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Marafeq Qatar



LUSAIL DEVELOPMENT

District Cooling Distribution System Design Guidelines for Civil Works for Mega-development

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1 INTRODUCTION

1.1 General

This document and the attached files define the technical requirements to furnish pipe and materials for the portion of the district cooling system referred to as Mega-Development. For ease in understanding, these documents are prepared as if the project was broken into three separate contracts, but in fact they are all components of a single contract between the Client and one contracting party.

In the end, the contracting party is responsible for all aspects of the project and that all tools, equipment, and devices are suitable and reliable for the intended use and in the ambient conditions expected at the construction site. He shall be responsible for all documents and procedures requested by authorities for the official inspection and acceptance of the works.

In general the technical tender documents are described as:

- LUS-CPALL-MAQ-SPE-UT-00001 Pre-insulated Pipes: The scope of supply is described as pipe and materials including delivery to a lay down area designated by Client, but the scope does NOT include fabrication or installation of pipe (mechanical works) or trenches (civil works).
- LUS-CPALL-MAQ-SPE-UT-00002 Civil Works: The scope of supply is the civil portion of the underground piping system and thus does NOT include pipe materials or mechanical installation.
- LUS-CPALL-MAQ-SPE-UT-00003 Mechanical Works: The scope of supply includes mechanical installation of pipe and materials, but does not include furnishing materials or preparing the trenches.

1.2 Tender documents package

This document is part of the total tender package and ultimately will be incorporated into the project Agreement.

1.2.1 Technical Requirements Civil works – documents package

This document specifies technical requirements for civil works and is a part of the total Technical requirements for Civil works package.

The Scope of Works is defined by:

- This document.
- Appendices and drawings in accordance with Drawings/Documents List form (DLF).

1.3 Scope of Works

Scope of works is defined as the detailed engineering, planning, demolition of existing pavement where required, excavation, protection of exposed existing underground structures, transportation, preparation of pipe-bed, backfilling, packing, putting cable hoses in place, reinstatement of pavement, commissioning and documentation.

The Contractor of Civil works shall include in its scope all the works, material and services necessary for a complete, safe and prudent underground pipe system as described herein.

Works shall be carried out in accordance with good industry practice, notwithstanding certain essential items not being expressly stated in these requirements or elsewhere in the RFP.

The Scope of Works shall include, but not be limited to:

1. Mobilisation of all equipment, machinery, material and resources needed for the successful completion of the works.
2. Fencing off the work areas in accordance with the authorities regulations. (where necessary).
3. Demolition of existing pavement (where necessary).
4. Excavation for the new pipe system.
5. Protection of exposed existing underground structures.
6. Construction of concrete underground valve chambers. (Only if applicable)
7. Preparation of a sand bed for the pipes.
8. Transportation of excavated soil and new sand, from/to the site.
9. Backfilling and packing (for parts not located in utility tunnels).
10. Installation of hoses for cables (Only if applicable).
11. Supply and Installation of manholes including manhole's covers (Only if applicable)
12. Reinstatement of pavement (where necessary).
13. Documentation.

Mechanical works and the supply of pre-insulated pipes and components will be carried out by others (the Mechanical contractor and the Pipe supplier) and is **not** a part of this Scope of Works, for the Civil works Contract.

2 DEFINITIONS, ABBREVIATIONS AND REFERENCES

2.1 Definitions

The following expressions shall, where the context so permits, have the meaning hereby respectively assigned to them.

Client	The master developer - Lusail Real Estate Development Company (LREDC) or its appointed representative.
Contractor	The organization or its appointed representative, responsible for execution of the works.
Customer	The owner / sub-developer in-charge of the building.
Engineer	Marafeq's supervision engineer or its appointed representative.
Marafeq	The utility company which provides District Cooling, Gas Supply and Waste Management services.
Mega-Developer	The owner of the district.
Sub-Developer	The owner of the building.
Vendor	Any invited companies being fully eligible to submit the Tender. The successful Vendor will be the contractor/Supplier.
Works	Means products, materials, works, computer software and documentation, as called for in the Agreement.

Agreement	Means the contract or other written agreement entered into between the Client and a contracting party regarding supply of the Works, including appendices, amendments and additions agreed in writing.
For Information only	Means information only is indicative and not under responsibility of the Client. Vendor has to control, verify and be responsible for any such information in the same manner as other submittals.
Must	This is a minimum requirement.
Shall	Indicates a mandatory requirement.
Should	Indicates a preferred method or material.
Request for Proposal	Means the document prepared and issued by the client which includes this document and other general and particular requirements.

2.2 Abbreviations

DP	Design pressure
ID	Internal diameter
OD	Outer diameter
WT	Wall thickness
QCP	Quality Control Plan
FAT	Factory Acceptance Test
SAT	Site Acceptance Test
RFP	Request For Proposal
WPS	Welding Procedure Specification

2.3 Reference documents

2.3.1 Codes, standards and specifications

Material supplied by the Contractor or its sub-contractor, shall, at a minimum, confirm to the requirements of the codes listed below.

Work, work methods, testing and actions carried out by the Contractor shall, at a minimum, confirm the requirements of the codes listed below.

When an edition date is not indicated for a code or standard, the latest edition in force at the time of contract award shall apply.

EN12613	Plastic warning devices for underground cables and pipelines with visual characteristics
QCS	Qatar Construction Specifications
Kahramaa	Water and Electricity Works and Components
QCD	Qatar Civil Defense
Local standards	All applicable standards, specifications and regulations issued and/or referred to by Authorities, City Council, Civil Services department or other parties.
Other standards	Mentioned or referred to in the complete package of Tender documents.

2.4 Document precedence

The Contractor shall notify the Engineer of any conflict between this specification, the related requirements and/or data sheets, the codes and standards and any other specifications noted herein. Resolution and/or interpretation precedence shall be obtained from the Engineer in writing before proceeding with the design or manufacture.

In case of conflict, the order of precedence shall be:

1. Material narrative specifications.
2. Project specifications and standards.
3. Industry and official codes and standards.

3 TECHNICAL REQUIREMENTS AND SPECIFICATIONS

3.1 General

The piping system will consist of two pipes (supply and return) parallel in the trench. The pipes are pre-insulated bonded carbon steel pipes with PUR polyurethane foam insulation and with HDPE outer jacket.

Supply of pipes, installation and welding are carried out by the Pipe Supplier and Mechanical Contractor but the Civil Contractor shall be aware of the sensitivity of the pipes during his contract works.

The pre-insulated pipe system shall, for the main part, be directly buried in trenches without any duct, concrete cover or similar. However some shut-off valves, drain valves and venting valves shall installed in concrete valve chambers.

Works, materials and components shall meet the technical and environmental requirements of the applicable directives and harmonised standards.

Health and safety requirements and the function of safety related systems must be fulfilled.

3.2 Surface cutting or removal

On special request from the Client, the demolition of roads and footpaths must be performed in order to obtain a selection of their components in view of their re-use; otherwise the components will be transported to a dump.

Paving stones and cobblestones must be removed carefully and stored on worksite premises or transported to a storage area by the Contractor.

Hydrocarbon-binder based surfaces must be cut in a clean and rectilinear manner using adapted equipment.

3.3 Execution of excavation

The Contractor will be responsible for taking all the precautions necessary to preserve structures belonging to Public Services or private owners and will be responsible for damage and deteriorations caused by himself or one of his workers.

The means used for the execution, shoring and closed or semi-closed sheeting of excavations must be adapted to the type of land, dimensions and environmental constraints.

Unless a dispensation is granted, material extracted, even if intended to be reused, cannot be stored on the site. It shall be evacuated progressively as the excavation is opened. Material evacuation conditions shall be defined by the Contractor.

Trench excavation sidewalls must be vertical. It is forbidden to dig under peripheral surfaces that are maintained and under curbs. If necessary, the Contractor will have to execute all sheeting even closed; these sheeting must be established so that the pipes can be lowered and positioned.

All arrangements must be made to avoid the decompression of adjacent land as well water run-off in the excavation. Route continuity for vehicles and pedestrians must be ensured.

3.4 Proximity to other, existing services

Contractor shall be aware of the occurrence of other existing services such as water and sewer pipes, electrical, telephone and communication network cables, gas pipes, etc.

The work shall be carried out with minimum disruption to existing services. A minimum distance of 250-500 mm (depending on pipe DN) should be respected between DC pipes and other services crossing or parallel course, or more if the installation specification states it should be so.

Before beginning work, the Contractor awarded the work should make contact with all the service companies in order to obtain the relevant information and confirm the existence and exact location of the existing services of each company.

You will find in this section the special conditions that should be complied with when carrying out work next to:

- Sewer systems, potable water systems, drainage systems, irrigation systems
- Buried electrical lines
- Special crossing

The purpose of these minimum distances is to facilitate network maintenance operations and ensure physical protection and integrity of equipment and workmen when faced with possible impact from another service.

Whenever it is not possible to respect the previously indicated distances it will be necessary to install sufficient protection. Similarly, the protection should be installed at the request of the land owner's representative.

In case the above mentioned distances cannot be maintained, the following procedure should be followed:

- A protection system shall be placed between the two networks; it will be made of fibre-cement protection measuring 10x600x300mm, either as a 25cm board or using solid blocks 40x300x150mm or solid bricks 50x300x150mm, laid side by side to each other;
- If the specific characteristics of the installation prevent this protection, making it difficult to install, it is possible to use half struts made from fibre-cement 7 mm thick.
- In addition to this protection, if it is not possible to put a minimum of 20 mm layer of sand between any tube and the protection system, rubber sheets (NBR) must be installed. They must be 3 mm thick on both sides of the conductor to protect it and avoid possible damages.

3.4.1 Proximity to sewer systems

When minimum distances to sewage systems cannot be avoided, the following procedure should be followed:

- The construction area close to the sewer shall be waterproofed by using an asphalt sheet. The width of this sheet shall be the width of the pre-insulated conductor plus 500 mm on each side;
- Before putting the asphalt sheet in place, a layer of asphalt primer should be applied first;
- A layer of mortar shall be laid to protect the asphalt sheet from the aggressions of the ground that sits on it;
- As an alternative to the previous solution, DC-pipes can be installed inside a steel sheath.

3.4.2 Proximity to electrical lines

When laying DC-pipes next to electrical lines the work must be handled manually to avoid short circuits and hot spots. The minimum distance indicated above must be respected to avoid premature ageing of the pipes. The manual process described above shall be followed with electric lines, placing special emphasis on the need to avoid the eventual heating up or short circuiting of the electrical line that can affect the DC-pipes.

For the crossing of High Voltage Electrical lines the Contractor shall propose a tailored procedure to ensure the safety of the works and the integrity of the pipe during the operation phase.

3.4.3 Special crossing and proximity to other services not detailed in this document

When there is a special crossing or there are other services than above within minimum distance, alternatives shall be proposed to the land owner's representative and they must also be approved by him.

In the proposal, the reason why the above mentioned procedures cannot be used must be justified, in addition to the reason why the alternative procedure is the most adequate to achieve the requirements described at the beginning of this section, which are:

- Allow for easy maintenance of the affected installations;
- Ensure integrity and protection of them.
- A special design will be discussed with the Property Owner in case of over-passing a river inside a bridge under construction.

3.4.4 Special crossings

Here the document refers to special passes or crosses at sections of the network that have to go under railway tracks or below a stream or river, and in general, due to certain circumstances, the conductor requires special attention and/or it is not possible to dig a trench.

The protection in this type of cross can be resolved using three types of solutions:

- Laying the pipes under a protective steel plate;
- Concrete covering;

- Underground water cross.

3.4.4.1 Pipes under a protective steel plate

This type of protection consists of installing a steel plate and the pre-insulated pipes go inside it. The steel plate shall be of sufficient resilience and shall absorb any forces that it may receive, preventing the force from reaching the pipes inside.

Contact between the pipe and the steel plate should be avoided. The appropriate items should be put in place to distance the pipes from the steel plate in relation to the pipe diameter and should be made from polythene.

3.4.4.2 Reinforced Concrete block Conduction

This second method of protection for the DC-pipes consists of using a concrete covering that provides the necessary mechanical resistance.

3.4.4.3 Underground water crossing

This type of solution will only be used when crossing rivers, marshes or areas prone to flooding.

The underwater cross will weigh down the DC-pipes to prevent it floating or being dragged by water.

- Concentric;
- Simple;
- With trestles.

The installation of under water crosses will be studied separately in each specific case and the pertinent calculations will be carried out in addition to the detailed plans.

4 CIVIL WORKS

4.1 Work area

The Vendor shall specify in his offer the width of needed work area on the sides of and along the trench as well as needed areas for storage and machinery.

Local conditions of such nature which the Vendor will not take responsibility for shall be clearly pointed out in his offer.

The Contractor should ensure that a sufficient space is reserved for correct and safe excavation and installation.

The Contractor shall on his own responsibility inform himself about the local conditions and any circumstances which can have influence on his work before starting the works.

The Contractor must remove all types of water of whatever origin which may lie in the excavations, trenches, or which invade the site. The Contractor must carry out all of the temporary works and structures necessary to ensure removal of this water and dry out the excavations while they are open.

4.2 Breaking existing ground surfaces

Breaking and removal of existing ground surface structure shall be included in Scope of works. In this project are existing surfaces mainly natural and consisting of gravel, soil etc,

However, the Vendor shall on his own responsibility inform himself about the local conditions and calculate with all circumstances affecting his price.

4.3 Pre-insulated district cooling pipes (DC-pipes)

The pre-insulated pipe system with a carrier carbon steel pipe, insulation foam and an outer casing jacket pipe is shown on the drawings with the carrier steel pipe dimension indicated.

Following dimensions apply for the outer casing jacket pipe:

Dimension	Outer diameter casing pipe	Minimum casing wall thickness (mm)
DN100	200 mm	3,2
DN125	225 mm	3,4
DN150	250 mm	3,9
DN200	315 mm	4,5
DN250	400 mm	4,8
DN300	450 mm	5,2
DN350	500 mm	5,6
DN400	520 mm	5,7
DN450	560 mm	6,6
DN500	630 mm	7,2
DN600	780 mm	7,9
DN700	900 mm	8,7
DN800	1000 mm	9,4
DN900	1100 mm	10,2
DN1000	1200 mm	11,0
DN1100	1300 mm	11,8
DN1200	1400 mm	12,5
DN1300	1500 mm	15,9

4.4 Trenches for DC-pipes

The trench design should fulfil the following requirements:

- Sufficient trench open space (both length wise & width wise) for the correct installation of DC-pipes and fittings.
- Sufficient space to compact filling materials in the trench;
- Necessary safety conditions for workers in the trench.

In any case shall the Contractor fulfil the specifications and follow the regulations issued by the Authorities; such as the City Council or Civil Services department.

A table with the dimensions of the trenches within the different DC-pipe diameters is shown at the "Typical trench section" drawing, LUS-CPALL-MAQ-DWG-UT-10301.

The measures specified at the "Typical trench section" drawing have been adapted in order to allow for the Mechanical Contractor to perform a professional and high quality work in welding the steel pipes and sealing the outer casing joints.

Depth of the trench depends on DC-pipe dimension both also on the level of crossing existing underground structures. Covering above top of the pipes shall not be less than 1000 mm measured from the highest point of the pipe to the ground surface.

The two DC-pipes, supply and return, will be laid in parallel next to each other in the trench

4.4.1 Excavated sand, soil and other masses

Existing sand masses, excavated from the trenches may be re-used for sand bedding and backfill under conditions specified in paragraph 4.4.2 and following:

For use in the sand bed

- Only washed material with low content of chlorides in order to not pollute the local atmosphere during welding and keeping the steel pipes surfaces clean from corrosion factors.
- No natural stones larger than dia. 32 mm
- No sharp stones from crossing material larger than 8 mm
- The sand shall have less than 2% content of organic material to avoid the material decomposing over time and the support base being reduced.

For use as embedding (selected backfill)

From the sand bed and up to a level 200 mm above top of the pipe, following conditions shall apply:

- No natural stones larger than dia. 32 mm
- No sharp stones from crossing material larger than 8 mm
- The sand shall have less than 2% content of organic material to avoid the material decomposing over time and the support base being reduced.

For use as remaining backfilling

- The grain of the sand shall be less than 75 mm, pre-conditioned that the selected backfill is secured up to a level of 200 mm above the top of the pipe.
- The sand shall have less than 2% content of organic material to avoid the material decomposing over time and the support base being reduced.

Before any re-use of sand and other masses the Contractor must submit detailed specifications of all materials he proposes to re-use. He must get a written approval from the Engineer.

4.4.2 Sand bed and embedding material requirements

Detailed specifications of material approved for use as sand bed and embedding will be issued prior to contract sign.

Under no circumstances will the following materials be approved for re-use as sand bed, embedding or backfilling:

- materials likely to cause irregular future settlements such as peat, sludge, silt, clay or unburned household refuse,
- compressible materials,
- materials containing components or substances likely to be dissolved, leached, damage the networks or alter the quality of the water resources,
- unstable materials,
- industrial by-products

4.4.3 Sand bed for DC-pipes

A sand bed for the DC-pipes shall be constructed on the bottom of the trench. The sand bed shall be made in accordance with the "Typical trench section" drawing LUS-CPALL-MAQ-DWG-UT-10301

Sand bed compacting shall be performed in order to obtain over the entire thickness of the filling a dimensional weight higher than 95 % of the optimum Proctor normal.

When sand bed is finished for a section, this must be reported to the Engineer by Written notice.

After approval, the pipes will be laid down in the trench by the Mechanical Contractor. The pipes will be put on temporary supports in order to allow for welding and jointing of the outer PE-pipe jackets.

4.4.3.1 Temporary supports in trenches

Temporary supports are put in place by the Mechanical Contractor and shall also be removed by the Mechanical Contractor.

Temporary will be placed with a maximum interval of 5 m and each support will have a minimum supporting length of 200 mm, for dimensions larger than DN400 the supports will have a supporting length 300 mm or will be placed at a maximum interval of 3 m.

Temporary supports are fabricated of wooden logs or sandbags. .

Before backfilling is started must the Contractor make sure that all temporary supports have been removed.

4.4.3.2 Temporary supports – alternatives

As an alternative for temporary supports described above, the Mechanical Contractor may place pipes directly on the sand bed and then excavate a pit locally under each joint.

Since this alternate method may require extra work for the Civil Contractor for embedment and compaction, this alternate must be coordinated between the Mechanical and Civil Contractors such that there is no variance to the Client.

The Mechanical Contractor needs a written approval from the Engineer if he wants to use this alternative method.

Local excavation alternative

The pipes are placed directly on the sand bed and the Contractor excavates a pit locally under each joint. Size of the pit must allow for welding, insulation and application of outer jackets pipe sleeves. Minimum length is 2.0 m and minimum depth is 200 mm measured from the outer jacket.

4.5 Mechanical works

The Civil Contractor shall make room for the Mechanical Contractor's works, including testing and commissioning, in his planning.

After completion of the sand bed, following steps will be commenced by the Mechanical contractor:

- Placing out temporary supports
- Lifting down pipes and fittings, adjustment of pipes positions.
- Preparations and welding.
- Tests and inspection of welds
- Jacket pipe jointing
- Test and inspection of jacket pipe joints.
- Insulation of joints
- Removal of the temporary supports
- General inspection
- Interior cleaning of the pipe system by pigging.

4.5.1 Embedding (selected backfill around the pipes)

After written approval from the Engineer, work with embedding shall be carried out in steps as follows:

1. Drain and/or clean the trench from water, dirt, debris, etc. remaining from the pigging procedure.
2. Removal of all temporary pipe supports, this is best done by lifting the pipe with straps so much that the temporary supports can be pulled out one by one.
3. Adjusting positions of the pipes to the right position and distance between.
4. Backfilling of first layer and careful filling under the lower pipe curve and between the pipes. First layer material must be pushed and packed manually in order to secure fill up the lower narrow gap between pipes and sand bed.
5. Packing and compacting with Forward soil plate.
6. Backfilling and embedding
7. Packing and compacting (and so on) up to level above top of the pipes, as shown at the "Typical trench section" drawing LUS-CPALL-MAQ-DWG-UT-10301

Backfilling and packing shall be made in repeated layers not exceeding a thickness of 200 mm for each layer.

Duct for opto cables shall be installed in level with top of the pipes, in sections where indicated on drawings.

4.5.2 Remain backfilling

Remaining backfilling from top of embedding to bottom of the surface layers, structure and road foundation shall be carried out with the same method with repeated layers and packing/compacting between layers.

4.5.3 Surface layers and road foundation

Surface layers and road foundation shall be carried out in accordance with separate requirements issued by the City Council or Civil Services department.

4.6 Civil works for pre-insulated valves

Pre-insulated valves will be installed on locations as shown at the drawings. Embedding, preparations, final adjustments, etc shall be included in Scope of works. The numbers of valves are listed in Bill of Quantity.

4.7 Manholes

Manholes for drainage and venting valves (pre-fabricated) shall be included in Scope of works, in accordance with the drawings and Bill of Quantity.

4.8 Communication cables - Option

Installation of tubes for communication cables shall be regarded as an option. The Vendor shall present optional prices for two different alternatives:

Optic fibres alternative

Installation of three ducts/hoses in parallel which shall located in the trench embedding above the chilled water pipes.

Duct/hose in polyethylene PEL, with smooth inner surface aimed for blowing of optic fibre.
Size, DN 40 mm

Tube shall be installed seamless, joints are only allowed in pulling/connection chambers.

Maximum distance between pulling/connection chambers is 500 m, including branch chambers.

Installation of optic fibre into the ducts/hoses will be carried out by others.

Copper cables alternative

Installation of three ducts in parallel which shall located in the trench embedding above the chilled water pipes.

Hoses/tubes in polyethylene; PEL, PVC or PEAD.
Size, DN 100 mm
Minimum radius, 3 m

Maximum distance between pulling/connection chambers is 100 m, including branch chambers.

The installation of copper cables into the ducts will be carried out by others.

Branches, both alternatives

Branches for customer connections

At branches for customer's connections shall the three tubes follow each branch connection back and forth with a pulling/connection chamber installed at each property border (six tubes in parallel along the short branch connection trench)

Main pipes branches and T-pieces

No pulling/connection chambers are allowed to be installed in roads and streets why branches for main pipes must be located elsewhere. Examples of locations accepted are in roundabouts, planting areas or combined with customer connections chambers.

At main pipes branches shall the tree tubes be routed back and forth to the connection chamber where it is located offset from the pipes branch.

4.9 Warning devices

Plastic net warning devices with a width of 400 mm shall be rolled out in the trench embedding above the chilled water pipes.

Two, three or four nets (depending on pipe dimension) shall be rolled out in parallel as shown on drawings.

Plastic warning devices are furnished by others and shall be installed by the Contractor.

5 TRANSPORTATION, STORAGE AREA

The Contractor shall prepare a site storage area for the received pre-insulated pipes. Pipe Suppliers recommendations for storing shall be followed. Size and location will be pointed out prior to contract sign.

Unloading from trucks is included in the Contractor's Scope of works.

The Contractor is responsible for protection of the pipes unloaded and put into storage. Sun protection is required; overheating by the sun will lead to cracks in the jacket pipe casing and separation of the insulation foam from the carrier steel pipe.

Damaged pipes and fittings will be rejected at the Contractor's cost.

During loading, transport and unloading the material should be handled in such a way that prevents damage, in accordance with pipe supplier's recommendations.

Flat type fabric band straps shall be used for lifting, Chains, wires, ropes or other round lifting equipment are not allowed. A fork lift can be used to lift fittings and components, provided that flat forks are used.

T-piece branches shall not be lifted by the branch pipe only.

6 QUALITY CONTROL

All quality control, inspection and testing shall be carried out in accordance with applicable and specified codes and standards.

A quality system in accordance with the international standard ISO 9001 is preferred.

Vendor shall, in the tender, provide a quality manual in which the quality control system is described.

A testing program shall be agreed upon before the starting the works.

7 DOCUMENTATION

The Contractor shall submit all documentation from quality control, inspection and test reports.

All documentation shall be delivered in minimum 5 sets hard copies and 1 set soft copy as a minimum.

7.1 As-built drawings

As built drawings showing final location of pipes and components shall be delivered by the Contractor minimum two weeks after finalisation of each pipe section phase.

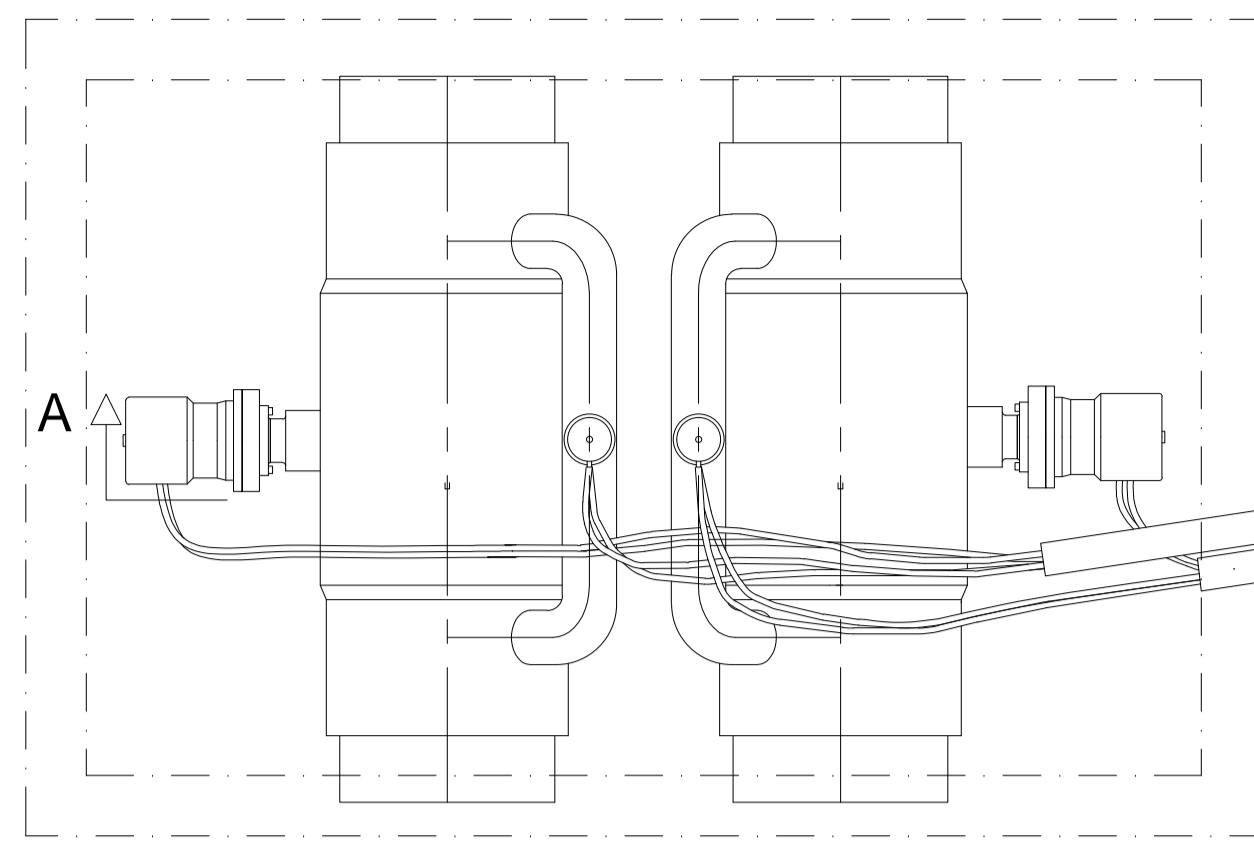
Drawings shall include information of all measurements, levels and coordinates in X, Y and Z directions. All valves, valve chambers and cable hose chambers shall be shown.

8 APPENDICES

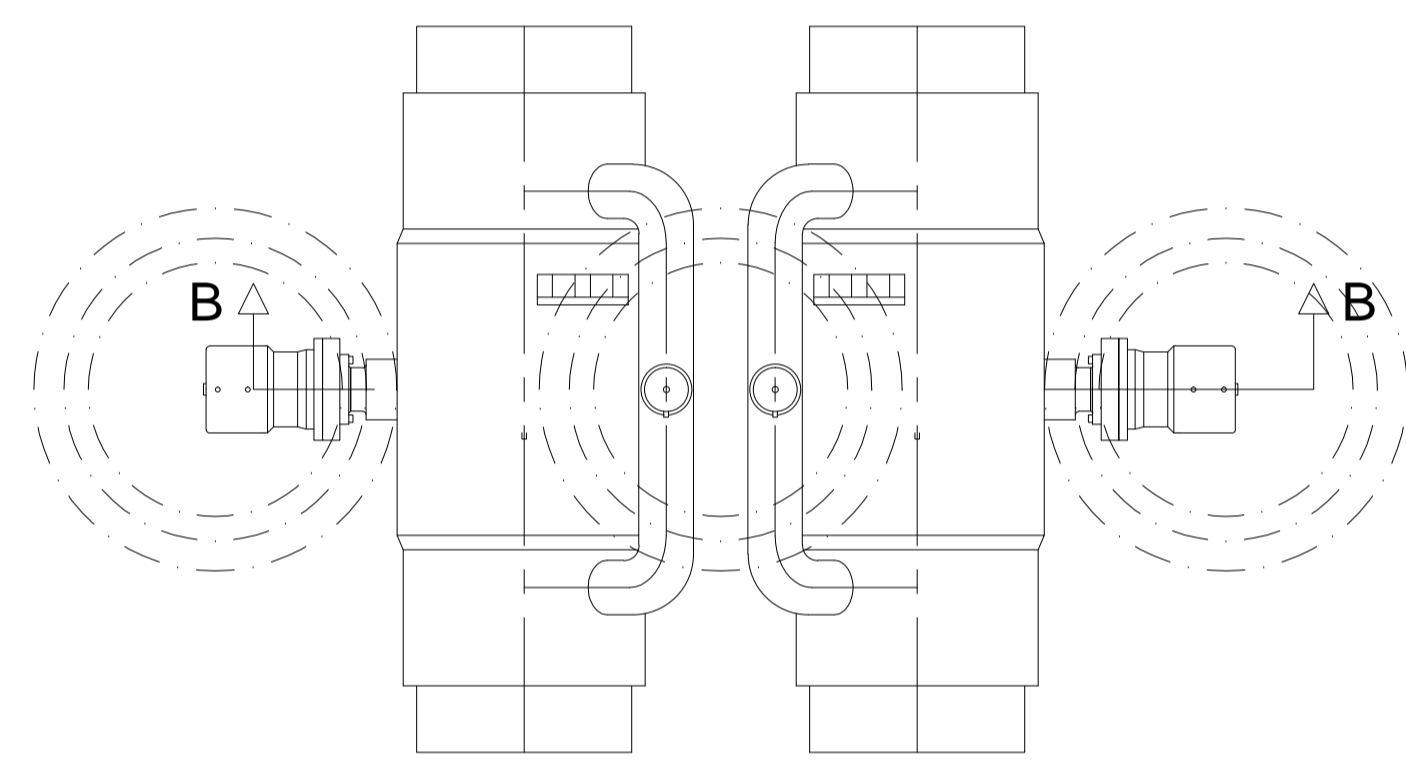
Appendices and applicable drawings are listed in the Drawings/Documents List form (DLF).

9 DRAWING / DOCUMENT LIST FORM

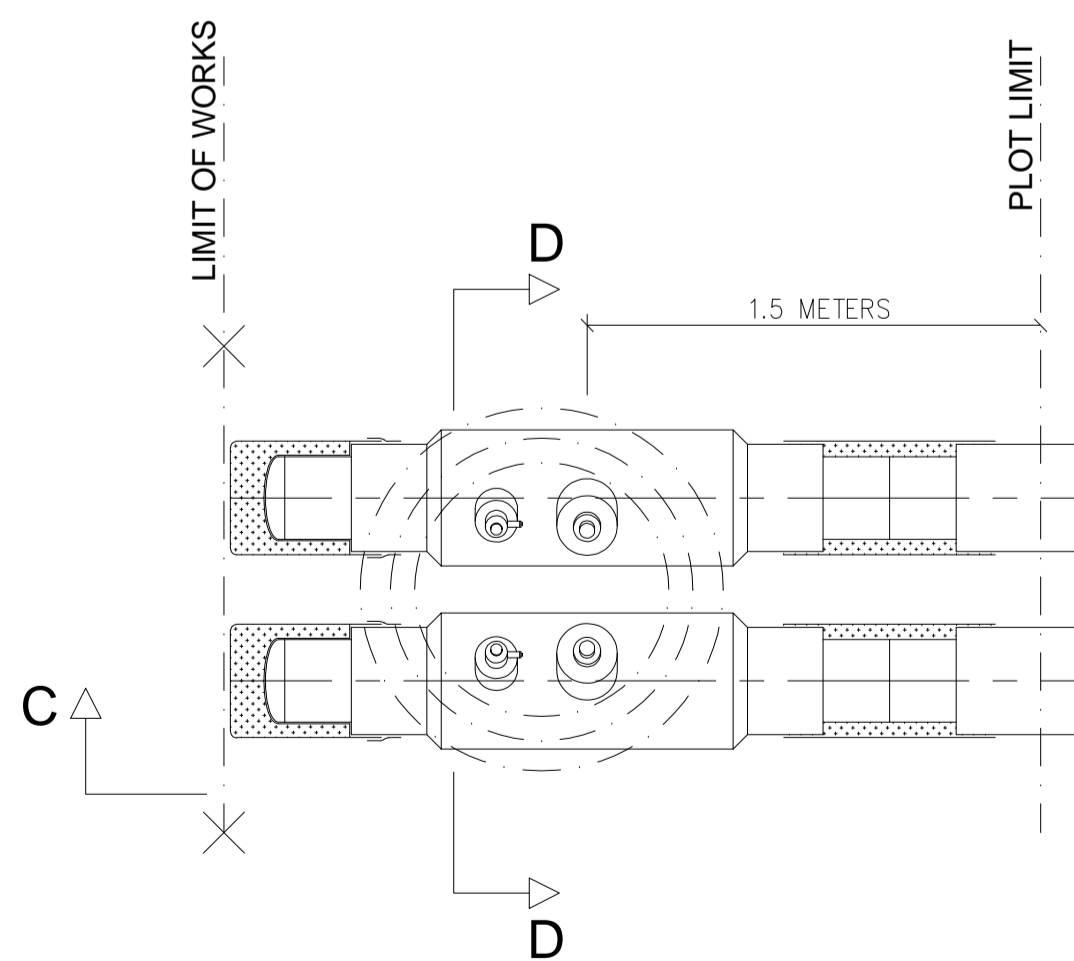
DRAWINGS/DOCUMENTS LIST FORM (DLF)			
ITEM	DRAWING/DOCUMENT NUMBER	DRAWING/DOCUMENT TITLE	Revision
01	LUS-CPALL-MAQ-DWG-UT-10301	DISTRICT COOLING-TYPICAL TRENCH AND TUNNEL SECTION	0
02	LUS-CPALL-MAQ-DWG-UT-10302	DISTRICT COOLING-VALVE WITH HYDRAULIC ACTUATOR	0



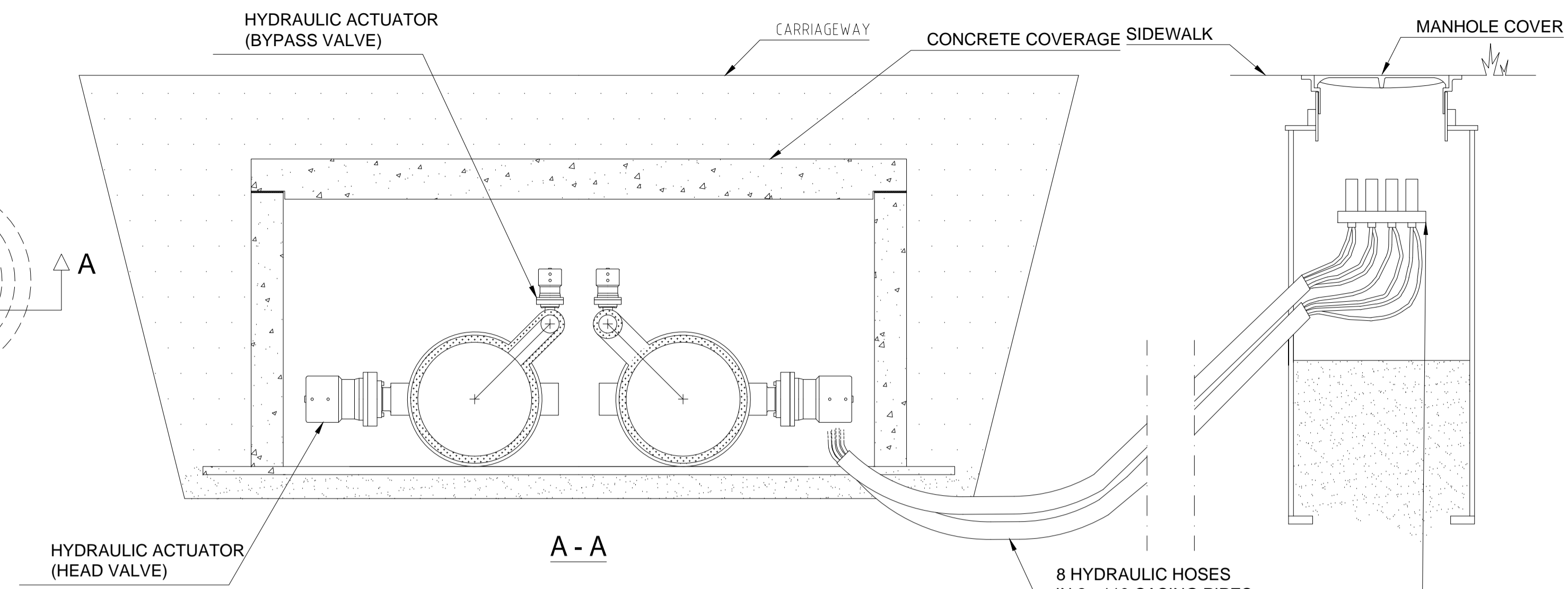
PREINSULATED VALVE WITH HYDRAULIC ACTUATOR AND BYPASS VALVE
ALTERNATIVE 1
NOT TO SCALE



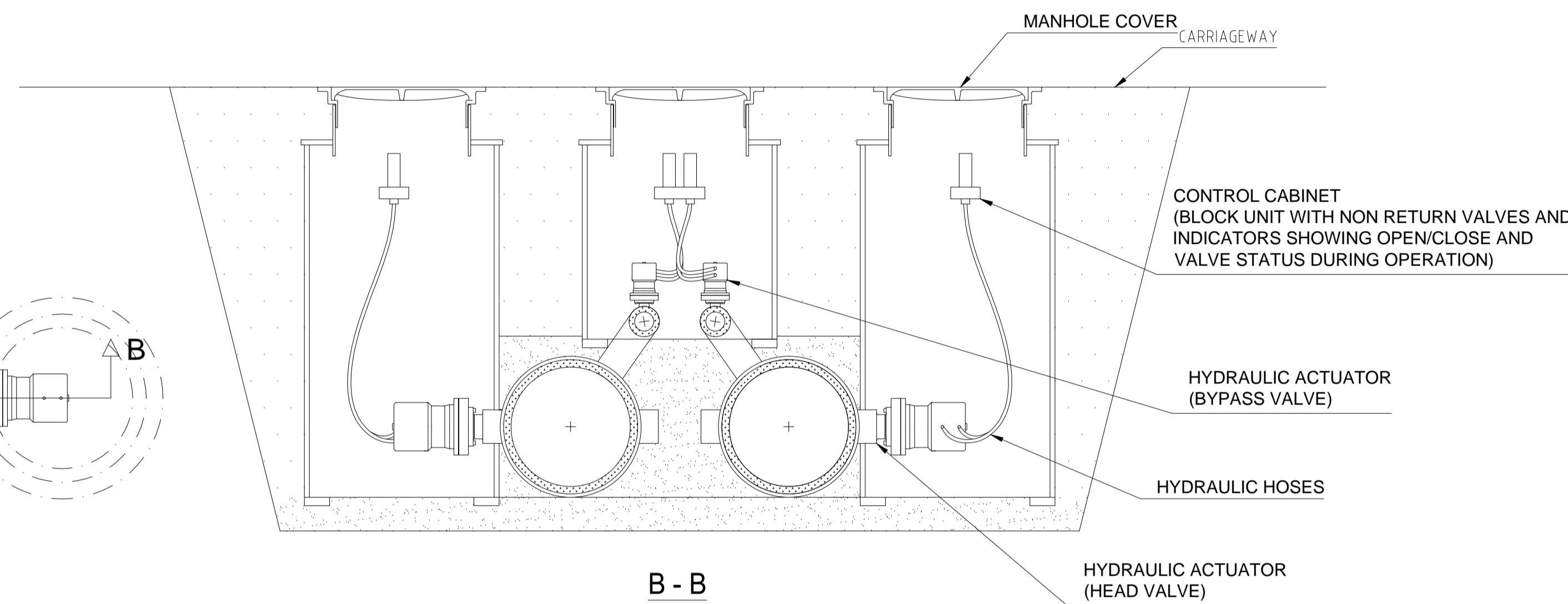
PREINSULATED VALVE WITH HYDRAULIC ACTUATOR AND BYPASS VALVE
ALTERNATIVE 2
NOT TO SCALE



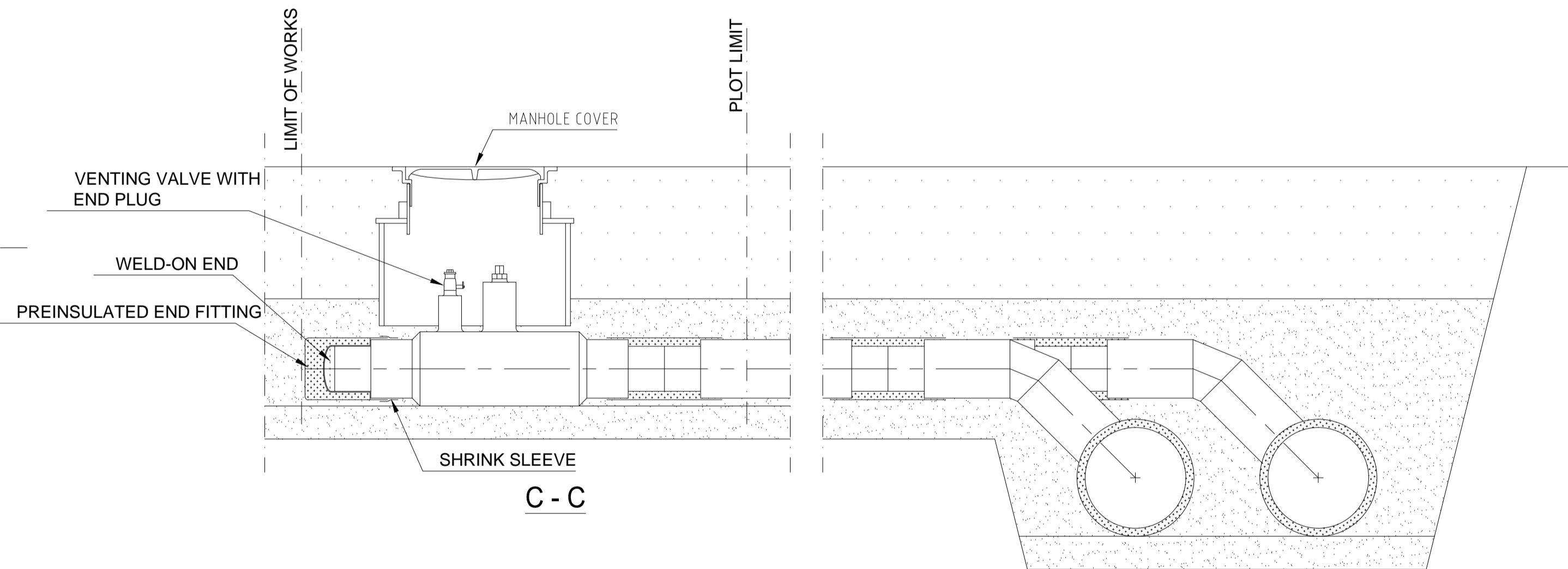
PREINSULATED SERVICE VALVES WITH VENTING VALVES AND TEMPORARY END FITTINGS
NOT TO SCALE



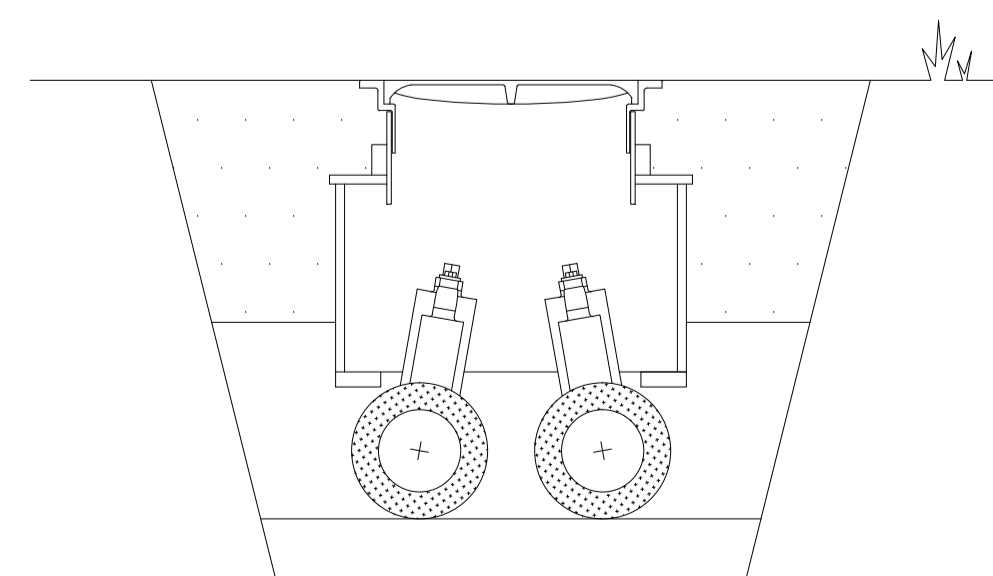
A - A



B - B



C - C



D - D

GENERAL NOTES

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE TECHNICAL REQUIREMENT FOR CIVIL WORKS.
2. FOR TYPICAL TRENCH SECTION REFER TO DWG. LUS-CPALL-MAQ-DWG-UT-10301.

DRAWING REFERENCE:

Rev	By	Chkd	Revised	Apprvd	Date	Description
0	PKS	H.K.	A.A.	D.R.	2.4.12	REVIEW

Client:



QATARI DIAR
LUSAIL REAL ESTATE DEVELOPMENT COMPANY

Utilities Provider:



Marafiq Qatar

Project: LUSAIL DEVELOPMENT

Drawing Name: DISTRICT COOLING VALVE WITH HYDRAULIC ACTUATOR

Drawn by:	NJB	Date:	02-Apr-2012
Checked by:	H.K.	Date:	02-Apr-2012
Reviewed by:	Abdullah Abushaikha	Date:	02-Apr-2012
Approved by:	D. R. PHILLIPS	Date:	02-Apr-2012

Drawing No: LUS-CPALL-MAQ-DWG-UT-10302 Rev.: 0
Drawing Scale: NTS