



Exploration & Production

GENERAL SPECIFICATION

CIVIL WORKS

GS EP CIV 403

Temporary construction camps and associated facilities (onshore)

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Contents

1. Scope	6
2. Reference documents.....	6
3. Preliminary data	8
3.1 Surveys impact	8
3.2 Climatic conditions.....	8
3.3 Local environment	8
3.4 Life duration	8
3.5 Removal of the Camp	9
4. Population.....	9
4.1 Camp capacity	9
4.2 Breakdown of population by categories of personnel	9
4.3 Countries of origin/Cultural groups	10
4.4 Types of stays and relieving system, work constraints.....	10
4.5 Female staff facilities	10
5. Pioneer's camp.....	10
6. Organization of the camp	11
6.1 General organization	11
6.2 Relations with Local Population.....	12
6.3 Operation of Camp facilities.....	12
6.4 Maintenance of Camp facilities.....	12
7. Catering.....	12
7.1 Training and behavior of Catering personnel.....	13
7.2 Caterer's duties.....	13
8. Security.....	14
8.1 Security and Safety Central Station.....	14
8.2 Security scope	14
8.3 Internal police	15
8.4 Badges control.....	15
8.5 Liaison with local police and authorities.....	15

9. Safety	15
9.1 Fundamental requirements for Safety of buildings	15
9.2 Organization of fire-fighting.....	15
9.3 Fire-fighting equipment	15
9.4 Emergency means.....	16
9.5 Radio/UHF	16
9.6 Marking.....	16
9.7 Miscellaneous	16
10. Health - Hygiene and medical support	16
10.1 General requirements	16
10.2 Clinic and medical equipment.....	17
10.3 Organization and management of medical support	19
11. Transports and traffic	21
11.1 Transport means.....	21
11.2 Road safety plan.....	21
11.3 Safety of transports.....	21
12. List of buildings	22
12.1 General.....	22
12.2 Housing accommodations	22
12.3 Prayer room	26
12.4 Recreation Facilities	26
12.5 Restaurants and services	28
12.6 Laundry.....	31
12.7 Camp Commissary	31
12.8 Clinic	32
12.9 Camp administration offices	32
12.10 Camp maintenance Workshop	32
12.11 Camp maintenance Warehouse	32
12.12 Gate houses	32
12.13 Miscellaneous shelters	33
12.14 Miscellaneous other buildings.....	33
13. Plot plan layout, roads and outdoors facilities.....	33
13.1 Layout consideration.....	33

13.2	Concept for design of plot plan	34
13.3	Roads and car parks.....	36
13.4	Fencing.....	37
13.5	Sports and leisure areas (outdoors)	37
13.6	Landscaping	37
14.	Buildings construction	38
14.1	Applicable international Codes and Standards.....	38
14.2	Buildings concept.....	38
14.3	Building's equipment.....	40
14.4	HVAC.....	40
15.	Utilities	40
15.1	Electrical system.....	41
15.2	Potable water system	46
15.3	Industrial water system	47
15.4	Fire water system	47
15.5	Sewage treatment and system	47
15.6	Rainwater drainage.....	48
15.7	Waste management.....	48
15.8	Telecommunications.....	51
15.9	Instrumentation	53
16.	Schedule	53
17.	Legal and authorizations	53
18.	Battery limits	54
19.	List of documents to be provided by CONTRACTOR	54
19.1	CONTRACTOR's and SUB-CONTRACTOR's references	54
19.2	Histogram of personnel.....	54
19.3	Camp Capacity	55
19.4	Pioneer's Camp data	55
19.5	Manpower requirement for operation of Camp facilities	55
19.6	Catering	56
19.7	Security policy and concept.....	56
19.8	Safety policy and concept.....	56



19.9	Hygiene and Medical support policy and concept	56
19.10	Transport policy and means	56
19.11	Buildings layout.....	57
19.12	General Plot plan layout	57
19.13	Buildings Specifications	57
19.14	Utilities	58
19.15	Construction Schedule of Camp	61
19.16	Authorizations and Readiness to mobilize for Camp	62
19.17	Battery limits	62
Appendix 1	Maximum noise limits	63
Appendix 2	Potable water Specification.....	64
Appendix 3	Key One-line-diagram (small camps)	66
Appendix 4	Key One-line-diagram (large camps)	67

1. Scope

This document gives the minimum general standards requirements for design and realization of onshore **Temporary Construction Camps** and facilities within turn key contracts concept.

It must be adjusted according to each particular Project and country.

It is within CONTRACTOR's responsibility to conceive and realize the facilities for temporary accommodation of CONTRACTOR's and COMPANY's personnel for Plant works Site.

Accommodations should be developed and designed to avoid social or security troubles, which could impact Project schedule at Site.

Consequently, COMPANY wants to make sure of a correct standard, for both CONTRACTOR's, and COMPANY's personnel, and wishes to obtain adequate standard level in compliance with Total Health, Safety and Environment charter and ethic.

This Specification does not concern Permanent Base Camps.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
BS 5378	Safety signs and colours
IEC 60364 (2006)	Electrical installation of buildings
ASTM E-84 (2007)	Test method for surface burning characteristics of buildings materials
ASTM E-136 (2004)	Standard Test Method for Behavior of Mater Vertical Tube Furnace at 750°C
IEC 61024	Protection of structures against lightning
IEC 60298 (1993)	A.C. metal enclosed switch gear and control gear for rated voltages above 1 kV and up to and including 52 kV
NF C 13-200 (1987)	High Voltage electrical installations
NF C 15-100 (2002)	Low-Voltage electrical installations
IEC 60449 (1973)	Voltage Bands for electrical installations of buildings
IEC 60050-826 (2004)	International Electro-technical vocabulary - Electrical installations of buildings
IEC 60439-1 (2004)	Low-voltage switchgear and controlgear assemblies - Part 1: Type-tested and partially type-tested assemblies
IEC 61024-1 (1999)	Protection of structures against lightning - Part 1: General principles

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
NFPA 101 (2006)	Life Safety Code
NFPA 31 (2007)	Installation of oil burning equipment
NFPA 54 (2005)	National Fuel Gas Code
NFPA 17 (2002)	Dry chemical extinguishing systems
NFPA 220 (2006)	Types of building construction
NFPA 251 (2005)	Standard methods of tests of fire endurance buildings construction and materials
NFPA 255 (2005)	Method of test of surface burning characteristics of building materials
NFPA 259 (2007)	Standard test method for potential heat of building materials
NFPA 70 (2007)	National electrical code. Soft bound version
NFPA 82 (2004)	Incinerators and waste and linear handling systems and equipment

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP SAF 021	Lay-out
GS EP SAF 221	Safety rules for buildings
GS EP SAF 321	Fire pump stations and fire water mains
GS EP SAF 351	Escape, evacuation and rescue from fixed installations
GS EP ENV 421	Landfill design and operation for E&P sites

3. Preliminary data

3.1 Surveys impact

Environment and technical constraints shall be taken into consideration for the design of the Camp and the realization of the work, as described in particular Project's contractual documents:

- Topographic survey (existing relief, oueds, thalwegs, soil drainage, underground water table, etc.)
- Geometrical survey (limit of allocated land)
- Geophysical survey (borings, consistency and resistivity of soil, chemical)
- Local specific risks such as seismicity, landslides, floods, etc.

3.2 Climatic conditions

Design shall be based on climatic conditions as described in particular Project's contractual documents:

- Rain conditions, snow, icing, frost if any
- Winds (speed, direction, frequency, sand wind if any)
- Temperatures of air (minimal and maximal, daily and nightly, seasons during year)
- Hygrometry of air according to seasons
- Storm, lightening, etc.

3.3 Local environment

Design shall be based on local environment as described in particular Project's contractual documents:

- Existing logistic support:
 1. Accesses by road, sea, rail, air, etc.
 2. Nearest industrial center
- Availability of construction material and equipment in surrounding areas
- Local telecommunications facilities
- Administrative local regulations:
 3. Importation conditions and Customs conditions
 4. Local authorizations to be provided
 5. Miscellaneous local servitude's
 6. Requirements and constraints imposed by local Authorities.

3.4 Life duration

Life duration of buildings, utilities and equipment (assuming normal maintenance is carried out) shall be normally 3 to 5 years, unless otherwise specified.

3.5 Removal of the Camp

As a base case, CONTRACTOR shall remove the Construction Camp on completion of the work on Site.

Retention of the Camp (or part of) should be considered as an option if requested by COMPANY.

CONTRACTOR shall issue for COMPANY's approval a study demonstrating the feasibility of the decommissioning, dismantling and removal of the Construction Camp with minimum impact to the environment.

All the buildings, tools, vehicles and any other items subject to bonding for temporary import shall be re-exported or disposed of as directed by the local Authorities.

CONTRACTOR shall co-ordinate these activities with COMPANY.

Removal and dismantling of the Construction Camp shall be done with the approval of the COMPANY.

Site cleaning shall be performed by CONTRACTOR and shall include as minimum the removal of debris and/or surplus material making good all surfaces and areas as required by COMPANY.

Unless otherwise specified, all underground work, civil foundations, underground piping and cabling shall be removed. Soil restoration should be done with suitable back-fill material and compaction shall be controlled.

4. Population

4.1 Camp capacity

Camp capacity, (including Caterer's personnel), for normal occupancy and for peak occupancy, shall be in consistency with manpower histogram for:

- Beds availability
- Utilities availability.

4.2 Breakdown of population by categories of personnel

Breakdown of population, (including Caterer's personnel), for normal occupancy and for peak occupancy, shall define various categories of personnel as follows:

- COMPANY's camp
- Management and VIP's (may be common to COMPANY's and to CONTRACTOR's camp)
- Guest house for visitors (may be common to COMPANY's and to CONTRACTOR's camp)
- CONTRACTOR's camp:
 7. Senior's Staffs
 8. Junior's Staffs
 9. Skilled Labors
 10. Unskilled Labors.

The above theoretical repartition of categories of personnel shall be defined according to each particular Project/country.

4.3 Countries of origin/Cultural groups

Countries of origin, languages, cultural and religious groups shall be taken into consideration for design and concept of facilities:

- Impact for housing and amenity center
- Impact for Catering, food.

4.4 Types of stays and relieving system, work constraints

Rhythms and systems of stays ("rotation" systems) for the various types of population shall be anticipated for sizing of some facilities like entrance main Gatehouse, means of transport, etc.

Camp capacity and breakdown of population should be defined accordingly.

Refer also to § 12.2.1. for accommodation of night-shift workers in areas where disturbances to sleep and rest is minimal during the day.

4.5 Female staff facilities

In some particular cases some accommodations have to be provided for female staff.

In this case, separate accommodations shall be provided for bedrooms.

This shall be defined by each particular Project Specification.

In any cases, at least one set of separate female toilets shall be provided for all common buildings (Offices, Dining room, Recreation-halls and work areas).

5. Pioneer's camp

Temporary urgent facilities for first arrival of workload for erection of Camp are necessary, during a few months, before the Camp can accommodate the workers step by step.

Definition of Pioneer's Camp, capacity, types and breakdown of accommodations, shall be defined in relation with anticipated schedule of phased bed availability.

- Location of Pioneer's Camp shall be defined in accordance with future location of Construction Camp facilities
- Concept of Pioneer's Camp shall be developed and based on local availability, if any. Various options may be considered by CONTRACTOR which include:
 11. Utilization of existing facilities
 12. Trailers (In isolated areas, "portacabin type" with all amenities should be recommended, if available. They have to be hired sometimes long in advance)
 13. Prefabricated or pre-assembled skids
 14. Barge accommodation
 15. Temporary facilities
 16. Others.

- Minimum requirement for Pioneer's Camp shall be as follows:
 17. Accommodations, including COMPANY's Site representatives (Qty. and types to be defined)
 18. One first-aid
 19. One mobile workshop trailer
 20. One small restaurant with galley and services (capacity to be defined)
 21. Two units diesel generator set (type and capacity to be defined) (covering case when one unit is out)
 22. Relevant temporary power distribution
 23. One potable water treatment unit (or desalination unit, or transport by barge, or truck)
 24. Minimum Telecommunications facilities as per Telecom Specifications
 25. Fire-fighting protection by extinguishers
 26. Septic tanks or chemical units (Sewage treatment is not required at this stage, except specific local requirement)
 27. Waste management (mainly solid waste).
- CONTRACTOR shall also give following information:
 28. Security and Safety organization
 29. Food supply and preparation
 30. Logistic organization
 31. Schedule
 32. Pro-forma Purchase order for Pioneer's Camp with selected VENDOR or SUB-CONTRACTOR shall be issued as soon as contract award is signed with CONTRACTOR.

6. Organization of the camp

6.1 General organization

CONTRACTOR shall prepare, put it forces and maintain a set of regulations dedicated to the Camp.

Camp shall have its own administration logistic and police organization.

Use of local laborers should be systematically considered.

Camp Management team shall be fully aware of the socio-economics issues with the surrounding communities, and shall provide all efforts to maintain good relationships with local Authorities, and call for their assistance as and when required.

Dedicated teams shall be appointed to be in charge of hygiene control, fire-fighting, patrol, etc. (Possible use of multi-skill staff).

6.2 Relations with Local Population

CONTRACTOR shall appoint a Personnel Manager who will insure education of all workforces of Ethics and relation with local population so that any conflicts, arguments or cultural gaps with local population will not be issued.

6.3 Operation of Camp facilities

CONTRACTOR is fully in charge of the administration, management and operation of the Camp and associated facilities, including provision of all water, diesel fuel for power generation, materials, and supplies consumables, utilities and services.

Necessary manpower shall include:

- Management, administration, accounting and logistic team
- Catering, house keeping and laundry team
- Drivers and car maintenance
- Maintenance services and operation of facilities and utilities
- Maintenance services of roads, parking
- Medical support
- Security and guards
- Fire-fighting team.

CONTRACTOR shall collect, treat, process and distribute all utilities such as electric power, water, diesel, petrol and the like.

6.4 Maintenance of Camp facilities

CONTRACTOR shall maintain, service, regular cleaning and repair the Camp facilities to ensure it is maintained in a fully functional and operating state at all times to avoid any unacceptable deterioration during the construction phase of the Project.

Maintenance services shall include buildings, utilities, roads and car parks, and complete facilities.

A team of skilled labors, under supervision of the Camp management operation shall be responsible for operating a planned maintenance system covering structural, mechanical, electrical and communication systems. Particular attention shall be paid on the maintenance of air conditioning equipment, kitchen equipment, and transport, to ensure that levels of comfort, Catering and personnel movements are not allowed to fall due to equipment failure.

CONTRACTOR shall provide and store at the Camp adequate supply of spares and replacement items at the time of the construction of the Camp, for operation and maintenance for the duration of Contract, and replace this stock as required.

7. Catering

CONTRACTOR shall assign an experienced SUB-CONTRACTOR for Catering and ensure its control.

7.1 Training and behavior of Catering personnel

Particular attention shall apply to training and permanent control of Caterer's personnel capacities and behavior including not limited following:

- Good knowledge of strict hygienic attitude and reflexes
- Cleanliness of Catering personnel (hands, hair, clothes, gloves, hats, etc.)
- Cleanliness of Kitchen and associated facilities like cold stores (floors and floor drains, fume exhaust hoods, etc.)
- Cleanliness of Kitchen equipment and utensils
- Cleanliness of Catering toilets and changing rooms
- Medical permanent follow-up of Catering personnel
- Good knowledge of basic precautions to avoid diseases due to bad food conservation, bad defrosting, etc.

7.2 Caterer's duties

Caterer shall be in charge of not limited following duties:

- To ensure all messing, housing in appropriate conditions:
 33. Three meals per day shall be provided. Breakfast and evening meals shall be available in the mess rooms/restaurants before starting and after completing work.
 34. CONTRACTOR shall organize regular inspection/audit on food quality by independent third party.
 35. In the interest of health and hygiene, food shall not be removed from the restaurant/mess hall for consumption around the Camp premises or on Site.
 36. In some cases, to minimize transportation of personnel from Site to the Camp, meals of mid-day break may be taken by the labor force either in the Camp facilities or on Site served within mess rooms established for this purpose.
 37. To ensure food is prepare by culture and to have due regard to all recognized festivals and religious holidays.
 38. In case the resident population of the Camp may comprise Muslim, non-Muslim, Asian and European, meals shall be adapted to meet the requirements of religions and nationalities.
- To ensure cleanliness of all buildings:
 39. Cleaning of, accommodation rooms, dormitories seven days per week
 40. Regular daily cleaning of kitchen and mess rooms after each meal
 41. Daily cleaning of recreation areas
 42. Cleaning of offices and common areas
- To ensure regular changing of bedding, toilet and kitchen linen
- To ensure laundry of residents working and personal clothing
- To ensure refuse collection and disposal

- To organize distribution of newspapers, reviews, books, films, videos, music, entertainment, etc. with regard to local rules and habits
- To organize sportive competitions with awards and special occasion events to suit nationalities.

8. Security

CONTRACTOR shall be responsible for Security services inside Camp.

Security shall comply with COMPANY's general Specifications, with particular Project Security Specifications, completed or amended by Local Regulations.

CONTRACTOR shall provide minimum following requirement:

8.1 Security and Safety Central Station

CONTRACTOR shall form immediately after Contract award a special team to identify special Security requirements and actions thereof.

One Security and Safety Central Station shall be provided in the Camp to centralize all means (Ref. Chapter 9).

It shall be located in a **permanently manned building**:

- Like main Gatehouse for small camps (capacity < 500 persons)
- Or in a specific fire station room/building for large camps (capacity > 500 persons), which can be adjacent to main Gatehouse building, or separated.

Concept and location shall be defined on a case by case basis by each particular Project Specifications.

The Security and Safety Central Station shall be permanently manned with two men minimum during night time, and four men during daytime.

8.2 Security scope

Security team shall dispose of following means: badge unit, radio transmitter, motorcycles or bicycles or vehicles, uniforms, etc.

CONTRACTOR shall be responsible as well of:

- Prevention of socio-economics contentions in the neighborhood
- Prevention of internal contentions
- Ethics and code of conduct, respect of local traditions. Different ethnic groups of Camp population shall be considered for Security policy
- To ensure alcohol, drugs, firearms, etc., are forbidden on Site
- Regular and random security patrols shall be carried out, particularly at night, and street lighting within Camp shall be provided
- The Camp shall be fenced and provided with gates and guard posts, and surrounded by a patrol road.

8.3 Internal police

CONTRACTOR shall appoint a Security team and provide full-time Security guard (SUB-CONTRACTOR for all security matters, with supervision of main CONTRACTOR).

8.4 Badges control

Any entry/leave to/from the Camp of personnel or material, consumable, etc., shall be checked through security posts.

An ID card computerized system shall ensure full time Security control of personal.

Slip control shall be provided at gates in both directions (entrance and exit) for material control.

8.5 Liaison with local police and authorities

Security guards will be permanently in charge of Security, with support of local police at request if necessary.

9. Safety

Safety to life shall comply with the Code **NFPA 101**, completed or amended:

- By local Regulations
- By particular Project Safety concept
- And by COMPANY's general Specification **GS EP SAF 221**.

CONTRACTOR shall provide minimum following requirement:

9.1 Fundamental requirements for Safety of buildings

Buildings shall be provided with appropriate means of egress to permit prompt exit.

Means of egress shall be arranged and maintained free and unobstructed.

Every exit and road to reach every exit shall be indicated and adequately illuminated (this lighting shall be battery supplied back up).

Buildings shall be provided with fire protection features.

9.2 Organization of fire-fighting

One Security and Safety Central Station shall be provided in the Camp to centralize all means (Ref. Chapter 8 for description).

It shall be located in a **permanently manned building**.

Firemen brigade by CONTRACTOR under supervision of COMPANY shall be provided. CONTRACTOR shall assess whether fire brigade is permanent professional and/or how is supplemented by productive workers.

Training/drills of firemen and Camp occupants shall be organized.

9.3 Fire-fighting equipment

- Permanent fire water storage (capacity to be defined)

- Fire-fighting:
 - 43. Fire hydrants and distribution networks (outdoors)
 - 44. Hose reels and distribution network (indoor)
 - 45. Fire station (should be preferably located upwind of the Plant)
 - 46. Fire-fighting trucks (Location, Qty. and characteristics to be defined)
- Fire alarms/sirens
- Fire and smoke detection, when applicable, shall be connected to the permanently manned Safety and Security Central Station
- Fire extinguishers (wheeled and portable), sand boxes, shovels, etc.
- General public alarm, sirens
- Escape route, means to egress
- Mustering places (to see Chapter 13.2).

9.4 Emergency means

Oxygen masks, flashlights, flood lights, electrical saws, gas detectors, etc.

9.5 Radio/UHF

(Refer to Telecom Section Chapter 15.8).

9.6 Marking

Road signs, instructions, maps, self contained unit light, working ribbons, stake, surface cable marking for all buried cables, etc.

9.7 Miscellaneous

Uniforms, helmets, levers, sledgehammers, towing chain, first aid kits, etc.

(For further detail refer to COMPANY's Specification [GS EP SAF 321](#))

10. Health - Hygiene and medical support

Detail of Health, Hygiene and Medical support is defined by Health, Hygiene and Medical Specifications.

CONTRACTOR shall provide medical facilities, which cover the peak occupancy of the Site:

10.1 General requirements

CONTRACTOR shall ensure that adequate Hygiene level are maintained with due consideration to the local climate.

CONTRACTOR shall ensure that adequate accommodation conditions are maintained for all personnel involved in the work.

CONTRACTOR shall ensure through systematic medical visits that all personnel are physically and mentally capable for their job positions. As a minimum, systematic medical visits shall be

carried-out upon appointment on site, as a yearly routine, and upon job change to more demanding work conditions.

CONTRACTOR shall ensure that personnel can have treatment from small injuries and illness.

In addition, CONTRACTOR shall have a system to diagnose epidemic risks, at their early stage of development and undertake all necessary actions.

10.2 Clinic and medical equipment

As soon as work of Plant starts on Site, the Clinic shall replace the first aid of Pioneer's Camp.

Clinic concept, size, layout, equipment and organization of medical support team shall be in compliance with requirements of COMPANY's medical service, and approved by COMPANY.

10.2.1 Location of Clinic

Clinic shall be in a separate building, easily accessible from main entrance and guardhouse in order to get fast access of ambulances (but not directly close to traffic of main Camp entrance).

Clinic must be located in a quiet area, separated from housing accommodations and from noisy activities.

Clinic shall be practically accessible by stretcher from any place in the work site, and shall have an easy route by stretcher to the evacuation means (normally by helicopter).

The Clinic shall be designed and arranged in such a way to minimize the risk of contamination from/to other rooms in the Camp.

10.2.2 Clinic layout

Clinic, depending on remoteness of Site from other medical facilities, shall be of sufficient space to handle facilities for treatment, periodic visits, X-ray if any, pharmacy, sufficient bed wards.

The layout shall segregate private rooms and public rooms.

Design of building, width of corridors, width of doors shall be compatible with easy access of a stretcher handled by two persons.

Clinic building shall provide as minimum:

- **One Entrance hall** with large doors for stretchers, and waiting seats. Sheltered waiting area shall be provided as well outdoors
- **One Office of nurse** with key lockable cupboards and filing cabinets for storage of medical records
- **One Treatment room** with examination tables, workbenches, cabinets, one bath basin accessible by stretchers, and one shower.

In some particular cases, a bathtub can be required to treat light hypothermia. It shall be defined on a case by case basis by each particular Project Specification.

- **One Emergency room** with emergency stretchers carts
- **Doctor's consultation offices** (Qty. of doctors shall be defined according to Camp capacity)
- **One Pharmacy** (key lockable, with shelving and dust tight cabinets for medicine storage, and one lockable refrigerator for medicines)

- **Toilets** for public, and for medical team
- **Stores, technical rooms and lockers**
- **Isolation patient observation ward(s)** accessible with stretchers, for national and for executives (Qty. of beds shall be defined according to Camp capacity)
- **Private toilets and sanitary facilities** (showers and wash basins) adjacent to insulation ward
- **X-ray cabin** shall be required according to local context (lack of hospital in vicinity). In this case, wall protection shall comply with international codes and regulation
- **One small laboratory** for analysis, hematology, blood chemistry, testing.

10.2.3 Clinic equipment

Building shall be fully air-conditioned, with hot and cold water, telephone, adequate lighting.

Building shall be fully furnished with all necessary emergency medical tools and equipment, appliances and furniture to be fully operational.

The level of equipment shall be defined in rapport with following criteria:

- Level of risk
- Reliability of hospital of nearest town
- Possibility of fast medical evacuations
- Reliability of telecommunications with regard of local constraints (for example Camp may be isolated by sand wind for more or less duration)
- Reliability of medical team
- Medical and sanitation surroundings.

Clinic shall be supplied with complete adequate equipment for first aid to the injured patient and for medical evacuation. In case of difficult logistic context, the level of equipment should be more adequate (for example small operating unit, reanimate equipment, dentist, etc.).

The lighting and HVAC of the Clinic, and electrical powered equipment it contains shall be supplied by essential network.

CONTRACTOR shall provide mortuary facilities for conservation of bodies resulting from fatal casualty, if any, during the required period of time for the local enquiry. (To be defined on a case by case basis with COMPANY's medical Authority).

List of medical equipment and medicines

CONTRACTOR shall submit a complete list of medical equipment and medicines for approval by COMPANY's medical Authority (SMI).

Following non-exhaustive list recalls the main equipment to be supplied (Quantities to be defined with COMPANY's medical Authority on a case by case basis):

- Examination bed (80 cm minimum width), with free access for stretcher on four sides
- Material for fractures stabilization
- Table for casts
- Mobile X-ray set

- Two cardiac monitoring and defibrillation unit (one unit is for Medevac)
- Intubator laryngoscope
- Breath suction machine
- Oxygen inhalators sets
- “Ambu” (oxygen mask)
- Sterilizer
- Small surgery kit
- Material for analysis
- Suitable types and quantity of stretchers
- Suitable quantity of first aid responder bags and cold boxes.

10.2.4 Ambulances

Fully equipped and dedicated ambulances and accredited drivers in sufficient quantities, with necessary equipment and full time availability shall be provided, and maintained on standby during working hours, to transport injured personnel to the nearest designated health care facility.

Each ambulance shall be equipped for emergency response and transport to town or airstrip for medical evacuation, as a minimum, with the following supplies:

- Stretcher and blankets
- Portable oxygen
- Splints for bone fractures
- Bandages/rubber tourniquet
- Sterile wash water.

10.3 Organization and management of medical support

Medical support shall include followings:

10.3.1 Medical team

- **Doctors** shall be in sufficient number, reflecting by their mother's tongue and their culture the diversity of the nationalities of the workforce.

Quantity, qualifications and organization of doctors and medical team will be defined according to Camp's capacity, local medical context, and various origins of Camp's population, and shall be submitted to approval of COMPANY's medical Authority (SMI).

- **Nurses and assistants** in sufficient number.
- **X-ray inspector**, if needed.

10.3.2 Medical staff scope of duty

Medical team shall be in charge of followings:

- Treat occupational injuries and illnesses

- Contribute to accident reports
- Keep medical records, first aid log, and medical files
- Maintain a site register of all injuries treated
- Render re-treatment when required
- Control of personal medical status
- Control of hygiene of food supply/production
- Control of hygienic circuit of frozen food from origin to Site
- Control of water analysis (potable water supply/storage/distribution/wash eye bottles)
- Control/hygiene of Sewage treatment
- Control/hygiene of Refuse disposal (burying and incineration)
- Doctors shall in addition be involved in the Hygiene control on Site and shall attend periodic HSE meetings.

10.3.3 First aid facilities on Site

First aid is the immediate help that is provided at the Site to an injured or seriously ill person, before professional medical help can be obtained.

Proper first aid shall be made available to all employees at the Camp and at Site.

Some first aids facilities shall be organized at Plant Site, Construction area, and Site offices.

First aid supplies shall be kept available in designated cabinets for those supplies only.

These cabinets shall be placed under the charge of a first aid attendant, who shall ensure the cabinet is well stocked at all times.

Notices shall be posted on the first aid facilities indicating the following:

- Name of the person who is in charge of the first aid cabinet
- Hospital to which any injured person who requires hospital treatment is to be sent
- Telephones numbers of the doctor or first aid attendant
- Emergency telephone number to be called for assistance.

10.3.4 Organization of Medevac

In cases of severe and serious injuries or illnesses, medical team shall be in charge of medical evacuation for domestic and expatriates.

CONTRACTOR shall submit for approval by COMPANY two Medevac procedures for emergency evacuation:

- One domestic Medevac procedure for local workers to a convenient nearby hospital
- One Medevac procedure for expatriate personnel to the most suitable international hospital/airport, compatible with pre-existing COMPANY's Medevac procedure.

These procedures after Contract award, and after approval of COMPANY, shall be incorporated in the Safety Plan.

CONTRACTOR shall insure through the implementation of the Medevac procedures that any personnel seriously injured or ill can be immediately evacuated to the nearest convenient hospital within the required period of time.

11. Transports and traffic

11.1 Transport means

CONTRACTOR shall provide all transports for personnel and materials between the Camp, Plant and Site. The means of transport and organization shall permit safe and rapid movement of large numbers of personnel in a short period of time in order that productive time on Site is not diminished due to time lost in transit.

This shall include the provision of necessary vehicles like buses, trucks, saloon cars, 4X4 wheels vehicles, etc.

This shall include as well adequate maintenance and servicing to avoid accidents and breakdowns.

Truck loading/unloading stations for flammable and combustible liquids, or any chemicals should be located outside Camp to avoid traffic of trucks inside the Construction Camp.

11.2 Road safety plan

CONTRACTOR shall provide a Road Safety Plan applicable to any road movement, for COMPANY approval. This traffic plan shall include:

- Highlighting the roads to be used
- Setting up regulations and controls, safety courses and training for drivers
- Adequate road signs and markings needed for safe driving along with speed limits
- Monitoring road conditions for any maintenance or repair work
- Monitoring of road traffic safety.

11.3 Safety of transports

CONTRACTOR shall organize the transport including the provision of drivers and traffic patrol under Safety officer responsibility to monitor road traffic safety.

CONTRACTOR shall be responsible for organizing and enforcing road traffic regulations to minimize road accident within site.

Roads will be designed and equipped as necessary (humps roundabouts, traffic lights, adequate road signs, etc.).

CONTRACTOR shall put in place adequate Safety panels both inside the Site and in its vicinity on the public roads. The applicable standards for Safety signs and colors shall be as per British Standard [BS 5378](#) and those of local road traffic regulations.

Texts shall be in both English (UK) and local language.

CONTRACTOR shall avoid using the public roads as much as practically economical.

For this purpose, internal circulation roads shall be built and maintained over the whole duration of the Project.

CONTRACTOR shall insure adequate skill of drivers of all vehicles, and that vehicle Safety requirements are maintained in good status (safety belts, etc.).

Refer also to COMPANY's Specification: Safe driving policy (under preparation).

12. List of buildings

12.1 General

Following description and surfaces shall be considered as guidelines for minimum standard requirement. It should be adapted to each CONTRACTOR's prefabrication or construction system, and any change shall be approved by COMPANY.

Breakdown of population shall be done in accordance with expected histogram for Plant construction, but some flexibility is required for quantity and capacity of each type of buildings in order to absorb unexpected changes of Camp population capacity during development of the work.

For COMPANY's camp and for CONTRACTOR's camp, minimum scope of work shall be as follows:

12.2 Housing accommodations

12.2.1 General

12.2.1.1 Day sleeping area

It is essential that personnel not working in day-shift can rest and sleep during the day in bedrooms that remain of low-noise during day activities and in particular, are not exposed to traffic noise and vibrations.

The arrangement of a particular day-sleeping area in the accommodations shall be provided if relevant.

12.2.1.2 Smoking policy

Segregation of "smoking" and "non smoking" buildings/areas/rooms shall be defined clearly.

The COMPANY policy is to forbid people to smoke except in following specific buildings and rooms:

- Guest house and VIP bedrooms
- Guest house and VIP living rooms
- Staff bedrooms
- Recreation Rooms bar and noisy area (assuming some "non smoking" facilities are also provided for Recreation hall).

12.2.1.3 Policy for dressing into Dining rooms

COMPANY policy is to forbid personal wearing working overalls and shoes to get access into Dining rooms and Recreation rooms.

For this purpose, CONTRACTOR shall define, on a case by case basis, the policy for changing rooms, taking into account following criteria:

- Distance between the Construction Camp and the miscellaneous Site working areas
- System and rhythms of shuttle buses transport
- Duration and quantities of services at Restaurants
- Location of changing rooms and toilets at Site, at Construction area and at Construction Camp.

This aspect is more particularly sensible at lunchtime break, in order to minimize break duration.

12.2.2 Management and VIP's

Quantities to be defined according to requirement of each particular project Specification.

Each accommodation shall include:

- One living room
- One bedroom adjacent to living room
- One individual bathroom adjacent to bedroom.

12.2.2.1 Living room of Management and VIP's

Surface of one living room = 15 m² minimum

Minimum furniture and equipment of one living room shall be as follows:

- One sofa
- One armchair
- One low coffee table
- One book shelves cabinet
- One small table-top fridge (possibly small kitchen corner)
- One telephone
- One TV set.

12.2.2.2 Bedroom of Management and VIP's

Ditto bedroom of Senior Staff

12.2.2.3 Bathroom of Management and VIP's

Ditto bathroom of Senior Staff

12.2.3 Guest House for visitors

One building accommodates several bedrooms for Staff visitors.

Bedrooms and bathrooms standards shall be as per Senior Staff accommodations.

To provide as well a small common living room (approximately 20 m²) with TV and refrigerator.

12.2.4 Senior Staff

Each accommodation shall include:

- One bedroom
- One adjacent individual bathroom.

12.2.4.1 Bedroom of Senior Staff

Surface of one bedroom = 15 m² minimum

Minimum furniture and equipment of one bedroom, including mattresses, pillows, sheets, pillowcases, blankets, etc., shall be as follows:

- One single bed per occupant (0.90 m x 2.00 m)
- One bedside table
- One small desk table
- One chair or small armchair for desk
- One locker per occupant (key lockable, Length 1.20 m x Depth 0.60 m x Height 2.00 m approx., with hanging rope and shelves)
- One space for suitcases storing
- One window with occultation curtain (In some countries windows and external doors shall be equipped with mosquito's screens). All bedrooms' doors will be key lockable
- General lighting
- Bedside lighting for each bed
- One telephone
- One TV set.

Occupancy of one bedroom: one person per bedroom for normal and for peak occupancy.

12.2.4.2 Bathroom of Senior Staff

One adjacent individual bathroom with:

- One shower with protection curtain
- One toilet (seating type, with cover and paper holder)
- One washbasin (with cabinet, mirror and shaving plug)
- Hot and cold water
- In case hot water is not supplied by central system, the water heater for shower and washbasin will be 50 liters minimum capacity, location shall be away from splashing areas, and it will not be installed directly on the floor, but hanged to a wall or partitioning with reinforcement bracket
- Towels supports and coat pegs
- One dustbin.

12.2.5 Junior Staff

Each accommodation shall include:

- One bedroom
- One adjacent bathroom (individual or common for two bedrooms).

12.2.5.1 Bedroom of Junior Staff

Ditto Bedroom of Senior Staff, except following:

- Telephone shall be provided only in some dedicated rooms.

Occupancy of one bedroom:

- One person per room for normal occupancy
- Two persons maximum per room for peak occupancy
- Possibility to provide double bunks for peak occupancy.

12.2.5.2 Bathroom of Junior Staff

One individual adjacent bathroom for each bedroom/or common to two bedrooms.

Description as per bathroom of Senior Staff except following:

- Water heater for shower and washbasin shall be 50 liters/person minimum capacity.

Note: Refer to particular Telecom guideline or Specification for detailed descriptions, locations and quantities of Telephones and TV.

12.2.6 Labors

Each accommodation shall include:

- Bedrooms for 4, 6, 8 or 10 persons maximum
- Common sanitary facilities at proximity of bedrooms.

12.2.6.1 Bedroom of Labors

Description as per bedroom of Senior Staff except following:

- Size of bedroom to be minimum 20 m²
- Minimum size of lockers: Length 0.60 m x Depth 0.60 m x Height 2.00 m approx.
- One telephone per building only (restricted access).

Occupancy of one bedroom:

- Maximum 10 persons per room for peak occupancy
- Without double bunk beds for normal occupancy
- Double bunk beds shall be considered for peak occupancy only.

12.2.6.2 Common Sanitary facilities for Labors

Toilets and shower facilities shall be provided adjacent or in blocks connected to the dormitory sleeping accommodation buildings.

Ratio for common sanitary facilities shall be as follows:

- One toilet for 10 persons

According to countries, sitting and/or squatting type toilets shall be required.

COMPANY's policy is to provide squatting type toilets for public or common toilets, and to provide sitting type toilets for private individual toilets.

In some countries, private individual toilets shall be also squatting type (Refer to each particular Project specification).

In case of squatting type, it shall be supplied with ablution tap and flexible shower pipe.

- One urinal for 10 persons
- One wash basin for 5 persons
- One shower for 8 persons
- Hot and cold water for all showers and wash basins shall be provided.

12.3 Prayer room

In Muslims countries, one dedicated prayer-room shall be provided within temporary Construction Camp facilities.

Location of Prayer room shall be defined carefully, taking into consideration access from dormitories.

Ablution facilities shall be provided at entrance of Prayer room.

Large outdoor space shall be provided at main entrance of Prayer-room, to avoid congested space.

12.4 Recreation Facilities

12.4.1 Recreation Hall(s)

One Recreation building (or several buildings for Camp capacity above 500 persons) shall provide following facilities:

12.4.1.1 Noisy activities

- One bar with counter
- Small tables with seats
- Standing games (table tennis, darts, pool/snooker tables, etc.)
- Seated games (card games, dices, chess, backgammon, etc.).

12.4.1.2 Quiet activities

- One Television room separated from others activities with noise insulation (with satellite television and video services)
- One Library with newspapers reviews. This room shall be "non smoking" area and separated from noisy activities.

Noisy and quiet activities shall be segregated, and concept of building(s) shall be flexible.

Quantity and surface of Recreation buildings shall be adapted to Camp capacity (Generally one Recreation building for each type of population is required for Camp capacity over 500 persons).

“Smoking” and “non smoking” rooms shall be segregated.

Location of Recreation building(s) or Amenity center shall be close to the Restaurant building(s), or part of it, assuming segregation of noisy and quiet activities is provided.

12.4.2 Cinema

For camps above 500 men capacity, one cinema is required. Concept shall be multi-function (this room shall be used as meeting room, conference, training room). Seat capacity shall be defined on a case by case basis by each particular Project Specification.

Location to be close to main entrance. To provide adequate quantity of emergency exits.

Fresh air renewal shall be at least 10 volume/hour. Cinema shall be “non smoking area”.

12.4.3 Gymnasium

Indoor gymnasium is not compulsory for temporary Camp under 500 men capacity.

The building shall accommodate:

- One multi-function room for basket ball, volley ball and gymnastic exercises
- Some changing rooms and toilets
- Gymnasium shall be “non smoking area”.

12.4.4 Sports (outdoors)

The outdoor sports facilities shall include according to Camp capacity, and to duration of Camp life:

- One (or several) football pitch (soccer)
- One basket ball court
- One volley ball court
- One or two tennis courts, with peripheral fences (4 m height)
- One golf training.

Peripheral fences shall be provided.

Nightly lighting for the sports facilities shall be provided.

12.4.5 Swimming pool

Swimming pool (s) shall be provided for Camp capacity over 500 persons.

Location shall be in quiet area, and if possible close to Recreation hall(s).

Following equipment shall be provided:

- Basin depth shall be less than 1.50 m
- Diving board is forbidden
- Non slippery basin side walks

- Screens for sun and wind
- Fences.

Minimum 2 toilets, 2 urinals, 2 showers and changing rooms are required (size of changing room could be minimum if housing is not too far).

Swimming pool shall be fully operational with all-necessary equipment for water treatment, filters, circulation pumps, and accessories.

12.5 Restaurants and services

12.5.1 Location of Restaurant

Restaurant(s) shall be located preferentially at geographic Center of Camp, in order to minimize pedestrian moving between housing and dining room.

CONTRACTOR shall define the location, concept and size of restaurant(s) in relation with the proximity of Site, with the philosophy for personnel transport and number of services.

For Camp capacity over 500 persons, one Restaurant per category of personnel is required.

Concept shall be self-service type.

12.5.2 Dining rooms

Dining room(s) capacities (Nb. of seats) shall be defined according to number of services.

Surface of dining room shall be minimum 1.60 m² per seat.

Surface of Restaurant + Galley + Stores shall be 2.50 m² per seat.

Table minimum linear width shall be 0.60 m per person.

Dining rooms shall be air-conditioned.

Dining room shall be "non smoking area".

Toilet facilities shall be provided at proximity of restaurant(s).

12.5.3 Kitchen and associated services

Kitchen location shall be accessible by trucks and services area for food supply and refuse removal, and shall be separate from housing areas.

The access to Kitchen and associated Catering facilities should be limited to authorized personnel.

The catering facilities shall in no case be considered as part of the required means of egress.

The use of combustible source of heat in the kitchen should be avoided.

Electrical power is the preferred solution.

Where inevitable, or where the risk is negligible, the combustible source of heat shall comply with **NFPA 31** (fuel oil), **NFPA 54** (fuel-gas). Use of LPG's would require COMPANY'S approval.

In case the Kitchen combustible is gas, then gas detection shall be provided, and any pressure reduction should be done outside of building.

Special care shall be taken for risks of fire.

In any case, the kitchen shall be considered as a special hazard area. The protection shall consist:

- From moderate hazards, in a separation by a A60 fire barrier **or** a sprinkler system in the hazardous area
- From high hazards, in the combination of the fire barrier **and** a sprinkler system.

The air renewal in the kitchen should be at least 20 air changes/hour.

Kitchen and associated services shall be “non smoking area”.

Ventilation outlet from kitchen and associated lavatories shall be channeled through separate ducts.

The places where fire and smoke developments are most probable shall be identified.

Where a hood is part of the artificial fixed smoke extraction system, it shall be designed to withstand a temperature of 400°C for two hours.

Fire-fighting of fires involving fats, should be preferably achieved, with a specific sprinkler system using R102TM or equivalent (water + sodium bicarbonate). For further details refer to [NFPA 17](#).

Catering facilities shall be provided with adequately situated toilets and wash basins to be used only by Catering personnel.

12.5.3.1 Design and equipment of Kitchen

CONTRACTOR may propose one central cooking kitchen, as alternate for economical reason.

The layout of kitchen and associated facilities shall take into consideration the following criteria:

- Segregation of circuits (food, rubbish, personnel)
- Design shall avoid any crossing of circulation between:
 47. Food supply and rubbish
 48. Persons entrance and exit.
- Galley shall accommodate following distinct functions:
 49. Entrance of food from dry store and from cold rooms (chillers and freezers)
 50. Daily food storage and specific defrosting fridge
 51. Vegetable preparation
 52. Cold preparations
 53. Butchery
 54. Bakery and pastry (bakery may be separate building for large capacity camps)
 55. Cooking area and hot preparations
 56. Distribution (hot and cold)
 57. Access of dirty plates and dishes from dining room
 58. Dishwashing for kitchen pots and utensils and for dining room plates

59. Storage of clean plates and dishes
60. Evacuation of rubbish from dishwashing area and from kitchen.

12.5.4 Food circuit

The circulation of food shall be properly defined and implemented, with clear cut of the different steps in the food processing:

- Raw food boarding and storage, preparation of food, sorted by compatible types of food
- Cooking, sorted by compatible types of cooking
- Intermediate cold storage for prepared meals
- Consumption
- Collection of waste
- Waste disposal.

Food, which has reached any processing step, shall not be allowed to return to any previous step. Furthermore the circuit arrangement shall preclude any risk of having food at two different processing steps to be in contact each other.

12.5.5 Food storage

Food storage capacities shall be defined in relation with local logistic context.

Depending on local logistic context, minimum in hand capacity for food shall be from two weeks (for easy access locations), to four weeks or more (for difficult locations).

Storage capacity policy shall be defined on a case by case basis.

Food storage shall be defined as follows:

- Freezers (-20°C) for meat and fish
- Chillers (+5°C) for dairy, vegetables
- Dry stores (grocery, grains, cans and drinks).

Control of temperature shall be monitored and controlled regularly (twice a day as minimum for freezers, if not permanently recorded).

Special care shall be taken for temperature continuity of frozen food, and adequate hygienic defrosting.

Refrigerating fluid shall be in compliance with Copenhagen and Montreal protocol (HCFC hydro chluro fluoro carbon shall be forbidden and should be replaced by R134A or R407C or approved equivalent).

12.5.6 Storage of dustbins

(To read in relation with Chapter 15.7 for definition and segregation of solid waste disposal)

Kitchen and mess hall food waste shall be placed in covered containers to keep out animals and birds and maintain acceptable standards of hygiene and cleanliness.

For large camps, storage of dustbins may be a separate building.

12.5.7 Bakery

For camps above 500 men capacity, bakery shall be a separate building.

Particular attention shall be paid to the specific risks of the storage and handling of flour (whose dust can form an explosive atmosphere), the kneading machine and the ovens.

Bakery shall be "non smoking area".

12.6 Laundry

Laundry shall provide facilities for washing, drying, ironing and storage of house hold-linen (bed linen, towels, pillowcases, etc) and personal clothes including working overalls.

This building shall be easily accessible, and concept and design of building shall segregate the circuits of dirty and clean linen:

- Collect and dropping of dirty linen
- Linen tagging marking
- Sorting out
- Washing
- Drying
- Ironing (roll ironing for bed sheets, steam press and electric flat irons)
- Storage
- Return of washed and pressed linen to residents.

Average ratio of 5 kg of linen per person per week shall be considered.

The interim storage of clothes shall be considered as storage of combustible products and shall therefore be minimized.

Equipment of Laundry shall be electric.

The laundry shall be considered as a special hazard area and the same type of protection as used for kitchen shall protect it.

Laundry is "non smoking area".

Refer to [IEC 60364](#) for Safety requirements specific to the use of electrical power.

12.7 Camp Commissary

This building shall be required for Camp capacity of more than 500 persons.

Building shall be designed as self-service for ready sale goods like toiletries, newspapers, cigarettes, soft drinks and snacks, telephone cards, postage stamps, etc.

To provide shelving racks, with alleys, cash desk, and emergency exit.

Depending on local surrounding, availabilities in vicinity, and rotation schedule of personnel, following facilities shall be provided as well:

- **One Barbershop**, with 1 or 2 seats and waiting corner

- **One Post office**, with private and public part, separated by one counter
- **One Bank**, with private and public part, separated by one counter, and one safe (overload to be foreseen).

12.8 Clinic

(To see Chapter 10 for definition of Clinic building layout and medical support).

12.9 Camp administration offices

This building shall accommodate offices for administration of the Camp.

Location of Camp's administration offices building shall be easily accessible from main entrance and gatehouse.

Building shall be at ground floor level.

Size of building shall be in accordance with expected administration personnel (to see Chapter 6).

Space of 10 m² minimum for telephones PABX shall be provided.

For Camp capacity over 250 persons, this building shall accommodate as well Security team and Security management, if not accommodated in main Gatehouse building.

In case there is no other facilities, this building shall accommodate as well, keys dispatching, and left luggage office.

12.10 Camp maintenance Workshop

During the construction period of the Plant, and during occupancy of the Camp, it is within CONTRACTOR's responsibility to keep and maintain the Camp facilities in good condition.

The Camp maintenance workshop shall be provided only for equipment of the normal routine maintenance of the Camp facilities and utilities. (Important reparations shall be done at Workshops of CONTRACTOR's Construction base).

Activities of Camp maintenance Workshop shall be mainly repair and maintenance of electricity, HVAC, carpentry, iron work, painting and plumbing.

In order to avoid troubles due to noise, location shall be separate from housing areas.

12.11 Camp maintenance Warehouse

This building shall be part of/or adjacent to Camp maintenance Workshop.

This building shall provide storage for furniture, beds, mattresses, air conditioning units, electrical fittings, plumbing fittings, etc.

Spare parts and consumable shall be supplied for a six months minimum period.

12.12 Gate houses

Main gatehouse shall be located at Camp main entrance.

The functions are:

- Control and information of personal in and out

- Control and information of visitors or SUPPLIERS in and out
- Control of vehicles and material in and out.

The building shall include following facilities:

- Car parks, at entrance and exit, for cars and trucks
- One shelter with information panels
- One information hall, with counter
- One guard's office adjacent to main visitor's hall, with large view to camp entrance (both sides: in and out)
- One large room divided in two parts for searching of persons and for Safety instruction courses
- Toilets and lockers room
- Coffee room
- In most of the cases Security and Safety Central Station (permanently manned) shall be located in the Main Gatehouse.

Badge control shall be implemented for each personal and visitor.

In case of fencing control by security cameras system shall be developed, the building shall include the control system by cameras.

Secondary gatehouses may be necessary at request.

12.13 Miscellaneous shelters

Following shelters shall be provided:

- One shelter close to Clinic for one or two ambulances
- One shelter for fire-fighting trucks.

12.14 Miscellaneous other buildings

In some cases other specific buildings shall be required:

- Production of chilled water for central HVAC
- Production of ice blocks, etc.

13. Plot plan layout, roads and outdoors facilities

13.1 Layout consideration

13.1.1 Identification of simultaneous operations

Particular consideration shall be paid to all measures likely to ensure the required Safety standards during the period when simultaneous construction and production activities will take place, i.e. from Commissioning up to a few months after start-up of Plant.

The layout of a Plant installation shall take into account the temporary facilities such as Construction Camp and temporary accommodations, temporary power generation, and other utilities, early production systems, etc.

These facilities shall form part of the Project, shall be identified separately (considering they might have been forgotten in the Statement of requirements and can produce specific hazards) and shall be represented in dotted lines on all plot plans and elevations, till their complete de-commissioning and removal.

In the case of “grassroots” installations, particular consideration shall be paid to all measures likely to ensure the required Safety standards during the period when simultaneous construction and production activities will take place, i.e. from Commissioning up to a few months after start-up of Plant.

Four main configurations can be identified that may entail impact on layout:

- The Construction Camp site and temporary accommodations are likely to be manned for a significant period of time after oil and gas-in
- Construction activities shall continue while part of the process Plant is already on stream, specially when initial production is obtained through an Early Production System (EPS) and more specially so when said EPS shares some systems (generally piping) with final units
- Temporary utilities such as power generation, are kept operational until the new facilities have proven reliable
- Mechanical completion (and hence commissioning and start-up) of units operating in parallel (e.g. separation trains or compression trains) are time staggered and lead inevitably to a lengthened period of simultaneous construction and production operation.

13.1.2 Location of the Construction Camp

The Construction Camp shall be beyond the limits of the restricted area of the Plant.

It should be beyond the limits of the impacted area of the Plant (refer to COMPANY's Specification **GS EP SAF 021** for Minimum distances from Plant in operation and for Distances between units within accommodation Camp).

Location of Camp shall be selected as close as possible of Plant's work Site, except if for security reason some distance has to be kept (i.e. gas risk, noise, smells, etc.), and also if part of the temporary Construction Camp is used in future as part of permanent facilities.

13.1.3 Impacted area

The impacted area around the Construction Camp shall be defined taking the major failures stated in the Safety concept as incident scenarios. In particular, permanent settlements, public places and traffic paths of way encroaching the impacted area shall be identified.

13.2 Concept for design of plot plan

13.2.1 General

The plot plan layout shall be designed to avoid housing concentration.

Large spaces shall be provided to avoid congested areas.

The land area and the plot plan layout shall provide space for future extensions, if required during the development of the plant work site.

13.2.2 Objectives

The general arrangement of the Construction Camp shall be such that the main Safety and Security objectives listed below are fulfilled:

- To pay attention to Security and control of access
- To prevent logistic accidents, in particular related to traffic and lifting
- To ease performance of work with special emphasis on accesses to working areas and space reservations around equipment
- To segregate the high risks and/or harmful equipment from the accommodation, high occupancy places
- To locate ignition sources and fuel sources with due consideration of wind, in order to prevent ignition after a gas release
- To locate fuel sources with due consideration of wind, and grade relief, to minimize the consequences of fires
- To ease mitigation measures, and in particular facilitate access for active fire-fighting
- To provide adequate arrangements for Safety to life, and in particular escapes, evacuations, and rescue.

13.2.3 High risks and nuisances

The high risks and/or harmful equipment shall be identified, properly segregated from the accommodation, high occupancy places, and located with sufficient spacing with due consideration of wind prevailing direction.

They can be formed, but not limited to:

- Main sources of fuel (petrol station, diesel-oil storage for power generation, interim combustible waste, laundry, paints and solvents storage, etc.)
- Main sources of ignition (power generation, boilers, incinerators, etc.)
- Harmful substances: chemical storage, carcinogenic materials, radioactive sources, etc.
- Noisy equipment: power generation, heavy trucks park lot, etc.
- Bad smell: black sewage, interim waste, sanitary landfill, and evaporation pond, sulfur components from plant in operation, etc.

13.2.3.1 References

- Refer to **GS EP SAF 021** for Minimum distances from Plant in operation to buildings located in impacted area
- Refer to **GS EP SAF 021** for Distances between units within accommodation Camps
- Refer to **GS EP SAF 221** for Access way and clearances
- Refer to **GS EP SAF 351** for dimensions of the escape routes.

13.2.4 Noise

Design shall segregate noisy and quiet areas, and shall provide large spaces for outdoor recreation and sports activities.

Location of noisy or dirty activities (Power plant, water treatment units, solid waste disposal, etc.) shall be chosen in order to minimize trouble with surrounding and more particularly with sleeping areas.

13.2.5 Wind

Flammable gas sources shall not be located up the prevailing wind of any ignition source.

Any hazardous area shall be located down the prevailing wind of any hazardous area of lesser danger.

In particular, the accommodations and non-hazardous areas shall be located up (preferred) or perpendicular to the prevailing wind of hydrocarbon production/processing units and bad smells sources.

Emergency escapes routes and systems shall be located up the prevailing wind of hazardous areas.

13.2.6 Escape evacuation and rescue systems

In addition to provisions for normal operation, the layout shall incorporate specific requirements to face an emergency situation.

13.3 Roads and car parks

Roads network shall be designed to facilitate escape (to avoid dead-end), and shall allow easy accesses of fire-fighting and services trucks.

At least one access road shall remain passable in any combination of fire scenario and environment conditions.

Provision for specific risks to the installation and its environment such as cattle guards, illuminating at night or under fog conditions, risk of water flood, heavy rains, etc. shall be considered.

Peripheral roads shall surround Camp for patrols, and provide fast access to main facilities.

One mustering area shall accommodate a large population in case of fire, panic or serious troubles.

13.3.1 Main roads and main accesses

Roadways shall be two ways, 7.00 meters minimum width, with asphalt.

Bending radius shall be 10 meters minimum.

13.3.2 Secondary roads

Roadways shall be one way, 3.50 meters minimum width.

13.3.3 Services areas

Some services yards/areas shall be provided close to following buildings or utilities:

- Access by trucks and containers (Kitchen and services, Dry Stores, Cold Store, Dustbins)

- Access by trucks (Bakery, Laundry, Camp Workshop, Camp Warehouse, utilities)
- Access by fire-fighting trucks (all buildings, utilities)
- Access by ambulances (Clinic, with shelter for ambulances parking)
- Access by fuel tank truck (Fuel station and tanks) Fuel station shall be located outside Camp.

13.3.4 Car parks

Car parks shall be provided for following:

- Shuttle bus (for organization of transport to see Chapter 11).
- Trucks (as per above paragraph 13.3.3. services areas)
- Ambulances (parking spaces with shelters to be provided at Clinic). Accesses of ambulances to accommodations shall be provided and kept permanently free of any obstacle
- Cars
- Motorcycles and bicycles.

CONTRACTOR shall define the quantities of car parks areas in accordance with capacity of vehicles and buses.

13.3.5 Foot paths

13.4 Fencing

Camp facilities shall be entirely closed with fencing.

In some cases, fence shall be required with lighting, security cameras and/or electrical protection.

In some cases, protection against wild life ingress shall be provided.

13.5 Sports and leisure areas (outdoors)

(To see Chapter 12.4.4)

13.6 Landscaping

Some landscaping shall be provided in Camp facilities.

Watering shall be done with treated water (exhaust of wastewater purification plant).

14. Buildings construction

Minimum standards requirement shall be as follows:

14.1 Applicable international Codes and Standards

Unless otherwise stipulated by local regulation, the construction of the Camp facilities shall meet reference documents:

- Codes, standards and recommended practices:
 61. NFPA 101 (Code for Safety to Life from Fire in Buildings and Structures)
 62. NFPA 220
 63. NFPA 251 (Fire resistance rating of materials)
 64. NFPA 255/ASTM E-84 (Flame spread indexes and smokes development rating of materials)
 65. NFPA 259/ASTM E-136 (Combustibility of materials)
 66. OMS (Organization Mondiale de la Santé, Geneva)
- COMPANY's general Specifications:
 67. GS EP SAF 021
 68. GS EP SAF 221
- Project's particular documents prepared by COMPANY:
 69. Safety Concept
 70. Statement Of Requirement (SOR)
 71. Project's Scope of work, and Specifications.

14.2 Buildings concept

14.2.1 Types of buildings

According to required Camp life duration, and to local environment, the concept of construction for temporary construction shall be made of:

- Trailers
- Prefabricated and pre-assembled modules
- Prefabricated modules to be assembled at site
- Bricks or concrete block construction at site
- Others types of construction
- Existing buildings.

The Construction Camp is one of the critical path items, and the Camp facilities shall be up and running as early as possible. Consequently the system of construction for the buildings shall take in consideration as priority a fast construction time schedule, and fast connection of utilities like electrical, water and sewage.

Following criteria shall be enforced:

14.2.2 Number of levels

In most of the cases, concept of one ground floor level buildings shall be preferentially applied, and is mandatory for seismic risk areas.

14.2.3 Prohibited materials

The following materials are prohibited for use as interior wall or ceiling finish:

- Asbestos
- Polyurethane foams
- Cellular or foam plastics
- Sublimation coatings
- Ceramic blankets.

14.2.4 Water proof insulation and thermal insulation

Insulation material shall be fire-resistant, toxic gas free in case of fire.

Sandwich type panels with thermal insulation shall be fire retardant as minimum requirement.

Refer to Norms as defined in above § 15.1.

14.2.5 Misc. vermin protection

All timber shall be protected against insects.

Pest control shall be applied.

14.2.6 Heavy duty material/equipment

CONTRACTOR shall insure that all furniture, appliance and equipment are suitable for heavy duty.

14.2.7 Noise protection

Work on Site shall be carried-out in the vicinity of inhabited places and of the temporary Construction Camp where personnel is accommodated.

Maximum noise levels in Camp, in particular at night, shall be in accordance with COMPANY's Specification **GS EP SAF 221** (as summarized in Appendix 1).

14.2.8 Human comfort

Refer to **GS EP SAF 221** for minimum requirement of Temperature, hygrometry, and generally comfort of occupants.

14.2.9 Lightning protection concept

CONTRACTOR shall provide for approval a system for lightning protection of installations, in line with recommendations of [IEC 61024-1](#) and [61024-1-1](#).

14.2.10 Local constraints

CONTRACTOR shall insure that local constraints are enforced in the design and the realization of the work (More particularly seismic data, heavy wind and rain, snow, etc.).

CONTRACTOR shall confirm compliance with climatic and local conditions as described in Project's particular documents.

14.3 Building's equipment

Buildings shall be fully furnished with all necessary equipment, appliances, furniture, machines tools, and accessories to be fully operational.

List and samples of furniture and equipment shall be submitted to COMPANY's approval.

Spare parts furniture, and accessories shall be provided.

14.4 HVAC

Particular attention shall be paid to:

- Minimum requirement of human comfort (Temperature, hygrometry, etc.) shall comply with COMPANY's Specification [GS EP SAF 221](#)
- Air renewal rates shall be minimum 20 m³/per man/per hour for dormitories, sanitarines, and kitchens
- Noises
- Ventilation outlets from clinic, kitchens, lavatories and washing-rooms, etc. shall be channeled through separate ducts
- Where air is re-circulated, adequate germ killing filters shall be installed (and periodically inspected, changed or disinfected)
- Refrigerating fluid shall be in compliance with Copenhagen and Montreal protocol (HCFC hydro chluro fluoro carbon shall be forbidden and should be replaced by R134A or R407C or approved equivalent)
- Heating by individual gas heaters shall be forbidden
- In case of individual window units, disposal shall be done for drainage of condensation water.

15. Utilities

Camp shall be supplied with all necessary utilities to be fully operational.

Utilities shall be designed for peak capacity.

However, without over designing, the concept and design of utilities shall be suitable to easy possible extension of the Camp capacity.

Design of networks shall be provided with tie-in points for future extensions, in order to minimize disruption of utilities.

15.1 Electrical system

15.1.1 Reference documents

In case of absence of more stringent local regulations, or particular Project Specification, the reference documents are the following standards:

15.1.1.1 For Low Voltage electrical networks ($U \leq 1000$ V)

The applicable codes shall be the IEC (International Electro-technical Committee) Standards and in particular the following ones:

- [IEC 60364](#): Electrical installations of buildings
- [IEC 60449](#): Voltage Bands for electrical installations of buildings
- [IEC 60050-826](#): International Electro-technical vocabulary - Electrical installations of buildings
- And for special applications not covered by the above referenced standards, the French Standard: [NF C 15-100](#): Low-Voltage electrical installations, shall be used (standard available in English).

15.1.1.2 For High Voltage electrical networks (1000 V < $U \leq 63$ kV)

Due to the lack of IEC Standards, the French Standard [NF C 13-200](#): High Voltage electrical installations - Requirements, shall be used (standard available in English).

15.1.1.3 The COMPANY's Specification [GS EP SAF 221](#)

15.1.1.4 In countries where American codes are applicable

(Subject to COMPANY approval), the reference shall be [NFPA 70](#), National Electrical Code (NEC), last edition.

15.1.2 Power generation and distribution

Two types of power generation and distribution shall be envisaged depending on the Camp size.

CONTRACTOR shall note that the electrical system shall be designed to allow future extension.

15.1.2.1 Small Camps (up to 200 people)

15.1.2.1.1 Power generation

The power plant shall consist of one to three LV Diesel generators (400 V - 50 Hz) running in parallel. Generator neutral point shall be solidly earthed. Furthermore it is highly recommended that a minimum of two diesel generators shall be installed in order to avoid complete shutdown during maintenance period or equipment failure (an acceptable solution might be two sets size for 2/3 of the load, or three groups (two duty and one standby) each sized for half the load; each case to be considered on economical and technical basis with regards to the required load).

15.1.2.1.2 Power distribution

The neutral system shall be solidly earthed (TT diagram). Power distribution shall be of radial type from the main LV switchboard (to which the generators are connected) to distribution a

board (which energizes a main building or a group of houses). Each main feeder shall supply a dedicated area (no mixing between general buildings and housing area) and shall be protected by an earth leakage circuit breaker (ELCB). Also power distribution from the distribution boards to the final distribution boxes or cabinets shall be of the radial type. (Refer to Appendix 3: Key One Line Diagram no. 1).

Main switchboard (400 V - 3 Ph - 4 W)

The main switchboard shall be form 3b (Incomer CB circuit breaker): WWW and Outgoer CB: WWD) according to [IEC 60439-1](#), single busbar (bare copper), indoor type (enclosure protection: IP 31 door closed/IP2X door open) and equipped with padlockable circuit breaker (generator incomers and feeder outgoers). Incomer electrical protections shall be designed to avoid damage to the generator depending of its size and technology (overcurrent, under/overfrequency, under/overvoltage, overload, reverse power, lockout relay). Outgoers electrical protections shall be designed with at least overload, overcurrent, lockout relay and earth fault protection.

Distribution board (400 V - 3 Ph - 4 W)

Each distribution board shall be outdoor type (enclosure protection: IP55 door closed/IP 2X door open) with a space heater, metal sheet enclosure, a set of copper bars, isolating screens and terminal protections to prevent contact to live parts. Incomer shall be a manual switch and outgoers shall be circuit breakers. When space is available in a dedicated room, the distribution board shall have an IP31 enclosure protection.

Final distribution box or cabinet (400/230 V - 3 Ph - 4 W)

This equipment shall be indoor type (enclosure protection: IP31 door closed/IP2X door open) with a set of copper bars, isolating screens and terminal protection to prevent contact to live parts. Incomer shall be a manual CB with an earth leakage protection and outgoers shall be fuse switch or ELCB's (Earth Leakage Circuit Breaker) in line with standard requirements.

15.1.2.1.3 Cables

- **General**

72. Conductor shall be either copper or aluminium
73. HV cables shall be single-core or multi-core cable with XLPE insulation, radial field, rated voltage 6/10 (12) kV
74. LV cables shall be single core or multicore cable with XLPE insulation, rated voltage 600/1000 V
75. LV single core cable with PVC insulation, rated voltage 450/750 V shall be used for end-user circuit with low power requirements
76. LV cables for fire-fighting circuit shall be copper cable with silicone rubber insulation, rated voltage 500 V, PVC outer sheath.

- **Indoor:** Cable shall be non armored with a PVC outer sheath and shall be installed above ground and mechanically protected where required (cable trays or ladders with cover, PVC conduits, etc.).
- **Outdoor:** Cable shall be armored DSTA (Double Steel Tape Armor) or SWA (Single Wire Armor) (nevertheless in both alternates it shall be galvanized steel) with a PVC outer sheath. Cables shall be suitable to be directly buried without additional mechanical protection.

15.1.2.1.4 Lighting

- **Normal lighting:** Lighting installations shall be designed to provide a suitable illumination level with regards to the room, building and area function and in line with the applicable standards
- **Emergency lighting:** Emergency lighting shall include exit lighting and general lighting in public areas, ensured by battery back up.

15.1.2.1.5 Earthing

An equi-potential earthing loop shall be installed for a group of buildings or houses. The loop shall be buried using the lighting trenches along the roads. All the earthing loops shall be interconnected.

The earthing conductor shall be either copper or equivalent, round shape or flat bar, bare or insulated according to environmental conditions. Furthermore in case of insulated conductor used for earthing network, earthing rods might be required to lower the overall earthing network impedance within the requirements of [IEC 60364-4-41](#). Conductor cross section shall be sized to sustain the greatest fault current.

One or two interconnection (depending of the building size) from the loop to a building dispatcher (installed out side) shall be provided. All steel part of structure, plumbing and electrical equipment shall be earthed through this dispatcher. End-user electrical equipment shall be earthed through a specific earthing conductor (green/yellow strips) which shall be connected to the final distribution box/cabinet earth bar or terminal; this bar or terminal being connected to the building dispatcher. Connection of the dispatcher-earthing conductor to the earthing loop shall be achieved through mechanical clamp of a suitable material (referring to environmental conditions and corrosion constraint).

15.1.2.1.6 Buildings with Stand-by power supply

For buildings like Clinic or Restaurant/galley requiring stand-by power supply, each building shall be equipped with a Normal/Standby distribution cabinet (feeder + diesel generator incomer). This cabinet shall comply with the final distribution cabinet requirements but shall be fitted with a normal and a standby incoming CB's. Furthermore in case of more than one power generator is installed with a load-shedding sequence, the stand-by power supply (small diesel generator) might be considered as redundant.

15.1.2.2 Large Camps (more than 200 people or camp spread on a large area)

15.1.2.2.1 Power generation

The Power plant shall consist of several HV diesel generators (6.6 kV - 50 Hz) running in parallel. Power will be directly generated at 6.6 kV and applied to the main HV switchboard. Generator neutral point will be earthed through a 30 A current limiting resistance. Furthermore it is highly recommended that a minimum of two diesel generators shall be installed in order to avoid complete shutdown during maintenance period or equipment failure (an acceptable solution might be two sets size for 2/3 of the load, or three groups (two duty and one standby) each sized for half the load; each case to be considered on economical and technical basis with regards to the required load).

15.1.2.2.2 Power distribution

The HV distribution network shall consist in one 6.6 kV loop to which HV/LV transformation stations shall be fed. The LV neutral system shall be solidly earthed (TT diagram). LV power distribution network shall be of radial type from the transformation station LV switchboard to the distribution cabinet. Power distribution up to final user shall be also radial type. (Refer to Appendix 4: Key One Line Diagram no. 2)

Main HV switchboard (6.6 kV - 3 Ph - 3 W)

The switchboard shall be metal-enclosed and compartmented according [IEC 60298](#), fixed type, indoor type (enclosure protection: IP31 door closed/IP2X door open), consist in two half busbars (bare copper) linked by a busbar breaker, and equipped with pad-lockable circuit breaker (generator incomers and feeder outgoers for the HV loop). Incomer electrical protections shall be designed to avoid damage to the generator depending of its size and technology (overcurrent, under/overfrequency, under/overvoltage, overload, differential protection, reverse power, lockout relay, etc.). Outgoers electrical protections shall be designed with at least overload, overcurrent, lockout relay and earth fault protection.

Transformation station

- **The standardized stations** can be either masonry blocks construction or prefabricated cabin, and shall include HV switchgear, HV/LV transformers (6.6 kV/420 V) and LV switchboard.
- **HV switchgear (6.6 kV - 3 Ph - 3 W)** The HV switchgear (Ring Main Unit) shall be metal-enclosed according [IEC 60298](#), single busbar (bare copper), indoor type (IP31 enclosure protection) and equipped with two incoming switches (HV loop connection) and a transformer outgoer (fuse and switch association). Switches shall be pad-lockable.
- **HV/LV transformer** (6.6 kV/420 V - Delta/Wye - neutral brought out and solidly earthed). It shall be hermetically sealed type with mineral oil dielectric. Power rating shall be standardized. TR (Transformer) shall be supplied with its protection (DGPT2, etc.).
- **LV switchboard (400 V - 3 Ph - 4 W)** The LV switchboard shall be form 3b (Incomer CB; WWW & Outgoer CB; WWD) according [IEC 60 439-1](#), single busbar (bare copper), indoor type (enclosure protection: IP31 door closed/IP2X door open) and equipped with fixed Circuit breaker pad-lockable (incomers and feeder outgoers). Incomer electrical protection shall be designed with at least overcurrent (incomer and TR neutral), under-voltage, transformer fault annunciators and lockout relay. Outgoers electrical protections shall be designed with at least overload, overcurrent, lockout relay and earth fault.

Distribution board (400 V - 3 Ph - 4 W)

Each distribution board shall be outdoor type (enclosure protection: IP55 door closed/IP2X door open) with a space heater, metal sheet enclosure, a set of copper bars, isolating screens and terminal protections to prevent contact to live parts. Incomer shall be a manual switch and outgoers shall be Circuit Breakers. When space is available in a dedicated room, the distribution board shall have an IP31 enclosure protection.

Final distribution box or cabinet (400/230 V - 3 Ph - 4 W)

This equipment shall be indoor type (enclosure protection: IP31 door closed/IP2X door open) with copper bars, isolating screens and terminal protection to prevent contact to live parts. Incomer shall be a manual CB with an earth leakage protection and outgoers shall be fuse switch or ELCB's in line with standard requirements.

15.1.2.2.3 Cables

- **General**

77. Conductor can be either copper or aluminium
 78. HV cables will be single core or multi-core cable with XLPE insulation, radial field, rated voltage 6/10 (12) kV
 79. LV cables will be single core or multicore cable with XLPE insulation, rated voltage 600/1000 V
 80. LV single core cable with PVC insulation, rated voltage 450/75 V can be used for end-user circuit with low power requirements
 81. LV cables for fire-fighting circuit shall be copper cable with silicone rubber insulation, rated voltage 500 V, PVC outer sheath.
- **Indoor:** cable shall be unarmored with a PVC outer sheath and shall be installed above ground and mechanically protected where required (cable trays or ladders with cover, tubes, duct, etc.).
 - **Outdoor:** cable shall be armored DSTA (Double Steel Tape Armor) or SWA (Single Wire Armor) (nevertheless in both cases it shall be galvanized steel) with a PVC outer sheath. Cables shall be suitable to be directly buried without additional mechanical protection.

15.1.2.2.4 Lighting

- **Normal lighting:** Lighting installations will be designed to provide a suitable illumination level with regards to the room, building and area function and in line with the applicable standards.
- **Emergency lighting:** Emergency lighting shall include exit lighting and general lighting in public areas, ensured by battery back up.

15.1.2.2.5 Earthing

An equi-potential earthing loop shall be installed for a group of buildings or houses. The loop shall be buried using the lighting trenches along the roads. All the earthing loops shall be interconnected.

The conductor to be used shall be either copper or equivalent, round shape or flat bar, bare or insulated according to environmental conditions. Furthermore in case of insulated conductor used for earthing network, earthing rods might be required to lower the overall earthing network impedance within the requirements of [IEC 60364-4-41](#). Conductor cross-section shall be sized to sustain the greatest fault current.

One or two interconnection (depending of the building size) from the loop to one or two building dispatchers (installed out side) shall be provided. All steel part of Structure, plumbing and electrical equipment shall be earthed through this dispatcher. End-user electrical equipment shall be earthed through a specific earthing conductor (green/yellow strips) which shall be connected to the final distribution box/cabinet earth bar or terminal; this bar or terminal being connected to the building dispatcher. Connection of the dispatcher-earthing conductor to the earthing loop shall be achieved through mechanical clamp of a suitable material (referring to environmental conditions and corrosion constraint) such as cadwell.

15.1.2.2.6 Buildings with Stand-by power supply

For buildings like Clinic or Restaurant/galley requiring stand-by power supply, each building shall be equipped with Normal/Standby distribution cabinet (feeder + diesel generator incomer). This cabinet shall comply with the final distribution cabinet requirements but shall be fitted with a normal and a standby incoming CB's. Furthermore in case of more than one power generator installed with a load-shedding sequence, the stand-by power supply (small diesel generator) might be considered as redundant.

15.2 Potable water system

15.2.1 Potable water sources and reliability

Any permanently manned installation shall be provided either with features ensuring the transportation to site, or with facilities for on-site production of potable water, and storage on site.

15.2.2 Potable water consumption

Potable water shall be provided in sufficient quantities to ensure all the physiological needs and normal hygiene for the occupancy load served.

Unless otherwise specified, the default value of 200 liters by occupant served and by day shall be assumed as a minimum for the Camp only.

This ratio does not take into consideration the water needed for Site construction area: concrete water (batch and cure), hydraulic tests of tanks and pipes, etc., and for Site offices of CONTRACTOR, SUB-CONTRACTORS and COMPANY.

Water production unit may be common for Site Construction area, Site offices and Construction Camp. In this case, detailed expected consumption shall be given for each area.

CONTRACTOR shall specify if "drinking" water is through potable water network or through bottles.

15.2.3 Potable water treatment

Process of water treatment shall be defined on a case by case basis according to reliability and characteristics of water source.

Potable water system shall be designed to allocate future extension of Camp capacity.

Reject brine water from the water treatment facility shall be disposed of back into appropriate location (i.e. sea).

15.2.4 Quality of water/water analysis

CONTRACTOR shall insure through periodic analysis the bacteriologic and chemical purity of potable water.

The quality of the potable water shall, unless otherwise stipulated by local regulations or specified in the Safety concept, meet the requirements of the "Organization Mondiale de la Santé" (OMS, Geneva), that are summarized in Appendix 2.

In addition to OMS recommendations, the total dissolved hydrocarbon shall not exceed 10 µg/l.

15.2.5 Potable water storage

As a minimum 10 to 15 days in hand capacity of potable water storage (not included firewater consumption) shall be provided for Camp, with chlorinating injection system.

15.2.6 Potable water distribution network

Potable water shall be available in any permanently manned building.

Distribution network shall be underground loop system.

15.2.7 Hot water

Hot water shall be provided in all bathrooms and sanitariums, clinic, kitchen, and laundry.

Automatic temperature system to avoid "legionary" disease shall be provided.

15.3 Industrial water system

Industrial water is not required specifically for Construction Camps.

It is required for Site and Construction area (concrete water and hydraulic tests).

15.4 Fire water system

Refer to COMPANY's Specification **GS EP SAF 221**.

This system shall include followings:

15.4.1 Fire water storage

Minimum capacity (m³) shall be two hours consumption.

Minimum pressure shall be designed according to fire water network.

15.4.2 Fire water network

Network shall be underground loop.

15.4.3 Accessories

Fire hydrant outside buildings.

Fire Hose reels inside buildings.

Mobile fire-fighting equipment, fire trucks, fire extinguishers (to see Chapter 9).

15.5 Sewage treatment and system

15.5.1 General

A dedicated domestic sewage system shall be installed, to collect, treat and discharge the effluents from the accommodations and other domestic areas.

As an order of magnitude, the installation shall be designed on the assumption of a quantity of effluent of 200 l/day/person.

Sewage process shall comply with the local regulations, and shall be designed for maximum occupancy.

Sewage drainage system from accommodations shall be totally independent from the other oily or chemicals drainage systems.

Two distinct domestic sewage systems shall be considered: Kitchen and Lavatories sewage.

15.5.2 Treatment routes

Two situations shall be envisaged:

15.5.2.1 Small capacity camps (< 1000 persons)

The sewage system shall consist of two different networks:

- **Grey water sewage** (effluents from Kitchen, wash basins, showers, and Laundry)
Grey sewage shall go through a grease tank (slop water) to hold-up the vegetal or animal grease .
- **Black water** (from toilets)
Black water treatment shall consist either of a chemical de-infection process, or a bio-chemical processing such as septic tanks.

15.5.2.2 Large capacity camps (> 1000 persons)

A dedicated biological water treatment plant (conventional activated sludge system) shall be installed collecting all the domestic effluents.

The design shall incorporate following equipment::

- A retention basin to collect the effluents
- An aeration tank containing the mixed microbial population, air being supplied by diffusers (compressed air, fine bubble aeration) or surface aeration
- A clarification/decantation tank allowing the settling of the biomass.

The produced liquid sludge (with around 1% solid content) shall be handled according to the environmental context and regulation (discharge into evaporation pond).

In case of necessity, a solution consisting of biosolid treatment (quick lime addition for instance) shall be installed, in order to transform the sludge into a stable harmless organic solid compost which can be used as soil improver in agriculture.

15.5.3 Discharge of effluents into environment

The treated effluents shall be stored in appropriate tanks and can be used for general purpose including gardening, irrigation, car wash, concrete fabrication.

Sludge shall be extracted and transported to sludge drying beds and disposed of at a proper disposal area, or used as a compost for vegetation.

15.6 Rainwater drainage

Drainage system for roof rainwater and run off shall be provided.

For large camps, the installation of a storm rainwater basin shall be provided.

15.7 Waste management

CONTRACTOR shall maintain the place clean and tidy.

CONTRACTOR shall organize the collect of all kinds of waste or rubbish.

Waste management shall comply with the local regulations and relevant international codes, standards and good practice.

15.7.1 Waste classification

Waste are divided according to COMPANY classification as follows:

15.7.1.1 General and inert waste

Used fluids, metal scraps and packing, non bio-degradable waste, bio-degradable food waste, clean material from civil works.

15.7.1.2 Special hazardous waste

Batteries, disused chemical, used oils, polluted packing, medical waste, contaminated muds, polluted soils, oily discharge.

15.7.2 Waste processing

CONTRACTOR shall:

- Minimize waste production as much as possible
- Promote recycling, and use local recycling facilities if available and appropriate (iron, plastics, papers, cardboard)
- Segregate waste according to the above classification
- Install safe collection devices in appropriate locations (bins, skips, containers, etc.).

Waste shall be treated using local authorized process facilities if available (incinerators, landfill sites, etc.).

If local facilities are not available, or evaluated below the COMPANY standards, the CONTRACTOR shall implement waste treatment process by following the requirements as below:

15.7.2.1 Inert waste

Inert waste such as earthwork debris, excess fill-earth, metallic and concrete scraps, construction surplus, shall be disposed in a safe bounded area. Metallic or concrete scraps shall be recycled as much as practicable.

15.7.2.2 Used oil

Used oils (vehicles change oil) shall be recycled, or incinerated in a small mobile incinerator located outside the Camp.

Requirement of **NFPA 82** shall apply, and the incinerator stack shall be equipped with spark arrestors.

15.7.2.3 Landfill facility

General domestic waste shall be disposed into a dedicated landfill facility that has to be fenced (at a minimum 2.20 m height) and installed at a minimum distance from the Camp, and down wind (Refer to **GS EP ENV 421**).

Lining system and leachate collection device shall have to be installed in order to protect the underlying soils and groundwater from potential contamination (Refer to **GS EP ENV 421**).

Possible leachate production shall have to be treated before being discharged into the environment by using the sewage water treatment plant for instance, or other dedicated device that has to be detailed by CONTRACTOR.

The landfill capacity shall be designed assuming a waste production of at least 2 kg/day/person.

The landfill shall take into account a possible extension (in case of further operation phase).

15.7.2.4 General waste

General waste shall be segregated into burnable and non-burnable waste.

Burnable waste shall be burnt in a dedicated area inside the landfill, prior being disposed of safely in the dedicated compartment (Refer to **GS EP ENV 421**).

Alternative solutions such as waste compaction with a compactor prior disposal can be envisaged on a case by case basis, segregation of burnable waste will not apply in this case.

15.7.2.5 Medical waste

Medical waste (surgical waste from clinic, bandages, hypodermic syringes, needles) shall be stored in dedicated containers under control of Doctor, in accordance with local regulations.

Medical waste shall be:

- Preferentially burnt in a dedicated safe incinerator, if available
- Or placed in closed sealed containers and dispose into landfill in a dedicated area.

15.7.2.6 Hazardous waste

If hazardous waste were to be produced by the Camp, they shall be disposed into the here above landfill facility inside a dedicated compartment (Refer to **GS EP ENV 421**), after having being stabilized by mixing with CaO lime (at a minimum ratio of 10% weight).

Used batteries shall be disposed in a dedicated compartment after acid removal and neutralization.

15.7.2.7 Interdictions

The following materials shall not be admitted into landfill:

- Liquid waste
- Flammable, corrosive or explosive materials
- Radio-active waste.

15.7.3 Waste disposal plan

CONTRACTOR shall provide a "Waste Management Plan" for COMPANY approval, including following data:

15.7.3.1 Before operation of Camp

- The applicable local regulation and procedure
- Waste processing responsibilities on site

- Waste collection principles (recycling, segregation, sorting)
- Landfill design and layout
- Waste incineration procedure
- Landfill covering and decommissioning procedure.

15.7.3.2 During operation of Camp

- Waste follow-up: quantities produced and processed, nature, etc.
- Landfill operation and follow-up
- Landfill covering
- Waste reporting
- Environment monitoring (surface and groundwater monitoring, etc.).

15.8 Telecommunications

Each permanently manned Construction Camp shall be provided with communications facilities for both internal and external use and for alerting personnel of an emergency situation occurring.

Part of the internal and external means of communications, and the whole system of alert to personnel shall remain active in case of an emergency, without creation of additional hazards.

CONTRACTOR shall be in charge of operating the Telecommunications, including provision of all trunks and local channel licenses, allocation of frequencies, fees, charges, and permits.

Detailed definition of Telecommunication System is part of Telecommunications Specification.

Following list must be read and adjusted on a case by case basis with each particular Project's Specifications and constraints.

It summarizes the main concept of Telecommunications system, and recalls the information to be given by CONTRACTOR.

15.8.1 General

The Construction Camp shall be equipped with the following Telecommunications systems. Wherever possible, these systems shall be integrated with the systems installed in the temporary Plant Construction Offices.

15.8.2 PABX Network

The Camp PABX shall have the following characteristics:

- Full private networking capabilities with PABX of Construction Offices
- Access to national Public Switched Telephone Network
- Handling of overseas call via PSTN.

15.8.3 Satellite Telephones

Portable Satellite Telephones shall be supplied if access to international telephone lines is difficult or unreliable (as a back up to a VSAT station).

15.8.4 Payphones

Payphones providing direct access to the national PSTN and allowing overseas calls shall be installed in sufficient numbers.

CONTRACTOR shall define the policy, system and quantity of payphones according to local context, proximity of nearest town, rotation schedule.

15.8.5 Local Area Network

An Ethernet LAN shall be installed in the Camp Administration Offices and in the Clinic.

The Camp LAN and the Construction Offices LAN shall be interconnected.

15.8.6 Video-conferencing equipment

Video-conferencing equipment shall be permanently installed in the Clinic.

It shall be equipped to operate via the LAN and on ISDN lines (when available).

15.8.7 Public Address/General Alarm System

The Public Address/General Alarm System shall include:

- Loudspeakers in all public indoor areas
- Alarm Sounders in all accommodations
- A siren for alarm coverage of all outdoor areas.

15.8.8 VHF/UHF Local Radio system

The VHF/UHF Radio System shall include:

- Handheld Radios (to be intrinsically safe as a precaution)
- Mobile Radios.

Suitable radio repeaters shall be installed if the Camp is not adequately covered by the Local Radio System of the Construction Offices.

15.8.9 VHF/UHF Paging System

A number of intrinsically safe Pager Units shall be provided if the Camp is within the coverage range of the Paging System of the Construction Offices (when applicable).

15.8.10 CCTV System

In some cases, security surveillance CCTV cameras shall be installed alongside the perimeter fence. Associated Monitors and Control Unit to be installed in the gatehouse (or in the dedicated security post if installed in another location).

15.8.11 Entertainment System

The Entertainment System shall consist of:

- **CA-TV System:** For distribution of local TV channels and satellite TV channels
- **CA-Audio System:** For music distribution in Recreation Hall(s).

15.8.12 Auxiliary equipment

The auxiliary equipment consist of:

- Multi-channel digital interconnection with Construction Offices via copper cable link, fibre-optic link or Line-Of-Sight radio link
- Multi-channel digital interconnection with PSTN
- VSAT link for overseas communications if PSTN is unreliable
- UPS for all telecommunications systems
- Air-conditioned Telecommunications Room
- Radio Tower.

15.9 Instrumentation

Definition of Instrumentation system is part of Instrumentation discipline.

- Fire and smoke detection shall be provided in buildings (to see Chapter 9)
- Gas detection from external gas risks e.g. gas Plant may be required in some cases. It shall be defined on a case by case basis by each particular Project's Specifications
- If gas is used as combustible for Kitchen, then gas detection and any pressure reduction should be done outside of building
- If gas is used to drive incinerator, then gas detection shall be provided
- Fire, smoke and gas detectors shall be connected from one or more central units to the Safety/Security Central Station (permanently manned)
- Emergency push buttons shall be provided.

16. Schedule

The Camp and infrastructure shall be mobilized early in the design phase of the Plant, to ensure that it is established and operational comfortably in advance of labors needs.

Schedule shall show following information:

- Critical path per areas (buildings, utilities, etc.)
- Construction schedule
- Philosophy to cover peak demand of personal on Site (POS).

17. Legal and authorizations

Certification for the reception of the Camp buildings and utilities shall be made through an international organization to verify and certify design and documents and through authorized local organization for the construction itself.

CONTRACTOR shall provide following information:

- Authorizations to built
- QA-QC during engineering, fabrication and construction

- Certification for main equipment (i.e. generators sets)
- Unless the Construction Camp is of small occupancy load and/or of short operational life span, the electrical systems, inclusive of the end-users electrical apparatus, shall be certified by a pre-determine Third Party
- Customs clearances, importation of early equipment.

18. Battery limits

CONTRACTOR shall clearly indicate the battery limits and interfaces, if any, with other sites like Plant Construction area or Plant Site offices.

19. List of documents to be provided by CONTRACTOR

Following not exhaustive list recalls the main documents to be submitted by CONTRACTOR for approval by COMPANY.

Legend:

- B = Bid Stage (Items shall be given by CONTRACTOR in the Bid proposal, before Contract award)
- E = Execution Stage (Items shall be given by CONTRACTOR after Contract award)

Bid Stage	Execution Stage
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19.1 CONTRACTOR's and SUB-CONTRACTOR's references

CONTRACTOR shall provide with following information:

- | | |
|---|---|
| • CONTRACTOR's references for similar projects (capacity, cost, building's surfaces, description of facilities, etc.) | B |
| • SUB-CONTRACTOR's references for similar projects | B |
| • List of SUB-CONTRACTORS for construction of Camp (shall be approved by COMPANY) | B |
| • Sources of main material, equipment and components | B |
| • List of main SUPPLIERS for equipment and material (shall be approved by COMPANY) | B |
| • Year of manufacturing for main equipment and components (brand new/second hand) | B |
| • Local content | B |

19.2 Histogram of personnel

For construction of Camp buildings, facilities and utilities	B
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	Bid Stage	Execution Stage
19.3 Camp Capacity		
(as defined in Chapter 4)		
• Total camp area (m ²)	B	
• Total Camp capacity (for normal and for peak occupancy)	B	
• Breakdown of buildings by category of personnel	B	
• For each category:		
82. Total building's floor area (m ²)	B	
83. Total Qty of buildings	B	
84. Total housing area (m ²)	B	
85. Total Qty of housing buildings	B	
86. Total Qty of beds (for normal and for peak occupancy)	B	
19.4 Pioneer's Camp data		
(as defined in Chapter 5)		
• Succinct description of buildings, utilities and facilities	B	
• Mobilization schedule		E
• Expected duration of use		E
19.5 Manpower requirement for operation of Camp facilities		
(as defined in Chapter 6)		
CONTRACTOR shall supply with information related to quantity and qualification of personal for operation of Camp facilities and utilities:	B	
• Management	B	
• Administration, logistic, accounting	B	E
• Catering team	B	
• Housekeeping		E
• Accredited drivers		E
• Maintenance of Camp and operation of utilities		E
• Medical support	B	
• Security and guards		E
• Fire men		E
• Miscellaneous		E

	Bid Stage	Execution Stage
19.6 Catering		
(as defined in Chapter 7)		
CONTRACTOR shall give information concerning:		
• Policy for Catering CONTRACTOR and SUB-CONTRACTOR		
• Catering CONTRACTOR and SUB-CONTRACTOR references	B	
• Succinct description of Catering organization	B	
• Food storage capacities:	B	
87. Dry stores	B	
88. Freezers and Chillers	B	
• Food sources and logistic context	B	
• Samples of typical menus for two weeks	B	
19.7 Security policy and concept		
• Succinct description (as defined in Chapter 8)	B	E
19.8 Safety policy and concept		
• Succinct description (as defined in Chapter 9)	B	E
• Portable Safety equipment (list and location)		E
19.9 Hygiene and Medical support policy and concept		
Succinct description of Clinic and medical support	B	
(as defined in Chapter 10)		
19.10 Transport policy and means		
• Succinct description (as defined in Chapter 11)	B	
• CONTRACTOR shall provide information concerning quantity of:		
89. Bus (Qty/seats capacity)		E
90. Minibus (Qty/seats capacity)		E
91. Trucks (Qty/capacity)		E
92. Cars/vehicles (Qty/capacity)		E
93. Motor cycles/bicycles		E
94. Gasoline expected consumption per week	B	
95. Storage capacity/delivery source	B	

	Bid Stage	Execution Stage
19.11 Buildings layout		
(as defined in Chapter 12)		
• List of buildings and facilities	B	
• Plan layouts, sections and elevations of each type of buildings	B	
19.12 General Plot plan layout		
(as defined in Chapter 13)		
• Location of all buildings	B	
• Location of utilities	B	
• Principle of design for main utility networks	B	E
• Design of access roads, link roads and peripheral roads	B	E
• Design of all areas for mustering, parking, services, shelters	B	E
• Design of fencing and entrances	B	E
• Design of outdoor sport facilities	B	E
• Location of landscaping areas	B	E
19.13 Buildings Specifications		
(as defined in Chapter 14)		
19.13.1 Types of construction		
• Description of each construction system:	B	
96. Prefabricated and pre-assembled modules		
97. Prefabricated modules to be erected at site		
98. Block construction at site		
99. Others types of construction		
• List of buildings for each type of construction	B	
• Life duration	B	
19.13.2 Buildings components		
CONTRACTOR shall provide following information:		
• Characteristics of components for buildings and finishing	B	
• Foundations		E
• Change in levels, if any (stairs, steps, ramps)		E
• Roofs		E

	Bid Stage	Execution Stage
• Walls		E
• Fire resistance and flammability, smoke development index		E
• Partitioning		E
• Doors with adequate tightness		E
• Windows with adequate tightness		E
• Floor covering		E
• Wall covering		E
• HVAC concept:	B	E
100. Window units		
101. Split system		
102. Central units system		
103. Chilled water distribution		
• Electrical		E
• Plumbing		E
• Miscellaneous		E
• Furniture and Equipment and supply relevant documentation or samples		E

19.14 Utilities

(as defined in Chapter 15)

CONTRACTOR shall provide following data:

• Succinct description and performance of each utility system	B	
• Main technical characteristics and quantity and capacity of each main equipment	B	
• Expected consumption of diesel and fuel and expected capacities of storage	B	
• Sources of material and equipment	B	
• Year of manufacturing of equipment	B	
• Battery limit of each system		E

	Bid Stage	Execution Stage
19.14.1 Electrical system		
(as defined in Chapter 15.1)		
CONTRACTOR shall provide the following information:		
• Load list and load balance (AC & DC) for normal and essential load	B	E
• One line diagram	B	E
• Load flow and short-circuit calculation		E
• Voltage drop calculation during large motor starting (if applicable)		E
• Cable sizing		E
• Electrical equipment list	B	E
• Equipment detailed specifications		E
• Typical mounting details (earthing/power/lighting)		E
• Earthing lay-out drawings with details	B*	E
• Cable schedule		E
• Power layout drawings with details	B*	E
• Lighting layout drawings and lighting circuit booklet	B*	E
• Substations layout drawing		E
• Detailed schematic and interconnection diagram		E
• Operation and maintenance instructions		E
• VENDOR documentation		E
19.14.2 Potable water system		
(as defined in Chapter 15.2)		
CONTRACTOR shall provide following information:		
• Source and characteristics of water	B	
• Volume of potable water required per day	B	
• Volume of potable water storage	B	
• Potable water treatment description	B	
• Electrical power consumption for potable water production	B	

* at BID stage general layout documents

	Bid Stage	Execution Stage
• Concept of phases (staggering of realization in time)		E
• CONTRACTOR shall specify if drinking water is bottled or from treatment unit	B	
19.14.3 Industrial water system		
(if any, as defined in Chapter 15.3)		
• Description of system		E
• Volume per day		E
19.14.4 Fire water system		
(as defined in Chapter 15.4)		
• Description of system	B	
• Minimum fire water storage capacity	B	
• Minimum pressure	B	
• Fire water network underground loop and material		E
• Accessories description and qty (fire hydrants, hose reels, etc.)		E
• Concept of phases (staggering of realization in time)		E
19.14.5 Sewage treatment and system		
(as defined in Chapter 15.5)		
CONTRACTOR shall provide following information:		
• Description of general concept of sewage system	B	
• Description of Waste water treatment and evaporation ponds	B	
• Quantity of black water to be treated per day	B	
• Sewage treatment units/capacities	B	
• Sewage networks/segregation of black and Grey waters, and specific waters if any	E	
• Concept of phases (staggering of realization in time)		E
19.14.6 Rainwater drainage		
(as defined in Chapter 15.6)		
CONTRACTOR shall provide information concerning drainage.		E

	Bid Stage	Execution Stage
19.14.7 Waste management		
(As defined in Chapter 15.7)		
CONTRACTOR shall provide following information:		
• Description of policy	B	
• Volume per month	B	
• Waste management plan (as per § 15.7.3)	B	E
19.14.8 Telecommunications		
(as defined in Chapter 15.8)		
• Description of system	B	
• Qty of lines	B	
19.14.9 Instrumentation system		
(as defined in Chapter 15.9)		
• Description of system	B	
• Fire and Gas Detection description, location of detectors		E
19.15 Construction Schedule of Camp		
(as defined in Chapter 16)		
CONTRACTOR shall develop and provide the following information.		
For schedule of buildings, facilities and utilities:		
• Contract award with main VENDORS and SUB-CONTRACTORS	B	
• Design phase	B	
• Material and equipment procurement and delivery on site	B	
• Mobilization on site	B	
• Site preparation	B	
• Buildings erection/critical path	B	
• Utilities construction/critical path	B	
• Completion of miscellaneous fencing, landscaping and irrigation, outdoors sports facilities		E
• Beds availability and occupancy in time	B	
• Philosophy to cover peak demand of personal on Site (POS)		E



Bid Stage	Execution Stage
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19.16 Authorizations and Readiness to mobilize for Camp

(as defined in Chapter 17)

- List of local authorizations to be provided
- Means to facilitate an early start to site activities

E

E

19.17 Battery limits

(as defined in Chapter 18)

E

Appendix 1 Maximum noise limits

(Ref. **GS EP SAF 221**)

Maximum permissible noise level (1) (2)	135 dB (linear)
General work area noise limits (1) (2)	
• 8 hours working day	90 dB (A)
• 12 hours working day	88 dB (A)
Work areas (1) (3)	
• Offices (5)	50 dB (A)
• Radio/communications room (6)	50 dB (A)
• Laboratory	55 dB (A)
• Control room (4)	60 dB (A)
• Workshops	70 dB (A)
• General Stores	70 dB (A)
Living accommodations (3)	
• Sleeping rooms	45 dB (A)
• Clinics	45 dB (A)
• Theatre, meetings, television rooms	45 dB (A)
• Recreations areas (8)	55 dB (A)
• Dining rooms	55 dB (A)
• Kitchens (7)	60 dB (A)
• Washing facilities, changing rooms, toilets	60 dB (A)
Corridors between (3)	
Not to be more than 5 dB (A) greater than in adjoining rooms, with a maximum of 60 dB (A) for any corridor	

Note (1): Noise level to be measured 1 m away from noise emitting equipment

Note (2): The maximum noise levels, instantaneous or averaged during a work shift, corresponds to the background noise **plus** the manually controlled operations

Note (3): The noise level in specific areas corresponds to the background noise only, not inclusive of manually controlled operations such as drilling, mixing, speaking, etc.

Note (4): DOE recommends 55 dB (A), NPD stipulates 60 dB (A)

Note (5): DOE recommends 55 dB (A), NPD stipulates 45 dB (A)

Note (6): DOE recommends 45 dB (A), NPD stipulates 50 dB (A)

Note (7): DOE recommends 60 dB (A), NPD stipulates 55-60 dB (A) range

Note (8): DOE recommends 55 dB (A), NPD stipulates 60 dB (A)

Appendix 2 Potable water Specification

(Ref. **GS EP SAF 221** and OMS. Geneva)

Organoleptic parameters	
Color ≤ 15 mg/l Pt-Co	Turbidity ≤ 5 JACSON units

Physic-chemical parameters	
$6.5 \leq \text{pH} \leq 8$	Chloride contents ≤ 250 mg/l Cl
Sulphate contents ≤ 400 mg/l SO_4	Aluminium contents ≤ 0.2 mg/l Al
Sodium contents ≤ 200 mg/l Na	Total hardness ≤ 50 d°F

Undesirable substances	
Nitrate contents ≤ 44 mg/l NO_3	Manganese contents ≤ 0.1 mg/l Mn
Hydrogen sulphide: not organoleptically detectable	Copper contents ≤ 1 mg/l Cu
Steel contents ≤ 0.3 mg/l Fe	Zinc contents ≤ 5 mg/l Zn
Fluorine contents ≤ 1.5 mg/l F	

Toxic substances	
Arsenic contents ≤ 50 µg/l As	Quick-silver contents ≤ 1 µg/l Hg
Cadmium contents ≤ 5 µg/l Cd	Nickel contents ≤ 50 µg/l Ni
Cyanide contents ≤ 100 µg/l CN	Lead contents ≤ 50 µg/l Pb
Chrome contents ≤ 50 µg/l Cr	Selenium contents ≤ 10 µg/l Se
Pesticide contents ≤ 0.03 µg/l aldrine + dieldrine	Poly-cyclic-aromatic HC ≤ 0.1 µg/l

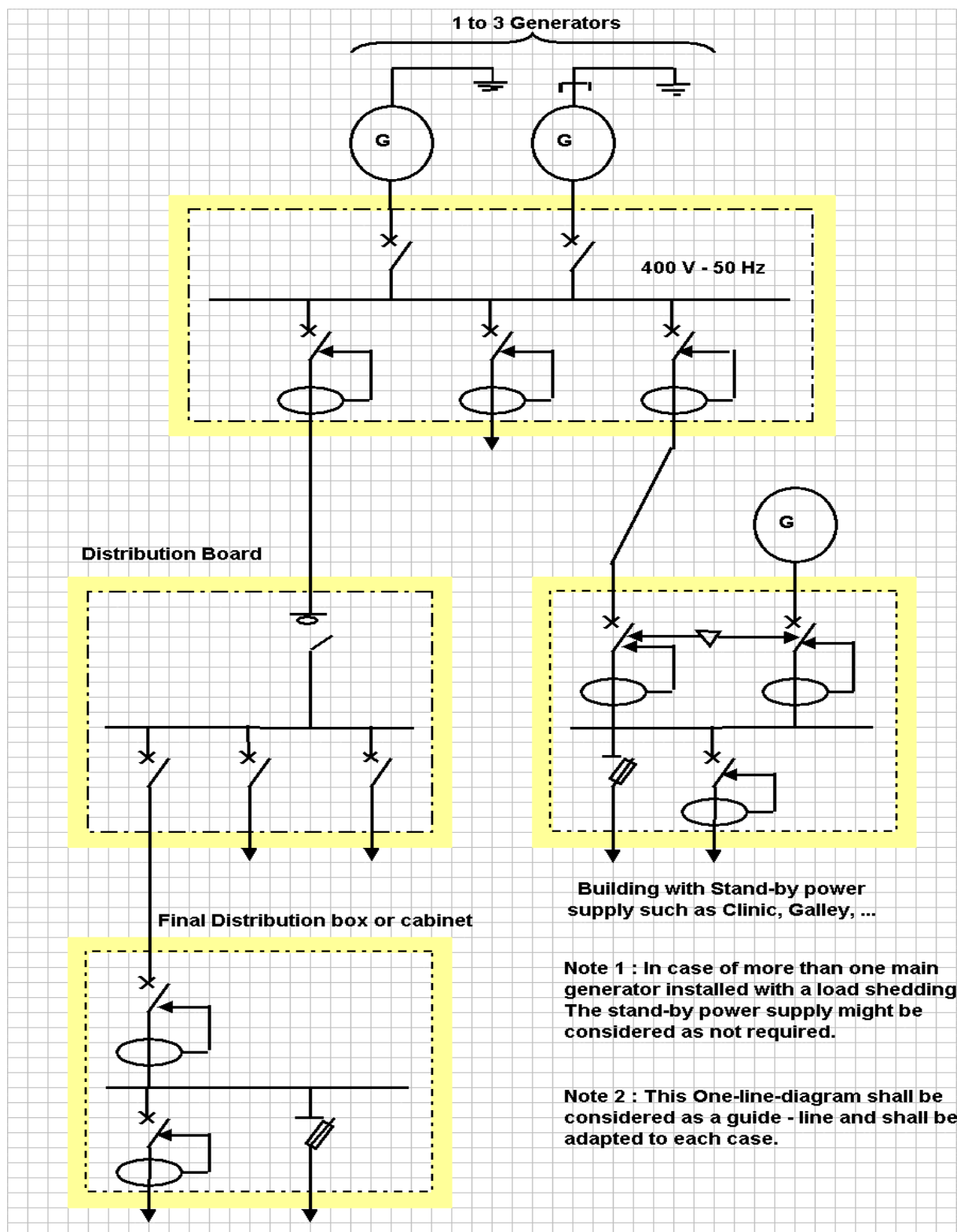
Toxic substances	
Total coliforms ≤ 0.1 l	Faecal streptococcus: 0
Faecal coliforms: 0	Sulfito-reductor clostridium: 0

Organic substances	
Benzene $\leq 10 \mu\text{g/l}$	Chlordane $\leq 0.3 \mu\text{g/l}$
Carbon tetra-chloride $\leq 3 \mu\text{g/l}$	$0.1 \leq \text{chloro-benzene} \leq 3 \mu\text{g/l}$
Chloroform $\leq 30 \mu\text{g/l}$	1.1. di-chloro-ethene $\leq 0.3 \mu\text{g/l}$
2.4.D $\leq 100 \mu\text{g/l}$	Hepta-chlorides $\leq 0.1 \mu\text{g/l}$
D.D.T. $\leq 1 \mu\text{g/l}$	Hexa-chloro-benzene $\leq 0.01 \mu\text{g/l}$
1.2.di-chloro-ethane $\leq 10 \mu\text{g/l}$	γ -HCH (lindane) $\leq 3 \mu\text{g/l}$
Metoxy-chlore $\leq 30 \mu\text{g/l}$	Penta-chloro-phenol $\leq 10 \mu\text{g/l}$
Tetra-chloro-ethene $\leq 10 \mu\text{g/l}$	Tri-chloro-ethene $\leq 30 \mu\text{g/l}$
2.4.6.tri-chloro-phenol $\leq 10 \mu\text{g/l}$	

Radio-activity	
$\alpha \leq 0.1 \text{ Bq/l}$	$\beta \leq 1 \text{ Bq/l}$

Note: (to see § 15.2) Total dissolved hydrocarbon $< 10 \mu\text{g/l}$

Appendix 3 Key One-line-diagram (small camps)



Appendix 4 Key One-line-diagram (large camps)

