traffic.

The electrical system will have a safety ground net through a bare copper wire that will be connected to a javelin according to the calculation of the design.

The general safety measures in the electrical system are:

4.1.1. Service connection

- It will be conducted according to the supply company.

- The section will be determined by the installed power.

- There will be a protective device (fuses and power limiters).

- It will always be located outside the machinery lifting areas and in zones without traffic of vehicles.
4.1.2. **General Panel**

- Protection will be available to indirect contacts through a differential minimum sensitivity of 300 mA. For lighting and power tools of double isolation this sensitivity must be 30 mA.

- It will have protection to direct contacts in order to avoid tension parts uncovered (inlets, automatic terminals, etc.).

- It will have magnetic-thermal switches for each circuit.

- It will be connected to ground. At the beginning of the work a provisional connection to the grounding ring will be done to earth right after making the foundation.

- It is recommended the usage of a special key for opening.

- It will be signaled with a standard electrical warning (RD 485/97) signal.

4.1.3. **Conductors**

- They will have an insulation of nominal voltage of 1000 v, which can be identified thanks to its printing on the isolation.

- Conductors will buried or stapled to vertical walls or ceilings away from areas frequented by vehicles and / or people.

- The joints must be made using plugs, never with connection strips, twists or curbs.

4.1.4. **Side panels**

- They will follow the same established specifications for the main panel and they must be double insulated.

- No point of consumption may be more than 25 m of one of these boxes.

4.1.5. **Power connections**

- They will be connected to the ground, except for the connection of double isolation equipment.

- They will be installed with a magnetic-thermal circuit to facilitate disconnection.

- It will serve the following colors:
• 24 v connection: Violet.

• 220 v connection: Blue.

• 380 v connection: Red

• No "thief" type connection is used.

4.1.6. Electrical equipment

• They will have connection to the ground.

• Guides elevators and crane rails or other devices will be connected to earth.

• The connection establishment to the electric bases will always be plug normalized.

4.1.7. Provisional lighting

• The circuit will have high sensitivity differential protection of 30 mA.

• The lamp will be insulated type.

• Phase will be connected to the central point of the socket and neutral will be connected to the side closest to the ferrule.

• The points of light in the walkways will be installed on roofs to ensure people inaccessibility.

4.1.8. Portable lighting

• The supply voltage will not exceed 24 V or alternatively it will provide double insulation.

• It will have an insulated handle, protective housing of the bulb and supporting element.

4.2. Temporary water installation

The proper actions will be taken by the Contractor with the supplying water company in order to install a bypass pipe from the general pipe to the point where the corresponding counter should be placed and from there continue with the rest of the provisional pipeline inside of the work.
The internal distribution of water may be performed with a flexible PVC pipe, sized according to the Basic Standards of Plumber Building at consumption points, while guaranteeing total dielectric insulation and sealing in necessary areas.

4.3. Installation of sanitation

Since the beginning of the work, facilities of the provisional works that produce waste water discharges will be connected to the public sewer system.

If any delay in obtaining a municipal permit connection occurs, a system that includes interim treatment tank must be installed by the Contractor.

4.4. Other facilities. Fire prevention and protection

For works involving the introduction of flame or spark producing equipment in areas at risk of fire or explosion, a permission form explicitly done by a responsible will be required. In this permission apart from the starting and ending dates, the nature and location of work, the equipment to use, the precautions to take in relation to combustibles (solids, liquids, gases, vapors, dust), the cleaning of the area and additional extinguishing media, monitoring and ventilation will be written.

Universal precautions for fire prevention and protection will be following:

- The electrical installation will be in accordance with that established in the Instruction M.I.B.T. 026 of the existing Low Voltage Electro technical Regulations for local risk of fire or explosion.

- The presence of flammable products in workplaces will be limited in quantities strictly necessary for the production process. The rest will be stored in locations different than at work, and if this is not possible, special isolated and conditioned enclosures will be made for that purpose. In any case, local and isolated enclosures will agree with the Technical Norm MIE-APQ-001.

- Airtight containers and fireproof containers will be installed so that flammable waste, scraps, etc., will be placed into them.

- The storage and use of liquefied gases will comply with everything set in the MIE-AP7 of the current instruction about pressure devices in rule 9, chapters 3 and 4 when referring to storage, use, service startup and the particular conditions of flammable gases.
• The evacuation roads will be free of obstacles. There will be signaling indicating smoking banned areas, situation of extinguishers, roads evacuation, etc.

4.5. Location and distribution of the work extinguishers

The basic principles for the location of fire extinguishers are:

• Manual extinguishers are placed marked on fixed supports to vertical walls or pillars, so that the top of the extinguisher remains at most 1.70 m from the ground.

• In areas with potential for fires categorized with an "A", the distance traveled horizontally from any point of the protected area until the nearest suitable fire extinguisher will not exceed 25 m.

• In areas with potential for fires categorized with a "B", the distance traveled horizontally from any point of the protected area until the nearest suitable fire extinguisher will not exceed 15 m.

• The portable extinguishers will be placed at the points where it is considered that it will be more likely to cause a fire. If possible, next to the exits and always with easy visibility and access. In big places or places where obstacles difficult its location, they must be signaled properly.

5. Health and comfort personal services

Temporary project installations will be adapted to the characteristics specified in Articles 15 and the following ones of the R. D. 1627/97 of October 24 concerning MINIMUM PROVISIONS OF SAFETY AND HEALTH IN THE CONSTRUCTION SITE.

For the cleaning of these sanitary facilities, a person or team will be designated, which can combine this work with others works on site.

For the implementation of this work, the following on site personal installations are defined and described below:

5.1. Hygienic services

5.1.1. Bathrooms

There will be at least one for every 10 persons.
5.1.2. **Evacuation cabins**

A walk-in 1,5 m$^2$ x 2,3 m high cabinet, equipped with squatters, has to be installed at least for every 25 persons.

5.1.3. **Showers**

Every 10 workers will have a shower with minimum dimensions of 1,5 m$^2$ x 2,3 m high, equipped with cold-hot water.

5.2. **Changing rooms**

Advisable area of 2 m$^2$ per hired worker.

5.3. **Dining room**

Different from the changing rooms. For calculation purposes it will have to be considered between 1,5 and 2 m$^2$ per worker on site to eat.

It must be equipped with a long bench or chairs near a supply of water (1 water supply device and one dishwasher for every 10 people), it will have some heating meals devices (one microwave for every 10 people) and a sealed bucket of 60 liters capacity to deposit garbage.

5.4. **Resting local**

In those works that are simultaneously occupied by more than 50 workers for more than 3 months, it is recommended to build an enclosure intended for the staff to rest, located as close as possible to the dining room and other service areas.

For calculation purposes it will be considered 3 m$^2$ per regular user.

5.5. **Accident assistance local**

In those workplaces that are simultaneously occupied by more than 50 employees during over one month, there should be an area reserved exclusively to the medical assistance of workers. Local first aid provide at least:

- A first aid kit.
- A stretcher.
- A source of drinking water.
The material and first aid rooms must be clearly identified and located close to the works.

The floor and walls of the room to assist injured must be waterproof, painted preferably in light colors. Bright, heated in the cold season, ventilated if forcibly required in the case of underground facilities. It must be provided with phones and addresses of the nearest health centers, ambulances and firefighters.

In addition, there will be a portable kit containing the following:

- Disinfectants and antiseptics allowed.
- Sterile gauze.
- Cotton wool.
- Bandages.
- Tape.
- Adhesive dressings.
- Scissors.
- Tweezers.
- Single-use gloves.

The first aid equipment shall be reviewed periodically and replenished as soon as the material is used or expired.

6. Auxiliary areas
   
6.1. Central and plants

They will be strategically placed according to the needs of the work. For the access of vehicles it will be necessary to care about the order and marking and signaling. Moreover, a minimum width of 6 m and a minimum height of 4 m will be respected.

Access to the facility remains restricted exclusively to the staff necessary for its exploitation. The presence of any person in the turning radius of the dragline is forbidden and must be signaled properly. All entrances or gateways located at altitudes greater than 2 m above the ground will have an appropriate fence of 1 m height.
Mobile elements and transmissions will be shielded in the working zones susceptible to cause possible entrapment or otherwise these areas will be properly marked.

6.2. Workshops

They will be strategically placed according to the needs of the work.

Generally workshops will have the following minimum dimensions (excluding the spaces occupied by machinery, apparatus, equipment and / or materials): 3 m in height from floor to ceiling, 2 m² of surface and 10 m³ of volume per worker.

The movement of personnel and materials will be ordered carefully: it will be marked and it will have a minimum width of the passageway for staff of 1,20 m² for main corridors. In traffic areas, the separation between machines and / or equipment will never be less than 0,80 m.

Around the radiant heat generating equipment a clearance of not less than 1,50 m will be kept. They will be shielded and they will provide the adequate portable extinguishing means. The temporary facilities suspended over step areas will be funneled to a minimum height of 1,90 m above the pavement.

The minimum illumination intensity, in the places of operation of machinery and equipment, will be 200 lux. Emergency lighting will be able to maintain, at least during one hour, an intensity of 5 lux, and its power source will be independent from the normal lighting system.

6.3. Warehouses

The materials stored on site will have to be between the minimum and maximum values indicated, in order to prevent parking of materials and / or equipment that may be inactive due to an accident.

The Auxiliary Means of Preventive Utility, necessary to supplement the manual or mechanical manipulation of stacked materials, will have been expected in the project plan.

Placing temporary zones will be marked and lighted properly.

7. Waste treatment

The Contractor is responsible for managing the leftover of the work in accordance with the guidelines given by D. 201/1994 of July 26, regulating the demolition and other construction waste, in order to minimize construction waste production as a result of the forecast of certain
aspects of the process. This forecast is necessary to be considered both in the design phase
and in the material execution of the work.

The volume and characteristics of waste likely to be originated during the project must be
evaluated. Moreover, the recycling installations close to project area must be evaluated so that
the Contractor can choose the most adequate one.

The waste is delivered to an authorized agent. The Contractor will finance all the necessary
costs.

8. Hazardous substances and materials treatment

The Contractor is responsible for ensuring through the Industrial Hygienic Area and its
Prevention Service, the management control for potential effects of contaminants waste or
materials used in the work, which can generate diseases on professional workers and / or other
people involved in their handling.

Industrial Hygiene advices include the identification, quantification, valuation and suggested
corrections of environmental, physical, chemical and biological factors of materials and / or
hazardous substances, to make them compatible with employees and / or third parties exposed.

For the purpose of this project, the measurement parameters will be set by fixing the threshold
limit values that refer to the contamination levels of physical or chemical agents, below which
workers can be exposed without danger to their health. The TLV is expressed with a level of
pollution over time.

8.1. Handling

Depending on the pollutant, its TLV, its level of exposure and possible ways of entry into the
human body, the Contractor must reflect in its Safety and Health Plan the appropriate corrective
measures to establish working conditions acceptable for workers and others exposed, especially when concerning:

- Asbestos.
- Chromium, Mercury, Nickel.
- Silica.
- Vinyl.
- Urea formaldehyde.
- Cement.
- Noise.
- Radiation.
- Thixotropic products (bentonite).
- Paints, solvents, hydrocarbons, glue, epoxy resins, fats, oils.
- Liquefied petroleum gases.
- Low levels of breathable oxygen.
- Animals.

### 8.2. Definition and preparation of collection areas

Substances and/or preparations will be received in the work labeled clearly, indelibly and at least with the text in Spanish language.

The label must contain:

- Designation of the substance in accordance with applicable law or otherwise IUPAC nomenclature.
- Common name, if applicable.
- Concentration of the substance, if necessary. If it is a preparation, the chemical name of the present substances.
- Name, address and telephone number of the manufacturer, importer or supplier of the substance or dangerous preparation.
- Pictograms and warning indicators in accordance with current legislation.
- Specific risks in accordance with current legislation.
- Precautionary statements in accordance with applicable law.
- The EC number, if any.
- The nominal amount of the content.
8.2.1. Oxidizing, extremely flammable and highly flammable

Storage will be done in a well-ventilated area. The presence of oxidizing and the prohibition of smoking will be expressly indicated.

Flammable products will be separated from the oxidizing ones.

The nearest possible point of ignition will be sufficiently far from the stacking area.

8.2.2. Toxic, very toxic, harmful, carcinogenic, mutagenic, toxic for reproduction

Their presence will be properly marked and they will have an adequate ventilation.

They will be handled with appropriate personal protective equipment to ensure tightness user in anticipation of contact with skin.

8.2.3. Corrosive, irritant, sensitizing

Their presence will be properly marked.

They will be handled with appropriate personal protective equipment (especially gloves, glasses and breathing masks) to ensure tightness user in anticipation of contact with skin and breathing human ways.

9. Environmental conditions

Occupation of the enclosure of the work

The enclosure of the work is the area really affected by the project, including fences, protection elements, railings, containers, stands, etc.

It must be taken into account that in this type of work, the scope may be permanent during the whole duration of the work or may be necessary to distinguish between the scope of the work (the project) and the scope of work at different stages, to allow vehicles and pedestrians circulation or access to buildings and fords.

The Health and Safety plan at work will specify the scope of the project and will state whether this will change in the different phases of the work or not. The area or areas of occupation will be clearly drawn on plans for all the construction phases.

Location of booths and containers
They will be placed preferably within the area delimited by the works enclosure.

If the special nature of the work do not allow the location of booths and containers inside the enclosure of the work the Health and Safety plan will indicate the new areas provided for this purpose.

**9.1. Affected services**

Drawings and other documentation related to the project incorporate the existence and situation of services, cables, pipes, conduits, manholes, wells, and in general, underground or aerial facilities and structures are for information purposes and not guarantee the completeness and accuracy. Therefore, they are not subject to claim faults and / or omissions.

The Contractor is obliged to do his/her own research, so he/she will ask holders of works and services for the location maps. Therefore he/she will locate and discover the buried conduits and works.

**9.2. Weather features**

The weather in the area is typical from a Mediterranean country climate due to its location and its proximity to the Sea.

The average annual temperature is 15.6°C. The average maximum temperature is 19.8°C and the minimum average temperature is 11.3°C. The average annual rainfall is 628 liters per square meter, although the amount varies considerably from year to year. Rainfall show two minimum months (February and July) and two peak months (May and October). The area rarely has snow, and when it has, it has been for a short period of time.

**9.3. Land features**

The study area falls within the Llobregat River Delta. It is an environment formed by Quaternary sedimentary deposits whose evolution has been influenced simultaneously by both fluvial processes and coastal processes of typical from a dynamic coast (storms, tides, etc.).

**10. Determination of the construction process**

The Contractor will develop the analysis of each activity during the construction process according to the "Principles of Preventive Action" (Art. 15 L. 31/1995 of November 8) and according to the "Applicable principles during the execution of the works" (Art. 10 RD. 1627/1997 of October 24).

**10.1. Execution procedures**
The main aspects to be considered for each execution procedure will be developed by the Contractor and described in the Health and Safety Plan of the work.

10.2. Execution order of works

Complementing previous approaches made by the author of project, during the execution of the work the Contractor will have to adjust the organization and planning of the work according to his/her special characteristics of business management, so as to ensure the works implementation from a quality and safety point of view.

10.3. Determination of effective time duration. Implementation plan

For programming the material necessary for the development of the different works, the following aspects were taken into account:

- List of activities: Work units' relation.
- Dependence relations: Temporal relationship of the physical implementation of each unit with respect to others.
- Duration of activities: It consists in setting time limits for executing each of the work units.

11. Health and safety systems or elements incorporated to the construction process

Every construction project or equipment design, auxiliary mean, machine or hardware to be used in the work covered by this Health and Safety Study, will be integrated into the constructive process always in accordance with the "Principles of Preventive Action" (Art. 15 L. 31/1995 of November 8), the "Applicable Principles during the execution of the Works" (Art. 10 RD. 1627/1997 of October 24), the "General safety rules for machines" (Art.18 RD. 1495/1986 of May 26, 1986) and Basic Construction Standards, among others related regulations, and in agreement with the Technology Construction Standards, Complementary Technical Instructions and UNE or European Standards, both mandatory and advised.

12. Working environment

12.1. Atmospheric agents

All the potential atmospheric agents that may affect the work and the conditions to be taken into account to prevent risks arising from them must be indicated.
12.2. Lighting

Although in general the construction works will be carried out with natural light, the Health and Safety Plan must contain some considerations regarding the use of artificial lighting needed in pits, workshops, night works or underground works.

The light intensity in each working area will be uniform, avoiding glare and reflections to the workers and abrupt changes of intensity.

Flameproof electric lighting will be used in areas of potential explosion due to the nature of their activities, the substances stored in them or the presence of dangerous environments.

In workplaces where a failure of the normal lighting endangers the workers, there will be an emergency lighting of evacuation and safety.

12.3. Noise

To facilitate the development of the Health and Safety Plan, a picture about the typically generated noise levels in the construction industry is attached here:

- Compressor: 82-94 dB.
- Team responsible for nailing (at 15 m): 82 dB.
- Small concrete mixer < 500 liters: 72 dB.
- Median concrete mixer > 500 liters: 60 dB.
- Jackhammer (in confined space): 103 dB.
- Jackhammer (outdoors): 94 dB.
- Standing grinding: 60-75 dB.
- Trucks and dumpers: 80 dB.
- Excavator: 95 dB.
- Freestanding Crane: 90 dB.
- Scraper: 105 dB.
- Crawler Tractor: 100 dB.
• Crawler Loader: 95-100 dB.
• Tires loader: 84-90 dB.
• Impact nails fixed gun: 150 dB.
• Radial portable grinding: 105 dB.
• Wood table machine: 105 dB

The measures to be adopted against noise and that must be properly compiled in the Safety and Health plan by the Contractor are the following:

• Elimination of the risk at origin.
• Isolation of the sound part.
• Individual Protection Equipment (IPE) through earplugs or earmuffs.

12.4. Dust

The permanence of workers in potential dust environments can cause the following affectations:

• Rhinitis.
• Bronchial asthma.
• Destructive bronchitis.
• Chronic Bronchitis.
• Pulmonary emphysema.
• Pneumoconiosis.
• Asbestosis.
• Lung cáncer.
• Mesothelioma.
Each of these diseases will depend on the nature of the dust, its concentration and the exposure time.

The construction area is often characterized by the existence of dust containing free silica (SiO$_2$). This is the component that makes it particularly harmful. The problem of massive presence of asbestos fibers in suspension requires a specific plan for their removal. This plan will be done by specialized companies.

The works in which dust production is usual are essentially the following:

- Sweeping and cleaning services.
- Handling of runes.
- Demolition.
- Drilling.
- Handling of cement.
- Sandblasting.
- Cutting ceramic and lithic materials.
- Grinding of materials.
- Dust and smoke with metal suspension particles when welding.
- Earthworks.
- Movement of vehicles.
- Polished surfaces.
- Asphalt plants.

In addition to the required personal protective equipment such as masks and glasses against powder, it is necessary to take the following preventive measures:

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<th>Preventive measure</th>
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<tr>
<td>Vehicles circulation</td>
<td>Track watering</td>
</tr>
</tbody>
</table>

12.5. **Housekeeping**

The Health and Safety Plan must indicate how the Contractor plans to face the basic housekeeping actions in the realization of this project, especially regarding:

- Removing objects and unnecessary things.
- Siting of necessary things in their respective stacking places.
- Internal standardization of the types of containers and transport platforms used. Internal maintenance works plan.
- Location of downspouts of debris and waste containers.
- Cleaning nails and other formwork leftovers.
- Eviction of walkways, cables, hoses and strips. Sufficient lighting.
- Removal of equipment and fittings resting only on provisional support surfaces.
- Drainage discharges in the form of fuel or grease puddles.
- Signaling of the specific risks due to lack of housekeeping.
- Daily maintenance of order and cleanliness conditions.
- Required information and training or the various participants in the direct and indirect jobs for each item included in the project with regards to maintaining order and cleanliness.

12.6. **Non-ionizing radiation**
Non-ionizing radiations are the radiations whose wavelength is between 10,6 cm and 10 cm, approximately.

Normally they do not result in the separation of the electrons of the atoms, but they are still dangerous. They include: Ultraviolet Radiation (UV), Infrared Radiation (IR), laser, microwaves, ultrasound, and radio frequency.

Non-ionizing radiation are those regions of the electromagnetic spectrum where the energy of the emitted photons is insufficient. It is considered that the lowest wavelength limit for this non-ionizing radiation is 100 nm (nanometer). Included in this category are the regions commonly known as infrared, visible and ultraviolet.

12.6.1. Infrared radiation

This type of radiation is quickly absorbed by the superficial tissues, producing a heating effect. In the case of the eyes, as the heat is absorbed by the lens and not dispersed quickly, it can cause cataracts. This type of injury has been considered most likely for blacksmiths, glass blowers and furnace operators.

All sources of intense IR radiation must be provided with protection systems, as close to the source as possible to achieve maximum heat absorption and prevent radiation entering the eyes of the workers. In the case of use of eyeglasses lighting must be incremented properly, so that dilation of the pupil of the eye is avoided.

12.6.2. Visible radiation

The most important affected organ is the eye. Through visible radiation wavelengths are being transmitted to the eye without appreciable absorption.

12.6.3. Ultraviolet radiation

UV radiation is the one that has a wavelength between 400 nm (nanometers) and 10 nm. It is included in sunlight, and is artificially generated for many purposes in industries, laboratories and hospitals. It is conventionally divided into three regions:

- UVA: 315-400 nm of wavelength.
- UVB: 280-315 nm of wavelength.
- UVC: 200 - 280 nm of wavelength.
The radiation in the UVA, the nearest UV spectrum region, is widely used in the industry and poses little risk, on the contrary the UVB and UVC radiation, are more dangerous.

Radiation in the UVB and UVC regions has biological effects that vary markedly with wavelength, being maximum at around 270 nm. It also varies with exposure time and the intensity of the radiation. The radiant exposure to unprotected eyes or skin will be limited to a period of eight hours.

Protection from exposure to sources that can pose risks must be carried out by combining organizational measures of shields or guards and personal protection. Moreover, it always must be tried to replace the dangerous by what involves little or no risk, according to the law on the prevention of occupational risks.

12.6.4. Laser

The mission of a laser is to produce a beam of high density and has been used in fields as diverse as surgery, topography or communication. Units with pulsed or continuous radiation are built, both visible and invisible. Such units, if powerful enough, can damage the skin and the eyes.

The pulsed high-energy unit is particularly dangerous when the short pulse of radiation hits causing widespread damage. Lasers CW can also cause damage to the eyes and skin. The IR radiation and V will present danger to the retina, in the form of burns; the UV and IR radiation may suppose a risk to the cornea and lens.

12.7. Ionizing radiation

Within the construction field there exist very few jobs that are exposed to these risks, although there are situations where they can receive such radiation, such as:

- Detection of weld defects or cracks in pipes, structures and buildings.
- In-situ density control by the nuclear method.
- Control of irregularities in the filling level of containers or reservoirs.
- Identification of trajectories using tracers in hydraulic currents, sediments, bulk movement, and so on.

To determine a safe work procedure to perform these operations will be the duty of the contractor in cooperation with its prevention service.
Work done within an environment or in proximity to certain facilities can also be considered a possible risk generation. For example:

- Medical facilities where therapy practices are carried out by ionizing radiation.
- Medical facilities where diagnostic practices are carried out with X-ray machines whose potential for operation is greater than 70 kilovolts.
- Medical facilities where radioactive material is handled or treated in a non-sealed way for its use in therapy or diagnosis techniques.
- Industrial facilities where radioactive material is handled.
- Particle accelerators for research or industrial use.
- Facilities and equipment for industrial radiography or spelling range, either by use of radioactive sources or X-ray emitting equipment.
- Deposits of radioactive waste, both transients and definitive.
- Control of irregularities in the thickness of block paper, plastic films and metal sheets or the filling level of containers or reservoirs.
- Estimation of the age of substances, using carbon-14 and other isotopes, as argon-40 and phosphorus-32.
- Passive lighting, clock or emergency exits.

### 13. Materials handling

Any material handling involves a risk; therefore, from the prevention point of view, any manipulation that is not strictly necessary must be avoided.

The following simple precautions are mandatory when manipulating materials:

- Start by the material that appears on the surface, i.e. the first and more accessible.
- Deliver the material, not throw it.
- Place the material orderly. In laminate stacking case, do it in stable cells away from walkways or where it may be dangerous.
- Use work gloves and safety shoes.
• When handling long loads between two or more persons, the load must be able to be maintained in hand with the arm stretched along the body, or on the back.

• Hardware and suitable aids are utilized for transporting each type of material.

• In the loading and unloading it is strictly prohibited to be between the back truck and the platform, post, pillar or vertical fixed structure.

13.1. Basic principles about materials handling

• The time spent on material handling is directly proportional to the accident risk exposure arising from such activity.

• Ensure that the different materials, the support platform and the working operator, are at the same height.

• Avoid depositing the materials directly over the ground; always pass on buckets or containers that allow their transfer in abundance.

• Shorten as much as possible the distance covered by the material handled, avoiding intermediate parking between the place of departure of the material handled and the final location of its placement.

• Do not try to reduce the number of assistants to collect materials.

• Keep the places of passage of materials manipulated clarified, marked and lighted.

13.2. Cargo handling without mechanical means

For manual lifting of loads the entire site personnel must receive basic necessary training, promising to take the following steps:

• Approaching as much as possible to the load.

• Firmly seat feet.

• Crouching bending the knees.

• Keeping the back straight.

• Grasping the object firmly.
• The effort to lift it must be done by the leg muscles.

• During transport, load must remain as close as possible to the body.

• If one person has to manage long pieces, the following preventive criteria will be adopted:
  
  o It will take the inclined load by one end, up until the height of the back.
  
  o It will move forward moving hands along the object until reaching the center of gravity of the load.
  
  o The load will be placed on back in balance.
  
  o During the transport, the load will be kept in inclined position, with the front end raised.

• Visual inspection of lifting heavy objects is required in order to remove sharp edges.

• It is forbidden to lift more than 50 kg individually. The limit value of 30 kg for men can be overcome promptly up to 50 kg in the case of downloading a material to place it on a mechanical support. In the case of women, these values are reduced to 15 and 25 kg, respectively.

• The use of a signal code when a group lifts an object in order to withstand the stress at the same time is necessary. It can be any system with the condition that is known or agreed by the team.

14. **Auxiliary means of preventive utilization (MAUP)**

For the purpose of this Health and Safety Study will be considered as MAUP all Medium Auxiliary endowed Protection, Shelter, Safety Device, Operation Sequential Positive Collective Security or Protection System, which originally comes integrated manufacturing, the equipment, machine or system, jointly and inseparable, so way that stands, or shield the risks or simultaneous supply of energy out of control, and workers, anyone other than the work and / or materials, machinery, equipment or near their area of influence, canceling or reducing the consequences hardware accident. Its operation by the manufacturer or supplier of each is guaranteed components, in the conditions of use and maintenance prescribed by him. the contractor is bound to its appropriate choice, monitoring and control of use.

15. **Collective protection systems (SPC)**
Purposes of this Health and Safety Study, shall be deemed Systems Collective Protection, the set of associated items, incorporated into the construction system provisionally adapted to the lack of protection more effectively integrated (MAUP), intended to shield or condone the possibility of coincidence of any type of energy out of control present in the workplace, with workers oblivious to the work and / or materials, machinery, equipment or fittings coming to your area of staff influence, canceling or reducing the consequences of accidents. Ensures operability persons or integrity of protected object, without a participation ensure its effectiveness. This last aspect is what sets it differs from a ComputerPersonal Protective Equipment (PPE).

In the absence of approval or certification of preventive efficacy of all these Systems installed, the Contractor shall at its Health and Safety Plan, referral and relationship Test Protocols, certificates or approvals taken and / or required to installers, manufacturers and / or suppliers for all the above systems Collective Protection.

16. **Conditions of personal protective equipment (EPI)**

Purposes of this Health and Safety Study, shall be considered Equipment Personal Protection, those workpieces acting as a cover or screen Portable, individualized for each user, to reduce the consequences of contact area protected body with a runaway energy, intensity lower than expected endurance of EPI.

Its use must be restricted to the absence of adequate preventive safeguards, for lack of MAUP, or failing SPC of equivalent effectiveness.

All personal protective equipment shall be properly certified in accordance with rules harmonized CE. Always according to R. D. 1407-1492, and R. D. R.D.159/95 773/97.

The Prime Contractor shall keep a documentary check your individualized delivery staff (own or outsourced), with the corresponding return receipt signed by the recipient.

17. **Prevention resources**

The legislation that must be accomplished for the presence of preventive resources in the construction works is covered by Law 54/2003. According to this law the presence of prevention resources in construction will be mandatory in the following cases:

- When the risks may be aggravated or modified in process development or activity, by the concurrence of several operations carried out successively or simultaneously and make precise control of the correct application of the methods working. The presence of
preventive resources of each contractor shall be required when, during construction, work progresses at special risk, as defined in the Royal Decree 1627/97.

- When activities or processes that are considered to be made by regulation as special risks.

- When the need for such presence is required by the Labor Inspectorate and Social Security, if the circumstances so require due to the conditions stopped to work.

18. **Signaling and beaconing**

Concerning signaling and beaconing at work, it is necessary to distinguish between the terms to which demand attention from workers and that which corresponds to the external traffic affected by the work.

In the first case there are applicable requirements established by the Royal Decree 485/1997, of April 14, as a beacon signaling and traffic are regulated, among other legislation, by Norma 8.3-IC Directorate General of Roads and is not the subject of the Safety and Health. This distinction does not exclude the possible complementation of signaling traffic throughout the work when it is done required for the safety of employees working in the immediacy of that traffic.

The RD485/97 states that safety and health signaling at work must be used provided that the analysis of the risks of foreseeable emergency situations and preventive measures set out the need for:

- Call the attention of workers on the existence of certain risks, prohibitions or obligations.

- Alert workers when a particular emergency situation occurs requiring urgent protection measures or evacuation.

- Provide workers the location and identification of specific media or protection equipment, evacuation, emergency or first aid.

- Direct or guide workers performing certain dangerous maneuvers.

19. **Access conditions and affectations to the public road**

The Contractor will define in the Safety and Health plan deviations and temporary passages for vehicles and pedestrians, circuits and signaling sections, signage, protective and detection measures, temporary pavements and modifications given by the implementation of the project. For that purpose, the regulations for information and signaling works in the municipality and the
Municipal Instruction about the installation of street furniture in public space will be taken into account.

Where appropriate, according to the forecast on the execution of the works, the working areas and areas intended for vehicular and pedestrian access to buildings and fords will be clearly differed for each of the phases. Moreover, signaling and protection measures appropriate to each phase will be defined.

19.1. Police rules

19.1.1. Access controls

Once the scope of the work is defined, and pedestrian enclosures and vehicular access are established, the contractor, together with the prevention service, will define within the Health and Safety Plan the process for entry and exit control of vehicles in general (including equipment such as mobile cranes) and personnel so as to ensure access only to authorized persons.

19.1.2. Interference coordination and security on site

The contractor, as long as necessary, and given the volume of work, the value of stored materials and other circumstances, will define a process to ensure the controlled access to the facilities that involve a personal risk and/or are potential for the intrusion of other people from outside the Project.

19.2. Scope of street occupation

19.2.1. Occupation of the work enclosure

Occupation of the work enclosure means the area that is really occupied, including fences, protection elements, railings, containers, stands, etc.

The Safety and Health Plan at work will specify clearly the occupancy of the work space and will state whether this will change in the different phases of the work. The area or areas of occupation will be clearly drawn on plans for all the construction phases.

The maximum width to occupy will be proportional to the width of the sidewalk. The space for the passage of pedestrians will not be less than one third (1/3) of the width of the existing sidewalk.

19.2.2. Location of booths and containers

Areas provided for this purpose will be specified in the Safety and Health Plan:
• The houses, containers, temporary workshops and construction vehicles parking will be located in an area close to the work which achieves the following criteria:

  o Preferably on the sidewalk, leaving a minimum distance of one meter and forty inches (1,40 m) for the passage of pedestrians on the sidewalk.

  o On the sidewalk, leaving a minimum distance of a meter and forty centimeters (1,40 m) for pedestrian crossing to the parking area of the driveway without encroaching any lane.

  o If there is not enough space on the sidewalk, they will be placed in the parking area of the driveway trying not to invade any lane and always leaving at least one meter (1 m) for the passage of pedestrians on the sidewalk.

• The pedestrian crossings will be protected. Adequate signaling will be placed.

19.2.3. Location of tower-cranes and lifts

They may only be located on the field of the works performed.

19.2.4. Changes in the Occupied Zone

Any change in the occupied zone affecting the scope of the public domain will be considered as a modification of the Health and Safety Plan at work and will have to be documented and processed according to the R.D. 1627/97.

19.3. Operations affecting the public space

19.3.1. Loading and unloading

The loading and unloading operations are executed within the scope of the enclosure works. When this is not possible, the vehicle will be parked at the nearest point to the fence of the work, pedestrians outside the scope will be diverted, the closed perimeter will be extended and the following measures will be taken:

• A passage for pedestrians will be enabled. A minimum width of one meter and forty centimeters (1,40 m) will be left for sidewalks or parking walkways without invading any lane.

• The pedestrian crossing will be protected with metal fences of 200 x 100 cm, delimiting the road on both sides. Moreover, appropriate signage will be placed.
• The distance between the metal fence and the scope of operations or the vehicles will form a protection strip whose width will depend on the type of products to load or unload. This width will be set by the Project Manager previous consultation with the Security Coordinator of the work.

• Finished the loading and unloading, metal fences will be removed and the pavement will be cleaned.

• The unloading of the truck mixers will be controlled to avoid spills on driveway.

19.4. Cleaning and impact on environment affecting the public space

19.4.1. Cleaning

Contractors will clean and water daily the public space affected by the activity of work and especially after making loading and unloading operations that potentially produce debris.

The emission of solid particles (dust, cement, etc.) will be especially controlled.

19.4.2. Noise. Working hours

The works will be carried out between 8.00 and 20.00 hours on weekdays.

Outside these hours, only permitted activities that do not produce noise beyond those who set the OCAF can be executed. Work performed outside these hours must be specifically authorized by the City Council.

19.4.3. Powder

Tracks for vehicles will be irrigated.

Elements to be brought down, debris and all the materials capable of producing dust will be irrigated.

Water will be added when cutting pieces by disc.

The cement silos will be equipped with a filter.

19.5. Waste affecting the public space

The contractor, within the Health and Safety Plan, will define in collaboration with the Prevention Service, work procedures for the storage and withdrawal of each of the different types of waste that may be generated on site.
The contractor will give appropriate instructions to workers and subcontractors, checking afterwards that they understand it properly.

19.6. Circulation of cars and pedestrians affecting the public space

19.6.1. Signaling and protection

If the implementation plan of the work involves road traffic diversion or reduction of road traffic, the measures defined in the Works Signaling Standard will be applied.

Placing unauthorized signs is prohibited.

19.6.2. Minimum dimensions of pathways and itineraries for pedestrians

The following minimum dimensions will be respected:

- If there is a restriction in sidewalks, the step width for pedestrians will not be less than one third (1/3) of the width of the existing sidewalk.

- The minimum width of pedestrians’ passages will be one meter and forty centimeters (1,40 m).

19.6.3. Lighting and luminous beaoning

The signs and beaoning elements will be properly illuminated even if there exist street lighting.

Painting and photo luminescent or reflective material is used for both vertical signs, horizontal signs and beaoning elements.

Itineraries and passages for pedestrians will be adequately illuminated throughout the entire section (minimum intensity of 20 lux).

19.6.4. Marking and defense

Elements of marking and defense to be used for vehicle steps will be types designated as TB, TL and TD described in the “Road Norms, 8.3 - IC”. This Norm has the following criteria for the location of marking and defense elements:

- In the border delineation of the vehicle lane contiguous to the enclosure of the work.

- In the boundary edges between vehicle passages and temporary pedestrian crossings.
• To prevent the movement of vehicles along a portion of a lane, an entire lane or various lanes when there is a narrowing and/or a reducing in the number of lanes.

• In the definition of the borders of lanes when there is a deviation due to the necessity to overcome an obstacle.

• On the borders of new lanes for temporary passages or to establish a new organization of the movement different from what it was before works.

19.6.5. Provisional pavement

The pavement will be tough, not slippery and without different thickness than the one of the pieces in their origin. If it is made of land, it will have a 90% compaction (MP (Modified Proctor)).

If it is necessary to extend the sidewalk for the pedestrian crossing on the road, a parquet on the occupied part of the road forming a horizontal plane with the sidewalk will be placed.

19.6.6. Accessibility of disabled people

If the pathway or pathways around the work are adapted according to what is stated in Decree 135/1995 of March 24, and there is no alternative route, provisional steps or pathways will agree with the following minimum requirements:

• Obstacle clearance of 2,10 m.

• In the changing direction areas, the minimum passage width must allow inscribing a circle of 1,5 m diameter.

• Isolated stairs or steps cannot be placed.

• The longitudinal slope will not exceed 8% and the crossing slope will not exceed 2%.

• The pavement will be tough, not slippery and without different thickness than the one of the pieces in their origin. If it is made of land, it will have a 90% compaction (MP (Modified Proctor)).

• The Fords will have a minimum width of four feet (1,20 m) and a maximum gradient of 12%.

19.6.7. Maintenance

Signaling and marking elements will be fixed in such a way as to prevent their movement and to difficult their subtraction.
Signage, markings, pavements, lighting and all itineraries, deviations and passages for pedestrians and vehicles will be kept in perfect condition during its term, avoiding the loss of perceptual conditions or safety.

The passages and routes will be kept clean.

**19.6.8. Removing of signaling and beaconing**

When the work is finished, all signs, elements, devices and beacons will be removed.

The deadline for the implementation of these operations is one week once finished the work.

**19.7. Protection and transfer of elements stationed in the public space**

**19.7.1. Trees and gardens**

All the vegetal elements and the existing trees located on public roads that affected by the works must be compiled in the Safety Plan. The Municipal Entity responsible for Parks and Gardens will issue a mandatory preliminary report.

While executing the works, woodland, gardens and plant species will be protected, leaving around them zone of one meter non-occupied. The Contractor will control that the tree pits and gardens are always free of strange elements, debris and garbage. Watering will be done periodically provided that this cannot be done normally from outside the construction area.

**19.7.2. Bus stops, kiosks and mailboxes**

Because of the implementation of the closure of the work, either, because they remain inside or because they step in a restricted area, temporary transfer of bus stops, kiosks, mailboxes or similar elements deployed in the public space must be planned.

Moreover, it must be indicated in the Safety Plan during the works and the relevant services to coordinate operations must be contacted.

**20. Risk of injury or damage to others and protection**

**20.1. Risk of injury or damage to others**

The risks during the implementation stages of the work that could affect persons or other objects falling are:

- Fall on the same level.
• Collisions.

• Collisions with obstacles on the sidewalk.

• Falling objects.

20.2. Protection measures to others

The following protective measures are considered to cover the risk of people transiting the vicinity of the work:

• Mounting of the metal fence of 2 m height, separating the scope of the work from external transit zones.

• For the protection of persons and vehicles traveling through the neighboring streets, a passageway structure having a signal (which will be optical and bright at night) indicating the gauge traffic protection will be installed.

• If it is necessary to occupy the sidewalk during the collection of materials on site, while discharging the pedestrians traffic will be channeled inside the passage of pedestrians and the vehicles traffic will be directed outside the affected area.

• Depending on the level of interference, hiring an access control to work service may be considered.

21. Catastrophic risk prevention

Main catastrophic risks considered for this work remotely foreseeable are:

• Fire and/or explosion.

• Flood.

• Structural collapse.

• Attack to the property and / or contractors.

• Sinking of loads or lifting equipment.

To cover the relevant contingencies, the Contractor will add an Emergency Plan to the Safety and Health Plan covering at least the following measures:
• Order and cleanup.

• Access and internal circulation roads of the work.

• Location of fire extinguishers and other extinguishing agents.

• Training of the Brigade of First Responders.

• Meeting points.

• First aid assistance.
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1. General layout and requirements

1.1. Purpose, scope and regulatory framework

1.1.1. Purpose

The current statement of technical requirements has as its main objectives, first, to structure the general organization of the work; second, to fix the characteristics of the materials to employ; third, to establish the conditions that the works execution must follow; and finally, to organize the way in which the measurements and the payments must be done.

1.1.2. Scope

The current statement of technical requirements will be applied to the construction, management, control and inspection of the works defined at the “Urbanization project of Street 114. Connection between L’Estany del Port Avenue and Street 114 (Port of Barcelona)”.

In case of contradictions with other statements or mentioned regulations, will prevail what is prescribed in the current Statement of particular technical requirements (from now on Statement).

1.1.3. Instructions, regulations and applicable dispositions

The following extra dispositions will be applied as additional and complementary dispositions as long as they are not modified or opposed to the current Statement.

Law 30/07 (30th October), about Public Sector Contracts, operative since 30th April 2008.

Royal Decree 817/2009 (8th May) (BOE 15), by which the Law 30/2007 (30th October) about Public Sector Contracts is partially developed.

Royal Legislative Decree 2/2000 (16th June), by which the Revised Text of the Law about Public Administration Contracts (BOE 21) is approved.

Statement of general technical requirements for Road and Bridges works (PG-3), including all the updates until today.
Instruction for the reception of cements (RC-08), approved by the Royal Decree 956/2008 (6th June).

UNE regulations about test methods, definitions, denominations and specifications of the cements and their components referred in the Regulation RC-08.

Instruction of Structural Concrete, Royal Decree 1247/2008 (18th July) (EHE-08-08).

Instruction related to the actions considered in the Project of Roads’ Bridges, approved by O.M. on 12th February 1998 (IAP-98).


General Circulation Regulation for the application and development of the Law about traffic, circulation of motor vehicles and road safety, approved by the Royal Legislative Decree 339/1990 (2nd March) and by the Royal Decree 1428/2003 (21st November).

Royal Decree 303/2011 (4th March), by which the General Circulation Regulation – approved by the Royal Decree 1428/2003 (21st November) – and the Law about traffic, circulation of motor vehicles and road safety – approved by the Royal Legislative Decree 339/1990 (2nd March) – are modified. Also, the general limit of velocity for cars and motorcycles in highways is reduced.

Royal Decree 2642/1985 (18th December), by which the technical specifications of the metal candelabrum (crosiers, external lighting columns and traffic signalling) are declared mandatory and they are homologated by the Ministry of Industry and Energy, modified by the Royal Decree 401/1989 (14th April).

Royal Decree 846/2006 (7th July), by which the dispositions in terms of regulation and homologation of industrial products are stated.

Existing dispositions and norms designated by the local authorities with rights on the works to carry out.

1.2. General dispositions

1.2.1. Dispositions that apart from the General Legislation will rule during the contract duration
In addition to what is stated in these Statement, during the term of this Agreement shall govern the rules indicated in section 1.1.3 and in the Statement of Conditions of the Contract to be established for recruitment of these works.

The Contractor is obliged to fill all the official regulations that are applicable to works of this project, even if not mentioned in the sections of this Specification. Also, it has to accept any instruction, regulation or standard that may be issued by the Authority Port of Barcelona during the execution of the work.

1.2.2. Coordinates system and reference level

The X and Y coordinates of surveying and Project axes are defined in UTM 31 on ED50.

Elevation, orthometric heights (H) calculated in ETRS89/00 system were calculated applying the EGM08D595 geoid model.

1.2.3. Project Manager

The Project Manager, as representative of the Port Authority of Barcelona, settled in Overall, on all issues raised during the execution of the work of this Project in accordance with the powers granted Legislation.

In a special way, the Contractor shall follow these instructions as regards the quality and storage of materials, execution of work units, interpretation of plans and specifications, changes to the project, program execution of work and precautions to be taken in their development and in relation to the conservation of landscape that may be affected.

1.2.4. Contractor personnel

It must comply with the stipulations in the tender documents for the contract procurement of these works.

All personnel assigned to the work, will be formally proposed by the Contractor to the Engineer Works Director for acceptance, approval may be denied by the Director, initially and at any time during the work, if there are grounds for it. They will be required to residence in the place of work.

They may be replaced by the Contractor without the consent of the Director of Works. The Director may also require that not work if it is not named, accepted and submit a Project
Manager and Chief Contractor, being in such case the Contractor responsible for the delay and its consequences.

1.2.5. Orders to the contractor

The Delegate, and on their behalf the Project Manager, will be the interlocutor of the Director of Works, with obligation to receive all verbal communications and/or written to the Director, directly or through others.

The Director of Works can communicate directly with the rest of junior staff, who must then inform the Project Manager. The delegates are responsible for such communications faithfully to reach people. It is responsible for all written communications: Construction Management, including site plans, tests and measurements, are guarded, arranged chronologically and available on site for inspection at any time.

The Delegate must submit to the Director of Development for all the visits to the work and forward immediately to the personal instructions received by the Director. The Delegate shall be required to be aware of all the circumstances of the development work of the work and report to the Director upon the request at any time, or without requirement, if necessary or desirable.

1.2.6. Work plan and execution order of the works

In the periods specified in the Law on Contracts with the State or in the specifications Conditions of Contract, the Contractor shall submit for approval of the Project Management Plan of work that it is intended, specifying the terms and partial termination date individual facilities and units of work, consistent with the total execution time. This Plan, once approved, will acquire contractual nature. If ignored, partially, will object to the sanctions provided in the legislation, the unobstructed Construction Management may require the Contractor to make the necessary means to recover delay or order a third the substitute delivery of outstanding units under the Contractor.

This Work Plan will contain a bar chart and a PERT valued related to it, with the study of paths and critical activities for the work. The Contractor shall also submit a supplementary list of services, equipment and machinery that undertakes to use in each stage of the Plan.

In addition, the Contractor shall increase the technical staff, aids, machinery and labour provided the Administration tells you after checking that it is necessary for the execution of the periods specified in the Contract. Management reserves, also, the right to prohibit starting new work, provided that they are subjected to the works already started and Works Director may require the completion of a section running before we proceed to make work in another.
1.2.7. *Initiation of the works order*

The command to start the work will be issued by the Director of Works appointed by the Directors and will be reviewed in the order book or other reliable documentation.

1.2.8. *Detailed stakeout of the works*

The Contractor shall be directly responsible for the individual redefinitions and detail.

1.2.9. *Marking and / or temporary signage works*

During construction works, they must be marked and signalled in accordance with regulations and instructions of the Project Manager.

The Contractor shall submit a draft marking and / or temporary signs in work and temporary diversions required for the works, once approved by the Construction Management, will be processed at the Port Authority of Barcelona for approval.

The Contractor will install the lighting equipment of the type and intensity that the Project Manager will order, and keep them in perfect condition for the execution of work. This illumination is to enable proper monitoring of the work during the course of the night running.

Both the installation and maintenance of the marking shall be borne by the Contractor during the period of execution of the works and warranty.

The Contractor shall be responsible for strict compliance with the provisions in force in the material, and determine the measures to be taken each time to signal, mark and, if necessary, defend works relating to free movement.

The Project Manager may introduce amendments and additions as it deems appropriate for each pit, through appropriate written orders, which shall be binding compliance by the Contractor.

Should not be initiated activities affecting the free movement by existing road without it has placed the appropriate signs, markings and, where appropriate defence. These elements must be modified or even removed by the Contractor as soon as changes or disappears, the condition of free movement that resulted in their placement, whichever it is the period of time that does not prove necessary, especially at night and holidays.
If this is not complied with the Works Director may withdraw, either directly or through third, through the timely expenditure by the Contractor, who may not return to normal works without pay it or without reset.

**1.2.10. Self-control plan**

The Contractor is responsible for the quality of the works performed.

Before beginning the works, the Contractor shall submit for approval of the Administration Self-Control Plan has provided quality, with detailed specification of the means human and material promises to use during the development of the works in this appearance.

This plan, to be drafted in compliance with the requirements of ISO 9002, it will define the scope in terms of controls plants and supplies as well as the type and intensity of quality control tests to be performed on all units subject to this work. It will include 100% of the tests set out in these Terms.

All materials used in the works shall comply with the conditions set out in the Technical Specification Sheets, and may be rejected if not by the Director of Development. Therefore, all materials proposed to be used in the work should be examined and tested before acceptance. No rejection or acceptance of a origin does not prevent subsequent rejection of any item of equipment that does not meet its requirements or even the eventual prohibition of such origin.

It shall also cover the testing compaction of fills and the previous trials proving the good quality of the materials thereof (whether of trace or loans), with an intensity sufficient to ensure that at each and every those tiers of compliance with the requirements in the specifications of these Terms without necessarily having recourse to control to carry on its own Administration.

**1.2.11. Precautions to be adopted during the works execution**

All projected works will be run without interrupting the traffic works, and the Contractor will propose the relevant measures to be taken. The execution was scheduled and held in so that the resulting inconvenience to railway traffic, traffic road and port road network, are minimal.

In any case, the Contractor shall take steps to the perfect regulation traffic and, if circumstances warrant, the Director of the Work the Contract may require the placement of traffic lights.

The Contractor shall establish competent staff supervision and the amount needed to prevent any possible negligence and recklessness that may obstruct traffic or lead to any accident.
The Contractor shall also take its own responsibility, all necessary measures to comply with the existing provisions relating to the use of explosives and accident prevention, fire and casualty, and follow the instructions.

The Contractor is prohibited to alter its work with the safety of users’ public road in operation, as well as facilities of any company to which could affect the works. It shall give notice for it and agree with companies to determine the order of execution and detail how many jobs might affect them.

1.2.12. Available lands for the works execution

The Contractor may dispose of those spaces adjacent or nearby pit of same work, within the occupied zone of the works defined, for the collection of materials, location auxiliary facilities or movement of equipment and personnel.

It shall be its own responsibility and replacement of such land to its original state and repairing the damage that had been caused in the properties. It will also be borne by the Contractor providing those spaces and temporary access that, while not expressly included in the project, decided to use for the execution of works.

1.2.13. Works accesses

If necessary, temporary roads and access to different pits will be constructed and retained by the Contractor, under the responsibility and on his behalf, and shall not compost direct.

The Contractor shall be required to rebuild on their own all works, buildings and public or private facilities, such as cables, sidewalks, gutters, sewer service, etc., which are affected by the construction of roads, sidewalks and temporary works.

Also it should place the necessary signalling at intersections with roads or diversions national or local work and remove your own risk, sludge materials and media leftover construction, once finished it, leaving a perfectly clean area.

1.2.14. Equipment, machinery and auxiliary methods to be given by the Contractor

All control and measurement equipment, machinery, tools and aids to equipment are to be provided by the Contractor for the proper execution of the works will be recognized by the
Director of Works in order to determine if they meet the proper conditions of suitability, and may reject any item that, in his opinion, does not meet the aforementioned condition.

If during the execution of works, the Director considers that, due to changes in conditions work or any other reason, the approved equipment is not suitable for the proposed end; require its reinforcement or replacement by a more appropriate.

The team will be recruited to work while they are in execution units you must used, not being able to remove any element thereof without express consent Works Director. In case of damage must be repaired the damaged items or unused provided their repair by the Contractor, required deadlines, according to the Director Work, do not alter the work program that may be applicable. Otherwise it must be replaced the entire team.

In any case, the conservation, monitoring, repair and / or replacement of the items integrate the equipment provided by the Contractor shall be the sole expense of the same.

The machinery and tools and aids that employs the Contractor for the execution of the work will never be payable, as it has already taken into account when making the composition prices being understood that, although not included in listed in the Tables of Costs explicitly any or some of them or all of them are deemed to be included in the price corresponding.

The price of all work units comprising the cost of the project is included aids required for both construction and to ensure the safety of operations personnel. Therefore, the Contractor is not entitled, in any circumstances, claim that you pay nothing for the costs it may cause the aids and shall be solely responsible for any damage that may occur, both works as operators by the lack, shortage or misuse of the media in the construction of the works.

The aids to ensure the safety of the operating personnel are solely responsibility and expense of the Contractor.

1.2.15. Security measures

The Contractor shall be responsible for the security in the work and is obliged to adopt and implement, at its expense, the existing provisions on this subject, measures they can dictate the Ministry of Labour and other relevant agencies on Security Occupational Health and safety standards that apply to the characteristics of works and available to the Project Manager or in his absence the Health and Safety Coordinator who has named the APB.

The Contractor shall establish under its sole responsibility a health and safety plan practices that specify security measures that are necessary to make the work take to achieve the
requirements of the Safety and Health included in the project. This plan must be approved by the APB and will be submitted by the Contractor to the Labour Authority and other competent bodies and services in accordance with Royal Decree 1627/1997 of 24 October.

It will also be communicated to the Project Manager Appointment Coordinator Safety and Health in charge of enforcing the Health and Safety Plan and control storage conditions of the security provided for therein. This Coordinator will approve and sign the plan.

This Plan shall specify the procedures for implementing regulatory measures and complementary made to particular risks of the work, with the aim of ensuring effectively:

- Staff security suite, from the APB and third.
- Hygiene, Medicine at Work, First Aid and cures the sick and injured.
- The safety of site installations.
- The safe operation of construction machinery.
- The security of port facilities generally owned by the APB or third.
- Traffic safety of affected vehicles.

Special care will be taken about the following:

a) Vehicles:

Trucks and other vehicles loaded or not, meet the maximum speed limit of twenty kilometres per hour (20 km / h). Loaded vehicles will run with no overhanging loads and can cause accidents to property or people. In risk areas and / or special situations, additional measures may be placed under the circumstances.

b) Access to the interior of closed areas and work inside:

When the work requirements necessary to access the inside of the fence areas and / or perform work within, the Contractor shall comply with the "Safety Standards Contractors " in effect at all times.

c) Personal Control:
The Contractor shall establish the access control and monitoring work within it, according to standards set by the APB. This safety plan to the Director of Development will be communicated prior to commencement of works. The Contractor shall complete the plan further and timely with all modifications suitable for the development of the works, and shall immediately notify the Works Director adoption of any amendment to existing security plan. The plan security and the changes should take into account special arrangements due to place in service facilities and the nature of the works.

Expenses arising from the adoption of security measures, as well as hiring the Health and Safety Coordinator, are borne by the Contractor and are included in the prices units of work.

1.2.16. Organisation

The Contractor shall be responsible for order, cleanliness and sanitation works. With this purpose shall take the measures necessary for the removal of debris and transport temporary storage, landfill or middle manager as may be indicated by the Authorities competent and Construction Management.

Also, take the necessary measures to prevent or limit contamination of soil, water or atmosphere, in accordance with current regulations and with the instructions of the Project Manager.

1.2.17. Replenishments

Replenishments means rebuilds those factories and facilities that has been necessary to demolish the execution of the works, and should be under the same conditions as before the work.

The characteristics of these works will be equal to the demolished must meet with the same level of quality and functionality.

All repairs of cracks or damage to the various individual utilities or the will also be performed by the Contractor for its own account, without the right to payment of some amount.

1.2.18. Various works

In the execution of works and other factories within the project and for which no there are requirements contained explicitly in this Specification, the Contractor shall comply with rules followed in each case by good construction practice, and the instructions of Works Director.
In addition to detailed work on the Project, the Contractor is required to perform all complementary or ancillary works necessary for the completion of the Works good, no excuse cannot be explicitly outlined in these Terms.

1.2.19. Tests and examinations during the execution of the works

The tests and thorough examinations roughly verified during the execution of the work, they have no other character than simple background for the reception. Accordingly, admission materials, plant or premises in any way it is performed before the reception, does not mitigate the obligations to remedy or replace the Contractor if the works contracts prove unacceptable, partly or wholly, at the time of final acceptance.

1.2.20. Works whose implementation is not fully defined in the Project

The works, whose execution is not fully defined in this project, shall be credited to Contract prices under the same conditions and the particular projects that are drawn to them.

Similarly the removal of debris and landslides occurring shall be paid during the warranty period provided they are due to apparent motion of land and not fouls committed by the Contractor.

1.2.21. Works that are hidden

Without authorization from the Director of Development or his delegate junior staff, the Contractor shall not proceed to fill open excavations for foundation engineering and in overall, of all the works that are hidden.

When the Contractor has carried out that landfill without proper authorization, the Director of Works may order the demolition of the executed and in any event, the Contractor shall be responsible for the mistakes that had committed.

1.2.22. Auxiliary and temporary buildings

The Contractor is obliged to build on its own, and to withdraw at the end of works, all provisional and ancillary buildings for offices, warehouses, sheds, service roads provisional, etc.

All these works will be subject to the prior approval of the Director of Works, as concerning location, dimensions, etc.
Auxiliary facilities of artwork located in the project, will be located in areas of lower environmental value, following the predefined criteria in the Manual of Practice Environmental.

The Contractor shall prevent any potentially polluting discharge, especially in refuelling areas, park equipment and maintenance and cleaning of vehicles.

### 1.2.23. Reception of the work and warranty period

The warranty period shall be as specified appears in the Conditions of Contract Specification for competition and contracting the work defined in the project. During this period, all maintenance and repair work needed to maintain the works executed in perfect condition will be done by the Contractor.

If granting recognition to final acceptance of the work was not in the proper conditions, the reception will be deferred until the work is about to be received. In this case the Contractor shall not be paid any amount for term extension warranty and shall be kept with the obligation to follow conservation.

### 1.2.24. Legal relations and responsibilities to the public

The Contractor shall have all permits and licenses from relevant agencies that they are necessary for the completion of works and in accordance with current legislation.

Shall be the Contractor to compensation for damages caused to third parties as result of traffic accidents due to insufficient or defective signalling to is attributable. Similarly, due to the interruption of public services to private damage caused to their property by trenching or diversion channels, enabling paths provisional establishment of warehouses, workshops, storage of equipment and materials and all necessary for the completion of works operations, provided they are not included in the project or not resulting from a guilty or negligence of the Contractor.

The Contractor shall obtain all information regarding the services affected by works, whether they are the Port as outside companies, regardless of the information that exists in the project, and will be responsible for any damage or accident caused by this reason.

### 1.2.25. Social duties

The Contractor shall, solely responsible for carrying out the works, undertakes to compliance, at your own risk, for all obligations arising from its character pattern legal provisions regarding the
type of work force or may be issued during execution of works. They go to his office and establishment expenses operation of hospitality that are required in the work.

APB staff related works has the right to enjoy the services installed by the Contractor under the same conditions which apply to your staff.

1.2.26. General expenses

They will be at the Contractor’s costs incurred by:

- General Stake, stakeout or partial verification.
- Construction, dismantling and withdrawal of all support facilities.
- Rental or purchase of land for equipment and material deposits.
- Protection of own materials and work against any deterioration, damage or fire.
- Existing requirements for storage of explosives and fuel.
- Cleaning and removal of waste and garbage.
- Completion and finishing touches to the work.
- Instrumentation, data collection and report the behavior of structures and any tests or trials.
- Replacement of structures, facilities, pavements, etc., damaged or altered by needs of the works or facilities, or the excessive use of those derived from the work.
- The inspection and supervision of works by the APB.
- Construction and maintenance of roads and temporary diversions for traffic diversions works and services, including signs, markings and temporary defences and modifications needed to fit the development of the works. The subsequent demolition detours when they stop using.
- Drains.
- Unforeseen by atmospheric disturbances, shifting land or water abundance.
- Withdrawal by the end of the construction of the facilities, tools, materials, etc.
• Maintenance and cleaning the surrounding streets of the works which are used for access equipment and materials, or those affecting indirectly in order to minimize the impact on third parties (Avinguda de Colville Lake Port, Round Port, etc., or which indicate the Director of Works).

• General cleaning of the work.

• Installation, maintenance and removal of installations for the supply of water and energy electrical.

• Acquisition of water and electricity.

• Demolition of the temporary facilities.

• Removal of rejected materials.

• Correction of observed or shortcomings revealed by the tests and trials.

• Monitoring and appropriate signage in works both day and night.

• The licensing, patent rights and licenses, etc., required for execution of work.

In the event of termination of the Agreement for any reason shall be at the Contractor's Expenditure on the clearance and removal of aids have been used in the work or not.

1.2.27. Price tables

Prices shown on the letter in the Price Chart No. 1, with the resulting low competition or auction, are the underpinning for the Contract and applicable only to works contracted. The Contractor shall not claim that any modification is introduced under pretext for error or omission.

The proportion of business was included in those prices in non-working days or reduced hours or overnight in the presence of pilots or supervisors via companies services, the Contractor may not make claim for any of these assumptions.

Prices Price Chart No. 2 shall apply solely in cases where it is Incomplete work must be paid when termination or otherwise terminated not reach the contracted works, but may be claimed valuation of each work unit fractional otherwise than as laid down in that table.
1.2.28. Payments to the Contractor

Unless otherwise indicated in the Bidding Documents and / or the Contract Award works contracted to be paid as work unit prices applying unit prices to measurements resulting from the work units.

They may also be settled in full, or in part, by raised lines.

In all liquidation cases by application of unit prices, quantities to be account will be established based on measurements deduced take-offs.

1.2.29. Measurements

Measurements are data collected qualitative and quantitative elements characterize the executed works, procurements made or the supply of goods, and be made in accordance with the provisions of these Terms. The Contractor is obliged to ask (in due time) the presence of the Project Manager, for making contradictory measurements in the works, services and supplies that were not susceptible to checks or further verification, failing which, unless contrary evidence, that must provide at its expense, shall prevail decisions of the Project Manager with all consequences.

1.2.30. Valorised relations

The Project Manager will make monthly provisional certification of works executed during the preceding month, which will be the basis for fertilizers that are made monthly to the Contractor.

The Contractor is obliged to provide to the Project Manager all elements and media to perform measurements and to witness them, and shall be subject to the procedures set by the Project Manager to perform. The Contractor shall sign documents data obtained may be included and concisely comments or objections, subject to submit other information to the Project Manager on the matter within a period not exceeding six (6) days.

If the Contractor is denied to any of these acts are deemed to have waived their rights and complies with the information of Project Management.

Simultaneously, the data, as determined by the Project Manager, can or should be taken after completion of the works for the final settlement.
1.2.31. Prepayments

Monthly payments will be made on account of work performed during the month, which will be subscribers under which indicates the Bid Conditions of Contract.

1.2.32. Unitary prices

Unit prices of "practical conduct" include, without exception or reservation, all the costs and expenses incurred in the discharge of each corresponding work of them, the resultant obligations to the Contractor by the different Contract documents and hereby Particular Technical Specification requirements.

These prices include all material execution costs necessary for the implementation of related work until full completion and commissioning, so that serve the purpose for which they were designed, in particular, without claiming a relationship exhaustive, the following:

- The costs of labor, materials consumption and miscellaneous supplies, including finishes and finished as necessary, even when there have been described explicitly in the description of the unit prices.

- Insurance of any kind and the costs of planning and organization of work.

- The cost of performing calculations; construction plans or sketches and updated file various of work.

- The cost of construction, maintenance, removal, and removal of all kinds of auxiliary constructions.

- The cost of renting or purchasing land for equipment and material deposits.

- The cost of protection and stockpiles of the work itself against any deterioration, damage or fire, meet the current requirements for the storage of explosives and fuel.

- The costs of Assurance and Quality Control of the Work.

- The prices of the units required for the execution of pilots have safety, electrification or security installations, include in any case the cost thereof, even if not specifically listed in the supporting prices.

1.2.33. Raised entries
Shall apply the provisions of Clause 52 of the PCAG. They are budget items for the execution of a work or of one of its parts in any of the following circumstances:

- For a fixed price defined prior to the completion of the work without decomposition in the unit prices (Part I integrate fertilizer raised).

- Justifying billing charge by applying basic prices, auxiliary or units of work existing in the budget to actual measurements whose definition prove inaccurate in the design stage (Part raised to justify).

In the first case the item is paid after the full completion of the work on it and defined under specified conditions, while in the second case only certify the amount resulting from the actual measurement.

1.2.34. Contradictions, omissions and amendments to the Draft

What is mentioned in these Terms and skip on the Drawings, or vice versa, shall be executed as if I were exposed in the two documents. In case of contradiction between the Plans and the Specifications prescribed conditions prevail in the latter.

Omissions or erroneous descriptions of the details of the work necessary to carry out the spirit and intent set forth in the Plans and in the Specifications, or to be made by the use and custom, not only does not relieve the Contractor from the obligation to execute them, but rather, shall be executed as if they were complete and correctly specified.

The various chapters of this Specification are complementary, meaning that prescriptions containing one and affects other force as if they were at all.

1.2.35. Defective or unordered units

The works that were not executed exactly according to the conditions, but were admissible, may be provisionally received, and finally, if necessary, with the reduction approve the APB and the Contractor shall accept unless you prefer demolish charge and redo according to the conditions of the Contract.

When the execution of any part of the work or unit that has not been authorized is detected will proceed to the stay of his execution until the Contractor is authorized to continue by the Project Manager, if it were shown that it has not meant a change in the project and has been executed in accordance with these Terms.
1.2.36. Uncompleted works

As a result of termination or other causes incomplete estimate necessary works, Price Chart No. 2 shall apply to the assessment can be claimed from the fractional work other than provided in the Schedule of Rates mentioned.

1.2.37. Work units not included in the budget

The units of work ordered by the Project Manager and not included in the Budget be executed in accordance with that specified in these Terms and rules cited or the which it refers, and failing that, by the standards of good building practice and directed by the Project Manager.

He paid the price, they stated in the Price Chart No. 1, in case of being included in it, or there is any comparable unit price work to done, or by being able compose several prices including for compliance by the Contractor, or continue for processing as appropriate under applicable law of Contracts Government.

1.2.38. Interference with port operations

The whole construction operations shall be conducted in a way that does not occur interference with the operation of the port. If necessary move equipment facilities or disrupt construction operations related causes of port operations, commuting or interruptions are always made by order Director of Development and will be at the risk of the Contractor, without being entitled to no payment.

The Project Manager may order the land transit of materials by volume withholding or cause significant difficulties to the operation of the Port, and to circulate hours when the springs are out of service.

1.2.39. Inspection and security

The Project Manager shall appoint watchers to foot force to ensure continuous inspection same. The Contractor may not refuse to appointed vigilantes, who shall at all times have free access to any part of the work, as well as workshops, factories, quarries, laboratories or other places are removed, materials or manufacturing or control units works.

The costs of production control shall be borne by the Contractor.
The Contractor shall provide and maintain uninterrupted access to the means of all parts of the work for inspection, as required by the Project Manager. To facilitate inspection, the Contractor shall not schedule any of the work without having informed the Construction Management twenty-four hours (24 hours) prior to the commencement of work.

1.2.40. Night works

Night work must be previously authorized by the Project Manager and be made only in the units indicated. Any extra amount will be paid by the performing night work.

1.2.41. Reception tests

The tests necessary to perform to fulfill the Statement will be made on a official or certified laboratory designated by the Project Manager in consultation with Contractor, that will take care of the expenses. The results of the tests shall be binding on both parties and the final decision as to issues of quality materials.

1.2.42. Diverse expenses

They will be at the Contractor's expense as specified in these Terms.

1.2.43. Industrial property

The Contractor shall be responsible for all sorts of claims relating to supplies, materials, methods and means used for the execution of the works and coming from holders of patents, licenses, drawings, models or brands or trade. If necessary is for the Contractor to obtain licenses or authorizations and precise support the burden of rights and indemnities.

The Contractor shall be responsible for the actions of third parties holding licenses, authorizations, drawings, models, trade marks or trade used for the execution of work and consequences arising.

1.2.44. Removing and cleaning the installation and completion of the works

Upon completion of the work, the Contractor shall promptly remove installation and structure provisional, including beacons, temporary signs, unless the Director of the Work provided otherwise. If the Contractor rejected, would show negligence or delay in Compliance with this
requirement, the facility will be considered as obstacles or impairments and may be removed from office.

The cost of removal, if necessary, will be deducted from any amount should or might be due to the Contractor.

1.2.45. General obligations

The Contractor is obliged to do everything necessary for the proper conduct, order and completion of the contracted work and so that traffic does not hamper the vials affected, although this is not expressly stated in the tender documents, provided in writing that the Director of Works, and without separating from the spirit and straight interpretation.
2. General description of the works

The purpose of this project is to define a level of construction project, the actions necessary to remodel the current intersection between the streets Avenida L’Estany Port, Carrer 100 and 114 Street to be part of the natural journey of arrival at the south extension in the municipality of El Prat de Llobregat.

Major works planned and the most significant data can be synthesized in the following sections:

**Track:**

The existing mini traffic roundabout is remodelled, taking into account all factors complying with existing and maximum and minimum geometric parameters indicating the Norma 3.1-IC.

The location of the gazebo plan is strongly influenced by the existence of consolidated parcels within the project and the current layout of the streets access the same. Therefore, it was necessary to move towards the centre of the southeast roundabout to the point of intersection of the axes of the streets. A roundabout is planned outer radius of 35m.

**Cross section:**

In accordance with the provisions of the Recommendations on roundabouts of Highways, Ministry of Public Works, should not arranged outer shoulders of more than 1 m wide at the ring road, as it can lead to a false or incite additional lane parking.

In the existing road connection type sections are held in L’Avenida Estany the Port, Carrer 100 and Street 114.

**Wrecking:**

The dismantling of elements such as fences, barriers are expected security staffs or lighting columns, vertical signs, curbs, caps manholes, pits, and elements of existing pipelines in the area to be reset.

Also, demolitions firm and defined sidewalks, pavement cutting, the factory demolition work and tree removal.

**Excavation:**
Roughly speaking, are summarized in 3.627 m³ of excavation, 397 m³ of fill, 758 cubic meters of soil to stabilize and 758 m³ of soil selected.

Sections of firm:

They are flexible and are made in thickness and chord type with Norma 6.1-IC, by artificial gravel, hot mix asphalt concrete type bituminous. Primer irrigation and provide necessary adhesion.

Drain:

A sewer is projected inclinations with minimal elements 0.3%. PVC-U pipes are used with concrete coatings equal to the minimum required by CLABSA.

One scupper every 180 m² of surface has drained at least dimension 70x30 cm. The type of fence is Barcelona1 scuppers. The maximum spacing scuppers is 15 m. The junction between two scuppers is done with tubes of 300 mm diameter, how minimum.

Connection collectors to scuppers made directly to the base of manifold, without the need to make a hole. These connections to collectors or wells or tubes made with 500 mm diameter.

Signage, markings and defences:

Road markings, signs and posters available necessary, in accordance with 8.1 and 8.2-IC-IC Rules. It also takes into account the urban character of the performance.

In addition, safety barriers are provided and reflector on roadways to improve road safety.

Lighting:

Lighting designed network consists of a central control exists, you connect lighting circuits designed using reserve C-5 and C-6 available in the existing control box and routing from that point of the two lighting circuits.

The lighting is projected according to the "Regulations per leading location at "Obres dins d'Urbanització Servei area of the Port of Barcelona".

Telecommunications network:

A pipeline constituted by a prism is expected telecommunications conduits 9.
Manholes every 50.0 m, or changes in direction are provided. Concrete anticipated prefabricated or solid brick, interior dimensions 70 x 70 cm and 1.0 m in height, approx.

**Irrigation network:**

In the irrigation system as defined in this project two types of irrigation are covered well differentiated: I sprinkler and drip irrigation of roadside trees.

The hydraulic systems for irrigation project with LDPE pipe density up to 75 mm diameter and low or medium density to diameters 90 mm. All pipes and fittings for the installation will be pressure work at least 10 atm., and according to regulations for food use.

Preferably hydraulic lines run through flower beds or areas of land, avoiding all possible asphalted or paved areas.

The irrigation network to run, is projected as an extension of existing in Avinguda de L'Estany the Port. Thus, existing sidewalks, we proceed to extend the secondary network drip for street trees. Furthermore, both the median Avinguda de L'Estany the Port, and the summerhouse, the extension of the primary network is planned and secondary to feed projected hydrants and sprinklers.

Thus, the projected irrigation network is divided into different primary and / or secondary networks.

**Gardening:**

The new trees, alignments and species, are based on different criteria public space design developed in this project.

Extend existing alignments in the Avinguda de L'Estany the Port, which is proposed planting "Populus Nigra". These trees are planted at a port 2m height so that its adaptation to the environment and your success is guaranteed.

The kind of grass to plant, following the criteria of Parcs i Jardins, will be of type C-4, lawn has, among others, feature improved resistance to drought and therefore needs less irrigation allocation.

**Replacement of the sewerage system:**
Currently, within the scope of the project as on the streets of this connection, two sanitation networks belonging to City of El Prat de Llobregat and the Metropolitan Entitat Serveis Hidraulics I Tractament of Residus (EMSHTR) whose management is entrusted to the Metropolitan Company Sanejament (EMSSA).

**Replenishment of the water supply system:**

Inside the scope and as in the streets of this connection, a network of water supply, THE ART AIGÜES property.

In addition, two supply lines that run through both sides of the L’Estany del Port Avenue, formed by a 250 mm diameter cast iron pipe in the range right (adjacent to the WWTP Baix Llobregat) and polyethylene pipe Ø 200 mm in the left margin. For the existing sidewalk, street 114, runs another line of Ø 250 mm cast.

**Resetting the network of reclaimed water:**

Inside the scope, as well as streets connecting to it, there are two lines of reclaimed water, the management is entrusted to the Metropolitan Company Sanejament EMSSA.

Since the area of tertiary treatment of the sewage treatment to 114th Street runs one Driving Ø 400 mm diameter carrying reclaimed water to the park Montjuic in Barcelona. In most of its route passes through the inside of the plot of the water treatment plant to the existing electrical box next to the entrance to thereof. From this section breaks the tube and placed under existing pavement in L’Avenue Port Estany to reach 114th Street. In this last section we affect the scope of the project, the upper bound of the tube is located at an altitude of 2.20, well below the lower bound of the dozing to execute, without provision for either condition a tube.

**Resetting the network Natural Gas:**

By land situated on the ocean side of the street 114, running a gas line belonging to high-pressure Natural Gas Company.

The proposed action will affect the pipeline and milestones of this signalling. It is therefore necessary to proceed with the replacement of the same.

The proposed replacement of all mechanical work has been performed by technicians Natural Gas Company; the project is attached as an appendix to this schedule.

**Replacement of pipelines Fecsa-Endesa:**
Within the scope of the project and on the streets of connection with this, there are different underground piping medium and low voltage belonging to the electric company Endesa FECSA.

The performances affect the projected medium voltage underground conduits company FECSA Endesa, being necessary to replace them.

The proposed replacement has been made by the company technicians FECSA Endesa, as the project is attached as an appendix to this schedule. The solution is basically on a path in variant MV pipes affected the projected path.

**Resetting the telephone network:**

There within the scope, different underground conduits and aerial telecommunications telephone line belonging to the telephone company. These pipes run along the left bank of the L’Avenida Estany the Port and the existing sidewalk on 114th Street., In turn, by land in sea side of 114th Street, a line extending telephone aerial on wooden supports.

The planned actions affect the pipeline 8 ducts running through the L’Avenida Estany of Port Street at its junction with 114, the air conduction and telephone 4 prism ducts running parallel to 114th Street.

**Siding:**

Depending on your location the following types of project closure:

Closing in Purifying land: The procedure for the replacement of the existing enclosure, fax type Rivisa 2.0 m high fence.

Closing plot ZAL: placing a fence is planned features similar to existing and consisting of galvanized wire single twist, with mesh size of 50 mm and 2.0 m in height.

**Waste management:**

In compliance with the provisions of Royal Decree 105/2008 of 1 February, on the production and management of construction waste is regulated and demolition (BOE. 38, of February 13, 2008) A Study of Management is drawn Waste, which is included in Annex No. 13 of the Draft.
The producer of the waste shall ensure compliance with the specific regulations, encouraging waste prevention work, reuse, recycling and other forms of valuation, always ensuring proper treatment to ensure the development of sustainable construction activity.
3. Basic materials

3.1. General considerations

In this chapter the properties and characteristics required materials specified which should be used in the work. In the event of any material or feature would not been sufficiently defined, it must be assumed that it is the best quality that exists in the market in its class and must comply with technical regulations. In any case, shall be recognized by the Director of Works, which if not met may reject, in their opinion, the conditions required to achieve the target to engage, without the Contractor have entitled to claim.

When the Project Management reject any batch of material not qualify required by this Specification, the Contractor shall remove from the work within ten days (10 days), counting from the date to be communicated. Failure to do so within that period, the Directorate of Work may order the removal from office and at the risk of the Contractor.

These materials shall have the dimensions and characteristics that make the documents Project or as directed by Construction Manager.

The Contractor shall propose for approval by the Project Manager, in time, the provenance of the materials you intend to use and submit the markings and signs materials to pass, together with certificates of tests and analyses that address work deem necessary, made in laboratories and workshops the Project Manager may direct.

Samples and certificates will be stored for later testing if required.

Fixing the origin of the material or its authorized change shall in no case reason for the variation of the prices offered and the period of the work. Should not been defined, because of the Contractor, within one (1) month, the origin of any material, the Project Manager may fix without the Contractor have right to claim the offered prices and may incur penalties for late the failure to meet deadlines.

However, all tests provided above do not involve the receipt of materials and therefore the responsibility of the Contractor will not cease until the works are received where they are used.

The Project Manager can remove, by the Contractor, those materials with defects not noted above, even if placed.
3.2. Materials for embankments, esplanade and located fulfilments

The materials used in the enhancement layer and subgrade are located fillers soil or granular materials consisting of products containing no organic matter decomposed manure, roots, topsoil or other similar material. These materials will come from loans and/or quarries approve or indicate Works Director.

3.2.1. Embankments

The materials used in the foundation and core of the embankments will be tolerable or adequate and comply with the provisions of Article 330.3 of the PG-3. At the coronation will be used selected soils or stabilized soil, as indicated on the drawings of sections of type Project.

The materials used in fillings embankment cleaning type are equal to the used in the foundation layer of said fillers and the requirement of compaction will be corresponding to said backing layer of fillings.

3.2.2. Esplanade made by selected soil

The size and type of material making up the different layers of the coronation of the fills and subgrade improvement reflected in the type sections planes.

Selected soil type 2 used. Bearing capacity of this layer is required for the category of defined esplanade plans and sections CBR type, corresponding to the conditions of compaction laying, is at least five (CBR $\geq$ 5), according to UNE 103502.

3.2.3. Esplanade made by stabilised cement soil

Shall apply with respect as is specified below, the provisions of Article 512 "stabilized soils in situ" of the PG-3.

Cement:

The cement used shall be Portland slag type CEM II / BS 32.5 N and must comply Instruction for receiving cement (RC-08), approved by Royal Decree 956/2008, of June 6.

If the SO$_3$ content of the soil is greater than 0.5 will be sulphur-resistant cement (SR).
Soil:

Terms:

Stabilize the soil will be clean, quality, free from clay materials, plant or that harm organic cement grout. The materials used come from the management of Runes.

Particle size:

Stabilize soil cement shall not contain elements of superior size eighty millimetres (80 mm).

Type and composition of the mixture:

The stabilization work will gain in S-type EST3 with cement. The minimum thickness and the widths of the layer planes are reflected in the type section.

Control of source materials:

Cement:

The requirements of Article 202 of the PG-3 will be followed.

Soil:

Before initiating the stabilization, soil type is identified, determining their fitness. Control is performed as set forth in paragraph 512.9.1.3 PG-3.

3.2.4. Located landfills

Shall apply with regard then, the provisions are specified in Article 332 of the PG-3.

This unit consists of the expansion and compaction of soils, from loans (previously authorized by the Director of Works) in backfilling, backfill of collectors, foundation and berms or any other area, which by its small size, engagement structural or other reasons do not allow the use of the same equipment with machinery that performs the execution of the rest of the filling, or requires special care in their construction.

Backfilling:
The materials used in backfilling for installation of sewers and pipes services will be suitable soils or sands selected from loans or quarries, duly authorized by the Director of Works, as indicated on the drawings Project.

Suitable soils and selected to be used meet the specifications indicated in 332.3 PG-3.

The sands have the seat filled pipes or ditches are discussed elsewhere in this Specification.

The shape, dimensions, characteristics and compaction of these fillers are reflected in the plans Project.

3.3. Drainage materials

3.3.1. Chambers and sinks

Chambers and manholes:

This unit relates to the implementation of concrete manholes and pits.

Wells or manholes will have the shape, dimensions and materials are reflected in the plans of Project. The Project Manager can adapt to the needs of the work without changing assessment.

Its location and elevation shall be as indicated on plans. Both the boxes and manholes shall be easily cleanable, prohibited; manholes not registrable.

The planned wells can be prefabricated or executed "in situ":

- Precast Concrete: Must comply with Concrete Instruction Structural (EHE-08). Transportation, handling and storage shall be carried carefully, being rejected those parts which are defective.

- Implemented "in situ": The walls and sills of wells, including the tapered portion is be made with concrete HA-35 IIlc Qc. The steel used is Type B 500 S.

The walls and hearth of the boxes are made with concrete HA-25. The steel to be used Type B 500 S.

Covers and fences:
Type tramex grid must be able to withstand without permanent deformation six wheel t (6 t) applied on a square area six hundred twenty-five square centimetres (625 cm$^2$).

Covers or grates and fencing materials will be indicated on the drawings.

Covers or gratings conform to the body of the work, and placed so that its outer face is flush with the adjacent surfaces.

Be designed so that they can withstand the passage of traffic, taking precautions to avoid theft or displacement.

**Inlets and drains:**

The shape and dimensions of these elements are reflected in the plans for the project.

Sinks are placed in the margins of the vials. They can build with:

- Brickwork: They will meet as indicated in Article 657 of the PG-3 and General Specification Conditions for receipt of bricks in construction. The solid bricks to be used.

- Precast Concrete: Must comply with Concrete Instruction.

Structural (EHE-08). Transportation, handling and storage shall be carried carefully, being rejected those parts which are defective.

### 3.3.2. Pipes and tubes

**PVC-U pipes for collectors:**

Tubes plasticized polyvinyl vinyl PVC-U, double wall, smooth interior will be used and corrugated exterior, shall be as that governing sanitation in the tender documents General Technical Specifications for Piping Sanitation Populations and in particular the requirements of the UNE EN ISO 9969, prEN 13476 and EN 1401-1, using exclusively by unions gasket EPDM (ethylene-propylene) housed in the end cape tube. The tubes will tile series colour.

The tubes will be reviewed prior to placing and, if in the judgment of the Director of Works, breach somehow these rules, this physician may refuse. Be cleaned of all foreign bodies and thus maintained until final acceptance works.
Precautions shall be taken in settling land susceptible to ensure theoretical coordinates and prevent breakage of the pipes.

3.4. Firm materials

3.4.1. Granular layers

ARTIFICIAL GRAVEL:

Materials:

The materials used in the layer of artificial gravel come from the stone crushing quarry or natural gravel.

The dimensions of the layer (minimum thicknesses and widths are reflected in the flat sections Project type.

Shall apply with respect as is specified below, the provisions of Article 510 "zahorras" PG-3.

Particle size:

The maximum size will not exceed one half (1/2) the thickness of the compacted tier. Curve grain size of the material will be covered in the relevant zones of gravel ZA25, as used in the project.

Hardness:

The coefficient of Los Angeles, according to UNE-EN 1097-2, aggregates for artificial gravel shall not exceed 30, according to the values indicated in Table 510.2 of PG-3.

Plasticity:

The material will be "no plastic" according to the UNE-EN 103104.

Cleaning:

The sand equivalent, according to the UNE-EN933-8, the material of the artificial gravel should be higher than 40, according to what indicated in Table 510.1 PG-3.
**Control of source material:**

It will be held in accordance with the provisions of 510.9.1 of PG-3.

**3.4.2. Bituminous mixtures and irrigation**

**HOT BITUMINOUS CONCRETE TYPE:**

**General aspects:**

The execution of this work unit will be in accordance with the technical requirements Terms of bituminous hot mix bituminous concrete type included in the Article 542 of the Order Circular 24/2008 on the specifications of General Technical Requirements Roads and Bridges (PG-3) (hereinafter Order Circular 24/2008), with the following individual requirements.

The aggregates for the manufacture of bituminous mixtures shall be subjected to the test of identification by X-ray, which will have to deduce that have no component expansive. Otherwise it will be rejected and may not be used.

Also be required to submit the certificate from the quarry of origin of the aggregates, which state that fulfils all the requirements of PG-3 for use.

**Carbohydrate binder:**

They comply with all the requirements of Sections 211 "Asphalt Bitumen" or 215 "Asphalt Bitumen Polymer modified "of PG3, as appropriate.

The bituminous binder of bituminous hot mix bituminous concrete type to use in layers will be rolling type BM-3c.

The bituminous binder to be used in other layers of hot mix asphalt type asphalt concrete (middle and base) will be B60/70 type.

**Barren thick:**

The proportion of fully and partially fractured particles, according to UNE-EN 933-5, shall be one hundred percent (100%) according to the set in Table 542.2.an Order Circular 24/2008.

The siliceous in nature will be rolling layers.
The coefficient of coarse aggregate Los Angeles, according to UNE-EN 1097-2, must comply with the set in Table 542.4 of the Order Circular 24/2008. This coefficient is equal to or less than 25 in the intermediate and base layers. In the surface layer this coefficient is equal to or less than twenty (20).

**Fine aggregate:**

The aggregate used in bituminous mixtures shall be natural sand, sand from the crushing or a mixture of both materials, free of dust, dirt, clay and other materials strange.

Natural sand shall consist of stable and resistant particles, and should not get into the mix, exceeding ten percent (10%) of the total weight of aggregates.

Employment Sands beach or rivers affected by tides is strictly prohibited.

**Mineral Powder:**

The recommended weight ratio of powder mineral filler and bitumen shall comply with the indicated in Table 542.12 of the said Circular Order.

The percentage contribution of mineral dust shall comply with Table 542.7 of the said Circular Order.

The particle size distribution of mineral dust shall be determined according to UNE-EN 933-10. 100% of the results must be within the general sieve zone defined in Table 542.8 of the said Circular Order.

**Control of origin of the binder:**

It will be mandatory as prescribed in Article 211.5 of the PG-3 and Article 542.9.1.1 Circular of the said Order, except as indicated below.

All bitumen tanks arriving to the plant shall hold a certificate specifications, a copy of which shall be given to Control Laboratory Quality or the Project Manager.

For each item that comes into the plant one (1) sample is taken, according to NLT 121 on the following tests:

- Penetration test according to NLT 124/84.
• A softening assay according to NLT 25/84.

• A penetration rate test according to NLT 181/84.

• A test about brittle point according to NLT 182/84.

• A test about ductility according to NLT 126/84.

In addition, another sample to be stored for possible further tests will be taken.

**Control of origin of aggregates:**

If the aggregates to be used in surface course or intermediate certificate will furnish certifying compliance with the mandatory specifications of this product or document accrediting approval mark, quality mark or stamp of the aggregate, as described in section 542.12 of the Circular Order mentioned, the criteria described below to perform the control source of aggregates shall not apply mandatory, subject to the powers corresponding to the Project Manager.

**Control of origin of mineral dust contribution:**

Quality mineral powder to be used in hot mix asphalt, may justify providing a certificate of compliance with the mandatory specifications.

This article or document of approval for the brand, mark or stamp of quality mineral dust, as indicated in section 542.12, without prejudice to the powers corresponding to the Director of Works.

**PRIMER IRRIGATION:**

**Carbohydrate binder:**

The binder used is a cationic emulsion ECI with a minimum bitumen content of forty percent (40%), except that the Contractor shall propose another type of binder and this is accepted by the Director of Works. Comply with the provisions of Article 213 of the PG-3.

The allocation of the binder will be defined by the amount the printed layer is able to absorb in a twenty-four (24) hours, and must be at least equal to five hundred grams per square meter (500 g/m2) of residual binder.

**Aggregates for primer irrigation:**
The aggregate coverage to use, optionally in irrigation primer will natural sand, crushing sand or a mixture of both, free of dust, dirt, clay or other foreign matter.

The characteristics of this arid meet the specifications of Article 530.2.2 of the PG-3.

The allocation of the aggregate coverage shall be the minimum necessary for the absorption of excess binder, or for the protection of the primer under the action of any movement during the work on this layer. That amount, in no case exceeding neither six liters per square meter (6 l/m²) nor less than four litters per square meter (4 l/m²).

Quality Control:

Control of origin of the materials will be conducted according to the requirements in paragraphs 530.7.1 and 530.7.2 of the PG-3.

ADHERENCE IRRIGATION:

Binder:

The emulsions used in the works shall ECR-1d type, except that the Contractor proposes other binder and this is accepted by the Director of Works. Should comply Article 213 of the PG-3.

The provision of irrigation not in any case be less than two hundred grams per square meter (200 g/m²) of residual binder.

Quality control:

Emulsions comply with the reception control specified in paragraphs 213.4 and 213.5.1, PG-3.

CURING IRRIGATION:

Bitumen emulsion:

The emulsion to be used in the works of ECR-1 type, except that the Contractor shall propose another type of binder and this is accepted by the Director of Works. Shall comply with the provisions of Article 213 of the PG-3.

Aggregates for curing irrigation:
The aggregate coverage employ eventually be cured in irrigations natural sand, sand crushing or a mixture of both, free of dust, dirt, clay or other materials strange.

The characteristics of this arid meet the specifications of paragraph 532.2.2 of PG-3.

**Quality Control:**

Control of origin of the materials will be conducted according to the requirements in paragraphs 532.7.1 and 532.7.2 of the PG-3.

### 3.4.3. Additional work

**Curbs and trench footings:**

The precast concrete placed on a hearth defined as curbs concrete, constituting a strip defining a particular surface. The project has defined curbs on sidewalks vials.

The trench footings are prefabricated concrete elements that have attached to the curbs into driveways continuous thing conforming with the curb.

The curbs and precast concrete trench footings will be executed in the workshop or on site, with reflected in the shapes and dimensions corresponding planes.

**Hydraulic floor tiles:**

These floors will run on the sidewalks and on the bike path. They are hydraulic tiles: four tablets mortar 20x20x4 cm.

The dimensions of the tiles, sidewalks, and characteristics of the materials that make up the sidewalks are reflected in the plans for the project.

The seat of the tiles made with a seat mortar MCP-3, 3 cm diameter, approx.

**Pavement concrete paver:**

The dimensions of the pavers are defined in the project plans. The colour of the face side will be defined by the Director of Development.

The concrete pavers are bilayer and meet the UNE EN 1338.
3.5. Mortar and concrete

3.5.1. Water for mortars and concretes

General aspects:

Water features used for mortars and concrete shall conform to the requirements of Structural Concrete, EHE-08.

The use of seawater in all cases is expressly prohibited that do not expressly permitted by this Specification.

Quality control:

Sampling and testing for the fulfillment of the conditions shall be according to the test methods UNE 7130, 7131 UNE, UNE 7132, 7178 UNE, UNE 7234, UNE UNE 7235 and 7236. The Contractor shall monitor the water quality to meet the characteristics specified in such instructions. Were required to analyze the water before starting to be used, and the change of origin, carrying out a comprehensive test it entails, with the limits indicated:

- An analysis of acidity (pH), UNE - 7236.
- An assay for soluble substances, as UNE - 7130.
- A chloride content test, according UNE - 7178.
- An assay for sulfates, UNE - 7131.
- A qualitative assay of carbohydrates, according to UNE - 7132.
- A trial of fat or oil content, as UNE - 7235.

3.5.2. Aggregates for mortars and concretes

General aspects:

The characteristics of aggregates and mortar shall conform to the specifications of Structural Concrete EHE-08.
The Contractor shall submit for approval by the Director of Works quarry or stockpile that for production of mortar and concrete aggregates, he intends to use, providing all supporting elements to the suitability of the aforementioned sources creates convenient or that they were required by the Director of Works.

The aggregates for the manufacture of concrete shall be tested identification X-rays, which are inferred to have no expansive component. Otherwise be rejected and may not be used.

**Aggregates for concrete:**

Shall comply with the specifications of Article 28 of the EHE-08 plus:

- Fine aggregate content passing through the sieve is less than 0.080 five (5%) by percent based on the sand, and two (2%) percent based on the total aggregates.

- Fineness modulus of the sand will be between two and three (2, 3).

- For sand, the sand equivalent is greater than eighty (80).

- All aggregates should be washed before use.

- The amount of sulphates and sulphides in the concrete should not exceed one gram per liter (1g/dm$^3$).

- The abrasion resistance shall give a trial value of attrition to lower Los Angeles to thirty-five percent (35%).

- Should be classified in a number of sizes sufficient to constitute a continuous grain.

**Quality control:**

The Contractor shall control the quality of the aggregate, according to the requirements of this Specification before start of works if there is no background and always changing conditions of supply.

Likewise, and with the frequency indicated, the following tests were performed:

- For each hundred cubic feet (500 m$^3$) or fraction thereof, or once every fifteen (15) days:
  
  - A sieve test and fineness modulus according to NLT-150.
O A test of content material passing through the sieve 0.080-7050 UNE, UNE-7135.

• Once every fifteen (15) days, provided that weather conditions do provide for possible alteration of the features:
  o A test for moisture content, according to ASTM C566.

• Once every two (2) months:
  o A test of organic matter content, according to UNE-7082.

• Once every six (6) months:
  o A content test soft particles in coarse aggregate, according to UNE-7134.
  o A test of clay lumps content, according to UNE-7133.
  o A lightweight content test subjects, according to UNE-7244.
  o A test of sulfur, according to UNE-7245.
  o A test for resistance to sulfate attack, according to UNE-7136.
  o A test reactivity to alkali, according to UNE-7137.
  o For the coarse aggregate, an assay for determining the form of particles, as UNE-7238.
  o When used, a stability test of steel slag as UNE-7243.
  o In concrete with anti-abrasive aggregate, a trial of abrasion resistance, as NLT-149.

3.5.3. Cements

General aspects:

The cement used in concrete shall comply with the provisions of Royal Decree 956/2008 6 June, according to the definitions contained in Instruction for receipt of Cement (RC-08), currently in force.
Also, comply as specified in Article 202 of the PG-3 specifications instruction EHE-08, and the UNE-80.301.85.

Basically, the use of cement mixtures is prohibited. Special precautions should be taken to prevent a unit of work is used by mistake a different hydraulic binder of that specified by the fact work simultaneously storing different types of cements.

**Terms of delivery and storage:**

The manufacturer must submit a data sheet of cement where the class is indicated and nominal amounts of all components, and the date of delivery. For that prompted the beginning and end of the set will be indicated and / or detailed information incorporated additives and their effects.

If the cement is supplied in bulk is stored in silos. If supplied in sacks are stored in a dry place, protected from the elements without direct contact with the ground.

### 3.5.4. Additives for mortars and concretes

The additives used in the manufacture of mortars and concrete shall conform to the requirements of EHE-08 instruction. The brand, quality and quantity of products to be used shall be approved by Construction Management.

For reinforced concrete will not be used as an additive calcium chloride, or in general chlorides, sulphides and sulphites or other chemicals that can promote corrosion armor.

### 3.5.5. Mortars

The characteristics of the mortars to be used in the works comply with the requirements in Article 611 PG-3.

### 3.5.6. Concrete

Shall apply in full the EHE-08.

The ductility of the concrete will be measured by the seat Abrams cone tolerances referred to in Article 30.6 of the EHE-08.

In addition to the EHE-08 and RC-08 the following shall be present:
The Construction Management established dosages of cement, aggregates, water, and in his case additives, according to the contents of paragraph 610.5 of Chapter 610 of the PG-3 by the appropriate tests. For each type of concrete there will be many ways of working as methods of placing intends to use the Contractor.

The tolerance allowed in the dosages is:

- For each aggregate size: 2%.
- For cement: ± 15Kg.
- For the water-cement ratio 0.02.

Aggregates, water and cement are dosed by weight necessarily means automatic. A measuring instrument shall be checked as frequently as necessary in the opinion of Construction Management and at least once every fifteen (15) days.

The installation of concrete must be able to make regular and intimate mixture of the components, providing a uniform concrete color and consistency.

For concrete pre-and characteristic tests of concrete made with criteria set out in the EHE-08 instruction. The tests will begin in Concrete laboratory, but for the final approval of the formula of work performed series of samples from an identical concrete to be used in the work.

The Project Manager may impose a maximum aggregate size for different dosages.

The workability of the resultant concrete will be such that with the proposed positioning means by the Contractor a compact and homogeneous concrete runs.

### 3.6. Steel

#### 3.6.1. Armor to be used in reinforced concrete

All steel for reinforcement shall comply with the provisions of Article 31 of the EHE-08. Corrugated steel bars of "weldable" type B 500 S or welded mesh should be used type B 500 T specified therein. The diameters, shapes, sizes and types should be those indicated on the drawings. Quality is checked as specified in the Article 90 of the EHE-08 instruction.
For steel to be used in reinforced concrete level of quality control is normally be considered under Article 90 of the EHE-08.

3.6.2. Galvanized

Definition:

Is defined as galvanized, the operation of coating a metal with an adhesive layer of Zinc that protects it from oxidation.

Type galvanized:

The galvanizing of a metal may be obtained by immersion of the metal in a bath molten zinc (hot dip galvanized) or zinc plating.

Implementation of galvanized:

The base material shall meet the requirements of the UNE 36080, 36081 and 36083.

For hot dip galvanizing zinc ingots used crude first merger, which respond to features specified for this purpose in the UNE 37302.

Appearance:

The appearance of the galvanized surface is uniform and not submits any discontinuity in the zinc layer. In those parts in which the crystallization of the coating is visible to the naked eye, it must be checked that it has a regular appearance on the entire surface.

Traction:

Any detachment of the coating will occur by subjecting the work piece galvanized the adhesion test specified in MELC (Test Method Central Laboratory) 8.06a "galvanized test methods."

Mass of zinc per unit area:

Determination is made in accordance with that specified in the MELC 8.06a, the amount of zinc deposited per unit area shall be at least six grams per decimeter square (6 g/dm²).

Continuity zinc coating:
Hot galvanized: assay performed according to the specifications in the MELC 8.06a, appear continuous coating and the base metal shall not be exposed to any point having been submitted the piece to five (5) dives.

**Coating thickness and density:**

Projection galvanized plating: conducting the test in accordance with the MELC 8.06a specified in the coating thickness is eighty-five (85) microns.

### 3.7. Materials for signaling and beaconing

#### 3.7.1. Road markings

Pavement markings shall comply with the provisions of Rule 8.2-IC “road markings” adopted by Ministerial Order of 16 July 1987 and Norma 8.3-IC “signaling work.”

They also comply with the provisions specified in the Technical Specification required listed here:

The most suitable materials to be used are: road markings to use permanent employment (white color):

- Wear factor of between 4-9.
- Paintings (acrylic paint in aqueous solution).
- Dosage:
  - Base material: 720 g / m².
  - Glass microspheres: 480 g / m².

The characteristics to be met by materials are specified in the UNE 135 200 (2), paint, hot-applied thermoplastic and cold applied plastic.

Also, Drop-on glass beads to use in reflective road markings shall meet the specifications indicated in the UNE-EN-1423. The particle size and the method of determination of defective percentage are those indicated in the UNE 135237.
When premix glass microspheres are used, shall apply the UNE-EN-1424 prior approval of the particle size thereof by the Director of Development. Furthermore, the materials used in the application of road markings shall comply with concerning durability according to what is specified in the "method B" specifications UNE 135 200 (3).

**Supply:**

It will be carried in bags clearly identified with name and serial number. The sac must be added to completely boilers material preheating and once molten material acting plasticizer.

**Implementation:**

- The road surface should be thoroughly dry and free of dirt, detritus, mud, and other foreign agent that might interfere with adhesion of the material pavement. The conditions under which this material is proceeding to disposal if necessary must be checked.

- For floors where the temperature is below 5 ° C, the material should be applied with a primer which increases the adhesion of the substrate; here, it is suggested to use Hot Spray tack-coat as a primer.

- The material shall never be heated for application at temperatures exceeding 230 ° C.

- To achieve high retro reflection from the outset, it should add Drop-glass microspheres in an amount by not less than indicated above.

Before starting the implementation of road markings will be repainted or materials necessary using white paint and glass beads are tested by the Official Laboratories indicated by the Construction Manager to determine if they meet the current specifications.

### 3.7.2. Vertical signs

**General aspects:**

Signs and posters are to be viewed from a moving vehicle will have the dimensions, colors and composition given in Chapter VI. Section 4 of Regulation General Circulation and the Norma 8.1-IC Road "Signage Vertical" and 8.3-IC "signage, markings and defenses still works on roads outside of town."
The signs on their face view will be flat. Signals may have a perimeter flange or be provided with other systems, provided that the structural stability is ensured and physical and geometric features remain during their service period.

**Badges:**

The materials used as substrate for the manufacturing of signs and billboards vertical permanent employment are galvanized steel plates and aluminum slats.

The galvanized steel plates and aluminum slats meet the specified requirements on UNE 135 310, UNE 135 313, UNE 135 320, UNE and UNE 135 321 135 322. It must be proven their certification (CE, or mark "N" of AENOR).

**From the retro reflective materials:**

Retro reflective materials used in making signs and posters vertical circulation will retro reflection level 1 and 2, as indicated on the drawings. The characteristics required retro reflective materials microsphere glass shall be as specified in the UNE 135334.

**Support members and anchorage:**

The supporting and anchoring elements, signals and vertical movement posters retro reflective, provide the accrediting certification document.

The poles are made of extruded aluminum designation indicated on drawings. The diameter 76 be appointed MB of Specification Technical Specification. The diameters of 90 will MC designation. The diameters of 114 will be appointed MC and ME. The appointment will be ME and MF, for 140 diameter.

The dimensions of these are reflected in project plans. The subject of the posts to the foundation shall be by galvanized steel plates 76, 90, 114 and 140 mm diameter.

The calculation assumptions to be considered for the design of any element support and anchorage are as defined in the UNE 135311.

**Foundation:**

The foundations of signals and signs consist of a given concrete dimensions HM 20 indicated on the drawings.
For concrete it shall apply the requirements of Structural Concrete (EHE-08), Article 610 PG-3 and in these specifications.

### 3.8. Lighting materials

For electrical and lighting installation will take into account the provisions of Regulation Low voltage electro technical. Materials and equipment shall be of premium brands that have catalogs with specifications listed perfectly.

If the project is specified brand and for some reason are unable to supply, should submit samples and technical catalogs to the Project Management of alternative materials shall be approved for possible use.

Materials that are not defined in any Project Document shall models standard for electric service and shall submit for approval of the Directorate of Work to be used.

#### 3.8.1. Junction Boxes

The boxes will consist of a body and a lid. Have uniform appearance and flawless. When will be recessed or surface anchoring fins. When be mounted surface will be holes in the body for fixing.

Plastic junction boxes are used, normalized for lighting, connecting power lines in and out up to $25 \text{ mm}^2$, more referral luminaire two fuses 6 A.

#### 3.8.2. Drivers

**Features:**

To calculate the power and the conductor section of lighting network has followed as specified in the Regulation for Low Voltage, approved by Royal Decree 842/2002 dated August 2, 2002, and instructions MI MI BT 017 and BT 004.

Electrical conductors will be copper and comply with the provisions of the UNE 21.123.

The minimum diameter of the connecting lead of six (6 mm2) square millimeters. Drivers for alternating current are internally identified by the following colors:

- Phase R: Brown.
• Phase S: Black.
• Phase T: Grey.
• Neutral: Blue.
• Land: Yellow with green transverse stripes.

3.8.3. Bare copper wire

The driver will be used bare copper wire. In addition, it will include all the small necessary for securing this material, as well as for ground assembly derivation of the ground network and staples for binding to the column, or metal frame.

The minimum section is $35 \text{ mm}^2$, as ITC-BT-09. Will building and electrical resistance class 2 according to UNE 21.022.

3.8.4. Pipes

Light pipes under pavement or unpaved area under roads, will be formed by 4 tubes of diameter 110 mm diameter recordable boxes. The prism in the tubes are embedded is made with HM-25 concrete for added protection.

Tubes:

In pipes tubes used Corrugated Polyethylene high density double wall (smooth interior, corrugated exterior) of 110 mm in diameter.

These pipes shall comply with:

- Compressive strength: less than 5% deformation under load diameter of 450 N.
- Protection external influence: solids and water penetration: $\geq$ IP 30 according to 60529.
- Working temperature: from -40 °C to 100 °C
- Impact resistance: -5 °C

Concrete:
Placing concrete in the prisms of the pipes will be HM-25. It shall apply requirements of Structural Concrete (EHE-08), Article 610 PG-3 and these specifications.

3.8.5. Protection Devices

The protective devices shall comply with the provisions of Regulation for Low Voltage and in addition, the types of instruments, the UNE 20317-88, 20314, 21103 - 91 (1) 2R, 21103-95 (2-1), 60898-92, 60947-2-94. and 60947-3-94.

3.8.6. Material for ground facilities

In general, be ground plates of steel, square, upper surface 0.25 m² and of at least 3 mm thick.

3.8.7. Manholes

Arranged the boxes next to each point of light, interior dimensions are 35 x 35 cm (frame dimensions 40 x 40 cm), with a maximum depth of 65 cm. For greater than 65 cm deep and at intersections, changes in direction and positioned manholes in driveways, manholes interior dimensions 55 x 55 cm (dimensions will run frame of 60 x 60 cm).

Overview:

The manholes shall be precast concrete with HA - 250.

These chests arranged in the base of an aperture to ensure drainage of water can reach the sink. The basis of the boxes will slope toward the opening.

The materials and the shape and dimensions of the various types are used manhole are defined in the plans.

3.8.8. Lighting columns

The columns for lighting shall comply with the conditions set out in the following legislation:

- Royal Decrees of 2.642/1.985 401/1.989 December 18 and 14 April 1989, and the Ministerial Decrees of 16 May and 12 June 1989, for which declared mandatory technical specifications Candelabra metal (staffs and external lighting columns and traffic signal) and approval by the Ministry of Industry and Energy, BOE # 21 of 01/24/86.

• 2.531/1.985 Royal Decree of December 18, by declaring mandatory compliance with the technical specifications for hot dip galvanized coatings about products, parts and sundries built or made of steel or other ferrous materials and their approval by the Ministry of Industry and Energy.

**Materials:**

The column is hot galvanized steel frustoconical. Contain all elements necessary for attachment to the foundation (base plate seat, brackets, etc.) reflected in the plans for the project.

All the small necessary for the full implementation of the unit material is included.

High quality steel was used A-360, grade B according to UNE 36-080-1978 first party.

### 3.9. Piping telecom materials

Are collected in this section features extensive use materials and the precautions and conditions to be considered in transport, storage and placing.

#### 3.9.1. Pipes

The diameter of the tubes to be used in pipes of 125 mm polyethylene. The underground or buried pipes shall be made with polyethylene tubes, depending on mechanical protection necessary depending on the use of the land where they are located and additional protection is made.

All 9 tubes are placed in a concrete prism HM-20. Also, in each of the 3 lower tri tubes PE tubes 40 mm is arranged diameter.

The dimensions and material characteristics are reflected in the plans for the project.

#### 3.9.2. Sand or river soil
Must be free of clay lumps. Tolerance allowed the average weight percent (0.5%), these percentages determined under test method UNE 7133.

The immutability of the sands by test with sodium and magnesium sulfates, performed according to the test method UNE 7136. Losing weight of sand subjected to five (5) cycles of treatment with solutions of sodium and magnesium sulfate shall not exceed twelve percent (12%) percent to eighteen percent (18%) respectively.

3.9.3. Manholes

The manholes are to provide telecommunications PORT model. Include lower drain consisting of gravel and geotextile, and frames and covers. The dimensions and characteristics of materials are reflected in the project plans.

3.10. Electrical medium tension cable materials

Electrical cables, will consist of 200 mm diameter tube, with the number of tubes and disposition, which is reflected in the project plans. The prism in which are embedded the tubes were made with HM-20 concrete for added protection.

Similarly, a galvanized steel plate 8 mm thick, is arranged to increase the protection. The dimensions of the channels and the material characteristics are reflected in the Project plans.

3.10.1. Pipes

In pipes tubes used Corrugated Polyethylene high density double wall (smooth interior, corrugated exterior) of 200 mm in diameter.

These pipes shall comply with:

- Compressive strength: less than 5% deformation under load diameter of 450 N.
- Protection external influence: solids and water penetration: ≥ IP 30 according to EN 60529.
- Working temperature: from -40 °C to 100 °C).
- Impact resistance: -5 °C.
3.10.2. Concrete

Placing concrete in the prisms of the pipes will be HM-20. It shall apply requirements of Structural Concrete (EHE), Article 610 PG-3 and these specifications.

3.11. Materials supply

3.11.1. Accessories, special parts and auxiliary elements

The nature and location of these elements are defined in the plans of the project. Installation is made for:

- Gate Valve spring closure DN-250 mm, PN-10 (PE), flange connection, body and cover of ductile iron GGG-400-15 stainless steel shaft (brand Hawle or similar), including framework and cover Foneria 60 cm of diameter D-400.

- Gate Valve spring closure DN-250 mm, PN-10 (FD), flange connection, body and cover of ductile iron GGG-400-15 stainless steel shaft (brand Hawle or similar), including framework and cover Foneria 60 cm of diameter D-400.

- Ventosa 2 inches in diameter, or a similar brand Hawle, pipe 250 mm diameter FD, including framework and cover Foneria 60 cm of diameter D-400.

- Ventosa 2 inches in diameter, or a similar brand Hawle, pipe 250 mm diameter PE PN-10, including frame and cover Foneria 60 cm of diameter D-400.

- Underground hydrant diameter of 100 mm with pipe clip type valve Barcelona and 100 mm diameter, mounted on pipe 250 mm in diameter, including the frame and cover of cast red, special color for fire, and signage.

- Blind flange ductile iron 250 mm diameter.

3.11.2. Manholes

The walls of manholes or wells will run with mass or reinforced concrete or brick Project according to the plans.

The brick shall meet as specified in Article 657 of the PG-3 and Specification General Conditions for the Reception of bricks in construction.

The slab of concrete pit runs with HM-20.
3.12. Irrigation materials

3.12.1. Pipes

Are collected in this section features extensive use materials and the precautions and conditions to be considered in transport, storage and placing.

Tubes of low density polyethylene (LDPE PE 40) were used for nominal pressures 10 bar.

The diameter of the tubes to be used in the pipes 25, 40, 63 and 75 mm diameter.

Accessories, special parts and auxiliary elements:

The nature and location of these elements are defined in the plans of the project. Installation is made by:

- By-pass" sector 1 solenoid formed by three flat plug valves with pipe clip two cubits (male and female) and two t brass, including steel frame mounted on manhole 60x60 cm.

- Solenoid 1" female thread 1/4 nominal diameter with a power relay 24v ac, for pressures between 1 and 10 bar, for flow rates between 0.50 and 34.0 m3 / h, with flow regulator with PVC body and cover, possibility of manual opening act on the relay, purged internal, fully placed in buried casket with body by-pass of cu-32 and three taps, including connections to the water network and connections electric.

- Discharge valves or automatic drain valve and pipe clip plane manual 1" ¼ cleaning, installed in valve box.

- Pressure reducing valves with thread, nominal diameter 1 "1/4 of 16 bar pressure high and with a maximum differential of 15 bar, brass, removable, mounted in type 2 chest.

- Ring techline approximately 2 m in length for inclusion 7 droppers 3.5 l / h eg 16 mm diameter, 4 atm.

- Hydrant 1" 1/2 Barcelona side entry type, with case and cast frame.

- Metal Filter d'male thread 1 1/2", to insert in the pipe, 300 microns, long detachable body for maintenance, especially for the prevention of biological blockages in pipe systems with integrated drippers, mounted chest.
• Pop turbine sprinkler water lubricated with head 9.2 cm radio action between 8.4 and 15 m, in full or part ccleulo, with rubber protection, with female threaded connection ¾", incorporating nozzle-filter anti-drain valve with controllable speed and memory sector.

• Pop-up diffuser with lifting height of 10 cm, range between 2.0 and 4.5 m, with thread ½ "female, with Check Valve with built-in pressure regulator, equipped standard nozzle.

3.12.2. Secondary pipes

The dimensions shapes, materials and their characteristics are reflected in the project plans.

In the pipeline for irrigation in flower beds, 1 tube of low density polyethylene is available variable diameter, according to the plans of the project. The tube will be surrounded by clean sand or earth river. Subsequently, a polyethylene film is available green. Finally filled the ditch to natural ground with topsoil comment.

In the irrigation pipe under pavement tube LDPE is available with variable diameter, according to the plans of the Project and rigid PVC pipe of 110 mm diameter.

Concrete:

The concrete to be placed in the pipes will be HM-20. I shall apply the requirements of Structural Concrete (EHE-08), Article 610 and PG-3 in this statement.

Land or river sand:

Must be free of clay lumps. Tolerance allowed the average weight percent (0.5%), these percentages determined under test method UNE 7133.

The immutability of the sands by test with sodium and magnesium sulfates, performed according to the test method UNE 7136. Losing weight of sand subjected to five (5) cycles of treatment with solutions of sodium and magnesium sulfate shall not exceed twelve percent (12%) percent to eighteen percent (18%) respectively.

No sand was used with a proportion of organic material such that, when tested under method UNE 7082, produces a darker than the standard substance color.

3.12.3. Manholes
The manholes are hollow bricks. The dimensions of the bricks in the planes defined project. The manholes will have the shape, dimensions and materials are reflected in the Project plans.

The Project Manager can adapt to the needs of the work without changing its rating. Its location and elevation shall be as indicated on plans. The hollow blocks shall meet the provisions of the Technical Specification General for the Reception of bricks in construction.

Transportation, handling and storage are carefully made, being rejected those parts which are defective.

### 3.12.4. Cable

A multipolar cable with copper conductors have appointed joins VV-K 0.6 / 1 kV, for command and control functions, with the sections indicated on the drawings, (minimum 2.5 mm²), with yellow-green conductor protection.

The cable is placed in the tube, channel or tray.

### 3.13. Various materials

#### 3.13.1. Materials for formwork

The forms may be wood, metal or other materials that meet the requirements of similar efficacy. Shall comply with the provisions of Article 65 of the EHE-08 instruction. The formwork timber will comply with the EME-NTE Standard and will be well seasoned and free show signs of putrefaction, woodworm or fungal attack.

#### 3.13.2. Fences

**Rivisa model:**

**Posts:**

The poles are special type of Lux ® ø 80 dip galvanized hot Z-275 specially designed for enclosures with accessories and fasteners for quick coupling unremovable. The height of the enclosure is 2 m and the distance between centers of posts 2,530 m.

**Panels:**
The panels are rigid wire mesh and metal posts. The racks are made of Welded mesh and wire 200x50 mm ø 5mm folded longitudinally to improve rigidity.

**Finishing:**

The set has a laminated finish Protecline ® type of minimum thickness of 100 microns. The Project Manager will determine the color of the enclosure.

**Wireframe:**

**Posts:**

The posts and braces shall be galvanized tubular profile of 2.00 m in length and 48 mm OD located every 3 m. The top of the poles shall be provided with a sealing cap and the bottom will be open so that it is securely attached to the concrete setting.

**Lattice and accessories:**

The trellis will consist of a wire mesh, galvanized wire single twist 2.7 mm diameter, rectangular 5x5 cm. The plates, screws and washers are galvanized.

**Concrete in foundations:**

It will be the type HM-20.

**Essays:**

The tests will be performed to make the appropriate Director of Works, to ensure good quality of materials used in the enclosure fences.
4. Units of work, implementation process and control

4.1. Works

4.1.1. Stakeout

Before beginning the works, the Director of Works, together with the Contractor shall give the Checking the Stakeout. The result of it will rise to be signed by the Act Construction Management and Contractor.

From the Stakeout Checking of works, all jobs that are staking necessary for the execution of the works, as well as data collection and longitudinal profiles and transverse to the purposes of measurement, custody, maintenance and replacement of the signals set will be performed by the Contractor's own risk.

The Project Manager shall check the stakeout executed by the Contractor and he may not start execution of any work or part of it without obtaining proper approval. The approval by the Director of Works of any stake made by the Contractor shall not decrease the liability in the execution of works. The damage liable to cause errors reframes the Contractor shall be responsible solved in the form indicated by the Construction Manager.

4.1.2. Access to works

Except in some specific requirement contract document shall be at the risk of Contractor all roads and ancillary facilities for transportation, such as roads, urban roads and port, roads, trails, walkways, inclined planes, transport of materials to the work, etc.

These roads and ancillary facilities will be managed, planned, constructed, preserved, maintained and executed, and demolished, removed, withdrawn, abandoned or surrendered for future use, expense and risk of the Contractor.

The APB reserves the right to those roads, service roads and infrastructure civil works and / or ancillary transportation facilities which it considers useful for the exploitation the definitive work or for other will be delivered by the Contractor when they are no longer used for the work, without thereby perceiving the Contractor has no fertilizer.

4.1.3. Auxiliary plant construction and ancillary works
The Contractor shall be responsible for the design, construction, maintenance and operation, dismantling, demolition and removal of all ancillary facilities of the work and the works auxiliaries necessary for the execution of the definitive works.

Ancillary facilities which, without limitation, the following shall be considered to indicate then:

a) Office of the Contractor.

b) Facilities for staff services.

c) Installations for the security and surveillance.

d) Laboratories, warehouses, workshops and Contractor parks.

e) Aggregates facilities; manufacturing, transportation and placement of concrete, manufacturing bituminous mixtures other than if the contract award would indicate otherwise.

f) Facilities for power supply and lighting works.

g) Water supply installations.

h) Facilities for loading and unloading of materials and weighing if necessary.

i) Any other facility that require the Contractor to execute the work.

Be considered as ancillary works necessary for the execution of the definitive works that, without limitation, are indicated below:

a) Works for the diversion of surface water flows such as cuts, pipelines, etc.

b) Drainage works collection and disposal of water in work areas.

c) Protection works and flood defense.

d) Works to exhaustion or to lower the water table.

e) Shoring, maintenance and ground consolidation works underground and sky opened.
f) Temporary works divert movement of people or vehicles required for execution of the work under contract.

During the term of the Contract, shall be at the Contractor’s risk operation, preservation and maintenance of all ancillary facilities construction and ancillary works.

4.1.4. Equipment and aids

The Contractor is obliged under its responsibility and have to be provided in the work of all machines, stores, supplies and auxiliary transport needed to carry definitive works both as auxiliary in the terms of quality, strength, production capacity and in sufficient quantity to meet all conditions of the contract, and to execute them, keep them, preserve them and use them properly and correctly.

Machinery and aids to be used for the execution of works, whose relationship will be among the data necessary to make the Work Programme, should be available on site early enough in the beginning of work appropriate, so that they can be examined and approved, if appropriate, by the Director of Work.

4.1.5. Precautions during execution of works

During the various stages of construction works will remain in perfect condition drainage to prevent the occurrence of rain that can damage them.

If frost is expected the Contractor shall protect all areas that may be affected. The Damaged parts will be demolished and rebuilt work by the Contractor, in accordance with indicated in this Specification.

The Contractor shall comply with the applicable rules for the prevention and control of fires and the instructions issued by the APB. It is strictly prohibited lighting fires for any reason in the area affected by the works. The Contractor shall responsible for the breach, as well as damages arising from it.

4.1.6. Signs of works

It is the obligation of the Contractor signaling works day and night and lighting nocturnal and therefore are solely responsible for accidents arising from the negligence or abandonment of compliance. At all times it will meet the indications to order the Construction Management.
4.1.7. Wastes management

Although the description of the work refers to any work to be done performing units to leave work completely finished, payment or discharge controlled deposition recycling centers is included in the budget chapter relating to waste management.

The payment of the classification of materials left on site, the transportation of such materials to the recycling center is included in the unit prices of each of the units of work which are leftover materials.

4.2. Earthworks

4.2.1. Preliminary work

DEMOLITION AND DISMANTLING:

Shall apply the provisions of Article 301 of PG3, together with the foregoing precepts.

The methods of demolition will be free choice of the Contractor, prior approval of the Director Building. Prior to the demolition study, will be subjected to the approval of the Director of Works, the Contractor shall be responsible for the content of this study and its proper execution.

In the study of demolition shall be defined as a minimum:

- Methods and demolition stages of implementation.
- Stability of the remaining structures in each stage, as well as centering and propping necessary.
- Stability and protection of remaining buildings that will not be demolished.
- Protection of buildings and facilities of the environment.
- Maintenance or temporary replacement services affected by the demolition.
- Means of escape and defining areas for the disposal of demolition products.
- Schedules work.
- Standards of control.
• Health and safety measures.

• It will, in any event, the provisions of the legislation on the environment, health and safety, and transportation and storage of construction products.

Terms and Conditions:

Demolition operations shall be performed with the necessary precautions to ensure conditions sufficient safety and avoid damaging existing buildings, according bringing order thereon director of the work, who shall designate and mark elements that must be preserved intact.

Within the demolition of the item will be included excavation (for those elements or and parts thereof that are buried) element corresponding to leave exposed, so that it can be accessible for demolition or removal.

When you have to demolish containments materials will gravitate to empty on the element to be demolished. The use of explosives, is strictly prohibited except in those places where explicitly specified.

In the case of walls must be created a plane of discontinuity through holes drilled in binding of elevation shoe.

If the director of works deemed appropriate to use any of the materials from the demolition work in the drilling and bucking will find included up gradation necessary to obtain a causeway, cleaning them, and the collection and transport shape and places determined by the Director of Development.

Types of demolition and dismantling:

Within these work units the following activities are considered included:

• Dismantling, loading and removal and temporary storage download selection, new location or center manager, all the resulting materials.

• Demolition of foundations if any.

• Court of materials.

• How many operations are necessary to have the areas and execute the works under them.
These demolition, dismantling and removal of elements is carried out in areas indicated on the drawings of the Project or, alternatively, where directed by the Director of Works.

**SCARIFYING AND COMPACTION OF EXISTING FIRM:**

This unit of work is executed in accordance with the requirements of Article 303 of the PG-3.

The implementation of this unit includes the scarified pavement, recall of products if necessary to the sorting center or to the recycling center, and compaction products removed or the resulting surface, once removed the products mentioned.

**MILLING FIRM:**

It consists of the disintegration of the existing pavement, made by mechanical means and the removal and download all the material resulting in temporary storage or management center.

It will, in any event, the provisions of existing environmental legislation, of health and safety, and transportation and storage of construction products. The milling was carried out in areas with depth to be specified in the Project or that, alternatively, point to the Construction Manager. Machinery equipment for milling shall be proposed by the Contractor and approved by the Director of Works. Items removed will be transported to unusable sorting center or to the recycling center, which must be approved by the Director of the Work to proposal Contractor, who is responsible for them and must obtain, at its expense and expense, the necessary contracts and permits, which shall deliver a copy to the Director of Works. Compaction equipment and the degree of compaction will be appropriate to the material scarifying.

**TERMINATION AND REFINING THE ESPLANADE:**

Is the set of operations required to obtain the geometric finish esplanade. For the implementation of this unit specifications Item must be met 340 PG-3.

**SLOPE REFINING:**

It is necessary operations for geometric finishing slopes of fillings. For the implementation of this unit specified in Article 341 shall be met PG-3.

**CANCELLATION AND SEALING EXISTING SCUPPER:**

Includes the following:
• Drain the well, if necessary.

• Replicate and demolition of the partition in the depth necessary to build then the concrete slab.

• Removing excess materials from demolition and fill the well with sand from loans.

• Loading, transportation and unloading at sorting center, and then loading and transport and unloading at recycling center.

• Placing formwork and implementation of the concrete slab 25 HA-15 cm thickness.

• Rear fill, if necessary.

4.2.2. Diggings

Running any excavation is not performed at all stages is not permitted to precise topographical references. Prior to the start of excavation and leveling should rethink the original ground.

ESPLANADE DIGGING OUTDOORS:

Overview:

Consists of the necessary ground recess is located above the level of the grading, paving box or the slope of the platform, including excavation for enhanced formation and discharge in concourse areas sanitizing.

It is also considered applicable content of this section of the excavation width equal to or greater than 3 meters in its line, even those made with excavator machine located into the excavation.

Execution of works:

For the execution of the works shall be taken into account Article 320 of the PG-3, which is not variance with the requirements of this paragraph.

Once the trace unobscured and topsoil removal necessary for later use, will begin the digging, after fulfilling the following requirements:

• Must have been prepared and submitted to the Project Manager, who must approve a development program of flatwork. In particular, there is authorized to initiate clearing
work, and may even be prevented if there is then prepared one or several pits filling indicated or the management center.

- Must have successfully completed in the affected area and the relationship with it, at the discretion of the Project Manager, all preparatory operations ensure good execution.

- The excavation of roadways, sidewalks, berms and ditches, shall be in accordance with the information contained in the plans and what the order thereon Address Work, not authorizing the execution of any excavation that is not held all stages with precise topographical references.

Drainage:

The existing watercourses will not be modified without prior written authorization of the Director of Work.

The esplanade shall constitute sufficient slope, so it drains into ditches and channels connected to the main drainage system. To this end, the trenches will be made and interim channels may be required by the Director of Works.

Any system of temporary or permanent drainage run so that not erosions occur in the excavations.

The Contractor shall immediately take steps to have the approval of the Director of Work, to subterranean aquifers which are in the course of excavation.

In the event that the Contractor did not take timely precautions for drainage, are provisional or final, shall, when it Works Director stated, the restoration of the works concerned and shall be in charge of the expenditure.

Tolerances:

Tolerances execution clearing excavations shall be as follows:

- In the earthworks excavated rock a maximum difference of twenty-five will be admitted (25 cm) inches between extreme bounds of the resulting explanation. In this interval should be within the corresponding dimension of the project or stakeout. Excavations in land, the above difference is ten (10) inches. In any case, the surface result should be such that there is no possibility of water ponding, and must done by the Contractor in
charge, the surface drainage digging appropriate, so that the waters remain driven into the ditch.

- On the surfaces of the excavation slopes of protrusions shall be allowed up to ten (10) inches and entrees to twenty-five (25) inches for rock excavations. For excavations in soil tolerance than ten (10) inches shall be permitted more or less.

- In the earthworks dug for the implementation of road differences are tolerated in dimension up to ten (10) inches in more and fifteen (15).

**Landslides:**

Shall be considered as such those produced outside inevitable landslide profiles theory defined on the plans. The Project Manager will define which landslides conceptualized as inevitable.

**EXCAVATION IN TRENCHES, PITS AND FOUNDATIONS:**

The term excavations in trenches, pits and foundations, excavations those wide less than 3 meters at its bottom, placed below the plane of the machine implementing bulldozer to build foundations, burying some pipes, passing facilities, etc.

For all purposes the trenching, pits and foundations shall be considered "digging unclassified ", i.e., that for the purposes of qualification and compost, digging the soil is assumed homogeneous and has no place differentiation by nature, embodiment, or by construction aids such as shoring or depletions, the Contractor’s use by imperatives of good practice because constructive or so indicate the Engineer Works Director, and when necessary to dig deeper than that contained on the plans.

**CARGO TRANSPORT AND TEMPORARY STORAGE OR APPROVED MANAGEMENT CENTER:**

The Project Manager shall determine which lands should be poured or demolition products interest to the APB. All other materials must be disposed of into the intended point for separation and classification of these wastes.

It should take into account the Royal Decree 105/2008 of 1 February, which regulates the production and management of construction and demolition waste.

The transport of the materials used in construction, from the point of delivery to collection temporal, and from temporary storage to its final location on site, is included in the price of the units of the part and therefore is no direct payment.
4.2.3. Fillings

EMBANKMENT:

They must meet specified in Article 330 of the PG-3.

Definition:

The corresponding unit consists of the preparation of the surface (scarified and natural soil compaction), in extension, wetting or drying and compacting the materials tiers, refining slopes and all work and materials required for the implementation of the embankments.

The material used in embankments and preload proceed from quarries authorized by the Director of Works. These materials should be transported to their place of site in work. The source location of the foregoing for the implementation of embankments may be located within an area of 5 km radius, with respect to the work.

Execution of works:

The execution of the works shall meet the specifications of paragraph 330.6 of PG-3.

When this natural ground slope exceeding 1:5 previously excavated berms carrying fifty to eighty inches (50-80 cm) in height and a width not less than one hundred fifty centimeters (150 cm) with a gradient of four landing percent (4%).

Once the seat was ready proceed to the construction of the embankment, using materials that meet the conditions, which will extend into tiers successive, uniform thickness and substantially parallel to the Esplanade, up to fifty minimum inches (50 cm) below it.

Compaction:

For the purpose of compacting the following conditions shall apply:

- The foundation shall be compacted to ninety-five percent (95%) of the maximum density obtained in the Modified Proctor test.

- The core shall be compacted to ninety-eight percent (98%) of the maximum density obtained in the Modified Proctor test.
- The Coronation of the embankment or esplanade improvement, minimum thickness of fifty inches (50 cm), will be compacted one hundred percent (100%) of the maximum density obtained in the Modified Proctor test.

**Control of compaction:**

It must meet the provisions of 330.6.5 chapter PG-3.

**Limitations of execution:**

Fillers fill type will run when the ambient temperature in the shade is than two degrees Celsius (2 ° C), the work must be suspended when the temperature falls below this limit, unless adequately justified the feasibility of placing and achieving the required characteristics and this justification was accepted by the Director of Works.

**LOCATED LANDFILLS:**

**Definition:**

This unit consists of extending and compacting suitable soils and selected in backfilling or any other area, which by its small size, structural compromise or causes not allow use of the same equipment with machinery that is performed execution of the rest of the filling, or requires special care in its construction.

Soils that will be used in landfills located shall loan or quarries previously authorized by the Director of Works.

**Execution of works:**

The works shall be implemented in accordance with Article 332 of the PG-3, being limited thickness one pour at a maximum thickness of thirty centimeters (30 cm). In any case the thickness the tier should be defined for compliance with the requirements of compaction layer.

The compaction of backfilling will be one hundred percent (100%) of the maximum density obtained in the Modified Proctor test.

**Quality control:**

The grain size of the material (at least one test per 500 m3), and the density will be monitored each tier (at least one test for each day of work or every 500 m2 or fraction of layer placed).
Conditions termination finish and tolerances are the same as in the general case of embankments.

**SELECTED SOILS:**

The thicknesses and dimensions of selected soil layers to be used in the coronation of fillings or improving the esplanade are reflected in the type sections planes.

Compaction of this layer will be by tiers whose thickness has to be more than three means \((3/2)\) the maximum size of material to be used, and a maximum of fifty inches \((50 \text{ cm})\) and monitored by the load plate test according to NLT 357.

**CEMENT STABILIZED SOIL “IN SITU”:**

**General aspects:**

This unit of work includes, without limitation by the relationship:

- The preparation of the seat surface.
- Study of the mixture and obtaining the working formula.
- Disruption of the soil.
- Wetting or drying of the soil.
- Distribution of cement.
- Implementation of the mixture.
- Compaction of the layer.
- Termination of the surface.
- Curing and surface protection.
- All work, equipment, materials and aids necessary for the proper execution of the work unit.

**Compaction of the mixture:**

The compaction is performed in accordance with 512.5.7 as indicated in PG-3.
Vibratory compactor exceeds 15 tons, with a higher static load to be used 300 N / cm. In addition, a tire compactor exceeding 35 t be used with a load exceeding 5 t wheel, to densify the mixture and close the area.

**Curing the mixture:**

Earlier than twelve (12) hours of compaction and surface finish shall apply watering curing with an ECR-1 type emulsion as indicated in Article 532 of the PG-3 and in the relevant sections of this Specification.

The provision of irrigation will be three hundred grams of residual binder per square meter of surface water (300 g/m²). However, the Construction Manager may amend the provision for view of the tests performed.

### 4.3. Drain

#### 4.3.1. Manholes

**Execution of works:**

Manholes or wells have the shape and dimensions as well as the materials used to be reflected in the plans for the project. The Project Manager can adapt to the needs of the work without their valuation is changed. Its location and dimension will be indicating the planes.

In it are included, without limitation by the relationship:

- The excavation required to construct manholes or wells.

- The supply and installation of materials.

- Placing a leveling layer of concrete cleaning and HL-150.

- The construction of the floor (concrete or sand HM-20) in the thickness specified in planes.

- The manufacture of the pit or well and the operations necessary for its connection with the rest of the work.

- The placement of the tapes, if they were defined in the plans.
• Fences.

• The backfill.

• Cleaning and maintenance of the pit or manhole until the completion of the work.

• Any other work, machinery, material or auxiliary element necessary for proper implementation of this unit of work.

• Loading, transportation and unloading of surplus materials sorting center, and / or transport and loading and unloading in recycling center.

4.3.2. Inlets and drains

Execution of works:

Sinks have the form and dimensions as well as the materials used are reflected on the drawings. The Project Manager can adapt to the needs of the work without modify their valuation. Its location and elevation shall be as indicated on plans.

In it are included, without limitation by the relationship:

• The supply and installation of materials.

• Placing a leveling layer of concrete cleaning and HL-150.

• The construction of the floor (concrete or sand HM-20) in the thickness specified in planes.

• The manufacture of the sump and the operations necessary for its connection with the rest of the works.

• The placement of the tapes, if they were defined in the plans.

• The placement of frames and grids.

• Cleaning and maintenance of the sump until the completion of the work.

• Any other work, machinery, material or auxiliary element necessary for proper implementation of this unit of work.
• Loading, transportation and unloading of surplus materials sorting center, and / or transport and loading and unloading in recycling center.

The grids and fences will cast dimensions reflected in the plans of the Project and shall comply as specified in the UNE EN 1563.

4.3.3. “Pates”

To extend the existing staircase pates in manholes that regrow.

Implementation:

The pate positioned to be level and parallel with the borehole wall, solidly fixed to the wall by embedment end taken with mortar. The embedment length shall be greater than 10 cm.

The vertical distance between pates be equal to that.

4.3.4. Replacing fences and covers of manholes

To trim the tops of the existing wells and manholes to dimensions defined in the Project sidewalks or driveways, caps and existing fences shall be removed.

4.3.5. Pipes

PVC-U COLLECTORS:

Implementation:

The dimensions shall be indicated on the drawings of the project. For the placement of the tubes perform the following works, but this list will be limited to:

• The excavation of the trench in which the tubes are placed and the transfer of surplus material a place of employment or management center.

• The seat preparation (cleaning, grading, compaction, etc.).

• The implementation of the concrete foundation bed HM-20.

• Supply, positioning and sealing of the tubes.
• Special parts behave.

• The junction with other elements or tubes

• The surface of the concrete pipe with HM-20, the thicknesses shown on the plans, if provided in the Project.

• The testing of the installed pipe.

• The supply, transport and dosing of fill material in the trench.

• The extension, moistening and compacting each of the tiers of the fillers, to the natural soil layers or until firm.

• Any work, machinery, material or necessary for the proper auxiliary element and rapid implementation of this unit of work.

In paragraphs measurement and payment included as indicated in the unit prices are employed in the measurement and payment of the mentioned works. For collectors of PVC-U, the thickness of the slab and the coating concrete HM-20, are reflected in the plans for the project.

**Quality control:**

**Manifolds PVC-U:**

Before starting the work, if the supply varies, and each different type you get to work, the contractor will be requested certificates manufacturer to ensure compliance with specifications technical conditions, including results of the following tests, it performed by an accredited laboratory:

• Tensile strength (UNE 53112).

• Elongation at break (UNE 53112).

• Resistance to internal pressure (EN 921).

• Density (UNE-EN ISO 11833-1).

• Resistance to dichloromethane at a specified temperature (EN 580).

• Vicat softening temperature (EN 727).
• Longitudinal reversion heat (EN 743).

• Water tightness (EN 1277).

• Impact resistance (EN 744).

CONNECTIONS TO EXISTING WELLS AND MANIFOLDS:

It defines the work needed to connect the new collector’s wells and manifolds existing.

Excavation required will be made to reach the area where the existing elements must make the connection. Necessary demolition in the existing elements are made, connections, sealing and repairs, testing and backfilling the excavations.

DRAIN WITH SLOTTED TUBE:

Definition:

Deep drainage is defined as all the necessary works to intercept water ground on his way to the platform and water infiltrated through the pavement layers.

They consist of ditches filled with drainage material, properly compacted fill an land located to the surface of the natural ground. The trench will be surrounded by a geotextile, protecting the drainage material.

Its implementation includes the following:

• Excavation.

• Implementation of the foundation bed and arrangement of geotextile filter.

• Placement and compaction of drainage material.

• Filling of land at the top of the trench.

• Loading, transportation and unloading of surplus materials sorting center, and / or transport and loading and unloading in recycling center.

Execution of works:
Includes the following:

- Excavation in trench.
- Preparation of the seat.
- Supply pipe.
- Laying and jointing of pipes.
- Placement of geotextile sheet.
- Fill the trench with drainage material.
- Loading, transportation and unloading of surplus materials sorting center, and / or transport and loading and unloading in recycling center.

The excavations necessary for the implementation of this unit shall be made in accordance with described in the corresponding to the excavation in trenches and pits paragraph.

Material from excavation is not deposited in the condition of course water. Also, material excavated within two feet (60 cm) there will collect the edge of the excavation.

### 4.4. Firms and pavements

#### 4.4.1. Granular Layers

**ARTIFICIAL GRAVEL:**

**Overview:**

A layer of artificial gravel on the firm is available. This unit of work includes:

- Study the material and obtain the working formula.
- Preparation of material, if applicable, and transportation to the place of employment.
- The preparation and testing of the seat.
• The spread and wetting, in case that is required, and compaction of the layer gravel.

• Refinement of the surface layer.

• All work, equipment, materials and aids necessary for the proper execution of the work unit.

Artificial gravel layer will run in a single tier with the thickness and widths identified in the plans of the project. The equipment used for paving shall be approved by the Director of Works, and executed in accordance with Article 510 of the PG-3.

Production Control:

Per thousand cubic feet (1,000 m³) of material produced, or every day if less fabricated material on a minimum of two (2) samples, one in the morning and one in the afternoon:

• Sand equivalent UNE-EN 933-8 and, where appropriate, methylene blue, according to UNE-EN 933-9.

• Particle size distribution by sieving according to UNE-EN 933-1.

• Proctor modified according to UNE 103501.

Execution Control:

Be considered as a batch, which will be decided on the block, the child resulting from implement the three (3) following criteria to one (1) single tier of gravel:

• A length of five hundred feet (500 m) of roadway.

• An area of three thousand five hundred square feet (3,500 m²) of roadway.

• The fraction built daily.

• Conducting on-site sampling and testing will be done at points previously selected by random sampling, both in longitudinal and transverse directions; so that there is at least one test for every decision or hectometer (1/hm).

• 7 natural moisture determinations, NLT 102/72 (*).

• Density determinations 7 "in situ" according to NLT 109/72 (*).
• 1 plate load test each four hundred square meters (400 m²) as NLT 357/86.

Criteria for acceptance or rejection of the lot:

The average density of each lot shall exceed one hundred percent (100%) of the Proctor density Amended. Measures remained at less than one hundred per cent are allowed a maximum of two (2) (100%), exceed ninety eight percent (98%) of Modified Proctor density.

4.4.2. Bituminous mixtures

HOT BITUMINOUS MIXTURES CONCRETE TYPE:

It is defined as bituminous hot mix asphalt concrete mix type of aggregates a bituminous binder, so that to carry out in advance to be heated aggregates and binder. The mixture is spread and compacted to a temperature higher than that of atmosphere.

The execution of this work unit includes:

• Study of the mixture and obtaining the working formula.

• Preparation of the surface on which the mixture should be extended.

• Manufacture of the mixture according to the formula proposed work.

• Transportation of the mixture.

• Extension and compaction of the mixture.

• All work, equipment, materials and aids necessary for the proper execution of the work unit.

Necessary equipment for the execution of the works:

Installation of factory:

The asphalt plant production will be automatic and not less than one hundred and twenty tons per hour (120 t / h).
Various indicators measuring equipment will be housed in a scorecard only for the entire installation.

The plant will have two silos for storage of mineral dust contribution completely free of moisture, whose combined capacity will be sufficient for two days manufacture.

**Transport elements:**

Box trucks are smooth and tight.

Before loading the asphalt mixture will proceed to grease the inside of the boxes truck with a light coating of soapy water. Product use is prohibited capable of dissolving the binder or mixed with it.

The shape and height of the truck shall be such that there is contact between the box and in no case the hopper of the paver, except through the rollers intended for disposal in the paver.

The trucks carry a tarp to protect the mixture during transport.

**Pavers:**

They are self-propelled and shall be provided with electronic probe and automatic leveling. The minimum width of 2.5 m will be extended. and maximum of 8.40 m. The paver wheel drive will be able to extend 6.00 m. once.

The hopper capacity and power and maximum forward speed of the paver. It will depend on the ability of the asphalt plant (120 t / h).

**Compaction equipment:**

Metal may compactors, static or vibrating rollers, tandem tricycles or utilized in tires or mixed.

The compaction equipment will compact with the requirements both layers basis as the binder and surface. At a minimum shall consist of:

- A smooth roller, tandem, eight to ten tons (8-10 t) deadweight.

- A steamroller tires than twelve tons (12 t) and pressure weight variable swelling of three to ten pounds per square inch (3-10 kg/cm²).
- A tandem vibratory compactor eight tons (8 t).

**Execution of works:**

**Study of the mixture and obtaining the working formula:**

Within prescribed zones, working formulas will be those that provide the greatest quality blends, always fulfilling the requirements in 542.3 of Chapter Order Circular 24/2008. The Contractor shall propose a working formula for each type of mixture is used, which determine the composition of the various measures of aggregate and proportions of binder and powdered mineral filler, and additives if used this formula must be approved by the Director of Development.

**Supply of aggregates:**

The Contractor shall bring to the attention of the Project Manager, with four (4) days term start date of the stockpiles at the plant for possible inspection.

Aggregates showing evidence of weathering due to not admit one extended collection.

Ten (10) days prior to the start of production of the bituminous mixture shall be stacked the aggregates corresponding to one third (1/3) of the total volume of each maximum size, and minimum.

During execution of the bituminous mix, and must be provided at least daily and the aggregates corresponding to the daily production on, until the total volume of aggregates envisaged in the project. These aggregates are stored in a different location to which they are used in the manufacture. Aggregates will be consumed on the principle of first use that longer they stored.

**Extension of the Mix:**

Feeding pavers will so that it is always agglomerate remnant in the hopper, filling them with starting a new truck when still remains an appreciable amount of material.

The laying of the mixture will be at a rate which ensures that, with the compacting means in service, they can get the prescribed densities without stopping the paver. The Directorate of Work may limit the maximum speed tended to view the compacting means present.

**Compacting the mixture:**
The minimum temperature of the mixture to start the compaction will be obtained in section proof.

Longitudinally starts compacting the lowest point of the different bands, and continue to the uppermost edge of strong, overlapping elements in their compaction successive passes that should have slightly different lengths.

Immediately after the initial compacted, the surface obtained will be checked as to pumping, camber, flush, surface regularity and other specified conditions.

**Test sections:**

Before starting this unit of work, the Contractor shall construct a test section with a minimum length fifty yards (50 m) and a thickness equal to that indicated on the drawings, for each type of mixture.

About the test section ten (10) samples were taken to determine the following:

- Thickness of the layer.
- Grain size of the compacted material.
- Density.
- Binder content.

**Specifications of the finished unit:**

It should meet as described in Article 542.7 from PG-3.

**Quality control:**

**Production Control:**

Hydrocarbon binder:

Input each game plan the certificate of analysis is required. It will one (1) displays by NLT-121/85, for conducting the following tests:

- One penetration test according to NLT-124/84.
• 1 trial of softening point, according to NLT-125/84.

• One penetration rate test according to NLT-181/84.

• 1 test Fraass brittle point according to NLT-182/84.

• 1 test ductility according to NLT-126/84.

Aggregates:

Daily, and each maximum aggregate size is received, the following will be made:

• 1 sieve test as the NLT-150/72.

• 1 equivalent of sand for fine aggregate, according to NLT-113/72.

• 1 Cleaning coefficient for coarse aggregate according to NLT-172/86.

Control of Execution:

Manufacture:

Mix dry cold:

Daily, about two (2) samples taken randomly, one in the morning and one in the afternoon, and before the entry to the drier, the following tests:

• One combined aggregate sieve test, according to the UNE-EN-933-1.

• 1 equivalent of sand, according to the UNE-EN-933-8 and, where appropriate, the rate of methylene blue, according to Annex A of the UNE-EN-933-9.

Aggregates in hot mix:

Daily, for one (1) randomly sampled 1 assay was performed sieve, according to the UNE-EN-933-1, which meet the tolerances specified in this section.

At least weekly, the accuracy of the scales and the correct dosage will be verified operating temperature indicators aggregates and hydrocarbon binder.
Bituminous mix:

A mixer output or storage silo on each element transport take samples of the manufactured mixture and lay them on the dosage of binder to EN 12697-1 and the granularity of the extracted aggregates, according to UNE-EN 12607-2, with suitable test frequency in Table 342 108. Order Circular 24/2008 corresponding to the control level X defined in Annex A of the standard UNE-EN 53108-21 and compliance level (NFC) determined by using the average value of four (4) Results defined in that Annex.

Execution on site:

At least one (1) time per day, and the ores one (1) time per batch, samples were taken and specimens prepared according to UNE-EN 1289740 by applying seventy-five (75) strokes per side if the maximum aggregate size is less than or equal to twenty-two inches (22 mm), or by UNE-EN 12697-32 for maximum size of aggregate value exceeding said. On these specimens void content, to EN 12687-8, and the apparent density was determined according UNE-EN 92697-6 with the test method described in Annex B of the UNE-EN 13108-20.

Finished product:

Be considered as a batch, which will be decided on the block, the child that results from applying three (3) following criteria to one (1) single layer of hot asphalt mix:

- Five hundred meters (500 m) of roadway.
- Three thousand five hundred square feet (3,500 m2) of roadway.
- The fraction built daily.

Criteria for acceptance or rejection:

Density:

For each of the layers, the average density obtained for each batch is given or higher than hundred percent (100%) as indicated in Article 542.7.1 paragraph. Order Circular 24/2008 taken as reference for dense, semi-dense and thick mixtures. Shall be admitted as maximum three (3) of the samples are less than one hundred percent (100%) of that density, always exceeding ninety-eight percent (98%) of said density.
If obtained mean density is less than ninety five percent (95%) of the density of reference, the bituminous mixture will rise to corresponding controlled batch by milling and replenished by the Contractor.

### 4.4.3. Irrigation

**OVERVIEW:**

Prior to the implementation of irrigation will be constructed for each type of irrigation, a stretch of thirty meters (30 m) long and three meters (3 m) wide with conditions which project and extend irrigation provided with various dosages.

Over watering regularly made the discharge will be observed, noting if there are areas without cover or excess binder is observed. Past twenty-four hours (24h) shall be taken six (6) samples of each type of dosage of the contents of residual bitumen is determined.

Construction Management, in view of the results, decide the dosage of binder and aggregate of any coverage to be used for the work.

Cold asphalt risks are implemented according to what the PG-3 specified in Articles 530, 531, and 532, with the restrictions specified in this Specification.

**PRIMER IRRIGATION:**

This unit of work includes:

- Preparation of the existing surface.
- Application of the bituminous binder.
- Any extension of an aggregate coverage.
- All work, equipment, materials and aids necessary for properly carry out the implementation of this unit of work.

**Dosing:**

The binder:
To dose the binder primer irrigation works Management will determine the allocation to use depending on the type of material it is applied to achieve not produced over irrigation or surfaces that can be absorbed scarce binder. The endowment minimal residual binder, after the breaking of the emulsion, will be five hundred grams per square meter (500 g/m²).

**The aggregate:**

In case you have not absorbed all the binder once past twenty-four hours (24 h) primer, or over the primed surface must move traffic will extend the arid with an allocation to be determined by the Project Manager, which may be between four (4) and six liters per square meter (6 l/m²).

**Necessary equipment for the execution of the works:**

You must comply as indicated in Article 530.4 of the PG-3.

**Execution of works:**

It shall meet the specifications of Article 530.5 of the PG-3.

Traffic will be prohibited until it has finished emulsion breaking. If it is necessary that traffic before it circulates around the clock (24 hours) of your application will run aggregate coverage, but the traffic will not flow during the four hours (4 h) after the extension of this arid, and speed will be limited to forty miles per hour (40 km / h).

**Limitations of the implementation:**

They are set forth in Article 530.6 of the PG-3.

**Quality control:**

It is indicated in Article 530.7 of the PG-3.

**ADHERENCE IRRIGATION:**

This unit of work includes:

- Preparation of the surface on which it shall be applied to irrigation.
- Application of the bituminous binder.
• All work, equipment, materials and aids necessary for the proper execution of the work unit.

Dosing:

The binder:

The allocation of residual binder not in any case be less than two hundred grams per meter square (200 g/m²) of residual binder between fifty layers of bituminous mixtures, type D, S and G firm again employed, or two hundred fifty grams per square meter (250 g/m²) when the top layer is a bituminous hot mix, type D used as a road surface rehabilitation service.

However, the Construction Manager may amend the provision in the light of the tests carried out.

Necessary equipment for the completion of works:

It is indicated in Article 531.4 of the PG-3.

Execution of works:

The Project Manager will verify that the surface on which irrigation is performed is clean, without free materials and meets the conditions specified in PG-3.

If a tack coat should be applied to an ancient pavement, the excess will be eliminated bitumen and damage that may prevent a perfect union with the layer is repaired lower bitumen.

Limitations of execution:

They are set forth in Article 531.6 of the PG-3.

Quality control:

It is indicated in Article 531.7 of the PG-3.

IRRIGATION CURING:

This unit of work includes:

• Preparation of the existing surface.
- Application of the bituminous binder.

- Any extension of an aggregate coverage.

- All work, equipment, materials and aids necessary for properly carry out the implementation of this unit of work.

Dosages:

The binder:

The provision of bitumen emulsion to be used will be defined by the amount that ensures forming a continuous, uniform film of hydrocarbon impermeable binder.

The aggregate:

To ensure the protection of irrigation curing under the action of any outstanding during work on that layer, manning aggregate coverage must fall between the four (4) and six liters per square meter (6 l/m²).

Necessary equipment for the completion of works:

It is indicated in Article 532.4 of the PG-3.

Execution of works:

It shall meet the specifications of Article 532.5 of the PG-3.

Limitations of the implementation:

They are set forth in Article 532.6 of the PG-3.

Quality control:

It is indicated in Article 532.7 of the PG-3.

4.4.4. Additional work

Curbs and trench footings:
This unit will be implemented in accordance with Article 570 of the PG-3. In this unit of work are included:

- Cleaning and preparation of the seat.
- Concrete and commissioning work on the foundation bed.
- Curbs and placement.
- Any work, machinery, material or necessary for the proper and quick auxiliary element implementation of this unit of work.

**Hydraulic floor tiles pavement:**

The floor tile will have the dimensions and characteristics reflected in the plans of Project. This unit of work includes:

- Cleaning and preparation of the seat.
- The supply, placement and compaction of selected soil and artificial gravel.
- The concrete and laying of the foundation bed.
- The supply and spread mortar.
- The supply and tile work.
- Any work, machinery, material or necessary for the proper auxiliary element and rapid implementation of this unit of work.

**Cobblestone concrete pavement:**

The dimensions and characteristics of the pavers are defined in the plans of the project, so as the location of this pavement.

The basis of this surface consists of a layer of concrete HM-20.

The paver will be placed on a layer of river sand final thickness of four (4) inches, which fulfill:

- Maximum size: 5 mm.
• % Passing sieve: UNE 0.063 <3%.

This layer will be uniform in thickness. Placing pavers will be made from the floor to avoid stepping over the sand.

**Tree grates for sidewalks:**

The tree pits to dispose sidewalk shall consist of galvanized steel plates 20 mm thick placed on a corner frame 25x25 mm. The shapes, dimensions and material characteristics are reflected in the plans for the project.

The execution of the work unit includes the following:

• Stakeout.

• Prior, plumb and level placement.

• Final fixing and cleaning.

The tree pits will have a uniform appearance, be clean and free from defects, and shall vertical. They conform to the alignments provided in the Project.

**4.5. Concrete**

**4.5.1. Armor**

**REINFORCEMENT TO BE USED IN REINFORCED CONCRETE:**

**Overview:**

As a general rule, the Contractor shall submit to the Project Manager for approval and advance, a proposal for cutting of reinforcement of all elements concreting.

This schematic will contain the exact form and all measures defined in armor drawings, clearly indicating the place where the joints occur, and the number and length thereof.

**Separators:**
The lower armatures of the foundation and the bottom of the lintel be substantiated by separators mortar measures 10x10 cm and plan thickness as shown on the drawings for coating at least four inches (4 cm), spaced at a distance maximum of fifty diameters (50), and a minimum of eight (8) per square meter.

The mortar strength is greater than 250 kg / cm².

For side reinforcement spacers are of plastic, suitable for the coating indicated on the drawings for the armor, at least four inches (4 cm) to a maximum distance of fifty diameters (50), and in a number not less than four (4) per square meter.

**Control:**

Article 90 of the EHE-08 establishes two levels to control the quality of steel: Control Normal control and reduced level. For prestressed concrete works only level will be used normal control.

**In reception:**

May not be used steels that do not yet work with a certificate of warranty, signed by an individual. For corrugated wires or rods shall have one specific certificate of adhesion. Throughout the work for each diameter will sample to check:

- The elastic limit.
- The breaking load.
- The elongation at break.
- The modulus of deformation.

**Production:**

The Contractor shall establish the ideal system to ensure that the reinforcements are developed and placed in accordance with the project specifications and drawings. Newsletter will be used to each block contained in the following checks:

- Quality materials and state of oxidation and cleaning.
- Length and form of the element.
- Bending diameters.
• Comments on any cracks.

• Standing on the work.

• Overlaps.

• Coating.

• Bonds.

4.5.2. Concreting

OVERVIEW:

Definition:

In this unit of work include, without limitation by the relationship:

• The study and the formula for obtaining each type of concrete, as well as materials necessary for the manufacture and application.

• The manufacture, transport, placing and vibrating of the concrete.

• The implementation and joint treatment.

• Protection of fresh concrete, curing and curing products.

• Finishing and conducting surface texture.

• Formwork and formwork.

• Any work, machinery, material or necessary for the proper and quick auxiliary element implementation of this unit of work.

During execution performance of any dynamic or static overload will prevent can cause damage to the already concreted elements. The measures will be taken necessary to ensure that the construction features and implementation processes conform at all times to the Project. In particular, special care should be taken that these provisions and processes are consistent with the hypothesis considered calculation.

CONCRETE PLAN:
Concrete plan is the explanation of the way that the means and process Contractor shall continue for the good placement of concrete.

The plan shall contain:

- Decomposition of the work in concrete units, indicating the volume of concrete used in each unit.

For each unit shall contain:

- Concrete system (by pump, crane and cupola, duct, direct discharge, and others).
- Characteristics of mechanical means.
- Personal.
- Vibrators (characteristics and number thereof, indicating the parts for possible damage).
- Stuffing sequence from the molds.
- Means for preventing defects in concrete by movement of people (bridges, scaffolding, planks or other).
- Concrete curing system.

**MANUFACTURE OF CONCRETE:**

Concrete must be manufactured in a plant that has a weight metering installation of all materials and coatings have a mixer, you should always run under the supervision of qualified personnel.

The facility shall have been previously subject to the approval of the Project Manager and shall not enter any changes without your consent. The Contractor shall submit for approval by the Project Management documentation complete on the manufacture of concrete, where the description of the plant and will include dosage to be used depending on the origin of cement and aggregates, the shape of transport etc.

Any change in dose at the facilities, transport, etc. notice shall be with a minimum of fifteen (15) days, provided that the documentation had been approved.
Before introducing the cement and aggregates in the mixer, it will be loaded with one hand the amount of water required by the mass, completing the dosage over a period of time shall not be less than five (5) seconds and no more than one third (1/3) of mixing time, counted from the time when the cement and aggregates have introduced into the mixer.

**TRANSPORTATION OF CONCRETE:**

The concrete shall be transported in truck mixers. The time period between loading and unloading of the concrete work will be less than one hour (1h). While you are transporting and unloading shall operate the system constantly stirring. The Concrete trucks will have to be cleaned after each load of concrete.

In no case work placement in mass concrete accused initially tolerated setting. Nor is allowed, in any case, the addition of water to the concrete mass cool.

The characteristics of the masses may vary from the beginning to the end of each download Concrete. Therefore, to achieve a higher uniformity not one it must be transported same batch or truck in different compartments.

**WORKS EXECUTION:**

The free fall of concrete shall be avoided for more than five feet (1.5 m) tall. The Concrete should be poured into a location that is in plan a maximum of two meters (2 m) point final location once it has hardened.

Not placed in layers or tiers of concrete work of a thickness that allows for complete compaction of the mass.

The Project Manager may authorize the pneumatic concrete placement provided the end of the hose is not located more than ten feet (3 m) of the point of application, Concrete volume in each discharge exceeding two hundred gallons (200 l) and which is removed excessive bounce all material and that the jet is not directed directly on the armor.

**COMPACTION:**

The compaction system will be appropriate for a concrete without pores or voids, especially along the walls and corners of the formwork, and will run with equal or greater intensity than that used in making test specimens. It shall comply with the specified in Articles 70 of the EHE-08 and PG-3 610.9.
The concrete is compacted by vibration provided. The thickness of the tiers of concrete, the application points vibrators and duration of vibration shall be approved by the Construction Management Contractor’s proposal. Vibrators shall be applied in so its effect extends to the entire mass without local segregations occur.

If concrete vibrators are compact surface, moving slowly apply so that the surface appears completely wet concrete. Coats after compacted thickness shall not exceed eight inches (20 cm).

**CONCRETE CURING:**

With respect to the curing system, it is with water, whenever possible. Meet strictly forbidden curing seawater. Cured with water will not run based sporadic watering the concrete, it is necessary to ensure constant moisture element by means of enclosures that are maintained with a water depth, type materials burlap or geotextile permanently soaked in water, irrigation system continuously or full coverage by plastics.

The minimum duration of curing shall be seven (7) days. In any case the length is determined total agreement with what is specified in Article 74 of the EHE-08.

In the case that the water cure is not possible use will be made use of film-forming material, which will be applied immediately after concreting under open surface or immediately after stripping to you. Sufficient thickness to be ensured film-forming material spread on the entire surface of the element, except for the part which constitutes the concrete joint.

**INSPECTION AND CONTROL:**

**Inspection:**

To ensure the proper execution of the concrete work, the Contractor shall designate permanently responsible technical specialist and at least intermediate level, to monitor compliance with the conditions imposed in each case, and especially monitor the quality of the materials dosage, the proper disposition of the forms before concreting and kneading conditions, placing, compaction, curing and formwork dates. For all the indications shall meet the Construction Management and record in a register all changes made in the Project and incidents there.

**Control:**
Control of reception:

Each load of concrete manufactured sheet accompanied by a statement identifying supply at least:

- Name of the manufacturing plant.
- Serial number of the sheet supply.
- Name of the petitioner and the person responsible for the reception.
- Specifications of concrete, with designation of the concrete, cement content, relative water-cement ratio, type of room, type of cement, consistency, maximum aggregate size, type of additive, if any, or otherwise indicated that does not.
- Designation of the place of delivery.
- Quantity in cubic meters of concrete.
- Identification of concrete mixer truck and the person to download it.
- Time limit use of concrete.

Production Control:

The components of the concrete shall be controlled as described in section 2.4 of this Schedule, and the different phases of the process described in this paragraph article. with this purpose the Contractor Services Control dayparts drawn in appropriate those who remain embodied, in addition to receiving data, the conformities or nonconformities are observed. These reports shall be kept by the Contractor and available to the Project Manager.

Execution Control:

Three levels for carrying out the execution control are considered:

- Reduced level.
- Normal level.
- Intense level.
To control execution Control Plan in which the work will be divided into lots shall be drawn according to what is indicated in the table 95.1.a EHE-08. For each batch will be made the checks listed in Table 95.1.b EHE-08.

4.5.3. Auxiliary elements

FORMWORK AND MOLDS:

Definition:

In this unit of work are included, the relationship is not limited to:

- The design calculations of formwork.
- The materials used in the forms.
- The preparation and assembly of the formwork, including sills.
- Stripping products and their application.
- The stripping.
- Any work, machinery, material or necessary for the proper auxiliary element and rapid implementation of this unit of work.

Execution:

Not allowed to reuse more than twice the wood framing in walls viewed.

Formwork shall be sufficiently tight to prevent loss of grout with appreciable the compaction process envisaged. The form surfaces shall be uniform and smooth to make the walls of pieces of concrete made with them without fault, bumps or burrs of more than three millimeters (3 mm). Both form surfaces and products that they shall not apply contain aggressive substances in the concrete mass.

Formwork:

In no case may formwork concrete before it twenty-four (24 h) hours from the end of the concreting, except in the case of using slip form the stripping will not take place until the concrete has attained sufficient strength to support with adequate safety without excessive
deformations, efforts to which shall be subject as a result of stripping. The minimum period stripping it to be determined as specified in Article 75 of the EHE-08.

4.6. Signing and lighting

4.6.1. Road markings

Includes horizontal beacon in its aspect of road markings on the pavement for separation of traffic lanes and webs with overtaking ban reflective paint and reflective white shoulder separation and road. The areas to be painted are indicated on the drawings of the project.

The Contractor shall stakeout lines to dial, indicating the Director of Works start and end points where the solid lines of overtaking ban.

4.6.2. Vertical signs

The Contractor shall give notice in writing to the Director of Development, at least two months advance, the ratio of the suppliers of all materials used and signals and traffic signs vertical object in the project as well as the trademark, or reference to these companies give that kind and quality.

This notification must be accompanied by a document certifying compliance with mandatory technical specifications of the materials and / or the document of brand recognition, quality mark or stamp. In both cases they will reference their technical features evaluated as specified in the preceding paragraphs.

Prior to the start of the placement of signs and posters, a stake will be held for signal locations.

4.6.3. Safety gates

Metal security barriers shall comply with the order indicated in Circular 28/2009 on Criteria for application of metal safety barriers.

The concrete safety barriers comply with the provisions of Order Circular 321/95 T y P Recommendations for vehicle restraint systems. In any case provide CE marking.

Metallic safety barriers and concrete is placed, and the corresponding terminals at locations shown on the plans.
The bands carry the connecting elements specified in the drawings and will overlap in the direction of traffic.

The characteristics and dimensions of the barriers are reflected in project plans.

**Metal safety barriers:**

**Materials and performance:**

They will meet as indicated in paragraph 7 of the Order Circular 28/2009 and Article 704 PG-3.

Since the entry into force of the CE marking for these products, all new systems containment must have the same as a previous step to use in the work saying marked enforces the tests prescribed in the standard UNE-EN-1317-2.

**Posts:**

The posts will be rolled tubular 120x55 mm of steel S235 JR. Iran placed every two to four meters as indicated in the relevant drawings.

The pole length tolerances are ten millimeters (10 mm) in more and none less, for the indicated on the Drawings.

In the event that the posts are to be brought into play by piling its lower end should finish bezel to forty-five degrees (45 º), and in addition have soldiers longitudinally a 'wide flat "rolled equal steel which is the post.

**Fences:**

It is considered that the metal fence for continuous safety barriers has a length of 4.318 mm and a cross section with a development of 473 mm, with tolerances set in UNE 135-121-94.

Furthermore, it is considered according to a galvanized UNE cited above and the presence of the holes for fastening screws of a fence to adjacent and with the connector or support.

**Foundations of security fences:**

The posts will cement by piling on the ground unless its hardness makes it impossible or that its resistance is insufficient. To distinguish the latter case, before placing the fence will take an "in situ" on the post kneeling isolated test consisting of applying a force parallel to normal ground in
the direction of the adjacent flow, directed towards the outside of the road and whose point of application is at fifty-five inches (55cm) above the ground level, and measuring displacement of said point of application and of the section post at ground level.

4.6.4. Marking of the road

Definition:

Comply with the requirements of Article 702 of the PG-3. The reflector is placed on the pavement surface and will stick with adhesives and reflective elements above it. The reflector shall be provided in the areas shown on the plans.

In the manufacture of retro reflective reflector (except for the retro-reflector) is used any material (such as plastic, rubber, ceramic or metal), provided it complies with specified in this Article.

In retro reflective reflex reflector formed by two or more parts, each of which may remove, if necessary, in order to proceed with the replacement.

The reflector will consist of a body, made of polymeric material and a lens retro reflective made from micro-prismatic retro reflective sheets of large angularity.

Placement:

The outline of retro reflector, not present sharp edges constituting a threat to the safety of road traffic.

The anchoring systems retro reflective reflex reflector shall be such as to ensure their permanent fixing and that in case of tearing or breaking occur no danger for traffic or because of captafaro booted, or by anchoring elements they can stay on the road.

The retro reflective reflex reflector on top, will identify indelibly, the least the manufacturer's name and the date of manufacture (month and last two digits of the year).

Implementation:

The Contractor shall give notice in writing to the Director of Works, not later than thirty (30) days from the date of signature of the certified report stakeout, the complete list of undertaking providing all materials used in manufacturing and retro reflective own reflector under the project, as well as trademark, or these companies give reference to that class and quality.
This notification must be accompanied by a document certifying compliance with mandatory technical specifications of the materials and / or the document of brand recognition, quality mark or stamp. In both cases they will reference their technical features evaluated as specified in the preceding paragraphs.

Quality control:

Quality control of installation works include retro reflective reflex reflector checking the collected materials and the finished unit and shall comply with prescribed in Article 702 of the PG-3.

4.7. Lighting installations

The electrical installation shall be in accordance with established practices in general in electrical installations and all requirements of the Electrical Code of Baja will continue Voltage (REBT) and / or authorities having jurisdiction. Also agree wit the provisions of these Terms.

Electrical Contractor shall use specific tools and equipment necessary for the proper execution of the work, which will be of the best quality available on the market. The installations be performed by an installer or Instaladora Entity authorized by the Ministry of Industry, which has valid title installer.

Entities or quoted installers issue, if they were asked, the newsletter of the installation model determined by the Department of Industry of the Generalitat de Catalunya, which is shall specify the data of the main features of the system and compliance with the precepts of R.E.B.T. and the particular rules of the company, if any.

4.7.1. Lighting cables

Operations and materials required are described in this section to completely stop finished pipes of electrical installations and lighting, according to the Project drawings and instructions of the Director of Works. At all times shall comply with the provisions of Low Voltage Electro technical Regulations.

The work consists of:

- Excavation of the trench and removal of surplus materials to place collection or temporary center manager.

- Supply and laying of lean concrete at the bottom of the trench.
• Supply and installation of pipes by spacers.

• Supply and installation of concrete HM-25 prism formation.

• Attaching the bands signaling.

• Fill the trench located with selected material, if necessary, to reach sidewalk dimensions, firm or natural terrain.

Once excavated trench prism corresponding to a layer is placed on the bottom of the trench cleaning concrete HL-150, with a cement content of 150 kg/m³ of concrete.

4.7.2. Manholes

This unit consists of the complete realization of the boxes that are necessary for the lighting.

The dimensions shall be indicated on the drawings of the project, but if need to fit the work will always vary no more or less than fifteen percent (15%), without the right to change the rating. This modification of dimensions must be authorized by the Director of Works.

Sufficient excavation for placement of pit and drain will be used. At the bottom of the excavation, a bed of gravel 20 cm thick is placed, and will be placed on gravel the geotextile.

Then the manhole is placed prefabricated. If the excavation is larger than necessary, will fill the backfill of the pit with concrete HM-25. Landfills will be allowed, sands debris or materials from the excavation.

4.7.3. Electrical circuits

Includes drivers for laying of pipe, tube wall wiring and taping to corresponding terminals step or switchgear apparatus and splices lighting columns or towers and connections, numbering and identification and grouping by flanges polyamide according circuits.

The works will be executed during the day. The cables are hung and then be interconnections at its terminals and grouped, numbered and identified by stages and circuits independent by flanges polyamide and labels.
All cables shall be carefully examined before laying them to check there is a visible defect in which case the affected part is discarded. It was also discarded cables show signs of having been used previously.

4.7.4. **Bare copper conductor**

This unit comprises the supply and laying of bare copper wire including using exothermic welding or clamp to form the ground network.

The work will be done during the day, establishing an equipotential ground throughout the mains by bare Cu wire. From this line, via welding of high melting point is made leads to each of the columns of lighting unite earth and to each of the power distribution boards and all accessible metal parts of the installation.

The junctions at each of the columns and tables are made with wire of the same material, by staples or terminals are tinned brass and allow good contact.

4.7.5. **Metal column for lighting**

**Execution of works:**

This unit includes:

- The supply and installation of the column and anchoring elements.
- The power cords.
- The mechanisms for proper operation.

Prior to installation the Contractor shall submit to the approval of the Director of Works Calculations resistant columns.

Once excavation executed, will proceed to the execution of the foundation with polyethylene corresponding tubes.

Formerly a tap will be passed to the thread of the foundation bolts and check the correct statement thereof.

**Quality control:**
In the calculation of the staffs and columns have been taken into account the following forces moments acting as listed below:

- Horizontal force on any element of the vertical portion of the column.
- Horizontal force on any element of the arm which is separated from the column.
- Strength of the luminaire.
- Forces engendered by the weights themselves.
- Bending moments acting on the column and the arm.
- Torques acting on the chandelier column under the effect of loads due to the wind.

4.7.6. Lighting column foundations

This unit includes, without listing limitation, the following:

- Excavation of the foundation.
- Formwork.
- Cleaning Concrete and concrete foundation.
- Central Supply Chest with frame and cover.
- Grommets for ground and power.
- Concrete filler.

The sizes, shapes and characteristics of foundations are reflected in the plans of Project.

Concrete leveling and cleaning HL-150, will have a budget of 150 kg/m³ of cement concrete.

The foundations of a slab lighting columns HM-25 are used.

4.7.7. Luminaires

In flat lighting indicates the place in which columns should be installed lighting. If necessary modify the site, the Contractor shall, after consultation with the Works Director shall determine
the situation to avoid interference with pipes or other mechanics and to obtain an adequate level of lighting equipment and uniform to avoid shadows harmful.

The luminaries will be held on the support or anchoring indicated in the Project. The mounting brackets will be done with the right materials so that they are provided with tilt.

Whatever the fastening system used, the luminaires should be subject rigidly so they can not rotate or oscillate.

Lighting appliances shall be subject to the following checks and measures:

- Measure the consumption of the lamp.
- Measure the initial luminous flux.
- Check the voltage drop from the command center to the ends of the line.
- Checking phase equilibrium.
- Identification of phases.
- Measuring the luminaire driveways.
- Measurement of parameters uniformities.

Luminaires are supplied with all the connected elements and a Certificate of Industrial Origin evidencing compliance features, rules and regulations.

4.7.8. Grounding

Each ground will be installed in a properly marked and covered pit, where will emerge plate grounding and connection to the protective conductor shall be given by a special flange of the same material will also serve for the measurement and maintenance. It will ensure that the distance between the ground and the plate or electrode is greater than five feet (0.50 m) funnels to avoid tension.

The grounding plate will connect to all the pictures and all the envelopes metallic elements having direct access. At the ends of the wire will plate main land, with appropriate connecting elements. The output of the ground conductor done through an insulating ceramic tube or to avoid dangerous potential around the cable.
4.8. **Telecommunication tubes**

This unit covers all operations and materials necessary to leave completely finished pipes telecommunications, according to the plans of Project and instructions Works Director.

In the drawings the location of the project is defined, the number of tubes and channeling dimensions and materials constituting these channels.

In polyethylene pipe pipes 125 mm in diameter are used willing as reflected in the plans for the project. The ducts are placed inside the trenches suitably prepared using spacers, within a concrete prism HM-20. About this prism a band signaling is provided.

4.9. **Medium voltage electrical piping**

This unit covers all operations and materials necessary to leave completely finished the medium voltage electrical circuits, according to the Project drawings and instructions of the Director of Works.

In the drawings the location of the project is defined, the number of tubes and channeling dimensions and materials constituting these channels.

In the pipelines used polyethylene pipe high density corrugated double wall (flat inner, corrugated outside) of 200 mm diameter arranged in reflected Project on the drawings. The ducts are placed inside the trenches suitably prepared using spacers, within a concrete prism HM-20. About this prism galvanized steel plate 8 mm thick and the side available signaling.

4.10. **Supply network**

4.10.1. **Manholes**

This unit consists of the complete realization of the boxes. The dimensions shall be indicated on the drawings of the project, but in case of need for the work may be adjusted always vary no more or less than fifteen percent (15%), although this of right to change the rating. This change in dimensions must be authorized by the Works Director.

Sufficient for executing digging the pit will be used. In the bottom of the excavation, the concrete slab is placed. Then the casket will be built brick. If the excavation is greater than necessary, the backfill of the pit is filled with soil selected.
4.11. Irrigation network

4.11.1. Pipes

Operations and materials required are described in this section to completely stop finished pipes, according to the project plans and instructions Works Director.

The work consists of:

- Excavation of the trench and removal of surplus materials to place of employment, collection provisional or center manager.
- Supply and installation of trench fill (concrete, sand, topsoil, etc.).
- Placement of the polyethylene sheet green.

Once excavated trench is placed in the bottom of the trench for the corresponding materials support of pipes. Thereafter the tubes are placed.

4.11.2. Tubes

Includes supply and installation of pipes LDPE and PVC, indicated in accordance with the plans of the project.

4.11.3. Manholes

This unit consists of the complete realization of the boxes. The dimensions shall be indicated on the drawings of the project, but in case of need for the work may be adjusted always vary no more or less than fifteen percent (15%), although this of right to change the rating. This change in dimensions must be authorized by the Works Director.

Sufficient excavation for the construction of the pit will be used. At the bottom of the excavation, a bed of gravel or sand 10 cm thick is placed.

4.11.4. Multipolar cable for monitoring and control

Includes the supply and laying of the cable with copper conductors type VV-K 0.6 / 1 kV 4x2, 5 cm² section, with green yellow protective conductor, placed in a tube, channel or tray.
4.12. Electrical tubes

The replacement work will be executed by the owner of the service company. Works executed shall comply with the technical requirements of the company.

The amount of this work has been included in the Budget Implementation Project Material, raised by a party to justify.

The civil works to be executed by the prime contractor for the works, will run under the project and the requirements regarding the supplier.

Furthermore, in previous sections some channeling medium voltage defined that value in the project through their respective work units.

4.13. Gas natural tubes

The replacement work will be executed by the owner of the service company. Works executed shall comply with the technical requirements of the company.

The amount of this work has been included in the Budget Implementation Project Material, raised by a party to justify.

4.14. Telefónica tubes

The replacement work will be executed by the owner of the service company. Works executed shall comply with the technical requirements of the company.

The amount of this work has been included in the Budget Implementation Project Material, raised by a party to justify.

4.15. Various works

4.15.1. Fences

The characteristics of fences and materials that constitute them and the location of the these are reflected in the plans for the project.

Fax placing Rivisa type fence 2m high lux formed by post type is expected 50 to 1.5 mm / E.M. (w = 2.2 cm3). The tensile strength of the sheet is from 300 to 500 N/mm2, per EN-10142. The
poles will be fitted with polypropylene non-degradable weathering, welded wire mesh frame with several folds to enhance your rigidity. The mesh size will be 100/50.

4.15.2. Bins

Bins should be provided at the location which is reflected in the plans for the project materials and the characteristics of the paper shall conform to those defined in the project plans.

The unit comprises the supply, installation and placement of the bins, and all work and auxiliary means to leave this fully finished unit.

4.15.3. Topsoil spreading

Topsoil shall loan. Collection of topsoil is included in the unit if necessary, within the area of the work, the amount needed for later use in plantations. In this unit of work fertilization topsoil is included.

Its implementation includes the following:

- Excavation of topsoil loan.
- Storage
- Conservation
- Spreading of topsoil.
- Excavation

Before starting work will be submitted for approval by the Director of the play choice collection areas and, where appropriate, a plan that included the areas and depths of extraction.

4.15.4. Plantings

Implementation and quality control:

Broadcast sowing is carried out once the surface to be covered with topsoil.

Quality control of hand seeding affect the equipment, products and implementation.
Implementation and installation:

During this phase the following controls and checks are performed:

- Seeding.
- Performance time.
- Environmental conditions.
- Composition of the mixture.
- Incidents.
- All those aspects that may be interesting for the control units.
- Control of germination and seedling emergence
- Controls the installation of plant species to be held with a floristic inventory 2, 4, 6 and 12 months of implementation.

4.15.5. Plantations

Opening of holes:

It consists of soft and open terrain by digging holes about binoculars with variable dimensions, in all cases, allowing roots plants their comfortable situation in the hole without bending or deteriorate, especially the apex the main or root comfortably fit the root ball.

The Contractor shall stake out the detail for the location of the plants, not being able started opening holes without prior approval of the stake by the Director of works.

Opening the work must be done with some wet ground, since, in this way, the soil consistency is lower, and sufficiently in advance of the time of planting, for good weathering of the earth. If any of the soil horizons appear poor quality land, unfit to be used in filling the hole made planting, transport will be necessary to center manager.

The excavated soil quality should be placed next to the hole, downwind, and if it is located on a slope, the lower part thereof so that no wind or water back fill the hole with the removed soil.

Plantation:
Planting work consists of furnishing labor, materials, equipment and accessories and execution of all operations related thereto.

Planting is in position on the ground, previously prepared with plant development and characteristics specified on the Drawings and this Specification, born and bred elsewhere.

Not able to start planting, without prior approval by the Director of the play, the stakeout and specific location of each species.

During the preparation of the planting will take care that the roots do not dry out. They take the measures and precautions to avoid bruising, fractures and other physical damage to the roots, stems or branches of plants, to prevent breakage or deterioration rootball. All plants are arranged in this way will lower the truck carefully. Plants never be stacked on top of each other, or so tightly that they can be damaged by compression or heat. Damaged be removed or disposed of them according to the order Director of the play.

4.15.6. Irrigation

The risks involve the addition of water to the plantations and crops. The risks of planting will take place in the same time that each plant is planted and immediately after planting compacted mulch.

Be made so that they do not cause mismatches plants or in erosions and washed soil or runoff or by filtration.

Throughout the duration of germination should be maintained with the ground surface needed moisture to the percentage (%) of the germinated seed is anticipated.

4.15.7. Conservation during the warranty period

Conservation work consists of furnishing labor, materials, equipment and accessories, and performing all operations related to the plantations and sow, and until the end of the warranty period.

The maintenance of the planted vegetation during the warranty period will cover the next two years at the time of planting.

Conservation during the period of warranty is included in the rates retain units not being therefore subject to independent subscription.
Irrigation:

Regarding the sown areas, immediate irrigation will be done with caution necessary to prevent seed lands or crawls. Be conducted so that it reaches the ground in form of light rain.

Subsequent irrigations can be spaced according to the degree of moisture earth. Irrigation system installed will be scheduled.

Pruning:

Pruning is carried out at the right time and the cuts should be clean and treated with healing in cases where the diameter of the cut limb is large.

4.16. Construction and demolition wastes management

Definition and Condition:

Manufacturer of construction and demolition waste is obliged by Royal Decree 105/2008 to include in the final design of a study of the work of construction waste management and demolition, with content laid down in Article 4 of Royal Decree 105/2008:

- An estimate of the amount in tonnes and cubic meters of waste construction and demolition waste that will be generated on site, encoded according to the list published by European Order of MAM/304/2002 waste of 8 February, laying published from recovery and disposal of waste and the European schedule of waste, or legislation replacing.

- The measures for waste prevention in the work to the project.

- The operations of reuse, recovery or waste disposal to be allocated that will be generated on site.

- The measures for the separation of waste on site, in particular to comply by the holder of the waste.

- Plans to facilities for the storage, handling, separation and other management operations of construction and demolition waste within the works. Subsequently, these plans may be subject to adaptation to the characteristics particular of the work and its execution, the agreement of the project management of the work.
• The requirements of the contract documents technical requirements of the project in relation with the storage, handling, separation and, where appropriate, other operations management construction and demolition waste within the work.

• An assessment of the estimated cost of the management of construction and demolition waste which will form part of the project budget in separate chapter.

In addition, the contractor shall submit to the promoter of a Management Plan to be RCD generate on site, with content provided in Article 4.1 and 5 of the RD 105/2008. This Plan is based on the descriptions and contents of Waste Management Study Project and shall be approved by the Site Manager and accepted by the developer, Once accepted will go part of construction contract documents.
5. Measurement and payment

5.1. Overview

5.1.1. Definition of unit price

All units are paid solely in accordance with the prices set in Table 1 to the Project, in which the coefficients notice shall apply allocation and price review as stipulated by the Tender Conditions of Contract. The Prices include, without exception or reservation, all overheads and charges incurred for the execution of the work under the terms and conditions laid out, and comprise all obligations to the Contractor for this Tender and documents complementary.

It is understood that all unit prices at which measurement standards and relate it fertilizer always included in the project include the supply, handling and use of all materials, equipment and labor that are needed to carry the loads, downloads and transport, communications, testing and trials and all needs circumstantial which they need to perform work as specified in the Specification and Drawings approved by the APB.

5.1.2. Unspecified system for measuring and assessing

The measurement and valuation of the work units, which have not been specified expressly in these Terms shall be conducted according to the measuring system that dictates Construction Management and prices contained in the Contract.

5.1.3. Prices of units of work not provided for in the Contract

All units of work that is required to fully complete the project and not they have been defined therein, shall be paid by the conflicting prices agreed with the Directorate Works and approved by the APB. A must precede its execution, in addition to the administrative approval, conducting detailed drawings that have been approved by the Construction Management.

5.2. Ground moving

5.2.1. Demolition and dismantling
Machinery, auxiliary means is included in the price of demolition and dismantling, labor and the elements necessary to make the unit work correctly without altering or destroying nearby services, conduits, pipes, etc.

The same unit price irrespective of the method used to apply the demolition.

The price transport and loading and unloading at warehouse, and temporary storage center includes authorized manager.

Payment for demolition and dismantling will be according to the type in question, applying the unit prices set out in the Price Chart No. 1:

- Demolition of solid masonry or concrete will be measured and paid for cubic meters (m3) actually demolished, measured in situ, and removed from its location to temporary storage area or facility authorized agent or where directed by the Director Building.

- The removal of pipes, of any type, will be measured and paid by the meter (m) actually removed, measured in situ, and removed from its location to area temporary storage or local authorized or where directed by the Director of Works manager.

- Removal of existing fencing, of any type, will be measured and paid for the meters (M) actually removed, measured in situ, and removed from its location to area temporary collection center or where authorized or directed by the Director of Works manager.

- Dismantling of manhole cover or other services of any type shall be measured and paid per unit (Ud) actually carried, measured in situ, and removed from their site to temporary storage area, or permanent work location, or center authorized agent or where the Tech Works Director.

- The surface pitting or reinforced concrete mass will be measured and paid for square meters (m2) actually executed, measured in situ, and removed from their site to temporary storage area or facility authorized agent or where indicate Works Director.

- The cutting of bituminous pavement or concrete mixtures will be measured and paid for meter (m) actually executed, measured in situ, and removed from its site of materials related to temporary storage area or facility authorized agent or where directed by the Director of Works.

- The demolition of the pavement will be measured and paid in square meters (m2), really executed, measured in situ, and removed the leftover materials to temporary storage, authorized agent or center where the Tech Works Director.
• Demolition of all sidewalks shall be measured and paid in square meters (m²), actually executed, measured in situ, and removed the leftover materials to collection temporary center where authorized or directed by the Director of Works manager.

• The demolition and removal of curbs shall be measured and paid in meters (m), actually executed, measured in situ, and removed the leftover materials to temporary storage, authorized center or where directed by the Director of Works manager.

• The removal of canes or lighting columns will be measured and paid per unit (Ud) actually executed, measured in situ, and removed from its location to storage area temporary or local authorized or where directed by the Director of Works manager.

• Removal of vertical signals will be measured and paid per unit (you) really executed, measured in situ, and removed from its location to temporary storage area or authorized agent or center where the Tech Works Director.

• The extraction and removal of trees will be measured and paid per unit (you) really executed, measured in work and removed from its location to temporary storage area or authorized agent or center where the Tech Works Director.

5.2.2. Diggings

Excavation of dozing:

The excavation of the earthworks or large trenches (excavation emptied) is measured and paid in cubic meters (m³), obtained as the difference between the profiles transverse contrasting terrain, taken immediately before the excavation and theoretical profiles dozing or ditches indicated on the drawings or where appropriate, ordained by the Director of Works, which will then be taken as theoretical regardless regarding the excesses theoretical profiles were produced.

Not be measured and payment for this article those entering excavations units of work as an integral part thereof.

Other excavations:

Trenching, pits and foundations will be measured and paid by the cubic meter (m³) to be obtained. Is measured by calculating the volume of the prism, the side faces correspond to the theoretical section deduced and horizontal planes form the background of the the trench and the ground. In excavations of foundations and walls of structures shall be calculated on volume.
of the prism vertical sides, the lower base at the level of the foundation, is determined by the area of parallel sides at a distance of fifty inches (0.50 cm) on each side of the shoe against the ground and the upper base is intersection of the sides to the bottom of the clearing, grading dimension or, in the case works outside the clearing to do with the natural terrain.

The volume actually dug for slopes and real sobreanchos executed, is considered always included within theoretical measurement defined in the previous paragraph, which is solely credit object.

This excavation is no direct fertilizer pipe, manholes and collectors PVC-U, that cost is included in the price of those units.

5.2.3. Fillings

**Embankment:**

Fillings are measured in cubic meters (m³), obtained as the result of the difference between the initial profiles of the area before starting the filling and the corresponding theoretical profile the grading and slopes defined in the plans, without excesses account produced by more lines or slope the embankment widening. Shall be paid with the price of the unit of work corresponding to landfills contained in Price Chart No. 1.

The subscription price includes transportation from the storage area specified by the Director of Works to its location in the work, permanent or temporary, extended, mix "in situ" if any, the wetting, compaction, refining slope, the gradations needed, sanitation of the areas that require it and other necessary activities.

**Esplanade with selected soil:**

The implementation of the enhancement layer with selected soil subgrade will be measured by the meter Cu (m³) of material actually executed, which is obtained directly from typical sections shown on the plans. The necessary operations are not paid to repair surfaces which is superior to the tolerable irregularities or presenting a defective appearance.

The price stated in the Schedule of Rates # 1 will be paid.

**Soil stabilized with cement “in situ”:**

Implementation of cement stabilized soil is measured by cubic meters (m³) of material actually stabilized, which is obtained directly from the templates listed in levels. The necessary
operations are not paid to repair surfaces having irregularities exceeding tolerable or showing a poor appearance.

The hydrocarbon binder (including irrigation eventual aggregate) used in irrigation curing be measured by the square meter (m2) actually treated.

Shall be paid at the rates set in the Price Chart No. 1.

Located landfills:

Localized fillers are measured by cubic meters (m3) actually executed, depending on filler, net of profiles taken before and after work. By taking the initial profiles excess excavation not justified criterion is not taken into account Director of the Work, or who has voluntarily made by the Contractor.

The payment of these units is made according to the prices that are reflected in Table Price # 1.

The price of the units is included the supply of the material, its transport to final location in the work, the extended, compaction, and all operations leave these fully completed units.

Slope refining:

Not be measured and paid for this item, since it is considered included within excavation units, and firm embankment and pavement.

5.3. Drain

5.3.1. Manholes and sinks

Manholes and manhole records:

The wells will be measured by units (ud) fully built, each of the types defined in the Project. The price includes the excavation of the pit, supply and placement concrete hearth and elevations and reinforcements, shuttering and stripping, plaster and plaster, cover or grate, frame and pates, the backfill of the well, and all necessary operations to completely end the unit.

Drains and inlets:
Scuppers shall be measured by unit (ud) in the work actually performed. The price includes construction of the floor and walls, reinforcement, formwork and stripping the plaster and Plastering, supply and placement of the frame and the grid, and made of mortar and all necessary to completely end the unit operations. It also includes excavation required for the scuppers and backfill.

**Connections to existing wells and manifolds:**

Connections are measured per unit (piece) actually executed in the work of each of the types defined in the project. The price includes the necessary demolition pits or existing collectors, excavations necessary to reach the point of connection and backfill the excavation, and all operations, materials, aids and controls necessary for the proper and complete execution of the work units.

The payment of these units is made according to the prices that in Table # 1 Price.

**Setting and manhole cover:**

When the siege and covers or grates manholes are direct payment, shall be measured and be paid by the units (ud) actually placed in the work, the price included in the box Prices # 1.

Price includes delivery and placement of the frame and cover or grate, taken from the mortar, anchoring the fence to the walls, and all operations necessary for the proper leveling and finishing unit.

**“Pates”:**

When pates are direct payment, shall be measured and paid for the units (ud) actually placed in the work, the price included in the Price Chart No. 1. Price includes supply and placement of pate, taken from the mortar and all operations necessary to leveling and finishing unit.

**Replacing fences and manholes covers:**

Be measured and paid for the units (ud) actually executed in the work of each of the marked, the price included in the Price Chart # 1 types. Prices include disassembly siege and cap, screed boxes and wells, repositioning the frame, with the necessary anchors, taken from the mortar, the relocation of the lid, and all operations necessary for leveling and finishing unit.

**5.3.2. Tubes**
PVC-U collectors:

Collectors of PVC-U, will be measured and paid per meter (m) of each of the types defined in the Project. Included in this price and will not result in payment separately, digging ditch and transport of surplus materials to place of employment or center manager, supply and tube placement, the concrete enclosure, flooring, paving, wetting and compaction of backfill, the proportion of joints, elbows and parts special, and all requirements specified by the Director of Development. Its measurement is performed deducting the corresponding lengths lights free boxes, logs, etc.

Payment will be made according to the price specified in the Schedule of Rates # 1.

5.3.3. Drawing with slotted tube

The slotted drain pipe will be measured by the meter (m) actually executed, including excavating the foundation bed, the slotted tube of PVC sheet, geotextile filter material and ditch fills.

5.4. Firms

5.4.1. Granular Layers

Artificial gravel:

The artificial gravel shall be paid in cubic meters (m3) actually executed, measured sections according to the type indicated on the Drawings, the price stated in the Schedule of Prices # 1.

5.4.2. Bituminous mixtures and irrigation

Bituminous mixtures, hot bituminous concrete type:

The manufacture and application of hot mix asphalt shall be paid by the ton (t), by type, by multiplying the width measures identified for each layer in the Plans, by the smaller thickness of the following two: Plans contained in or derived from trials control, and the average density obtained from the control tests on each batch density of the mixture including bitumen.

The price is also considered including preparation of the existing surface, aggregates and powder and mineral filler. No payment shall be excess or lateral thickness increases correction of declines in underlying layers.
**Primer irrigation:**

This unit will be measured and paid by the square meter (m2) actually executed in the money supply and the application of hydrocarbon binder, supply and includes application arid irrigations eventually used in primer and operations which are required for the full completion of the unit.

The preparation of the existing surface shall be considered included in the unit of work corresponding to the construction of the underlying layer and therefore not paid separately.

The unit price of the unit of work is included in the Price Chart No. 1.

**Adherence irrigation:**

This unit will be measured and paid by the square meter (m2) actually executed. Fertilization includes the preparation of the existing surface and the supply and application of the emulsion.

The excesses of the endowment established by the Director of Works shall not compost. Will not be paid the side excesses or preparation of the existing surface is included in the unit corresponding to the construction work of the underlying layer.

**Irrigation curing:**

This unit will be measured and paid by the square meter (m2) actually executed. In the money supply and the application of hydrocarbon binder includes preparation existing surface, supply and implementation of employee eventually arid irrigations curing and operations necessary for the total completion of the unit. Nor be paid the excess side.

The unit price of the unit of work is included in the Price Chart No. 1.

**5.4.3. Additional works**

**Curbs and trench footing:**

The trench footings and curbs shall be measured by the meter (m) actually placed on the work of each type, measured on the plans of the project. In the payment will be made according to the prices listed in Table # 1 Price.

The price supply, testing and commissioning work of curbs / rigola is included, the HM-concrete foundation 20, the mortar M-450 type used and all operations, aids, equipment or labor necessary for the complete execution of these work units.
Hydraulic tile flooring:

The hydraulic tile flooring to provide sidewalks shall be measured in square meters (m²) actually placed on the work of each, measured on the plans of the project. It is paid according to the prices that are included in the Price Chart No. 1. The price supply, testing and commissioning of hydraulic tile work is included, the concrete foundation HM-20, MCP-3 type mortar grout irrigation and all operations, aids, equipment or labor required for complete implementation of these work units.

Cobblestone pavement concrete:

The cobblestone pavement will be measured by square meters (m²) actually executed. It is paid according to the price specified in the Schedule of Rates # 1.

The price of the unit pavers are included positions corresponding size work and set with special parts needed, the bedding sand, the sand used in topsoil and their placement, and in general, all operations materials and auxiliary means required for successful completion of the unit. Also, the concrete slab is included HM-20. No additional payment shall be the chosen colors and drawing performed on the pavement.

Tree gates for sidewalks:

The tree pits shall be measured by units (ud) fully placed. The price includes excavation, supply and placement of concrete slab, fence and steel plates galvanized perimeter seal, and all operations necessary to leave the unit completely finished.

The payment of this unit of work is performed in accordance with the appropriate price Painting Price # 1.

5.5. Concrete structures

5.5.1. Components

Reinforcement used in reinforced concrete:

Steel for reinforcement shall be measured and paid by the kilogram (kg) resulting from multiply lengths for each diameter appearing on the plans by the theoretical weight of kilogram per meter shown in the EHE-08, or in the catalog indicating the Director Work. This measurement may not be increased under any circumstances, even tolerances lamination.
The price supply, transportation, processing, folding, placement is included, the spacers, wedges, ties, welds, cuts losses and blunted, and splicing by overlap although not included in the plans.

**Concrete:**

Be measured and paid in cubic meters (m3) deducted from the sections and plans of the project, and considering the following exceptions:

- The concrete used in fillings, will be measured by the difference between the previous state and after the execution of the works, with the prior corresponding to the measures used to fertilize the excavation, and therefore the excesses that are not paid produced by post-implementation of the excavation landslides.

- The concrete lined ditches, manholes, lining pipes, nozzles, etc. and any drainage work will not be measured and independent fertilizer because considered included in the price of these units.

- Similarly about any precast concrete element.

- Payment will be made for the type of concrete and the place of use, according to prices existing in the Price Chart No. 1.

- Rates of compost include, in any case, the supply and handling, and use of all materials, equipment and labor required for the execution and compaction, curing, finishing and all the operations necessary for proper commissioning work in accordance with the requirements of this Specification.

Additives used by the Contractor at its own initiative or need not be paid constructive.

### 5.5.2. Auxiliary elements

**Formwork:**

Formwork shall be measured by square meters (m2) actually executed, measured on planes according to the corresponding unit prices listed in the Table of Rates # 1.

**Anchors:**
The corrugated steel anchor shall be measured and paid per meter (m) actually executed. The price the drill steel rods, epoxy resin and all materials included accessories and auxiliary operations required to leave the work unit fully completed.

5.6. Signalling, beaconing and defences

5.6.1. Road markings

For the purposes of measurement and payment the following criteria are established:

- Reflective road markings 10, 15, 30 and 40 cm in width shall be measured and paid for meter (m) actually painted on site, measured along the axis of the band.

- Reflective run on signs road markings "YIELD", "STOP", small islands, arrows and words are measured and paid per square meter (m2) of area actually executed on site.

5.6.2. Vertical signs

For the purposes of measurement and payment the following criteria are established:

- Signals are paid per unit (Ud) according to their type. This price includes supply signals plates and placing and fixing elements to the pole.

- The plates of galvanized steel or aluminum are measured per square meter (m2), placed in work. The price the proportion of auxiliaries is included fixing and support the post.

- The posts shall be paid per unit (Ud) as the corresponding types. The price includes delivery and placement.

- The clamping of the posts to the foundation shall be measured by unit (Ud), and price includes delivery and placement.

- The foundations of signals and signs will be measured by cubic meters (m3) as dimensions set in the project. The price includes excavation, loading remaining to place of employment or management center, the concrete of the foundation material placement anchor bolts and all necessary work for the work unit is completely finished.
5.6.3. Security barrier

Safety barriers will be measured by the meter (m) actually placed, according to each type defined in the project, fully installed on site. The price includes the part proportional poles and foundations, the reflector and the supply and installation of barrier.

The terminals for the barrier will be measured by complete unit (Ud) implemented in work, according to each type. The price the supply and installation of all materials included and work necessary to make this element fully placed.

5.6.4. Marking of road

The reflector shall be measured on roads (Ud) units actually placed in work. in the money supply and placement of these elements and all materials and labor included necessary to make this work completely installed unit.

5.7. Lighting installations

5.7.1. Junction Boxes

The junction boxes shall be measured and paid per unit (Ud) actually placed and connecte and once the fitness for service testing and proven regulatory testing.

Prices stated in the Price Chart No. 1 shall apply.

The price the supply, installation and connection boxes and all components included necessary for proper system operation.

5.7.2. Electrical Circuits

Electric lighting and wiring shall be measured by the meter (m) cable, correct and fully installed, of each type provided in project, once proven installation. It is measured on flat and curved.

Prices for each cable type listed in the Table of Rates # 1 shall apply. In price of each type of cable supply, cable routing and connections included.

5.7.3. Bare copper conductor
It will be paid per meter (m) cord correctly and completely installed, after verifying the installation and according to Price Chart No. 1. This unit comprises the laying bare copper wire bonding by including exothermic welding or staple to form the ground network.

5.7.4. Pipes

Light pipes will be measured and paid by the meter (m) actually executed for each type, measured on the flat and the prices of Table Price # 1.

The price of each type of pipeline includes pipes HDPE, the excavation and backfill compacted, ties, connections and spacers, the prism concrete, removal of excess materials and transport management center, and all tapes signaling necessary for the completion of work.

5.7.5. Manholes

The caskets of the lighting system shall be measured and paid by (Ud) units actually executed every type specified in the project, and prices relevant Pricing Table # 1.

The price of each type of casket includes the excavation of the well, the supply and installation of fillings (HM-25 concrete, gravel bed, geotextile, in backfill of manholes), the chest finished, the frame and cover resistant to traffic and connections and other operations to leave completely finished unit.

5.7.6. Foundations of lighting columns

The foundations will be measured by cubic meters (m3) executed, and paid the price relevant Pricing Table # 1.

The unit price includes excavation, formwork, concrete, steel, bolts anchoring P.V.C. tube for referrals, fillings, loading and transportation of surplus materials management center and all operations and tools to make the unit work fully completed.

5.7.7. Metal lighting columns

The columns will be measured by (Ud) units placed on foundation, properly leveled and has paid the appropriate price Price Chart No. 1. shall be credited only one.
5.8. Telecommunication network

5.8.1. Pipes

The pipes shall be measured and paid by the meter (m) actually executed, measured on the plans and the corresponding price Price Chart No. 1.

The price of the pipeline includes excavation and backfill, concrete, pipes and tri tubes, band signaling, transport manager or provisional collection center of the surplus materials and all operations necessary for the completion of the work.

5.8.2. Manholes

The manholes will be measured and paid by (Ud) units actually executed, and the price relevant Pricing Table # 1.

The price includes the excavation pit well, supply and placement of fill backfill of the pit, the bottom drain, the chest completely finished, the frame and cover, the connections and all materials and work to stop the unit completely finished.

5.9. Medium voltage electrical lines

5.9.1. Pipes

The trunking shall be measured and paid by the meter (m) actually executed each type, as measured on the flat and the prices defined in Box Prices # 1.

The price of each type of pipeline includes pipes HDPE, the excavation and backfill compacted, ties, connections and spacers, the prism concrete, galvanized steel sheet, the replacement of the firm, the withdrawal of surplus materials and transportation management center, and all tapes are signaling necessary for the completion of work.

5.10. Supply network

5.10.1. Accessories, special parts and auxiliary elements
Measuring valves, vents, flanges and hydrants will be performed by units (Ud) actually installed, tested and operated according to the Project and orders Works Director. Prices include delivery of all items, placement and installation of the themselves, testing, and commissioning of the facility, as well as all elements necessary for installation and operation.

5.10.2. Manholes

The manholes will be measured and paid by (Ud) units actually executed for each type of projected in the project, as the prices of Price Chart No. 1.

The price of each type of casket includes the excavation of the pit, supply and placement backfill of the pit, the concrete floor, the chest completely finished, the frame and cover, connections and all materials and work to stop the unit completely completed.

5.11. Irrigation network

5.11.1. Pipes

Irrigation pipes will be measured and paid by the meter (m) actually executed measured on the planes and the corresponding price Price Chart No. 1.

5.11.2. Other pipes

The tubes that are included in the pipes, so the PVC as LDPE density will be measured and paid by the meter (m) actually placed, of each type, measured on the plans and the corresponding price Price Chart No. 1. The price includes the supply pipe and tube placement, ties, spacers and necessary connections, removal of excess materials and transport management center, and all operations necessary for completion of the work.

5.11.3. Accessories, special parts and auxiliary elements

The measurement of the valves, solenoid valves, by-pass, rings, hydrants and metal filter be conducted by units (Ud) actually installed, tested and working in accordance with the Project and the orders of the Director of Works.

Prices include delivery of all items, placement and installation of the themselves, testing, and commissioning of the facility, as well as all elements necessary for installation and operation.
5.11.4. Manholes

The manholes will be measured and paid by (Ud) units actually executed on site, and corresponding price Price Chart No. 1.

The price of each type of casket includes the excavation of the pit, supply and placement backfill of the pit, the gravel or sand bed, the chest completely finished, the connections and all materials and work to stop the unit completely finished.

The frame and the top of the boxes will be measured and paid by (Ud) units actually executed every type specified in the project, as the prices of Price Chart No. 1.

Price includes delivery and assembly of the frame and cover, and all materials and operations to stop the unit completely finished.

5.11.5. Cable multipolar command and control

The cable will be measured and paid by the meter (m) actually placed, connected and service.

5.12. Various works

5.12.1. Fences

Be measured and paid by the meter (m) actually placed in work, of each type. The corresponding price Price Chart # 1 includes the supply and use of all materials for both the foundations and post and lattices, opening holes for the foundations of the poles and the supply and use of all fixing and locking need to be placed in those posts that, for reasons of change of alignment or interruption of fence needed fixing in a special way.

5.12.2. Bins

Be measured and paid per unit (Ud) actually placed in work. The corresponding price Price Chart # 1 includes the supply, installation and placement and use of all materials, both for the paper and for the foundations and anchors, the opening holes for anchoring in the concrete floor, and all work and media tools required to leave the paper fully installed.

5.12.3. Contribution and spread topsoil
The spread of topsoil will be measured and paid in cubic meters (m³) actually executed, measured on cross sections.

The price of the unit supplying the material is included, from loans, maintenance of equipment in temporary stockpiles, fertilizers, treating the material prior extended, the extended material, transportation of material collection and temporary loan from there to site of final use, and all materials and work necessary to leave the unit properly executed. Thickness increases on expected not paid on the type of planes or within the limits ordered by the Director of Works sections.

The spread of topsoil shall be paid according to the unit price established in the Box Prices # 1.

5.12.4. Plantations

Planting shrubs and trees, and mentors will be measured by units (Ud) actually planted in accordance with the flat surfaces defined on or that are directed by the Director of the Works.

5.13. Road safety and temporary deviations

5.13.1. Definition and conditions of the works to be executed

Definition:

This Specification includes the operations of road safety, signage, markings, placement safety barriers and temporary diversions during the execution of the works.

As already indicated in other sections of these specifications, construction, maintenance and demolition of temporary diversions, when separation from the service, along with its signage, markings and temporary defenses made by the Contractor and at therefore are not direct payment.

Terms and Conditions:

Road signs must be affixed to the media and placed in the vertical plane, in the position indicated and approved by the Project Manager.

Conditions of the implementation process:
On signs and labels vertical signs, damage should not occur in painting or lumps on the board, and should be pierced to secure the plate, and the holes should be used existing.

All signs, landmarks, beacons, etc. must be positioned so that verticality is ensured and immobility.

5.14. Affected services

This statement applies to diversions affected services during the execution of the works.

The definition of forwarding services is included in the accompanying drawings and the Project, and evaluation of them is included in the Budget Implementation Project Material.

The work planned to be performed by the Contractor, shall be measured and paid at the unit prices of units of work executed by the corresponding measurements.

5.15. Construction and demolition wastes management

According to Royal Decree 105/2008, the classification on site waste is included construction and demolition waste transport facility authorized management waste deposition controlled recycling center or center manager, as specified in each. The transport is carried out within an area of 5 km radius.

Controlled Deposition recycling center or center manager, will be measured and paid prices Pricing Table # 1.

The classification on site of construction and demolition waste and transport waste facility authorized waste management is not of direct payment, but is included in the unit price of work of which they are part.

5.16. Raised items

5.16.1. Safety and Health

The payment of heading height corresponding to the Study of Safety and Health will be in accordance with corresponding Graphs Prices listed on Schedule Memory of that study. These tables are considered price contract documents and will therefore be affected by the ratio of the low bid submitted by the Contractor.
DOCUMENT N°4. BUDGET
Budget summary

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**EXECUTION BY CONTRACT BUDGET**

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