Client: **Hexion B.V.**
Project: **Formaline Storage Bund**

Technical Specification
Ground works, Piling and Concrete works
Formaline Storage Bund

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1 Introduction

1.1 General

This document herein describes the scope of work for the civil activities for the Formaline Storage Bund project. It covers the minimum requirements for the engineering, material, fabrication and installation of the works. This document should be used in conjunction with other scope of work documents. The project is a green- / brown field project being carried out for Hexion B.V. in Rotterdam-Botlek site. The main objective of this project is to install two formaline storage tanks and a tank pit around them.

This document states the minimum requirements for the engineering to be executed by the CONTRACTOR and the minimum required documents to be handed over by the CONTRACTOR to the CLIENT for reviews regarding the application of the specified starting point, requirements and the desired quality of work stated in the documents of **53591-01-1391001 "Specification / requisition"**

The CONTRACTOR shall be responsible for the preparation of all other documents, drawings and designs as required to execute the work, the engineering, procurement within their scope of work and construction.

Exceptions and additional engineering requirements are noted in subsequent paragraphs of this document.

Prior to commencing any fabrication or construction work, the CONTRACTOR shall study in detail drawings, specifications and instructions. The CONTRACTOR shall inform the CLIENT, prior to carrying out any fabrication or construction work, of any error or discrepancy in the drawings, specifications and instructions in a timely manner to avoid any delays to execution of the work.

All detailed engineering and construction works for infrastructure, concrete and steel structures, piping, mechanical and equipment works will be executed by perhaps several CONTRACTORs. In function thereof the CONTRACTOR is obliged to inform for/communicate and supply required detail design information to these CONTRACTORs.

The Contractor shall deliver the civil works to ensure a complete functioning entity.

Battery limit of the underground systems is given on the drawings. Battery limit of the site for the works is up to 1,5 m outside the foundation works.

Prices shall be presented in such a way that Client can order systems or parts of systems separately.

The Contractor can obtain the quantities, surfaces and lengths etc. from the drawings and documents as stated in **53591-01-1391001 "Specification / Requisition"**. Deviations of these quantities are not subject to any financial compensation.

All materials to be used at the site will be covered by a valid certificate of origin as stipulated by "Bouwbesluit".

Selection of materials by the Contractor to fulfil the scope shall be submitted for approval to the Client. The Contractor shall select only those materials, which have a good quality and have a lifetime of at least 10 years. All decision on selected and approved materials shall be registered in the regular progress meeting between Client and Contractor.

The Contractor shall be responsible for the receiving and visual inspection of materials and equipment, including Material Receiving Report thereof and store keeping.

The Contractor shall be aware that other Contractors may be working in the same area at the same time. In order to avoid interference with others, Contractor shall acquaint his organization with the work schedules of other Contractors by consulting the Client.

1.2 Miscellaneous activities

The scope of work includes but is not limited to the following e.g.:

- Move in and move out including the installation of temporary facilities, storage area, shops, etc, required to perform the works;
- Permanent and/or temporary lighting of working areas;
- Supply of certified equipment, tools and all miscellaneous required accessories for the works;
- Disposal of industrial waste to an approved and certified disposal company according to Dutch Regulations. Certificates of disposed materials and weighing tickets shall be submitted to the Client;
- Continuous good housekeeping and cleaning up of the construction areas on a daily and where required on a continuous base. Special attention shall be paid to elevated areas, excavations, lifting works etc. in non-performance Owner shall have the right to execute good housekeeping for the cost of Contractor.
- Daily removal of industrial waste materials and other foreign matter from the construction areas to Contractor's supplied waste containers at Contractor's cost;
- Domestic (only) waste can be disposed to a container located in the direct vicinity of the washroom/toilet facilities. Containers will be emptied on Client's cost. Any violation, which can have an impact on costs will be per ratio charged to the Contractors on site;
- Limited storage of materials in the working areas, one day stock principle, except when agreed otherwise;
- Contractor shall be fully responsible for securing and safe storage of any materials prior to the installation up to date of Completion;
- Required detailed execution planning, including manpower etc. to be submitted with quotation;
- Coordination and Liaison with the Client, Main Contractors and other Subcontractors;
- Attendance in all relevant meetings;
- All close-out activities as part of his scope of work under the contract and completion of these works in coordination and close conjunction with Client and other contractors;
- In case of obstructions of roads etc., required to execute the work(s), these works should be carefully planned and discussed before execution with the Client;
- All PPT (Personal Protective Tools) shall be provided by the contractor and shall be maintained in good quality;
- Contractor shall include in his quotation all required signalization for use during the works in order to visualize potential dangers to other personnel working at the site. Signalization should be visible during day and nighttime.

1.3 Site visit

In order to get acquainted and to judge the existing situation, the Contractor shall visit the before submitting his proposal. This site visit shall be performed by Hexion B.V. Rotterdam and/or Bilfinger Tebodin Netherlands B.V.

During the site visit the Contractor shall be informed by Hexion B.V. Rotterdam about the location of the contractor yard and the location of the connections for the installations for the works (e.g. electricity, etc.).

1.4 Work included

Contractor shall include for the supply of all materials and accessories, including certification, fabrication and installation and all items of work necessary for the execution of the scope of work in a safe and economical way.

All settling out and levels in accordance with the contract documents, starting from existing benchmarks present at site.

Provide winterization, (bad) weather protection as required to continue the work.

Perform all receiving, acceptance, administration, inspection, loading and unloading, storing, transporting, lifting, maintaining and protection of materials. Perform all cleaning, flushing, testing and inspections as required. Water shall be supplied by Client.

As soon as the work is completed and accepted, the Contractor shall generally clean-up the work areas and restore all ground surfaces to their original state as the commencement of the works.

1.5 Definitions

The following terms will be used throughout this document and their definitions are as listed below:

“CLIENT”	Shall mean the Owner Hexion B.V.
“Site”	Shall mean the site at Chemiestraat 30, 3197 KB Botlek, Rotterdam
“Engineer”	Shall mean Bilfinger Tebodin Netherlands B.V. on behalf of the CLIENT
“CONTRACTOR”	The party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project, or operation or maintenance of a facility.
“Supplier”	Shall mean any person or entity that appears as a manufacturer; vendor; seller or lessor of equipment and materials and/or construction equipment.
“Laboratory”	Means the (sub)CONTRACTOR's laboratory or another laboratory in charge of the required tests.
“shall’	The word shall indicates a requirement.
“should”	The word should indicates a recommendation

1.6 Regulations, Codes, Standards and Reference Documents

If national and/or local regulations, and/or if present the CLIENT’s specification, exists in which some of the requirements may be more stringent than those of this specification, the CONTRACTOR shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable as regards safety, environmental, economic and legal aspects. In all cases the CONTRACTOR shall inform the CLIENT of any deviation from the requirements of this specification which is considered to be necessary in order to comply with national and/or local regulations.

Exceptions and additional requirements are noted in subsequent paragraphs of this document.

Compliance with this specification shall not relieve the CONTRACTOR of its responsibility to execute the works in a suitable manner to meet the specified service conditions and applicable regulations.

1.7 Work plan

The CONTRACTOR must submit a work plan and have approval prior to commencing the works. The plan must address but are not limited to the following:

- Sequence of the work;
- Working method and tools;
- Installation and demobilization of equipment/crane;
- Safety measures when working under or near existing pipe bridges;
- Delivery time of materials;
- Construction site layout;
- Building safety plan.

A work permit by Hexion must be issued for all work to be performed, an RI&E and Task Risk Analysis, in order to exclude all potentially dangerous and undesirable events and to ensure that work is carried out in a manner that is permissible within the Hexion site and / or nearby cables / pipes / installations in operation.

1.8 Schedule

The CONTRACTOR must submit a time plan to the project supervisor before the start of the work, in which at least the matters referred to in section 1.4 must be dealt with. The following issues must also be addressed:

- Phasing of the work to be performed.
- The engineering activities such as a calculation for connections for the steel structures.

1.9 General conditions

The work must be carried out in accordance with the building regulations of the municipality of Rotterdam and according to the guidelines of the Labour Inspectorate.

The CONTRACTOR must check all dimensions / locations in the work and, if necessary, make the necessary adjustments in consultation for proper execution and progress of the work.

In the event of an inaccuracy, incompleteness or lack of clarity in the drawings and / or data provided, the CONTRACTOR must immediately inform Bilfinger Tebodin. If this is not done, the resulting costs will be borne entirely by the CONTRACTOR.

It is the responsibility of the CONTRACTOR to carefully and completely deliver the work described as such in this work description.

Stagnation in the work as a result of the CONTRACTOR not requesting the necessary permits in time can never be a reason for compensation for the CONTRACTOR by the CLIENT.

Entrances & exits must be kept free as much as possible in order not to disturb the production activities of the companies present on the site.

The CONTRACTOR must be aware that he carries out the work while plants are in operation. All work and working methods must be adjusted accordingly.

Power is provided by CLIENT. Connections and distribution stations for equipment are not provided by the CLIENT.

All personnel who will be present at the construction site and / or within the plant gates must be in possession of all PPE specifically required for that plant.

No EX equipment needed, the project area is considered “safe” from ATEX point of view.

1.10 More and less work

The CONTRACTOR is only entitled to compensation for additional work if this is reported in writing as soon as possible after it arises and is recorded in the minutes of the next progress meeting with Hexion.

Extra & less work settlements are always based on an open budget. If requested, the CONTRACTOR will hand over the quotes or invoices of subCONTRACTORs and / or suppliers.

Extra work must be immediately provided with a rough estimate of the costs with orders issued based on this. A fixed price must be handed over within 1 week or sooner if feasible.

Additional work may only be carried out after written approval of the Hexion project manager and the Bilfinger Tebodin Construction Manager and Project Manager.

If additional work is settled on the basis of management, the CONTRACTOR must submit a current cost overview to the management on a weekly basis.

All the points raised above does not relieve the CONTRACTOR of the attention, efficiency and smooth progress of the work that is be expected from the CONTRACTOR in order to keep the costs at a reasonable level. If the CONTRACTOR is in default, this may be the basis for the additional works not being fully payable.

1.11 HSE

The following HSE components were identified during the engineering phase:

- Measures to be taken with regards to working in contaminated soil.
- Measures to be taken to prevent collapse/caving in excavation.
- Measures to be taken to prevent damage to existing underground cables and pipes.
- Measures to prevent grout polluting to the ground environment.
- The CONTRACTOR must carry out the work in accordance with the CLIENT safety regulations and the HSE plan.

2 Engineering

2.1 Original design and engineering

The CONTRACTOR will have to use the documents as stated in document **53591-01-1391001 “Specification / requisition”** as a starting point to deliver a complete engineering package and to construct the following structures, but not limited to:

- Embedded and chemical anchors in concrete structure;
- Reinforcement bending states;
- Pile calculation;
- Reinforcement for piles based on shear forces and axial forces;

Mainly, the CONTRACTOR shall perform the following activities:

- Engineering;
- Construction phase: The CONTRACTOR will perform all the engineering required to construct a fully functioning entity, related equipment and installations;

2.2 As Built: The CONTRACTOR will deliver all the documents of the completed works.

For the preparation of the proposal and for the engineering works of the CONTRACTOR, documents stated in **53591-01-1391001 "Specification / requisition"** are to be used. The documents stated in that document are the starting points with the minimal required specifications for this design.

Other documents than stated in **53591-01-1391001 "Specification / requisition"** will not be handed to the CONTRACTOR.

The CONTRACTOR has to realize that the documents stated in **53591-01-1391001 "Specification / requisition"** shall contain omissions. Taken this fact into account, the CONTRACTOR is not excluded from its obligations to deliver, supply and execute a fully functioning entity, as can reasonable be deducted from the delivered documents.

The CONTRACTOR must deliver the engineering with consideration of the starting points and the minimal required specifications stated in the documents of **53591-01-1391001 "Specification / Requisition"** to ensure the complete functioning entity.

If during the Engineering and Construction phase the CONTRACTOR discovers faults, errors or contradictions in the original design, the extra costs as a result of these faults will not be accounted for by the CLIENT. The CONTRACTOR will always be responsible for the final design, engineering and construction.

Extra costs in the construction phase as a result of bad or incomplete engineering drawn up by the CONTRACTOR are on account of the CONTRACTOR. The engineering works are to be separated in the items to be built, so that the CLIENT can maintain control of original design, its program of requirements and the required quality of the works.

2.3 Engineering quality

All the (detail) calculations made by the (sub)CONTRACTORs, Suppliers, etc. must be done according to the Eurocode and its (practical) guidelines as given in the document **53591-01-1311001 "Uitgangspunten rapport / Formaline Storage Bund**".

The engineering works are to be performed according to the general, valid regulations and standards, commonly accepted (practical) guidelines and building practices in the Netherlands (such as the State, Province, Municipality, Water Board and General Utility Organisations, Fire brigade, etc.).

2.4 Detailed engineering

If the CONTRACTOR decides to start with the detailed engineering before approval of the CLIENT regarding the starting points and the program of requirements of the original design, than this will be the responsibility of the CONTRACTOR. Extra costs regarding this matter are for account of the CONTRACTOR.

During the detailed engineering the documents minimal containing information such as dimensioning, building materials, etc. according to general, commonly accepted regulations, (practical) guidelines and building practices in the Netherlands are to be submitted for review to see if the original design and its program of requirements in association with the required quality of the works are met.

The CLIENT has the right to ask for extra or more detailed documents if this is necessary for clarification of the design, engineering or construction method in association with the intended requirements of the original design.

Special attention is required for the architectural and structural connections between the existing concrete and steel structure(s) and the new concrete and steel structure(s). Therefore the details and sections of these connections are to be engineered in more detail at this time to see how these connections will be made.

2.5 Codes and Standards

The responsibility lies with the CONTRACTOR to ensure the design and construction is in accordance with the specifications and drawings. The CONTRACTOR shall ensure all works are in accordance with the applicable codes and national statutory regulations.

Local codes for the Netherlands that should be applied, but nit limited to:

- NEN-EN 1990 & NB Basis of structural design
- NEN-EN 1991 & NB Actions on structures
- NEN-EN 1992 & NB Design of Concrete Structures
- NEN-EN 1997 &NB Geotechnical Design

All standard sheets relating to the works, as published by the 'Netherlands Standardisation Institute' in the versions, which are current one month before the data on which the contract is placed.

All regulations, by-laws, decrees and directions of the State, Province, Municipality etc. which apply to or affect the works.

In the event of conflict between various codes and standards, the most stringent condition will apply.

2.6 Drawing and calculations

On the basis of the work description with accompanying drawings and data, the CONTRACTOR must make all other necessary work drawings, detailed calculations and statements that are necessary for the execution of the work and / or that are required according to the work description.

The working drawings to be made by the CONTRACTOR must give the CLIENT a full insight into the detailing and execution of the work.

The drawings, mentioned as appendices to the work description, must be regarded as principle drawings. The CONTRACTOR must perform the work professionally based on these drawings.

Drawings and calculations made must be submitted in time to the management in duplicate for approval and digitally (PDF). Errors found during approval must be corrected, after which the drawings and calculations must be resubmitted. Five working days must be counted for each approval. Approved drawings and calculations must be submitted to the management digitally (PDF).

The execution, production or assembly of any part will only be started when the related drawings and calculations have been released and provided with a stamp **"RELEASED FOR CONSTRUCTION".**

Where the approved working drawings deviate from what is described in the specifications and / or indicated on the accompanying specifications drawings, settlement can take place, except in the case of minor changes, for example in dimensions.

3 Documents

3.1 General

All documents must be drawn up according to **53591-01-1311001 "Uitgangspunten rapport / Formaline Storage Bund**", and as noted in **53591-07-1391001 "Specification / requisition".**

3.2 Documents, drawings and calculations

All drawings to be submitted are also to be foreseen with a numeration provided by the CLIENT. This numeration system will be explained and handed to the CONTRACTOR after award of contract and before start of the works.

Drawings are to be delivered in Dutch.

Calculations are to be delivered in Dutch

Documents other than drawings, calculations and for permitting are to be delivered in Dutch

Documents other than drawings and calculations to be submitted for permitting are to be delivered in Dutch.

3.3 Submitting of documents

Documents, such as proposals, reports, specifications, drawings, calculations, certificates etc., produced by the CONTRACTOR or third parties employed by the CONTRACTOR, for review are to be handed over to the CLIENT.

All other documents produced by the CONTRACTOR or third parties employed by the CONTRACTOR not necessary for reviewing are to be handed over to the CLIENT for information.

The development and supply of the documents are to be done in such a way that applicable building materials and constructions as well as construction methods are transparent and understandable by the CLIENT and can be checked by the CLIENT.

3.4 Reviewing procedure delivered documents by (sub)CONTRACTOR

Drawings, calculations, etc. of the CONTRACTOR(s) shall be checked, provided with initials and corporation stamp(s) including date of sending, before they are handed over to the CLIENT.

The remarks made by the CLIENT on the documents regarding starting points and requirements of the original design will be regarded as instructions to the CONTRACTOR. The CONTRACTOR shall modify the documents according to the noted remarks. After revision the documents shall be handed over to the CLIENT again for information.

Other remarks made by the CLIENT on the documents will be regarded as recommendations.

If remarks made by the CLIENT are not incorporated in the documents, than this will be the responsibility of the CONTRACTOR. If not incorporating these remarks is in conflict with the original design and its program of requirements than the CLIENT has the right to change the relevant engineering or construction at the cost of the CONTRACTOR.

Obligations made by the CONTRACTOR, such as purchasing building materials, without a primary review of the documents, by the CLIENT take place at the own risk of the CONTRACTOR. In those cases the CONTRACTOR can never lay claim to any compensation of extra costs.

By negligence the possible resulting costs of any necessary reviews regarding the original design and its program of requirements by the CLIENT are for the account of the CONTRACTOR.

The CONTRACTOR shall deliver the to be reviewed documents, to the CLIENT as such that the CLIENT has a minimum of ten (10) working days for reviewing these documents.

3.5 Building permit

The CONTRACTOR shall complete the building permit application by preparing additional required documents and drawings in time to the municipal Building Department.

The CLIENT has already supplied documents for the application of the regular building permit. The following documents have been submitted with this application:

Doc. Tebodin	Doc. Hexion	Description
53591-01-1311001	308-CL-FA-BUND600-6010-Desc	Uitgangspunten rapport / Formaline Storage Bund
53591-01-1334001	308-CL-FA-BUND600-6018-Calc	Strength & stability and reinforcement calculations - Tank Foundation Slab and Tank Pit
53591-01-1362001	308-FA-BUND600-6012	Foundation tanks V-620 & V-630 / tank pit / Site Lay-out
53591-01-1371001	308-FA-BUND600-6013	Foundation tanks V-620 & V-630 / tank pit / Piling plan
53591-01-1372001	308-FA-BUND600-6014	Foundation tanks V-620 & V-630 / tank pit / Formwork
53591-01-1373001	308-FA-BUND600-6015	Foundation tanks V-620 & V-630 / tank pit / Reinforcement
53591-01-1374001	308-EI-EL-BUND600-6000	Foundation tanks V-620 & V-630 / Earth plan Area 600

The CONTRACTOR will investigate which complementary documents are necessary to be submitted to complete the requested documents for the regular building permit. These documents will be provided by the CONTRACTOR and handed to the CLIENT for submitting to the municipal Building Department.

The development and supply of the documents are to be done in such a way that applicable building materials and constructions as well as construction methods are transparent and understandable and can be checked by the municipality Rotterdam.

Concerning the reviewing of the municipal Building Department, regarding the building permit, the CONTRACTOR has to take into account the progress of the job, deliverances of building materials and other relevant deliverables and to anticipate on the consequences of a probable rejection by the municipal building department of Rotterdam.

The CONTRACTOR shall deliver its documents for review by the municipal Building Department, as proposed in the latest issue of "Bouwbesluit", as such that the municipal Building Department will have a period of time as stated by the municipal Building Department for reviewing of the delivered documents.

The necessary documents for the municipal Building Department will be handed to the CLIENT after which the CLIENT will deliver these documents to the municipality.

It is not allowed for the CONTRACTOR to start with the relevant parts of the works without an approval by the municipal Building Department of Rotterdam.

3.6 As Built documents

All As Built information resulting from the construction works shall be digitally processed in the original drawings by the CONTRACTOR.

The CONTRACTOR will deliver all the documents of the completed works at the end of the work to the CLIENT.

4 General Requirements for Materials and Construction works

4.1 Summary of work

The works mainly contents the execution of Civil-, Structural- and Architectural works for the erection and construction of the foundations for the project “Formaline Storage Bund” at site of Hexion B.V.

Location of worksite:

- Hexion B.V.
- Chemiestraat 30
- 3197 KB Botlek, Rotterdam

The work comprises the following buildings, structures and foundations:

- Demolition existing wall tank pit Area 6;
- New piled foundation for tanks V-620 and V-630;
- New foundation tank pit for tanks V-620 and V-630 incl. pump foundation

4.2 Quality

The works must be carried out in accordance with the relevant Hexion Standard regulations or relevant codes.

4.3 Equipment and auxiliary structures

The CONTRACTOR shall provide all equipment necessary to execute the construction works such as (but not limited to) scaffoldings, scissor elevators and cherry pickers.

The CONTRACTOR shall maintain his equipment during the construction work. If so instructed by the CLIENT the CONTRACTOR shall, entirely or in part, remove or relocate his equipment if the work progress by third parties so necessitates.

4.4 Requirements by authorities

All CONTRACTOR’s equipment, tools and other auxiliary equipment required for the construction works shall comply with the relevant requirements of the “Arbeidsinspectie” (Labour Inspectorate). In addition, all auxiliary works shall require the approval of the CLIENT and the authorities. The equipment involved shall be brought to the construction site in good time in order to enable their replacement in case of rejection without stagnating the work.

Explosive gases, poisonous and / or environmentally harmful substances shall be stored in a separate and suitable storage facility, only accessible by qualified personnel. The location of the suitable storage facility shall be determined by the CLIENT.

4.5 Availability of equipment

If proper and safe execution of the works so requires, or the CLIENT deems necessary, the CLIENTs may instruct the CONTRACTOR to utilize for the works a larger number, specific type or a larger quantity of certain tools, equipment or auxiliary equipment.

In case, during the works, the CONTRACTOR intends to make use of equipment already finished as well as equipment not yet handed-over to the CLIENT, the CONTRACTOR shall request the CLIENT so in writing. Subsequently the CLIENT shall inform the CONTRACTOR on the conditions for the temporary use of the equipment by the CONTRACTOR. All costs and liabilities in connection with the use of the CONTRACTOR of these equipment, as well as remedying defects, additional guarantees, etc., are entirely for the account of the CONTRACTOR. The CONTRACTOR shall indemnify the CLIENT and the CLIENT for all liabilities arising from the premature utilization by the CONTRACTOR of the equipment.

4.6 Auxiliary structures

The CONTRACTOR shall, if requested by the CLIENT, submit (statical) calculations and drawings of auxiliary structures, shoring, supports etc. for approval by the CLIENT.

4.7 Assistance to third parties

4.7.1 Cooperation

The CONTRACTOR shall render his full cooperation to the construction work on site of third parties and shall allow their personnel to complete their works in time.

4.7.2 Hindrance

The transport and storage of construction materials and equipment shall be organized by the CONTRACTOR in such a way that a minimum of hindrance is caused to third parties. At the end of each working day all roads on the construction site shall be free of obstacles.

4.8 Temporary facilities

With his tender the CONTRACTOR shall submit an indicative plan showing site offices, storage facilities, etc., as well as the required utilities for the construction works. The area for the temporary facilities will be supplied by CLIENT to the CONTRACTOR.

After contract award the CONTRACTOR shall submit a site layout showing the temporary facilities for approval of the CLIENT, including the following information:

- Locations and dimensions of temporary offices and storage facilities;
- Locations of temporary fences and gates;
- Locations of site lighting poles (ATEX where required);
- Locations of parking;
- Locations of temporary roads and paving;
- Locations of cranes and major equipment;
- Storage areas of materials and equipment;
- Locations of temporary cables and lines.

The CONTRACTOR shall inform the CLIENT the necessary utility connections needed for the temporary facilities. Hexion B.V. shall provide the CONTRACTOR the utilities required.

The production process as well as the transport of materials by the CLIENT and those by the suppliers of the CLIENT shall not be hampered by the locations and utilization of the temporary facilities. Temporary obstructions require the approval of the CLIENT.

The CONTRACTOR shall keep the construction site and the site of the temporary facilities clean and cleared of waste. Access doors and emergency exits shall be accessible at all times during construction. Spilled oils or chemicals shall be cleared immediately by the CONTRACTOR.

The CONTRACTOR shall organize the construction work in a way to prevent pollution of air, ground water and soil. All spills on the construction site shall be reported to the CLIENT by the CONTRACTOR and immediate action shall be taken by the CONTRACTOR to prevent increase of the pollution.

The transport and handling of construction materials by the CONTRACTOR shall in no way result in contamination of roads and/or grade. In case of a spill the CONTRACTOR shall take immediate action to clear-up the spill.

Small quantities of waste chemicals shall be dumped into containers dedicated for that purpose and collected by authorized waste collection organizations. The CONTRACTOR shall submit documentation to the CLIENT showing the quantities and identification of the collected chemical waste.

On completion of the work and after removing the site offices and storage facilities, the CONTRACTOR shall hand over the construction site clean and cleared of waste and/or unused construction materials, restored into its original conditions or finished as further described in the specifications.

4.9 Site offices, Workshops and Storage Facilities

Canteens and toilet facilities shall meet the requirements laid down in publication AI-7 (Offices) of the Labour Inspectorate (“Arbeidsinspectie I-SZW”). Site offices, workshops and storage facilities shall comply with the requirements of the Labour Inspectorate, properly be maintained and regularly cleaned.

4.10 Waste and Dumping of Materials

Construction waste materials shall be collected, stored and transported off site separated as follows:

- Hazardous waste, as described in the Ministerial Decision Hazardous Waste (BAGA, stb-2000-592);
- Rock wool
- Glass wool
- Stony materials
- Other waste materials;
- Metals;
- Massive wood without preservative coatings;
- Glass panes;
- Paper and carton (packing materials);
- PVC- and PE piping;
- Plastic door- and window (frames);
- Plaster materials.

Construction waste shall be stored daily into dedicated containers and transported off site on a regular basis.

Incineration of waste materials on site is prohibited.

The CLIENT shall organize the storage facilities and transport off site. For this purpose the CLIENT shall place several closed containers on the construction site.

4.11 Transport and storage

4.11.1 Site

In connection with the simultaneous execution of works by third parties, locations for storage shall be determined in close consultation with the CLIENT. For this purpose the CONTRACTOR shall submit to the CLIENT a plan for the arrangement of the building site not later than 14 days after award.

Parking of personal cars on the site is only permitted on the car-park special designated for that purpose.

The CONTRACTOR shall examine the drawings, visit the site and make himself acquainted with the nature and extent of the works, the means of access, storage facilities, character of the soil, and any other conditions affecting the execution of the works.

4.11.2 Transport and storage

The CONTRACTOR shall be deemed to have ascertained, before making his state construction the work site, the unloading, loading and storage locations, the access roads and the adjacent areas. His tender shall be based hereon, with no subsequent right to financial adjustment.

The means of transport and the equipment, etc., to be used for transport of equipment and materials on site, require the approval of the CLIENT.

At completion of the construction work, the CONTRACTOR shall hand over the material- and equipment storage areas clean, cleared of waste materials and restored into their original conditions or finished as described in this Specification.

4.12 Order and safety

4.12.1 Certification

The CONTRACTOR as well as his SubCONTRACTORs and suppliers shall be certified according for Safety, Health and Environment ("VCA"). Copies of the relevant certificates (KOMO, etc) shall be submitted by the CONTRACTOR to the CLIENT.

4.12.2 First aid

At all times during the construction works the CONTRACTOR shall have a minimum of one person present on the construction site who is sufficiently experienced in first aid. A first aid kit, as approved by the Labour Inspectorate ("Arbeidsinspectie") shall also be available at site.

4.12.3 Access

Access to parts of the site, installations and buildings, not part of the working site, is prohibited. If this rule is infringed, the person involved shall be removed from the work immediately.

4.12.4 Excavations

Prior to driving piles, pickets etc. into the ground or excavations work, the CONTRACTOR shall check if underground cables or pipelines etc. could be damaged as a result. Relevant information obtained by the CONTRACTOR shall, if not obtained from CLIENT, passed on to the CLIENT.

4.12.5 Traffic

The construction site is on the site of Hexion B.V. Traffic measures to be taken on or around the construction site, in consultation with the CLIENT, are part of the Contract.

The CONTRACTOR is fully responsible at all times during the construction works for the safety of traffic on and around the construction site. At all locations with risks due to traffic the CONTRACTOR shall, conform instructions by the CLIENT and CLIENT's representatives, place barriers and signs and ensure that red flags and warning lights are present and properly maintained.

Damage to plant roads and paving caused by transports of materials as part of the works, must be repaired by the CONTRACTOR.

4.12.6 HSE rules and regulations

Prior to start of the works the CONTRACTOR shall prepare a Health, Safety and Environmental plan subject to approval of the CLIENT. Access to the Hexion site, working time, safety instructions, entrance check and work permit procedures shall be conform to the HSE-plan. All site personnel of the CONTRACTOR shall be qualified for their respective functions.

For the construction works, the CONTRACTOR is obliged to ensure the proper execution of the regulations for health, safety and environment (HSE) as laid down in the Law for Working Conditions ("Arbeidsomstandighedenwet") and other relevant laws or regulations.

The CONTRACTOR takes full responsibility for his personnel on site and will have an efficient registration system for all personnel present on the construction site, in accordance with the "Voorschriften voor Aannemers".

The CLIENT will have a HSE-coordinator available during the full project,

In accordance with the HSE-regulations the CONTRACTOR shall:

- Prepare and submit a Labour/Work Plan ("ARBO plan") for the construction works;
- Cooperate with the execution of the Labour/Work Coordination Plan ("ARBO coordination plan");
- Organize regular HSE-toolbox meetings;
- Attend to the ARBO-meetings with the CLIENT;
- Equip and maintain a first aid post in a separate room.

The CONTRACTOR will follow and apply the HSE-plan to the letter. Third parties, visiting the construction site, must be reported to the CLIENT.

5 General Work Description

5.1 Scope of Work

The CONTRACTOR responsibilities include the supply, fabrication, transportation/lifting and installation of all the structural works associated with the project, but not limited to:

- Formwork
- Concrete works & reinforcement
- Expansion joints
- Grouting
- Anchor Bolts and chemical anchors
- Demolition of the existing bund wall
- Earthing

General Activities for the CONTRACTOR, but not limited to:

- Engineering works to complete the detail design;
- Verifying dimensions and situations on site.
- To properly execute detailed Engineering and work preparations, based on referenced documents(the CLIENT wouldn't be providing additional Civil/Structural documents)
- Ground works;
- Engineering and execution of the foundation piles for the tank foundations tanks V-620 and V-630
- Execution reinforced concrete foundation for tanks V-620 and V-630, incl. anchors tank;
- Execution reinforced floor, gutters and walls tank pit for the tanks V-620 and V-630, incl. embedded items and anchors.

All above items shall be shown in the proposal with the quantities and unit rates clearly stated.

Parts of the Civil/Structural scope can be sub-contracted however, responsibility and coordination lies with the CONTRACTOR.

5.2 Deliverables

General Activities for the CONTRACTOR, but not limited to:

- Measuring reports
- Shop Drawings
- Execution plan, containing:
  - Order and planning of activities
  - Method and tools/equipment
  - Positioning of equipment
  - Safety measures for working near pipe racks
  - Materials and deliveries
  - Site plan of construction area

All above items shall be shown in the proposal with the quantities and unit rates clearly stated.

Parts of the Civil/Structural scope can be sub-contracted however, responsibility and coordination lies with the CONTRACTOR.

6 Setting out and measurements

6.1 General

The CONTRACTOR under the supervision of the CLIENT, using building boards provided by the CONTRACTOR, shall carry out setting out of all parts of the work. On behalf of the complete measuring CONTRACTOR shall deliver and erect all necessary aids and shall accurately maintain the complete measuring during the execution time of the works.

The present site has an average grade elevation of approx. **4,80m+NAP**. At the end of the construction works final average finished grade elevation of area shall be **4,80m+NAP**.

The executed soil investigation gives no information on the ground water level.

6.2 Elevation and orientation

The CONTRACTOR shall take care for the transmission of this level to the fixed point in the fence by PTCN with site coordinates N-54.000 and E-205.000 at the east sit of the Hexion site with coordinates according to RD (RijkDriehoekstelsel) **X =77808.3973** and **Y = 432658.7427**, which shall be carefully maintained by the CONTRACTOR during the execution of the work. The RD coordinates to be checked by the CONTRACTOR before starting of the works

6.3 Dimensions

The CLIENT shall install one or more benchmarks on the construction site with known coordinates and an elevation mark. The CONTRACTOR shall carefully maintain the benchmarks. All gridlines, profiles, gradients, elevations shall be measured from these benchmarks necessary for the completion of the work.

6.4 Setting out

The CONTRACTOR shall set out the underground systems based on the one or more benchmarks located on site and installed by the CLIENT.

The CONTRACTOR shall give no less than 24hours notice in writing of his intention to set out the works to enable the CLIENT to make arrangements for supervision.

The check by the CLIENT shall in no way absolve the CONTRACTOR from his responsibility for setting out the works correctly.

Supervised by the CLIENT the CONTRACTOR shall set out all parts of the work. For the supervision as well as to verify dimensions during construction by the CLIENT, the CONTRACTOR shall have a competent surveyor with assistance available during the entire construction period of the work. Verification of dimensions and elevations by the CLIENT shall not relieve the CONTRACTOR of his responsibility for the correct dimensions and elevations of the work.

Before commencing excavations or other works subject to dimensions, the dimensions shall first be marked on building board, measuring 30x150mm, secured to pickets measuring 50x70mm, spaced 1500mm center-to-center and of sufficient length. The building boards etc. shall be properly maintained until the dimensions have been transferred to the work and/or as long as the CLIENT deems necessary.

6.5 Measuring Equipment

From contract award until the end of the construction work, the CONTRACTOR shall make available for the CLIENT the following measuring instruments: theodolite, leveling instrument with accessories, and the measuring equipment.

6.6 Tolerances

In case deviations of dimensions, errors in dimensioning or careless construction work, result in consequences detrimental to the CLIENT, (Sub)CONTRACTORs, Suppliers of plant etc, the cost of the consequences shall be entirely for the account of the CONTRACTOR.

7 Ground Works

7.1 General

The present site has an average grade elevation of **EL.100.000**, which is approx. **4,80m+NAP**. The final average finished grade elevation shall also be **4,80m+NAP**. The executed soil investigation gives no information on the ground water level.

The CONTRACTOR shall ensure that all parts of the work remain readily accessible for the CLIENT during the construction works.

The CONTRACTOR shall include in his proposal all the necessary works for the removal from site and processing of the excess quantity of excavated soil.

In case during excavation the elevations for the founding soil strata are found to be different from the elevations stated on the drawings, the cost for the extra or less work for excavation works shall be settled.

Earthworks to be executed adjacent to facilities or near underground piping shall be carried out with care and if necessary done manually.

The CONTRACTOR is responsible for all damage to facilities and/or site finishing caused by or as a result of earthworks and shall be repaired as part of this contract.

Preventive measures shall be taken by the CONTRACTOR to prevent damage to adjacent buildings, terps, railway and structures resulting from earthworks, such as settlements, displacements. The CONTRACTOR shall be responsible in case of damage to or settlement of adjacent existing facilities and shall fulfill all consequent requirements by the CLIENT and the municipal authorities as part of this contract.

7.2 Restrictions

The maximum permissible soil pressure in the service strip is 5 tonnes / m².

The maximum permissible ground pressure on the road is 6 tonnes / m²

7.3 Excavations and Backfilling

7.3.1 Excavations

The CONTRACTOR shall perform all necessary excavation works.

The excavations mainly consists of, but is not limited to:

- Working area new tank pit;
- Pile foundation tanks V-620 and V-630;
- Foundation and concrete structure tank pit;

If present, the CONTRACTOR shall remove all vegetation. The costs for transport and handling are for the account of the CONTRACTOR. The topsoil of the area to be excavated shall be stored separately.

All the excessive excavated gravel shall be removed to a depot area on site. The depot shall be pointed out by the CLIENT

The soil of the areas to be excavated shall be tested by the CONTRACTOR for contamination.

The CONTRACTOR shall inform the CLIENT when the soil is contaminated and of the quantities of contaminated soil before transport. Only after approval of the CLIENT the contaminated soil may be removed.

All excavations, when completed and shaped needed to erect the foundations, shall be of sufficient width to provide free working space for the satisfactory jointing of pipe and tamping of backfill around the foundations. Shallow trenches shall have sufficient slopes for stability.

After backfill of the excavated construction pit all the excessive excavated soil shall be removed to a depot area on site. The depot shall be pointed out by the CLIENT

All excavation works shall be carried out in consultation with and after approval of the CLIENT, where necessary with sufficient extra working width.

The slope of the excavations shall not exceed the natural slope of the soil being excavated. Where necessary the excavation shall be shored, propped or timbered in a suitable manner for approval by the CLIENT.

Excavations deeper than was indicated on the drawings shall be filled in with clean sand and compacted by the CONTRACTOR without financial settlement.

The excavations and the necessary auxiliary constructions shall be maintained in profile and in position until all construction works and inspections to be carried out therein have been completed.

If unexpected objects or soil strata are encountered on or immediately below the foundation level, possibly causing irregular settlements of the building or structural section involved, these shall be excavated to sufficient depth below the bottom of the excavation. The resulting cavities shall be filled in with clean sand and compacted for approval by the CLIENT. The cost for these works shall be financially settled.

All piles locations shall be pre-investigated to a depth of 2,5m under grade using a suction truck.

7.3.2 Backfilling

For backfills the CONTRACTOR shall use suitable clean sand that is certified and civilly and environmentally suitable.

CONTRACTOR shall grade the site with sufficient overheight that after compaction the site elevations indicated on the drawings are reached.

Backfills and landfills shall be constructed with margin over the specified elevations, compensating for expected settlements. At handover the elevations of the backfills and landfills shall have as a minimum, the elevations given on the design drawings. If necessary the backfills shall be further backfilled by the CONTRACTOR as part of the Contract.

The sand base under pavements shall be extended to (at least) 200 mm outside the borders of the pavement.

Under the blinding of reinforced concrete structures, a backfill thick 200mm of clean mechanically compacted gravel (“repack”) shall be installed. The layer shall extent at least 150mm on sides of the blinding layer. The CONTRACTOR shall supply this gravel (“repack”) for approval of the CLIENT as part of the contract.

7.4 Soil and sand

In principle, all excavated soil and sand shall become the property of the CONTRACTOR and shall be transported off Hexion Terrain. Only after proper quality control by the CLIENT and approval by the CLIENT and Authorities, excavated soil can be re-used for backfill.

The materials recovered from excavations shall be sorted according to soil type and, in sofar as necessary for the execution of the work, stored separately. The excavated soil shall be stored on site in consultation with and at locations to be indicated by the CLIENT. The excavated soil shall be removed from Hexion Terrain as soon as possible, according to the reports of Tauw as mentioned in the list of related documents. Any temporary storage on Hexion Terrain shall be approved by the CLIENT

Additional sand or soil to be used for backfill and/or landfills shall be supplied by the CONTRACTOR as part of the contract

The released soil of the areas to be excavated shall be tested by the CONTRACTOR for contamination:

- If the soil is not contaminated than the costs for transport and handling are for the account of the CONTRACTOR;
- If soil is contaminated then the transport costs are for the account of the CONTRACTOR, the incineration costs are for the account of Hexion B.V.

The CONTRACTOR shall inform the CLIENT when the soil is contaminated and of the quantities of contaminated soil before transport. Only after approval of the CLIENT the contaminated soil may be removed;

In case the shortage of sand or soil is caused by rejection by the CLIENT of excavated soils or sand on site, the cost of the quantities of sand or soil to be replaced shall be settled.

7.5 Underground cables and pipelines

At least 3 working days prior to the start of the construction works involving underground cables or pipelines, the CONTRACTOR shall notify the Underground Cables and Pipelines Information Centre (Kabels en Leidingen Informatie Centrum KLIC).

Prior to the start of the construction works involving underground cables or pipelines, the CONTRACTOR shall locate all existing underground cables and pipelines and take measures to prevent damage to the existing underground cables and pipelines.

The CONTRACTOR shall ensure that the information concerning existing underground cables and pipelines is present on the construction Site and shall instruct all operational personnel on Site on this matter.

For the construction works the CONTRACTOR shall take into account the presence of underground cables and pipelines, which are not to be removed, damaged or loaded.

The position of existing underground cables, pipelines, etc. shown on drawings, can deviate slightly from the actual position. Small deviations in locations shall be considered as part of the contract and shall not be settled. The CONTRACTOR shall take all measures necessary to prevent rupture and damage to existing underground cables and pipelines when excavating or working near these. In case of existing underground cables or pipelines crossing trenches or excavations, the cables or pipelines shall be properly supported.

Near existing operational underground cables and pipelines, which will remain in operation, the excavation works shall be executed manually or by suction truck, as directed by the CLIENT.

In order to detect unknown underground cables and pipeline which can be passing through the project area, trial trenches (depth min. 1,5m) shall be made at the perimeter of the project site (around the tank pit).

Addition to the trial trench, for piling works, pre-digging and preliminary ground investigation shall be done to avoid any damages to the underground cables and/or pipelines due to the piling works.

7.6 Compaction

The use of mechanically vibrating equipment is permitted, compacting by watering is not allowed.

Backfills and landfills must be backfilled and mechanically compacted with vibration plates with a compacting force of 5 - 10 Nm. The backfill shall be built-up in layers not exceeding 300 mm compacted thickness, each layer thoroughly compacted.

The soil improvement with sand shall be compacted to 98% of the normal Proctor density.

The total site shall be compacted to a proctor minimum value of 98% measured at 1,0m below grade with an average of 100%.

In case the required value is not reached the CONTRACTOR shall carry out the compaction again.

Testing shall be executed by the CONTRACTOR under supervision of the CLIENT with standard sounding cone according to the CPT (Cone penetration Test) as described in **NEN-EN 1997** and **NEN 9997-1**.

In the testing a minimum value of 5,0MPa at 1,0m below grade, is to be reached. The value of 5,0MPa as a minimum shall be reached linear. In case the required value is not reached the CONTRACTOR shall carry out the compaction again

If the percentage of moisture in the sand for backfill is insufficient in order to reach the required Proctor-density, water shall be added to the sand.

In case the compacting operations are hampered because of a high ground water level, the ground water level shall be artificially lowered to a level allowing for proper compacting.

The CONTRACTOR shall in consultation with the CLIENT prepare and submit to the municipality of Bergen op Zoom the necessary permits for artificial lowering of the ground water level.

7.7 Making and keeping dry

All construction works shall be carried out in dry conditions. This requirement shall apply also to inspections, testing, maintenance, etc. All necessary ditches, trenches, dams, pumps, drains, pipelines, etc. to fulfill this requirement shall be supplied, installed and maintained by the CONTRACTOR as part of this contract.

In case drain water is discharged into a site sewer or a sewer owned by third parties, a suitable overflow pit must be provided at the connection. The CONTRACTOR shall obtain the required permits, if any.

The drainage pumps must remain in operation continuously until the underground construction elements have sufficiently hardened and have, if so prescribed, been bitumen-coated, backfilled and sufficiently ballasted.

The method of making and keeping dry the construction site and the discharge the drainage water shall require the approval of the CLIENT prior to the start of the works.

Spare drainage pumps with ancillaries shall be kept at readiness by the CONTRACTOR as part of the contract, in case of failure of the drain system.

If required for the execution of the work to lower the groundwater level artificially by drainage, this will be indicated in the project related documents and drawings. In case it turns out that the drainage is necessary for the construction work, and not indicated in the project related documents and drawings, then the cost of the well-pointing or return drainage shall be settled.

The drainage shall be designed and calculated by the CONTRACTOR and submitted for approval to the CLIENT.

8 Piling work

8.1 General

The execution of piling shall be in accordance with, but not limited to, the Eurocode, foundation advice and execution guidelines for drilled-in piles type “Fundex schroef-injectiepalen”.

The present site has an average grade elevation of **EL.100.000**, which is approx. **4,80m+NAP**. The executed soil investigation gives no information on the ground water level.

The CONTRACTOR shall execute all piling according to the latest issue of drawing(s):

- 53591-01-1371001 “Piling plan / Tank foundation V-620 & V-630”

The piling mainly consists of, but is not limited to:

- Foundation piles;
- Strength calculation for reinforcements for the piles. The following should be calculated, but not limited to: in the pile calculation:
  - Depth relative to N.A.P.
  - Shaft diameter
  - Shaft reinforcement (length and diameter)
  - Head reinforcement (length and diameter)
  - Maximum forces (tension, pressure and horizontal)
  - Any required couplings for tubular pole segments.
- Shop drawing of the piles

The piling works mainly consists of, but is not limited to:

- New foundations for tanks V-620 and V-630;

Prior to the piling work, the CONTRACTOR shall submit for the CLIENT's approval a schedule of the procedures, equipment, and supplies he intends to adapt. The schedule shall show in detail the sequence and timing of all piling installations and such other information that the CLIENT may consider necessary.

The CONTRACTOR shall receive in extracts the soil Investigation study to acquaint himself with the prevailing underground conditions. If considered necessary the CONTRACTOR can request any further information available from the study.

However, the CONTRACTOR may propose alternative layout and/or other types of piles, patented or otherwise for CLIENT's consideration. In the event that CONTRACTOR approves any such alternatives the requirements of this Specification shall still be applicable and CONTRACTOR shall comply therewith

The type of pile driving rig and the method of piling shall have the approval of the CLIENT,

Piles shall be reinforced, over the complete length of pile. Additional reinforcement length of at least 400mm should be added to allow connections with the upper structure.

The cover over all reinforcement including binding wire shall not be less than 40 mm of concrete for piles exposed to normal conditions. For piles likely to be exposed to the influences of seawater or other corrosive environments, the corresponding minimum cover shall not be less than 60 mm.

Pile installation in a group shall not be started before setting out of the group in question is completed and the management did give permission to start.

Setting out of piles shall be done with pickets with red painted heads, using one picket per pile.

If during execution of the works appear, that changes in the sequence shall be made, or third parties have caused delay, the working schedule shall be adapted in close consultation between CONTRACTOR and the CLIENT.

Each pile shall be installed continuously without interruptions, which are voluntary, or for reasons, which could have reasonably been foreseen by an experienced CONTRACTOR, and to the full length estimated, except if the management determines that the estimated length of pile is impracticable or undesirable.

Each tube shall be marked at intervals of 250 mm along the top 3 meter of its length to facilitate the determination of the actual penetration depth.

Prior to installation, tubes shall be inspected and any tube showing damage or dirt shall be cleaned or repaired when possible and otherwise removed from the work site.

A complete installation report of each pile shall be submitted to the CLIENT daily. The complete report, in tabular form, of each pile shall include the pile number, location, time and date of installation, size of the pile, developed resistance over the final 3,0m, tip elevation and total penetration below grade. In addition time and date of concrete filling, quantity of concrete to form the pile and identification of concrete samples taken.

In addition all unusual phenomena or occurrences during and after driving and placement of concrete shall be recorded.

The CONTRACTOR shall replace all piles not installed at the correct locations, as well as damaged or broken piles, as part of this Contract.

Extra costs for revising the construction work, caused by piles not installed at their correct locations, shall be for the account of the CONTRACTOR. The CLIENT has the exclusive right to decide if piles not installed at their correct locations shall be replaced or the construction work shall be revised.

In case piles are installed without the presence of the CLIENT or its representative, or when the CLIENT judges the bearing capacity of one or more piles to be insufficient due to irregularities during the piling process or for other reasons, the CONTRACTOR shall be bound under this contract to take all measures deemed necessary by the CLIENT.

After piling work the CONTRACTOR shall clean up the work site and make all necessary repairs to the grade.

If piling work shall be executed very near to existing buildings or constructions, CONTRACTOR shall advice the management regarding to hazardous situations, possible damages or vibrations.

8.2 Site Information

The CONTRACTOR is deemed to have visited the site and fully acquainted himself with the means of access, topography, obstructions such as existing buildings, trees, etc. and any other adverse conditions that are likely to affect his cost and construction time. By such action he is deemed to have made all necessary provisions.

8.3 Setting out and measurements

The CONTRACTOR shall be responsible for establishing and locating all lines, levels and positions of all piles and shall engage a Licensed Surveyor for the above work.

The CONTRACTOR shall provide all necessary equipment, tools, labour and any assistance as required by the CLIENT for the checking of the setting out of each pile.

The acceptance of the final position of each pile shall not relieve the CONTRACTOR of his responsibility of all remedial works required as a result of inaccuracies in the positions of piles installed.

The CONTRACTOR shall submit "As Built" drawings showing the actual positions, inclinations and eccentricities of the piles at their cut-off levels, duly endorsed by the Licensed Surveyor.

Existing ground levels at pile positions shall be determined and agreed between CONTRACTOR and the CLIENT before piling work starts.

8.4 Sequence of piling

The CONTRACTOR shall first obtain the CLIENT's approval for his proposed sequence of installation. The CONTRACTOR reserves the right to order changes to the approved sequence of piling if, based on work completed, he considers it necessary to do so.

8.5 Piling rig

When installing the piles, the CONTRACTOR must take extreme care not to damage any underground services in close proximity to the piles.

The piling must be carried out with a pile driver that will have a total construction height of no more than 8 meters.

Provisions must be made, inter alia, by laying dragline bulkheads, in order to prevent damage to the existing subsurface, underground facilities, foundations of surrounding installation parts and skewers of the pile-driving machine

8.6 Piling records

The CONTRACTOR shall keep a record of each pile installed and shall furnish signed copies to CLIENT daily. The information required and the format of records shall be in standard formats as approved by CLIENT.

As and when required, the CLIENT may ask for additional information or modify the standard formats. CONTRACTOR shall provide such forms before the commencement of piling work at his expense.

The progress of penetration of the piles into the ground shall be measured by the CONTRACTOR, according to a method given by the CLIENT. For piles to be installed on or near a sounding, a diagram shall be made by the CONTRACTOR, for each 0,25m of penetration of the pile. The piling process of each pile shall be uninterrupted.

All information, measures and diagrams of the piling shall be recorded by the CONTRACTOR as directed by and for the approval of the CLIENT. Weekly two (2) copies of all piling records shall be submitted to the CLIENT.

After completing the piling work CONTRACTOR shall submit all relevant information to the CLIENT.

8.7 Tolerances

The position and verticality tolerances of vertical piles shall not exceed the following limits:

- Positional tolerance : 50 mm
- Verticality tolerance : 1:50 (1 horizontal to 50 vertical)

The above limits shall also apply for piles installed in a single line.

For pile group of three or more piles not installed in a single line, the positional tolerance of the individual pile in the group may exceed the above limits subject to the approval of CONTRACTOR. However, the positional tolerance of the center of gravity of the pile group shall be 75 mm. The CONTRACTOR shall bear the cost for any necessary enlargement of and additional reinforcement to the pile cap due to eccentricities of piles in this case.

Any pile or pile group with position and verticality deviating more than the above mentioned limits shall be liable for rejection and shall be replaced when instructed by the CLIENT. Alternatively, the CONTRACTOR may propose modifications to the pile cap or any remedial work, subject to CLIENT's approval.

8.8 Drilled-in piles type “Fundex schroef-injectiepalen”

Prior to driving piles, pickets etc. into the ground or excavations work, the CONTRACTOR shall check if underground cables or pipelines etc. could be damaged as a result. Relevant information obtained by the CONTRACTOR shall, if not obtained from CLIENT, passed on to the CLIENT.

The installation method shall be according the specification of the Supplier in combination with the installation description given in the foundation advice:

MOS Grondmechanica B.V. – project nr: R1901679:

- Document: R1901679-01 “ Results of soil investigation for the construction of 2 formaline storage tanks”, dd. 17 September 2019;
- Document R1901679-03 “Recommendations for the foundation of 2 formaline storage tanks”, dd. 08 June 2020.

Excavated soil should be handled as described in chapter 7.

The works consist of drilled grout injection piles of pile system “Fundexpalen met groutinjectie” diameter: Ø380/450.

- Length according to the specific depth given in the foundation advice;
- Reinforcement at least of quality B500B;
- Type of cement to be used according to the specifications of the Supplier, but should be at least of the grade C30/37. The cement to be used should be at least cement CEM III / B 42.5 N LH SR;
- Bearing capacity according to the foundation advice.

The minimum number of longitudinal bars provided in a bored cast in situ concrete section shall be five (5) in circular piles and their size shall not be less than 12 mm in diameter. In any case, the total cross sectional area of these bars shall not be less 1% of the cross section area of the pile.

The lateral reinforcement in the piles is to be carried out as a spiral reinforcement.

8.9 Earthing

The earthing piles, as indicated on the drawing **53591-01-1371001 “Piling plan / Tank foundation V-620 & V-630”**, to be provided with one earthing bar of 16mm diameter S220.

Supply and installation of the earthing bar shall have sufficient over length for a connection to the earthing grid in the foundation. The earthing bar should be uninterrupted over the full length.

8.10 Bearing capacity

The CONTRACTOR shall, on basis of the foundation advice, MOS Grondmechanica B.V. - document R1901679-03 “Recommendations for the foundation of 2 formaline storage tanks”; dd. 08 June 2020, guarantee the bearing capacity of the foundations and the piles.

The CONTRACTOR shall inform the CLIENT if, to his judgement, the required pile system and the required bearing capacity do not match.

If the CONTRACTOR does not give such notice, the predicted parameters of the piling and foundations will be valid for the work and the CONTRACTOR shall fully commit himself to these information.

The CONTRACTOR shall guarantee the bearing capacities of the piling.

8.11 Chamfer angle

The piling rig shall be set and maintained to attain the specified chamfer angle.

8.12 Risen piles

During the process of driving piles, observations and measurements shall be made at the site by any suitable method so chosen by the CONTRACTOR to determine whether a pile has risen as a result of driving adjacent piles. The CONTRACTOR shall provide the necessary tools, instruments and any other assistance required by the CLIENT to make these measurements.

Risen piles shall be re-driven to the original depth or resistance, unless tests have shown this to be unnecessary. Such tests shall be conducted at the expenses of the CONTRACTOR. If the system uses sections, which are inadequately designed against driving stresses, the pile shall be jacked down to its original position.

8.13 Cutting off piles

The applicable piles and foundations shall be cut off at a height as shown on the drawings.

The cutting work on piles and or foundations shall be such that proper connections can be made to the upper constructions or floors.

Pile heads of concrete piles shall be cut off at 40 mm above the underside of the foundation beams.

Free coming reinforcement from the pile heads to bend into the reinforcement of the foundation beams If no concrete blinding layer has been used, the head of the piles shall be cut off using a steel ring around the pile head.

Cutted pile heads and waste construction materials become property of the CONTRACTOR and shall be removed from the work site.

8.14 Checking of alignments and cut-off levels

The CONTRACTOR shall be responsible for the arrangement and provision for all necessary labour, materials and construction equipment for checking pile alignments, cut-off levels and rake. The method of checking and the form of recording shall be approved by the CLIENT.

All such checks shall be carried out in the presence of the CLIENT. On completion of checks, the CONTRACTOR shall submit a signed copy of the recorded results to the CLIENT.

8.15 Pile investigation

Supervision of the piling should be performed by a specialized independent and certified company (like “Brem funderingsexpertise” or equivalent) which will be provided by the CLIENT. The CONTRACTOR should at least two (2) weeks in advance of the piling works inform the CLIENT

After cutting the pile caps and a minimum curing period of 1 week, all piles must be investigated by using a non-destructive testing (NDT) method (i.e. acoustically) by an appropriately qualified and independent company. A report of the investigations must be submitted to the CLIENT timely (up to 1 week after measurements) in duplicate (2) hard copies and digital for approval.

The costs of these measurements and reporting are for the account of the CONTRACTOR.

9 Foundations and concrete works

9.1 General

The execution of foundations and concrete structures shall be in accordance with the documents stated in **53591-01-1391001 "Specification / requisition"**, and to **PGS 29** and/or **CUR 65** for liquid tight concrete structures. A certificate shall be included to prove suitable liquid tight construction.

The CONTRACTOR shall execute all required precast concrete works and in-situ concrete works. All the concrete structures are liquid tight.

If the CONTRACTOR wishes to use reinforced prefabricated elements instead of cast-in-place components for building or construction elements, he shall obtain the prior approval of the CLIENT. All design and engineering of the reinforced prefabricated elements are for the account of the CONTRACTOR.

The reinforced concrete constructions shall be subject to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards.

The demolition works mainly consist of but is not limited to:

- Demolition of the existing bund wall as mentioned on drawing 53591-01-1372001. The demolition works shall be executed without obstructing or hamper the production process of the CLIENT or that of third parties. The hindrance to all parties caused by demolition works shall be kept to an absolute minimum. After demolishing concrete, an epoxy coating to cover the exposed rebar shall be applied.

The in-situ concrete works mainly consists of but is not limited to:

- New reinforced foundation for tanks V-620 and V-630;
- New reinforced foundation for tankpit 600, incl. walls, pump foundation, pedestals for steel structures, and embedded items;
- Support layer for tanks V-620 and V-630 acc. to drawing 53591-01-1372001 consisting of, but not limited to:
  - Stainless steel ring of quality 304 (minimum) incl. anchoring to tank foundation;
  - Levelling layer on foundation;
  - Foamglass 100 mm;
  - Oil-Sand layer 50 mm (at least)

The CONTRACTOR shall make the respective detail design documents. In particular this will be the following, but not limited to:

- Foundation piles;
- Grating floors for the gutter in the floor of the tank pit
- In-situ anchoring for pipe rack, pipe supports, stairs, platforms and walkways, concrete structures:
- Embedded items;
- Bill of Quantities.

All revisions of drawings and documents issued prior to and during contract handling shall become an integral part of the (sub)contract.

Prior to starting work, the CONTRACTOR shall ensure that all documents submitted reflect the actual revision and have the status: "For Inquiry".

All enclosed drawings noted "For Information Only" shall not be used for engineering, fabrication or construction.

The CONTRACTOR shall set out the works, after approval by the CLIENT. The main gridlines shall be marked on building boards. The CONTRACTOR shall see to it that the pickets remain in their correct locations during the construction works.

Extra costs for revising the construction work, caused by deviations in the foundation, are for the account of the CONTRACTOR. The CLIENT has the exclusive right to decide if the deviations in the foundation shall be altered and/or corrected, or its superstructure be revised.

If the foundation works work shall be executed very near to existing buildings or constructions, the CONTRACTOR shall advice the CLIENT regarding to limited working conditions, hazardous situations, possible damages or vibrations.

After the foundation work the CONTRACTOR shall clean up the work site and make all necessary repairs to the grade.

Slopes of floors shall be as indicated on the drawings and according to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards.

For reinforcement not shown on the drawings shall be calculated and prized for:

- Concrete floors: 175 kg/m³ of concrete;
- Piled foundation: 150 kg/m³ of concrete;
- Concrete walls: 200 kg/m³ of concrete;
- Concrete plinths: 150 kg/m³ of concrete
- Miscellaneous supporting: 100 kg/m³ of concrete

9.2 Dilatation

The CONTRACTOR shall provide dilatations between elements the following, but not limited to,:

- New and existing concrete structures and / or foundations, etc.;
- Foundation tanks V-620 and V-630, and the foundation tank pit

The dilatation between the new and existing concrete structures shall consist of the following, but not limited to:

- Profile Tricomer DA 320 KI incl, all relevant parts and accessoires;
- Tempex;
- Compression tape of Vedafue C fire resistant joint filing;
- Primer SABA Primer H17;
- Flexible sealant of SABA type "MS Floor".

The dilatation between two new concrete structures shall consist of the following, but not limited to:

- Profile Tricomer DA 320 KI incl, all relevant parts and accessoires;
- Tempex;
- Compression tape of Vedafue C fire resistant joint filing;
- Primer SABA Primer H17;
- Flexible sealant of SABA type "MS Floor".

All materials should be applied in accordance with the specifications of the Supplier.

9.3 Preparatory Works

All work shall be set out accurately from benchmarks. During execution the correct position, level and alignment of all parts of the work shall be ensured at all times. Tolerances for construction shall be as defined elsewhere in the document.

The CONTRACTOR shall provide all equipment and labor which is necessary for the construction of the concrete work at plant site including loading, offloading, handling, transporting and storing of concrete work and materials.

The CONTRACTOR shall supply shims, temporary erection bolts, angles, plates and other structural bulk material for erection.

Before commencement of erection work of prefabricated concrete elements, the CONTRACTOR shall confirm that the foundations, including anchor bolts or cutting reinforcement, which are provided and installed, are within allowable tolerances. The CONTRACTOR shall report any discrepancies to the CLIENT and HSE-coordinator.

For lifting concrete work during transportation and installation, nylon slings or approved equivalent shall be used, avoiding any damage to the shop applied coating.

All equipment shall be suitable and of sufficient capacity to complete erection of the concrete work.

All equipment used shall be of sound construction and free from defects. It should have been regular tested in accordance with the factory acts and the test certificate shall be made available for inspection.

9.4 Quality control during fabrication and erection

The CONTRACTOR shall have as part of his usual business practice an established routine quality control program insuring that all variables affecting the requirements for reliability of the end item have been considered, evaluated, and controlled. The program shall, at CLIENT's option, be subjected to review.

All materials of construction shall be new and unless otherwise specified shall be of the CONTRACTOR's standard suitable to fulfill all operating conditions specified in the purchase documents.

All services and supplies shall be subjected to inspection by the CLIENT at all stages of fabrication.

All fabrication, materials, and packaging shall be subjected to inspection by the CLIENT at all stages of fabrication. Shop drawings shall be available to the CLIENT at the time of inspection. Surfaces and foundations shall not be poured until the inspection is complete, provided the CONTRACTOR has been previously advised of the intended inspection.

The inspection reports shall be made available to CONTRACTOR's authorized representative on request. Unless otherwise requested these reports are to be retained by the SubCONTRACTOR for a period of two (2) years.

All tests specified or necessary (unless specifically directed otherwise in the contract) shall be performed or arranged by the CONTRACTOR to ensure that the requirements of this specification are fulfilled and to ensure proper function of components.

Safety shall be specifically addressed in design, fabrication, erection, inspection and maintenance.

The CONTRACTOR shall have a written safety program that shall address the safety measures that the CONTRACTOR shall use during fabrication and concrete erection work.

At a minimum, the safety program shall include:

- a detailed description of how to prevent injury to all personnel affected by the fabrication and erection operations;
- an effective system for initial orientation and education in safety and accident prevention, as well as appropriate records to document compliance.

At a minimum, the field safety program shall place particular emphasis on the following aspects:

- CLIENT's Health, Safety and Environment (HSE) specifications;
- ground-level preassembly to minimize elevated erection;
- Hole covers and opening barriers;
- Access control to incomplete areas of erection;
- Erection / assembly lifting plans;
- Hoisting procedures;
- Safety execution plan;
- Task statement;
- Job safety analysis;
- Risk and evaluation analysis;

The safety programs shall be provided to the CLIENT for review and comments.

9.5 Site Storage

The CONTRACTOR shall make their own arrangements for loading, offloading, handling, transporting and storing of structural concrete materials. He shall arrange for the storage of structural concrete work materials on site.

Materials likely to be damaged from exposure shall be stored under cover, stored above ground on pallets, timber blocks or other similar supports, be kept above the level of any standing water and be kept free from dirt, grease, paint sprays, etc. and shall be protected from harmful environments.

Damage to any part of the concrete work, either before, during or after erection shall immediately be brought to the notice of the CLIENT. All structural concrete shall be stored and handled so that the members are not subjected to undue stresses and damage.

Particular care shall be taken in storage and handling of parts which have been painted, etc., and should the coating be damaged, it shall be restored by an approved method at the cost of the CONTRACTOR, and be compatible with the particular coating.

10 Concrete Mixes

10.1 General

Factory produced concrete must be supplied by a BMC-certified mortar plant, approved by the building management, to which it must be able to inform itself about the method of production and the capacity of the mortar plant.

For each quantity of concrete to be supplied, a written statement must be provided stating the concrete composition.

The concrete company must guarantee the compressive strength of the concrete on the composition and the cube. This guarantee must be provided in writing to the project supervisor via the civil CONTRACTOR.

Concrete shall be composed of High Furness cement, water, fine and coarse aggregate and additives as approved.

All concrete shall be manufactured and delivered in accordance with the requirements of **NEN-EN 206-1** and **BRL 1801/02** or equivalent relevant standard.

Concrete shall be proportioned and mixed to meet the minimum strength required for the design.

Specimens shall be made and cured and tested in accordance with **NEN-EN 206-1** or equivalent relevant standards. Concrete strength shall be based on twenty-eight (28) day tests for High Furness Cement or on seven (7) day tests if high early strength cement is used.

Ready mixed concrete shall be designed by the supplier in accordance with **NEN-EN 206-1** or equivalent relevant standards and specifications and the compressive strength set forth in this specification.

Concrete shall be regularly stirred from mixing to pouring.

Lightweight concrete aggregate shall be in accordance with NEN-EN 206-1 or equivalent relevant standards.

The maximum Water-Cement-Ratio (WCR) shall be according to **NEN-EN 1992** and **NEN-EN 206-1** or equivalent relevant standards.

Minimum cement content shall be according to **NEN-EN 206-1** or equivalent relevant standards.

No substitutions shall be made in the materials used in the work without additional tests in accordance herewith to show that the quality of the concrete is satisfactory. In the field, consistency shall be determined by slump tests in accordance with **NEN-EN 206-1** or equivalent relevant standard.

10.2 Concrete

Provided not requested otherwise all underground reinforced concrete foundations and base slabs shall be placed on a minimum 50mm thick blinding concrete layer without reinforcement, with a concrete quality of C12/15. Blinding concrete shall extend at least 50mm beyond the foundation.

In order to avoid disturbance of soil by traffic, rain or ground water the blinding layer shall be laid immediately after excavation, draining and compacting of the bed area is ready.

Care shall be exercised during back-filling to ensure that sheeting is not damaged.

Cement shall be at least **High Furness Cement CEM III/B 42,5 N LH HS**, and shall be used unless otherwise specified. Only one brand of any type of cement shall be used for any individual structure.

The reinforced concrete structures shall be made with a concrete quality of at least **C30/37**

Cement reclaimed from cleaning bags or leaking containers or of elapsed shelf life shall not be used.

Cement shall be free from earth, trash and damp set. Cement shall be used in sequence of receipt of shipment, unless otherwise directed.

Cement reclaimed from cleaning bags or leaking containers or of elapsed shelf life shall not be used.

10.3 Aggregate

Fine aggregate shall be of natural sand or stone screenings or a combination thereof. The aggregate shall be from an approved source and conforming to the requirements called for in specification **NEN-EN 197, NEN-EN 12620** or equivalent relevant standard.

Coarse aggregate shall consist of crushed gravel, crushed stone, or a combination thereof conforming to the requirements of the grading and physical properties called for in specification **NEN-EN 197, NEN-EN 1262**0 or equivalent relevant standard.

The maximum aggregate size shall be 25 mm except for slabs or walls less than 250 mm thick which shall have a maximum size of 19 mm.

Blast furnace slag and crushed stone fines shall not be used as aggregate.

10.4 Water

Water for use in mixing concrete shall be according **NEN-EN 1008** and shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.

No change in water source shall be permitted. Testing of water shall be performed at a minimum frequency according to **NEN-EN 1008** or equivalent relevant standard.

10.5 Additives

Additives for concrete shall be used in strict accordance with the Supplier’s instructions and tests shall be made in accordance to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards.

Air entraining agent used shall conform to the requirements of to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards and shall be of uniform consistency and quality within each container. Agents will be accepted on supplier's certification of conformance to specifications. Agents shall be subjected to sampling and testing. The air-entraining agent shall be compatible with the other additives when more than one additive is used in the design mix and shall each be added separately into the mix.

Concrete that, after curing, will be exposed to freezing temperatures while wet shall contain entrained air within limits of, and concrete air content shall be checked in accordance to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards.

The use of a water reducing, set-controlling additive will require approval by the CLIENT. Where such mixture is used, it shall be in strict accordance with the supplier's instructions, and only after having been successfully incorporated in the trial mix.

Color and hardener for use in concrete wearing surfaces shall be used only when called for on the drawings and shall be used and applied in strict conformance with the supplier's specifications and recommendations.

Accelerating agent used shall conform to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards. Calcium chloride additives or additives containing chloride salts shall not be used.

10.6 Check on concrete and reinforcement

A recognized institution shall do checking tests for inspection of concrete and reinforcement. The costs of these tests and transport of the test pieces are for CONTRACTOR's account.

The concrete test cubes required for tests shall be made by the CONTRACTOR free of charge and under the CLIENT supervision. The CONTRACTOR shall test at least 3 concrete test cubes after 1 day, 3 days, 7 days and 14 days (in total 12 test cubes) to check the increase of compressive strength of concrete.

The CONTRACTOR shall supply test bars for testing reinforcing steel free of charge.

The CONTRACTOR shall provide the CLIENT with the measured values, results of testing and the like at least two working days after testing.

11 Reinforcement

11.1 general

The CONTRACTOR shall fabricate, supply and install reinforcement in accordance with design drawing and to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards, except as noted herein.

Reinforcement for general concrete work shall be hot rolled high yield deformed bars quality B500B acc. to **NEN-EN 10080**.

Reinforcing bars shall be uncoated deformed billet steel.

A copy of the supplier's test certificate for ultimate strength, elongation and cold bending, together with the chemical analysis of the steel shall be submitted to the CONTRACTOR for each batch of reinforcing steel delivered to site.

Only new materials shall be used, and shall be free of loose rust or loose mill scale, deleterious amounts of salts or coatings, which reduce or destroy bond.

Bending schedules of provisional quantities of reinforcement shall be submitted by the CONTRACTOR to the CLIENT for approval as soon as possible and together with the drawings belonging to them.

Provisional quantities are without cutting losses, handling reinforcement, supports, supporting bars and all other auxiliary steel, which shall be for the CONTRACTOR's account. The quantities of reinforcing steel shall be charged for on basis of the approved bending schedules, according to the theoretical thickness stated thereon, at a specific gravity of 7850kg/m^3. Additional bars included on the CLIENT's instructions shall be settled.

The CONTRACTOR shall submit one copy of bending schedules and placing drawings to the CLIENT for review before starting fabrication. Only checked drawings will be accepted. The CONTRACTOR shall be responsible for the accuracy of detailing and fabrication. Reinforcement placing drawings and bending schedules shall be prepared in accordance with applicable standards.

All Drawings and schedules shall show number, grade, size, length, mark, location, and bending diagrams for reinforcing bars.

All drawings shall indicate related purchase order number, design drawing number, foundation or structure item number, and CLIENT´s projectnumber.

11.2 Transport and storage of reinforcement

Reinforcement shall be handled and transported in a manner to avoid bending or other damage to the bars. Bars shall be bundled, preferably for one placement, in accordance with the placement schedule.

Bars for separate buildings or large structures shall not be bundled together. Bars for small structures may be bundled together, but each bar or group of bars, which have the same piece mark, shall be then bundled together.

Metal tags or approved equal shall be provided and labeled with legible marks. All bundles shall be tagged at each end. Tags shall show piece marks corresponding to the mark numbers on the placement drawings and on the bending schedule. Tags shall also identify the supplier, steel, epoxy coat classification and date of manufacturing.

Bars shall be bundled in the largest size practical for handling and transport.

Reinforcement shall be stored on site under a weatherproof cover on a hard standing (concrete floor) to prevent ground water evaporation and building up salt dust on the ground, with walls to help protect stocks from wind-blown salty dust. During storage, reinforcement shall be generally protected from sun and rain.

11.3 Preparation and handling reinforcement

All reinforcing shall be in place prior to pouring concrete. No wet placing (i.e. during concreting operations) shall be permitted.

It is not allowed to bend reinforcing steel at temperatures below 5ºC.

Exposed reinforcing bars including dowels that are vertical shall be protected using plastic protection caps.

Reinforcing steel shall be secured against displacement within tolerances specified in **NEN-EN 10080** and other relevant equivalent standards.

Whenever conduit, piping inserts, pipe sleeves, etc. as called for on the drawings interfere with placing of reinforcement, proper adjustment or addition of reinforcement steel or the other embedment shall be approved by the CONTRACTOR before concrete is placed.

A procedure for bending or straightening of reinforcing bars partially embedded in concrete shall be submitted to the CLIENT for review and comment.

Protruding bars, which will be exposed to the open air for a long period, shall be coated with a sand-cement mortar, to prevent damage caused by rust.

Reinforcement shall be accurately bent, cut and formed to the dimensions and configurations shown on the detail drawings, within the tolerances and permissible deviations specified in **NEN-EN 10080** or relevant equivalent standards.

Reinforcement shall be bent cold using pin sizes in accordance to the applicable requirements and the current edition of the respective separate specifications, regulations, codes and standards.

Reinforcement shall not be re-bend or straightened without CONTRACTOR's approval. The pin around which the rebar is bent shall be fabricated from (or covered with a collar of) wood, nylon or other non-abrasive material which will not damage the epoxy coating.

Reinforcement having a reduced section, kinks, visible transverse cracks at bends, or otherwise damaged in any way shall not be used.

Reinforcement shall not be welded, unless specifically shown on the drawings or especially permitted by the CONTRACTOR. Welding of reinforcement shall only be permitted after approval has been given to the method of welding appropriate to the grade of steel and type of welding rod to be used.

Reinforcement in prefabricated concrete parts shall not be settled.

11.4 Placing and fixing of reinforcement

Reinforcement shall be accurately placed in accordance with the detail construction drawings and shall be adequately secured and held in position. Ties at intersections shall be made with annealed wire as specified; the wire ends shall be bent so that they do not protrude into the area considered as concrete cover.

Lap splices shall be in accordance with the relevant standards. Welded wire fabric shall be lapped 1½ mesh plus the extension on the wires, unless shown otherwise on the detail construction drawings.

At the time concrete is placed, the reinforcement shall be free from loose rust, scale or other coatings that will destroy or reduce the bond with the concrete.

Reinforcing bars that are left protruding from the cast concrete, as starter bars, must be well cleaned of concrete immediately after the pour is complete. They must be protected, even if they are only to be exposed for a short time, from contamination by wind-blown dust and salts by enclosing them in polyethylene sheeting. They must be cleaned in the same manner as newly installed reinforcing bars before the next pour is done.

Concrete shall under no circumstances be poured until the rebar placement has been checked and approved by the CLIENT.

During the placement of the concrete, competent supervision is to be maintained. The position of reinforcement should be checked immediately before and during concreting.

11.5 Concrete cover

Particular attention shall be paid to the positioning of reinforcement in such a way that requested concrete cover is guaranteed at all locations, as the lack of cover can be the cause of premature chloride access to the reinforcement.

The cover to reinforcement shall be measured as the minimum distance between the outside of the outermost reinforcement including links or ties and the nearest finished surface of the concrete members (excluding finishes).

Concrete cover shall be as defined on drawing **53591-01-1372001**

These limits shall be maintained with a tolerance of ±5mm.

11.6 Bar support

Reinforcement bar supports, bolsters, chairs, spacers and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place shall be manufactured and installed acc. to the applicable

requirements and the current edition of the respective separate specifications, regulations, codes and standards unless otherwise indicated on the structural drawings.

Chairs made of reinforcement shall be used to support the top mats of slab reinforcement and they shall be dimensioned to be stable during concrete placing. The chairs shall be supported on concrete blocks or directly on blinding, if existent.

Concrete spacer blocks shall be made of the same materials, to the same specification and have the same inherent properties as the concrete used for casting, but with the exception that the maximum aggregate size shall be appropriate for the thickness of the spacer.

The use of sand and cement blocks is not acceptable.

12 Formwork

12.1 General

The design and construction of the formwork shall be in accordance to the applicable requirements, regulations, codes and standards and shall be the responsibility of the CONTRACTOR

Unless otherwise noted on the drawings, formwork shall be constructed so that concrete surfaces conform to the tolerance limits listed in the applicable requirements, regulations, codes and standards.

After the installations have been fitted, the recesses shall be made good to the satisfaction of the CLIENT. Before pouring the concrete, the CONTRACTOR shall ensure that all recesses, anchors, sleeves and the like are correctly positioned.

After pouring the concrete, the CONTRACTOR shall check the position of the anchors of the steel structure and the like.

The CONTRACTOR shall take precautions to ensure that inserts, rails, sleeves and the like are not filled with concrete, etc. Any prior filling shall not cause grease stains on the concrete surface or in the finish coat to be applied thereon, nor shall it have any adverse effects on the adhesion of the finish coat or paint layer.

12.2 Forms

Forms shall be of wood, metal or other material of an approved type and shall conform to the common requirements of construction and placement.

Formwork must be sufficiently strong and rigid. The CLIENT may ask the calculations of principal elements for inspection and approval.

Forms shall be constructed to conform to shape, lines, dimensions and details as indicated on the construction drawings. Forms shall be sufficiently rigid to prevent deformation under load.

Formwork and supports must be constructed in such a way that the formwork will be in the right position and profile when loaded with just poured concrete.

All formwork for concrete, which is not to remain visible, shall be made of planed timber of equal thickness, at least 20mm thick.

Waterproof plywood of sufficient thickness shall be used for concrete surfaces, which are to remain visible.

If the CONTRACTOR wishes to use steel formwork, he shall obtain permission from the CLIENT.

The CLIENT may in this regard specify the positioning of the joints between the sheets and require that the joints be caulked and finished smooth.

The necessary recesses shall be made for architectural provisions and installations, which are to be made.

To this end, inserts and sleeves shall be incorporated in the formwork and shall be removed after casting the concrete. All sides of recesses in concrete floors not going through the floor shall be tapered.

Patented forms, dressed lumber, or plywood may be used for forming concrete.

Formwork and supports must be constructed in such a way that the formwork will be in the right position and profile when loaded with just poured concrete.

Joints shall be leak-proof and shall be arranged vertically or horizontally to conform to the pattern of the design. Forms placed on successive units for continuous surfaces shall be fitted to accurate alignment to assure a smooth completed surface, free from irregularities. In long spans, where intermediate supports are not possible, the anticipated deflection in the forms due to weight of fresh concrete shall be accurately calculated and taken into account in the design of the forms, so that finished concrete members will have true surfaces conforming accurately to desired lines, planes and elevations.

If adequate foundations for shores cannot be secured, trussed supports shall be provided. Lumber, once used in forms, shall have nails withdrawn and surfaces to be exposed to concrete cleaned before re-use. Forms shall be readily removable without hammering or prying against the concrete.

12.3 Form ties

Form ties shall be adjustable in length, free of devices that will leave a hole or depression larger than 22mm diameter back of exposed surface of concrete, and such that when forms are removed, no metal shall be within 25mm of finished surface. Wire ties are not be permitted where concrete surfaces will be exposed to weathering, at any point where discoloration will be objectionable, or for liquid retaining structures.

The design of form ties shall be subject for the approval of the CLIENT.

The use of center pins, swivel wire and similar auxiliary material shall require the CLIENT's approval from case to case.

The places where center pinholes are left after removing the formwork shall be finished with the same mortar mix used for casting. Below the groundwater level they shall be covered, after hardening and drying, with bituminized fabric, dimensions 150x150mm, or as much larger as may be necessary.

Covering with bituminized fabric shall only be required for the walls of cellars, crawl spaces, etc.

Any fins left on the concrete after the formwork has been struck shall be removed. Any holes, gravel pockets or other defects shall be cut out and filled with a mortar as approved by the CLIENT.

12.4 Edges

All external corners of columns, girders, beams and other exposed edges above grade level, shall be provided with a beveled edge of 25mm using moldings placed within the forms, unless otherwise indicated on the drawings.

All concrete surfaces on edges must be cleaned off to give a smooth surface with surface assessment class IA and IB.

12.5 Coating of forms

The mould oil and the like employed shall not have any adverse effect on the curing of the concrete or on any finishing to be applied thereon, nor shall it cause stains in or impair the adhesion of such finishing.

Forms for exposed surfaces shall be coated with oil before reinforcement is placed. Excess oil on form surfaces and any oil on reinforcing steel shall be properly removed.

Forms for unexposed surfaces may be thoroughly wetted with water immediately before placing of concrete in lieu of oiling, except under freezing weather conditions.

Form oil shall be of paraffin base oil of appropriate quality for this purpose and placed in accordance with the supplier's recommendations.

12.6 Preparation of formwork

Water shall be removed from excavations before concrete is placed. Any flow of water shall be diverted through proper side drains. All dewatering work shall be maintained and continued as directed by CONTRACTOR.

Hardened concrete, debris, and foreign materials shall be removed from interior of forms and surfaces of mixing and conveying equipment.

Wood forms, unless lined, shall be oiled or wetted with water in advance of placing concrete with joints tightened to prevent seepage of concrete.

Reinforcement shall be secured in position, inspected and approved before placing the concrete.

Runways or other approved means shall be provided for wheeled equipment to convey the concrete to the points of deposit.

Equipment used to deposit concrete shall not drive over reinforcement nor shall the runways be supported on reinforcement.

12.7 Removal of forms

Removal of forms shall be in accordance with Eurocode or equivalent relevant standard.

Forms shall not be removed until concrete has attained sufficient strength to support its own weight and any superimposed loads.

Forms for walls shall remain in place for a minimum of four (4) days. Slab, beam or girder forms may be removed after seven (7) days provided, the structure remains adequately supported.

13 Concrete pouring

13.1 General

In general, the mixing, conveying, and placing of concrete shall be in accordance with the appropriate provisions of NEN-EN 197 or equivalent relevant standard with the following clarifications:

- Mixing in concrete trucks is not permitted.
- Concrete shall not be hand-mixed or re-tempered, nor shall anything be added to the concrete after batching.
- The amount of water shall be in compliance with the approved mix design. No additional water or ice shall be added to the mix at any time. Addition of ice or water at site is not permitted
- All admixtures shall be added at the batch plant.
- The dosage and method of application of admixtures shall conform to the admixture Manufacturer's recommendations.
- An auditable record system shall be in place to record delivery of ready mixed concrete.
- Concrete that has achieved initial set or has been contaminated by foreign matter shall not be deposited in the structure or foundation.
- Slabs shall be carefully screeded to ensure proper drainage slopes and placed in alternating strips.
- Curing and protection of placed concrete shall begin immediately after compaction of the concrete.
- Formwork shall be inspected during placement. If shores, braces, or inserts move, placement shall be stopped until corrective work is completed.
- Concrete shall not be placed during rain, sleet, or snow unless adequate protection is provided. Protective measures shall be provided to the Principal for review and comment.
- Rainwater shall not be allowed to increase the mixing water nor damage the concrete surface.

Placing (pouring) vertical and horizontal elements of the same structure shall not be done at the same time.

Any concrete delivered to the site and found to be unsuitable shall be removed from the job site.

The in-situ poured concrete works mainly consists of but is not limited to, the blinding layers and the structures mentioned in art. 9.1.

Concrete shall not be placed over previously poured concrete sufficiently hardened to cause formation of seams and planes of weakness within the section.

Concreting may not commence until the CLIENT has inspected and approved the reinforcement.

The CONTRACTOR is obliged to inform the CLIENT in good time of the dates on which he intends to cast concrete.

The CONTRACTOR must submit a transport and pouring schedule to the CLIENT for approval before concreting commences.

Casting joints, which are not indicated in the drawing, needs the CLIENT's approval.

The concrete shall be compacted by means of mechanical vibrators of satisfactory quality.

Interruptions in concrete placing shall be avoided. The CLIENT may, in this regard, require that the concreting should commence before or finish after normal working hours and that the lunch breaks and rest breaks should be rearranged, at no extra charge.

In connection with the above, the CLIENT may require that the concreting operations should continue normally during wet weather. The CONTRACTOR shall ensure that the work is able to proceed without interruption.

Placement of concrete for construction recommended by the Supplier shall be mutually agreed to and in compliance with applicable laws and standards.

The Supplier shall indicate where specifications require excessive measures that result in non-standard material supply.

13.2 Curing

After pouring, all concrete constructions must be kept wet for two (2) weeks.

In the event of rain, frost or other adverse weather conditions, freshly poured concrete shall be covered.

Floors that are to receive a screed finish or tile finish shall be left rough but without a cement skin. These floors shall be finished flat under the rule.

Floors (and surfaces not formed by formwork), which are to receive no monolithic-, screed- or tile finish shall be trowel finished. These surfaces shall, after the concrete has hardened to some extent, be scoured with the addition of dry cement and shall be made smooth and flat with a rubbing board or by mechanical means.

Floors may not deviate more than 5mm from the required profile, measured under a row of 2m.

Liquid membrane curing compounds shall not be used on surfaces that receive bonded treatments, tiles, paint or other adhered finishes, epoxy toppings, or additional concrete.

After initial setting of the concrete, any disturbance thereon (e.g. from walking, wheeling-over or vibration of the formwork) shall be prevented until the concrete has sufficiently hardened.

Unless otherwise specified, curing shall continue for a minimum number of cumulative days, or fractions thereof, according to **NEN-EN 1992, NEN-EN 206-1, NEN-EN 13670** or equivalent relevant standard.

Curing shall begin immediately after concrete has hardened sufficiently to prevent damage to the surface. During the curing period, the concrete shall be protected from load stresses, heavy shock, and excessive vibration.

Finished concrete surfaces shall be protected from damage by curing methods or materials.

Area warming and humidification control of the curing of concrete that will be exposed to severe freezing and thawing shall continue until it develops more than 85% of the compressive strength.

13.3 Repair

Any concrete repairs must carried out with shrink-free mortar. The surface must also be roughened.

14 Embedded parts

14.1 General

For the following embedded anchorage between steel structures and foundations, but not limited to, anchor bolts shall be used:

- Structural steel angles on both sides of the gutter for the support of the grating floor as is indicated on drawing **53591-01-1372001 "Foundation tanks V-620 & V-630 / tank pit / Formwork"**;
- Tanks V-620 and V-630;
- Pumps and other equipment;
- Steel structures and pipe supports.

14.2 Anchors

The steel CONTRACTOR shall, design, engineer and deliver the anchors for the steel structure to be embedded. If not otherwise noted, these bolts have to be supplied by the CONTRACTOR.

The Supplier of the tank shall deliver the CONTRACTOR the anchor plans and anchors to be embedded. If not otherwise noted, these bolts have to be supplied by the CONTRACTOR.

All anchor bolts to be supplied shall be threaded bars, hot-dip galvanised with metric thread and two nuts and two washers per anchor on top of each other.

The preparation of the foundations conforming to the relevant drawings including the corresponding anchor holes, anchor bars, anchor bolts, etc. is to be checked well in advance before the beginning of the assembly is scheduled.

Embedded items, other than anchor bolts, shall be galvanized in accordance to the applicable codes and standards.

All inserts, anchor bolts, sleeves and all other embedded items shall be accurately located, using templates where appropriate and held securely in place prior to placement of concrete.

Reinforcing steel bars, anchor bolts or other steel embedments shall not be used as the means for grounding electrical equipment and shall not be tied to grounding neutral conductors, or any part of lightning protection system.

Aluminum items are not permitted to act as concrete embedments.

Anchor bolts, anchors, inserts, anchor rails, sleeves, drains, curb and seat angles, nosing, and other embedded items shall be positioned in accordance with the requirements given in the table below and secured before placing concrete. Welding of these items to the reinforcing bars shall not be permitted.

14.3 Check and inspection

The correct position of the anchors in the foundations will be checked by the CONTRACTOR in corporation with the CLIENT and confirmed by the CONTRACTOR. If the position of the anchors appears to be deviating from the position indicated on the drawings no compensation for extension of the delivery time caused by said deviation will be permitted.

When an anchor bolt template is provided by an equipment Manufacturer any adjustment in the position of template or anchorage locations within the template shall be indicated on the base plate drawing supplied with the loading information from the Manufacturer. Any such adjustments shall be clearly indicated on the detail foundation drawing with the method(s) to be applied. If adjustments are required, the Manufacturer shall approve these changes before they are made.

Anchor bolt threads and the exposed surfaces of other embedments shall be kept free of concrete and be protected from corrosion and other damage until the equipment/structure is permanently installed.

14.4 Tolerances

Embedded items shall be installed in accordance with the **NEN-EN 1993, NEN-EN 1090** and other applicable requirements, regulations, codes and standards.

15 Earthing

15.1 General

All foundations, part of the works, shall be provided with an earthing plates and earthing net according to drawing **53591-01-1374001 "Foundation tanks V-620 & V-630 / Earth plan Area 600"** for connecting equipment and structural steelwork, as indicated on the drawings of, but not limited to:

- Piled reinforced foundation for tanks V-620 and V-630;
- Reinforced foundation tank pit;
- Steel structures for piping supports.

15.2 Earthing

Earthing installations and lightning protection installations shall comply with the Dutch norms **NEN 1014, NEN 1010, NEN 1041**.

The CONTRACTOR shall investigate if it is necessary to install an additional earthing circuit. An additional earthing circuit shall be connected with the existing circuit. The earthing plates to be installed along the perimeter of the foundations shall be connected to the site earthing grid by others.

The CONTRACTOR shall install all necessary earthing connections (steel structure, wall cladding, etc.) for the new equipment and connections.

Each earthing connection shall be tested and have a resistant less than 0,1 ohm

Testing results shall be laid down in a testing report, which has to be handed over to the management. Testing actions shall be carried out before covering or cast-in the earthing connection points.

CONTRACTOR shall provide earthing plates to be embedded in concrete and earthing circuit within the concrete structure according to drawing **53591-01-1374001 "Foundation tanks V-620 & V-630 / Earth plan Area 600"** and/or Hexion standards.

Connections shall be electrically welded over the full thickness of the bars.

Earthing connections between main steel structure and earthing circuit in the floor shall be executed with earthing plates according to drawing **53591-01-1374001 "Foundation tanks V-620 & V-630 / Earth plan Area 600"** and/or Hexion standards.

If the steel structure functions as earthing medium, between steel structure connections stainless steel ribbed plates to be used to ensure the guidance of the main frame.

Special flexible connections shall be made on the locations of building dilatations and construction expansion joints.

16 Cleaning

16.1 Garbage

CONTRACTOR shall keep the work site clean and clear from all waste materials, packing material, construction waste and litter.

16.2 Package materials

Surplus of support building materials (wood-steel- pipes, etc) shall be removed from the work site. Burning or burying of materials is absolutely forbidden.

16.3 Execution of cleaning

On delivery date of work, all parts of the site, building and installations shall be clean, dry, well functioning and free of spots, stickers etc.