

Contract No. 8451 - C 1.6

(Lot 1&2)

between

Moldova Energy Projects Implementation Unit (MEPIU)

and

*JV Progress-92 LLC, Energoresurs-Invest Corporation and
FCP SOLDI SRL*

for

**Plant Design, Supply and Installation of Individual Heating Substations
and associated pipes in Chisinau District Heating System:**

- **Lot 1.** Supply and installation of 117 new Individual Heating Substations and associated pipes in the West circuit; and
- **Lot 2.** Supply and installation of 114 new Individual Heating Substations and associated pipes in the South circuit and in other locations

Chisinau, 2016

Contract Agreement no.8451-C 1.6

THIS AGREEMENT is made the 30 day of *December, 2016*,

BETWEEN

(1) **Moldova Energy Projects Implementation Unit (Beneficiary – SA “TERMOELECTRICA”)**, a corporation incorporated under the laws of Republic of Moldova and having its principal place of business at 1, Alecu Russo Street, block 1A, office 163, Chisinau, MD-2068, Republic of Moldova (hereinafter called “the Employer”),

and

(2) **Joint Venture Progress-92 LLC, Energoresurs-Invest Corporation and FCP SOLDI SRL**, a corporation incorporated under the laws of Ukraine and Republic of Moldova and having its principal place of business at Frunze Street, b.24-a, of.4, Kiev, 04080, Ukraine (hereinafter called “the Contractor”).

WHEREAS the Employer desires to engage the Contractor to design, manufacture, test, deliver, install, complete and commission certain Facilities, viz. **Plant Design, Supply and Installation of Individual Heating Substations and associated pipes in Chisinau District Heating System:**

- **Lot 1.** Supply and installation of 117 new Individual Heating Substations and associated pipes in the West circuit; and
- **Lot 2.** Supply and installation of 114 new Individual Heating Substations and associated pipes in the South circuit and in other locations. (“the Facilities”),

and the Contractor has agreed to such engagement upon and subject to the terms and conditions hereinafter appearing.

NOW IT IS HEREBY AGREED as follows:

Article 1. Contract Documents 1.1 Contract Documents (Reference GC Clause 2)

The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read and construed as an integral part of the Contract:

- (a) This Contract Agreement and the Appendices hereto
- (b) Letter of Bid and Price Schedules submitted by the Contractor
- (c) Particular Conditions
- (d) General Conditions
- (e) Specification
- (f) Drawings
- (g) Other completed bidding forms submitted with the Bid – not applicable
- (h) Any other documents forming part of the Employer’s Requirements – not applicable
- (i) Other documents:



- Employer's Notification of award
- Minutes of Contract signing

1.2 Order of Precedence (Reference GC Clause 2)

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above.

1.3 Definitions (Reference GC Clause 1)

Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions.

Article 2. Contract Price and Terms of Payment

2.1 Contract Price (Reference GC Clause 11)

The Employer hereby agrees to pay to the Contractor the Contract Price in consideration of the performance by the Contractor of its obligations hereunder. The Contract Price shall be for **Lot 1: 1,453,283.00 Euro and 23,629,454.95 MDL** and for **Lot 2: 1,591,325.00 Euro and 22,998,648.00 MDL**, the aggregate of: **3,044,608 EURO and 46,628,102.95 MDL** as specified in Price Schedule No. 5 (Grand Summary), or such other sums as may be determined in accordance with the terms and conditions of the Contract.

2.2 Terms of Payment (Reference GC Clause 12)

The terms and procedures of payment according to which the Employer will reimburse the Contractor are given in the Appendix (Terms and Procedures of Payment) hereto.

Article 3. Effective Date

3.1 Effective Date (Reference GC Clause 1)

The Effective Date from which the Time for Completion of the Facilities shall be counted is the date when all of the following conditions have been fulfilled:

- (a) This Contract Agreement has been duly executed for and on behalf of the Employer and the Contractor;
- (b) The Contractor has submitted to the Employer the performance security and the advance payment guarantee;
- (c) The Employer has paid the Contractor the advance payment.

Each party shall use its best efforts to fulfill the above conditions for which it is responsible as soon as practicable.

3.2 If the conditions listed under 3.1 are not fulfilled within two (2) months from the date of this Contract notification because of reasons not attributable to the Contractor, the Parties shall discuss and agree on an equitable adjustment to the Contract Price and the Time for Completion and/or other relevant conditions of the Contract.

Article 4. Communications

4.1 The address of the Employer for notice purposes, pursuant to GC 4.1 is:

1, Alecu Russo Str., Block A1
 Floor/Room number: sixteenth floor, office 163
 Chisinau, MD-2068

Republic of Moldova

4.2 The address of the Contractor for notice purposes, pursuant to GC 4.1 is:

MD-2032, bd. Decebal 80, of.14, mun.Chisinau, Republica Moldova

Article 5. Appendices

5.1 The Appendices listed in the attached List of Appendices shall be deemed to form an integral part of this Contract Agreement.

5.2 Reference in the Contract to any Appendix shall mean the Appendices attached hereto, and the Contract shall be read and construed accordingly.

IN WITNESS WHEREOF the Employer and the Contractor have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

Signed by, for and on behalf of the Employer



Aurelia SAMSON

Director of Moldova Energy Projects Implementation Unit

in the presence of _____
Deputy Minister of Economy

Valeriu TRIBOI

in the presence of _____
General Director JSC "TERMOELECTRICA"



Veaceslav ENI

Signed by, for and on behalf of the Contractor

Authorized representative of JV Progress-92 LLC, Energoresurs-Invest Corporation and FCP SOLDI SRL

Sergev ROZDOROZHNYI

in the presence of _____
Deputy President of the Energoresurs-Invest Corporation



Andriy RUDOMIR

in the presence of _____
Director FCP SOLDI SRL

Mihail SOLCAN

APPENDICES

- Appendix 1 Terms and Procedures of Payment
- Appendix 2 Price Adjustment
- Appendix 3 Insurance Requirements
- Appendix 4 Time Schedule
- Appendix 5 List of Major Items of Plant and Installation Services and List of Approved Subcontractors
- Appendix 6 Scope of Works and Supply by the Employer
- Appendix 7 List of Documents for Approval or Review
- Appendix 8 Functional Guarantees

Appendix 1. Terms and Procedures of Payment

In accordance with the provisions of GC Clause 12 (Terms of Payment), the Employer shall pay the Contractor in the following manner and at the following times, on the basis of the Price Breakdown given in the section on Price Schedules. Payments will be made in the currencies quoted by the Bidder unless otherwise agreed between the Parties. Applications for payment in respect of part deliveries may be made by the Contractor as work proceeds.

TERMS OF PAYMENT

Schedule No. 1. Plant and Equipment Supplied from Abroad

In respect of plant and equipment supplied from abroad, the following payments shall be made:

Ten percent (10%) of the total CIP amount as an advance payment against receipt of invoice and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. The advance payment security may be reduced in proportion to the value of the plant and equipment delivered to the site, as evidenced by shipping and delivery documents.

Eighty percent (80%) of the total or pro rata CIP amount upon Incoterm "CIP", upon delivery to the carrier within forty-five (45) days after receipt of the following documents.

- (i) Two originals and two copies of the Supplier's invoice, showing Project name, Employer's name; Contract number, Goods' description, quantity, unit price, and total amount. Invoices must be signed in original and stamped or sealed with the Company stamp/seal.
- (ii) Two copies of the Supplier's Certificate of Origin covering all items supplied.
- (iii) Two copies of the packing list identifying contents of each package (if not included in the Certificate of Origin).
- (iv) Two copies of the Certificate of Conformity issued by the relevant State Authority of the Republic of Moldova for each type of Goods supplied (where required).
- (v) Two copies of waybill (*factura fiscala*) showing Project name, Employer's name and delivery through to final destination as stated in the Contract, countersigned by the Employer.
- (vi) One copy of the invoice issued and used for custom procedures.

Five percent (5%) of the total or pro rata CIP amount upon issue of the Completion Certificate, within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata CIP amount upon issue of the Operational Acceptance Certificate, within forty-five (45) days after receipt of invoice.

Schedule No. 2. Plant and Equipment Supplied from within the Employer's Country

In respect of plant and equipment supplied from within the Employer's country, the following payments shall be made:

Ten percent (10%) of the total EXW amount as an advance payment against receipt of invoice, and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. The advance payment security may be reduced in proportion to the value of the plant and equipment delivered to the site, as evidenced by shipping and delivery documents.



Eighty percent (80%) of the total or pro rata EXW amount upon Incoterm "Ex-Works," upon delivery to the carrier within forty-five (45) days after receipt of invoice and the following documents:

- (i) Two originals and two copies of the Supplier's invoice, showing Project name, Employer's name; Contract number, Goods' description, quantity, unit price, and total amount. Invoices must be signed in original and stamped or sealed with the Company stamp/seal.
- (ii) Two copies of the Supplier's Certificate of Origin covering all items supplied.
- (iii) Two copies of the packing list identifying contents of each package (if not included in the Certificate of Origin).
- (iv) Two copies of the Certificate of Conformity issued by the relevant State Authority of the Republic of Moldova for each type of Goods supplied (where required).
- (v) Two copies of waybill (*factura fiscala*) showing Project name, Employer's name and delivery through to final destination as stated in the Contract, countersigned by the Employer.

Five percent (5%) of the total or pro rata EXW amount upon issue of the Completion Certificate, within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata EXW amount upon issue of the Operational Acceptance Certificate, within forty-five (45) days after receipt of invoice.

Schedule No. 3. Design Services

In respect of design services for both the foreign currency and the local currency portions, the following payments shall be made:

Ten percent (10%) of the total design services amount as an advance payment against receipt of invoice, and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer.

Ninety percent (90%) of the total or pro rata design services amount upon acceptance of design in accordance with GC Clause 20 by the Project Manager within forty-five (45) days after receipt of invoice.

Schedule No. 4. Installation Services

In respect of installation services for both the foreign and local currency portions, the following payments shall be made:

Ten percent (10%) of the total installation services amount as an advance payment against receipt of invoice, and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. The advance payment security may be reduced in proportion to the value of work performed by the Contractor as evidenced by the invoices for installation services.

Eighty percent (80%) of the measured value of work performed by the Contractor, as identified in the said Program of Performance, during the preceding month, as evidenced by the Employer's authorization of the Contractor's application, will be made monthly within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata value of installation services performed by the Contractor as evidenced by the Employer's authorization of the Contractor's monthly applications, upon issue of the Completion Certificate, within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata value of installation services performed by the Contractor as evidenced by the Employer's authorization of the Contractor's monthly applications, upon issue of the Operational Acceptance Certificate, within forty-five (45) days after receipt of invoice.

In the event that the Employer fails to make any payment on its respective due date, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the rate of four percent (4%) per year for the foreign currency payment portion and ten percent (10%) per year for the local currency payment portion, for the period of delay until payment has been made in full.

PAYMENT PROCEDURES

The procedures to be followed in applying for certification and making payments shall be as follows:

The payments shall be made by bank transfer to the Contractor's nominated bank account upon submission of documents specified above.

Invoices must be submitted by the Contractor as specified in the contract. Each invoice must clearly specify the corresponding goods or works performed, or must be supported by a statement of works, as appropriate. The invoice must show the costs, taxes shown separately, of the work done, the amount of any withholding for the mobilization advance, the total to be paid, the Contractor's bank account to which payment should be made, and the pertinent reference to the accompanying statements of work. Invoices must be dated and signed by the Contractor's authorized representative.

Payments to Contractors from the Employer's country (in addition to the above-mentioned).

Payment invoiced in foreign currency shall be paid in accordance with the rules and regulations of the National Bank of Republic of Moldova in force at the time of payment.

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Appendix 2. Price Adjustment

Prices are to remain firm and fixed for the duration of the Contract.

Appendix 3. Insurance Requirements

Insurances to be Taken Out by the Contractor

In accordance with the provisions of GC Clause 34, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, such approval not to be unreasonably withheld.

(a) Cargo Insurance

Covering loss or damage occurring, while in transit from the supplier's or manufacturer's works or stores until arrival at the Site, to the Facilities (including spare parts therefor) and to the construction equipment to be provided by the Contractor or its Subcontractors.

<u>Amount</u> (in Euro)	<u>Deductible</u> <u>limits</u>	<u>Parties insured</u>	<u>From</u>	<u>To</u>
110% of the Contract Price of Plant and Equipment in transit	€ 3 500	Contractor and Employer	Supplier's or manufacturer's works or stores from time of delivery to first carrier	Arrival at Site
110% of replacement cost of construction equipment	€ 3 500	Contractor and Employer	Supplier's or manufacturer's works or stores from time of delivery to first carrier	Arrival at Site

(b) Installation All Risks Insurance

Covering physical loss or damage to the Facilities at the Site, occurring prior to completion of the Facilities, with an extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the defect liability period while the Contractor is on the Site for the purpose of performing its obligations during the defect liability period.

<u>Amount</u>	<u>Deductible</u> <u>limits</u>	<u>Parties insured</u>	<u>From</u>	<u>To</u>
110% of the Contract Price	€ 3 500	Contractor, Contractor's Subcontractors and Employer	Arrival at Site	Completion and while the Contractor is on Site for the purpose of performing its obligations during the defect liability period

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property (including the Employer's property and any parts of the Facilities that have been accepted by the Employer) occurring in connection with the supply and installation of the Facilities.

<u>Amount</u>	<u>Deductible</u> <u>limits</u>	<u>Parties insured</u>	<u>From - To</u>
10% of the Contract Price	0	Contractor and Contractor's Subcontractors	In connection with the supply and installation of the Facilities

- (d) Automobile Liability Insurance
Covering use of all vehicles used by the Contractor or its Subcontractors (whether or not owned by them) in connection with the supply and installation of the Facilities. Comprehensive insurance in accordance with statutory requirements.
- (e) Workers' Compensation
In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.
- (f) Employer's Liability
In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1, except for the Third Party Liability, Workers' Compensation, Employer's Liability and for the Construction equipment to be provided by the Contractor or its Subcontractors Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1, except for the Cargo, Workers' Compensation and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies.

Insurances To Be Taken Out By The Employer

No insurances are to be taken out by the Employer during the performance of the Contract.

Hanson

Appendix 4. Time Schedule

Limited Liability Company

Settlement Account: 260028053 in the "FUIB" PJSC. Bank Code (MFO): 334851. EDRPOU number: 19117928

Address: Kiev 04080, st. Frunze, b.24-a kv.4; Tel. fax: (044)463-59-65(64)

Legal address: Kyiv 04212, st. Marshal Timoshenko, 2-A, kv.101

e-mail: progres92@mail.ru; Postal address: 04080, Kiev-80, a c 40

SOLDI

GROUP OF COMPANIES



List of Proposed International Subcontractors for Major Items of Plant and Installation Services

Major Items of Plant and Installation Services	Approved Subcontractors/Manufacturers	Nationality
District Heating Substations	1. Swep International AB 2. Danoss A/S	1. Sweden 2. Denmark
Pre-insulated DH pipes and fittings	1. Energoresurs Invest	1. Ukraine
Heat exchangers	1. Swep International AB 2. Danoss A/S	1. Sweden 2. Denmark
Ultrasonic heat meters	1. Kamstrup A/S	1. Denmark
Pumps (including motors and VSDs)	1. KSB Pumps and Valve Ltd. 2. Biral AG	1. Germany 2. Switzerland
Shutoff ball valves	1. Vexve OY ~ 2. Broen S.A.	1. Finland 2. Denmark/Poland
Control valves	1. Broen S.A. 2. Samson A/G 3. Danoss A/S 4. Siemens	1. Denmark/Poland 2. Germany 3. Denmark 4. Germany
Automation and control systems	1. Samson A/G 2. Danoss A/S 3. Schneider Electric SE	1. Germany 2. Denmark 3. France
Pipes for SH and DHW distribution systems in buildings	1. Energoresurs Invest	1. Ukraine

Sincerely, director FCP Soldi SRL

Mihail Solcan



Appendix 5. List of Major Items of Plant and Installation Services and List of Approved Subcontractors

A list of major items of Plant and Installation Services is provided below.

The following Subcontractors and/or manufacturers are approved for carrying out the items of the Facilities indicated below. Where more than one Subcontractor is listed, the Contractor is free to choose between them, but it must notify the Employer of its choice in good time prior to appointing any selected Subcontractor. In accordance with GC Sub-Clause 19.1, the Contractor is free to submit proposals for Subcontractors for additional items from time to time. No Subcontracts shall be placed with any such Subcontractors for additional items until the Subcontractors have been approved in writing by the Employer and their names have been added to this list of Approved Subcontractors.

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Appendix 6. Scope of Works and Supply by the Employer

The following personnel, facilities, works and supplies will be provided/supplied by the Employer, and the provisions of GC Clauses 10, 21 and 24 shall apply as appropriate.

All personnel, facilities, works and supplies will be provided by the Employer in good time so as not to delay the performance of the Contractor, in accordance with the approved Time Schedule and Program of Performance pursuant to GC Sub-Clause 18.2.

Unless otherwise indicated, all personnel, facilities, works and supplies will be provided free of charge to the Contractor.

<u>Personnel</u>	<u>Charge to Contractor (if any)</u>
The Employer shall provide the operating and maintenance personnel for training by the Contractor.	n/a
The Employer shall provide sufficient, properly qualified operating and maintenance personnel, including those required by the Contractor to properly carry out Pre-commissioning, Commissioning and the Guarantee Test.	n/a
<u>Facilities</u>	<u>Charge to Contractor (if any)</u>
In accordance with GC Sub-Clause 10.2, the Employer shall provide access to the Site and to all other areas reasonably required for the proper execution of the Contract on or before.	n/a
<u>Supplies</u>	<u>Charge to Contractor (if any)</u>
<p>In accordance with GC Sub-Clauses 10.5 and 25.1.2, the Employer shall make available the following utilities required by the Contractor to properly carry out Pre-commissioning, Commissioning and Guarantee Test:</p> <ul style="list-style-type: none"> - Heat from the DH system; - Electricity, AC, 1-phase, 220 V / 3-phase, 380 V, 50 Hz (the Contractor shall obtain the technical conditions from the electricity distribution company and connect to the relevant connection points); - Cold water, through supply pipe (the Contractor shall obtain the technical conditions from the water supply company and connect to the relevant connection points); - Sewerage (where available). 	All consumption by the Contractor up to putting into operation of the Facilities shall be paid for by the Contractor

Appendix 7. List of Documents for Approval or Review

Note that all drawings and design documents are required to be submitted to, and be approved by, the Moldovan Authorities for design review/expertise and in the field of constructions and other relevant authorities. Prior to receiving such approvals, no installation work shall begin.

Pursuant to GC Sub-Clause 20.3.1, the Contractor shall prepare, or cause its Subcontractor to prepare, and present to the Project Manager in accordance with the requirements of GC Sub-Clause 18.2 (Program of Performance), the following documents for:

A. Approval

All drawings and design documents prior to submission to the Moldovan Authorities for design review/expertise (State Expertise) and in the field of constructions shall be submitted to the Employer for review and no-objection.

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Appendix 8. Functional Guarantees

1. General

This Appendix sets out

- (a) the functional guarantees referred to in GC Clause 28 (Functional Guarantees)
- (b) the preconditions to the validity of the functional guarantees, either in production and/or consumption, set forth below
- (c) the minimum level of the functional guarantees
- (d) the formula for calculation of liquidated damages for failure to attain the functional guarantees.

2. Preconditions

The Contractor gives the functional guarantees (specified herein) for the facilities, subject to the following preconditions being fully satisfied:

- Thermal energy supplied from the DH system.
- The Test shall be performed during the heating season. During the tests, the outdoor temperature shall be sufficiently low for a period of time, in order to have sufficient heat consumption (the exact time and conditions of the Test shall be agreed with the Employer).

3. Functional Guarantees

3.1 DH substations (IHSs)

The Guarantee Test shall be performed under both full-load and part-load conditions for each substation. However, should circumstances during the Guarantee Test permit only part-load operation, the Employer shall have the right to have a separate test in which the Plant's performance at full load are measured.

During the Test:

- The functions and parameters of the substations shall be tested and verified;
- The capacities of the SH and DHW parts of the substations shall be tested and verified.

All the necessary measurements shall be performed, including temperatures, flows, loads and other relevant parameters.

For the Test the following shall be taken into consideration: the outside temperature conditions (at the time of the Test and during the previous time period), the indoor temperature conditions (considering the necessary amount of ventilation / air exchange), the supply and return temperatures from/to the DH system, the supply and return temperatures to/from the SH and ventilation systems of the buildings, the CW temperature, the DHW temperature (at different flows, including the maximum flow), the flows and temperatures on each side of each heat exchanger, etc.

The operation of the heat exchangers, pumps, VSDs, control valves, control units, etc. shall be tested and verified.

Noise/vibrations levels during operation of equipment shall be verified and measured if/as necessary.

The pressure tests of the substations shall have been successfully performed and minutes of the tests developed and signed.

The detailed conditions, steps and methodology for the Test shall be agreed with the Employer.

The Contractor guarantees as follows:

- that the substations have all the functions as required in the present document (as described in "Employer's Requirements");
- that the capacities of the substations correspond to the heat loads of the buildings (verified and, where applicable, recalculated by the Contractor) for SH, ventilation and DHW, at the temperature schedules/conditions for the systems and heat exchangers as described in the present document.

3.2 DH pipes, SH, DHW and DHWRC pipes / distribution systems

The pressure tests of the piping systems shall have been successfully performed and minutes of the tests developed and signed.

4. Failure in Guarantees

In case of failure to attain the functional guarantees, following the Guarantee Test pursuant to GC Sub-Clause 25.2, the Contractor shall make changes, modifications and/or additions to the Facilities, pursuant to GC Sub-Clause 28.3, until such functional guarantees are attained in the Guarantee Test.



Letter of Bid and Price Schedules submitted by the Contractor

Limited Liability Company

"Progress-92"

Settlement Account: 260028053 in the "FUIB" PJSC, Bank Code (MFO): 334851, EDRPOU number: 19117928
Address: Kiev 04080, st. Frunze, b.24-a kv.4; Tel. / fax: (044)463-59-65(64)
Legal address: Kyiv 04212, st. Marshal Timoshenko, 2-A, kv.101
e-mail: progres92@mail.ru; Postal address: 04080, Kiev-80, a / c 40

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Letter of Bid

Date: 29.11.2016
ICB No.: 8451-C1.6
Lot No.: 1,2
Invitation for Bid No. ICB No.: 8451-C1.6

To: JSC "TERMOELECTRICA"

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Document, including Addenda issued in accordance with Instructions to Bidders (ITB)8;
- (b) We offer to Plant Design, Supply and Installation of Individual Heating Substations and associated pipes in Chisinau District Heating System, in conformity with the Bidding Document, the following Plant and Installation Services: Lot 1. „Supply and installation of 117 new Individual Heating Substations and associated pipes in the West circuit “and Lot2. „Supply and installation of 114 new Individual Heating Substations and associated pipes in the South circuit and in other locations.“
- (c) The price of our Bid, excluding any discounts offered in item (d) below is the sum of:

Lot nr.1 – One million four hundred fifty three thousand two hundred eighty three EURO, (1 453 283.00 EURO) and twenty three millions five hundred seventy three thousand four hundred forty seven , (23 573 447,00 MDL)

Lot nr.2 –one million five hundred ninety three thousand six hundred twenty five Euro, (1 593 625.00 EURO) and twenty seven millions one hundred sixty seven thousand three hundred sixty five MDL , (27 167 365,00 MDL)

- (d) The discounts offered and the methodology for their application are: Non;

[Handwritten signature]



- (e) Our bid shall be valid for a period of **120** days from the date fixed for the bid submission deadline in accordance with the Bidding Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;
- (g) We, including any subcontractors or manufacturers for any part of the contract, have or will have nationalities from eligible countries, in accordance with ITB4-2;
- (h) We, including any subcontractors or manufacturers for any part of the contract, do not have any conflict of interest in accordance with ITB-4.3;
- (i) We are not submitting more than one bid in this bidding process as a Bidder, either individually or as a partner in a joint venture, in accordance with ITB-4.3;
- (j) We, including any of our subcontractors or manufacturers for any part of the contract, have not been declared ineligible by the Bank, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (k) We are not a government owned entity/ We are a government owned entity but meet the requirements of ITB-4.5
- (l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: **None**
- (m) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (n) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Name Sergiy Rozdorozhny In the capacity of Director of "Progress-92" LLC

Signed _____



Duly authorized to sign the bid for and on behalf of **"Progress-92" LLC**, **"Energoresurs-Invest" Corporation**, FCP **"SOLDI" S.R.L.**

Dated on 28.11.2016 day of Monday, 2016

Particular Conditions

The following Particular Conditions (PC) shall supplement the General Conditions (GC). Whenever there is a conflict, the provisions herein shall prevail over those in the GC. The clause number of the PC is the corresponding clause number of the GC.

PC1. Definitions

The Employer is: as stated in the Contract Agreement.

The Project Manager is: Veaceslav Hamitchi

Responsible for Project Implementation from Termoelectrica SA is Carolina Cebotari, Nicolae Glingeau, Andrei Virlean.

The Contractor is: as stated in the Contract Agreement.

The Contractor's Representative is: Mihail Solcan

The Bank is: the International Bank for Reconstruction and Development Bank (the Bank).

Country of Origin: all countries and territories as indicated in the Section V of the bidding documents, Eligible Countries.

PC 4. Communications

PC 4.1 Employer's address for notice purposes is: as stated in the Contract Agreement.

Contractor's address for notice purposes is: as stated in the Contract Agreement.

PC5. Law and Language

PC5.1 The Contract shall be interpreted in accordance with the laws of the Republic of Moldova.

PC5.2 The ruling language is the English language.

PC7. Scope of Facilities

PC 7.1 The Contractor's obligations shall also include, as specified in the Employer's Requirements, demolition works.

All demolished equipment and materials will remain the property of the Employer and shall be transported by the Contractor for storage to a location indicated by the Employer, or – those elements and/or materials indicated by the Employer – to disposal.

PC 7.3 The Contractor agrees to supply spare parts for a period of years: five (5)

The Contractor shall carry sufficient inventories to ensure an ex-stock supply of consumable spares for the Plant. Other spare parts and components shall be supplied as promptly as possible, but at the most within six (6) months of placing the order. In addition, in the event of termination of the production of spare parts, advance notification will be made to the Employer of the pending termination, with sufficient time to permit the Employer to procure the needed requirement. Following such termination, the Contractor will furnish to the extent possible and

at no cost to the Employer the blueprints, drawings and specifications of the spare parts, if requested.

PC8. Time for Commencement and Completion

PC 8.1 The Contractor shall commence work on the Facilities within 7 (seven) calendar days from the Effective Date for determining Time for Completion as specified in the Contract Agreement.

PC 8.2 The Time for Completion of the whole of the Facilities shall be 11 months from the Effective Date as described in the Contract Agreement (but not later than December 15, 2017).

All IHSs and associated pipes shall be operational by the beginning of the heating season but not later than October 15, 2017.

PC 9. Contractor's Responsibilities

PC 9.4 The following shall be added to GC Sub-Clause 9.4:

The term "laws" includes any National, District or Municipal statute, ordinance or Law, any decrees by the President or local authorities having the force of law, any order, regulation or by-law of any duly constituted authority and the rules and regulations of all public bodies or organizations whose property or rights are affected by the Facilities.

PC13. Securities

PC 13.3.1 The amount of performance security, as a percentage of the Contract Price for the Facility shall be: 10% (ten percent)

PC 13.3.2 The performance security shall be in the form of a Bank Guarantee as per form included in Section IX. Contract Forms.

PC 13.3.3 The performance security shall not be reduced on the date of the Operational Acceptance.

The word "Defects" in GC Sub-Clause 13.3.3 shall be replaced by the word "Defect".

PC 14. Taxes and Duties

PC 14.3 Financing of the Facilities shall be subject to Value Added Tax at the zero level, in accordance to Article 104 (c1) of the Fiscal Code of the Republic of Moldova, and shall be exempted from payment of Customs and Import Duties, in accordance with Government Decision No. 246 of April 8, 2010. The Contractor shall ensure that the Plant and Equipment imported for use in the Contract is correctly marked and accompanied by all correct documentation as specified in the Contract Agreement so that it may be correctly identified as being covered by this tax and duty exemption. The Contractor remains liable for any taxes and duties charged due to its failure to adhere to this condition.

PC 17. Representatives

PC 17.2.1 The Contractor's Representative shall be able to communicate and work in both the English and Romanian languages. In the event that the Contractor's Representative is unable to work in the required language(s), the Contractor shall

provide a competent interpreter/translator to be available as required to ensure the proper transmission of information and instructions. The cost of such interpretation/translation shall be deemed to be included in the Contract Price.

PC 17.2.4 The Construction Manager shall be able to communicate and work in the Romanian language. In the event that the Construction Manager is unable to work in the required language, the Contractor shall provide a competent interpreter/translator to be available as required to ensure the proper transmission of information and instructions. The cost of such interpretation/translation shall be deemed to be included in the Contract Price.

PC 18. Work Program

PC 18.2 The detailed program of performance shall be in the form of a critical path method (CPM) or GANT diagram, or other internationally used programs.

PC 18.23 The Monthly Progress Report will be submitted to the Employer by the 10th day of every month during the whole period of Contract implementation. The Report will be developed in a format coordinated with the Project Manager and will include a separate Chapter on Environmental issues and EMP implementation and Social Issues.

The Contractor will submit as well brief Weekly Reports, such will be presented every Thursday and will include the percentage of works performed during the reporting week (per categories comprised in the Working Plan) and the estimated percentage to be executed over the next reporting period.

PC 19. Subcontracting

PC 19.5 The word "Defects" in GC Sub-Clause 19.5 shall be replaced by the word "Defect".

PC 20. Design and Engineering

PC 20.3.2 Documentation

The Contractor shall supply to the Employer complete documentation for the Facilities. The documentation shall be in a form acceptable to the Project Manager and shall consist of all installation and construction drawings (design documentation, as-built drawings/documentation) and maintenance manuals as required for the Employer's maintenance, dismantling, re-assembling and adjusting of all delivered and erected parts of the Facilities. All as-built documentation shall also be supplied in digital form on CD or DVD, in AutoCad, MS Word or MS Excel formats. Manuals may be delivered in PDF format.

The Contractor shall submit in due time, two copies of maintenance manuals, etc.

Documentation amended as required by the Project Manager shall be delivered in three sets to the Site three months before commissioning and be updated during the installation, pre-commissioning and commissioning periods. After commissioning, the Contractor shall submit to the Project Manager for review one reproducible transparent copy of each final drawing and two copies of the instructions with all the design modifications incorporated.

When a drawing contains all design modifications it will be marked "As-built" and returned to the Contractor by the Project Manager.



The following general manuals, covering the whole project, shall be delivered:

- A general description of the equipment in the Facilities.
- General maintenance instructions, describing frequencies and methods for regular inspections for planned maintenance and for regular part replacements.
- The manual shall include spare part lists and description of any special tools needed for service of the equipment.
- All other drawings or manuals, which are not mentioned, but are deemed necessary for a safe and proper handling of the delivered equipment.

Manuals shall be in size A4 and bound in hard covers.

The Operational Acceptance Certificate will not be issued until all documentation as specified herein has been delivered by the Contractor.

PC 21. Procurement

PC 21.1 Plant

The Contractor shall at its own risk and expense unload at the Site all Plant and Equipment, including any specific items furnished to the Contractor by the Employer in accordance with GC Sub-Clause 21.2, transported to the Site and provide any lifting equipment required for such unloading.

PC22. Installation

PC22.2.5 Working Hours

According to the law of the Republic of Moldova.

PC 22.2.7 Health and Safety

The word "Engineer" in the third paragraph of GC Sub-Clause 22.2.7 shall be replaced by the words "Project Manager".

The fourth and fifth paragraphs of GC Sub-Clause 22.2.7 shall be removed.

PC 24. Completion of the Facilities

PC 24.5 Completion Certificates shall be issued for each Object separately, in respect of the complete Facilities only (where all the facilities under the respective Object were completed).

PC 25. Commissioning and Operational Acceptance

PC 25.2 Guarantee Test

The Guarantee Test shall be performed under both full-load and part-load conditions for each substation. However, should circumstances during the Guarantee Test permit only part-load operation, the Employer shall have the right to have a separate test in which the Plant's performance at full load are measured. During the Test shall be tested and verified the functions and parameters of the substations and the capacities of the SH and DHW parts of the substations.

All the necessary measurements shall be performed, including temperatures, flows, loads and other relevant parameters.

The operation of the heat exchangers, pumps, VSDs, control valves, control units, etc. shall be tested and verified.

The detailed conditions, steps and methodology for the Test shall be agreed with the Employer.

PC 25.2.2 The Guarantee Test of the Facilities shall be successfully completed within ninety (90) days from the date of Completion.

PC 25.3.3. The Operational Acceptance Certificate shall be issued in respect of the complete object Facilities only, for each Object separately.

PC 25.5.1 The words "Notwithstanding the terms of GC Sub-Clause 25.2.2," shall be inserted at the start of GC Sub-Clause 25.5.1.

PC 25.5.2 The words "Sub-Clause 13.1" in the first paragraph of GC Sub-Clause 25.5.2 shall be replaced by "Clause 25.5.1

PC26. Completion Time Guarantee

PC26.2 Applicable rate for liquidated damages: one-half percent (0.5%) per week

Maximum deduction for liquidated damages: ten percent (10%) of Contract Price.

PC 26.3 No bonus will be given for earlier Completion of the Facilities or part thereof.

PC 40. Extension of Time for Completion

PC 40.1 The words ", Appendix to the Contract Agreement titled" in item (e) of GC Sub-Clause 40.1 shall be replaced by the words "specifically including failure to supply the items listed in Appendix 6. Scope of Works and Supply by the Employer".

PC46. Disputes and Arbitration

PC46.1 The DB shall be appointed ad-hoc.

The DB shall be: one sole member

List of potential DB members is: List of arbitrators of the International Commercial Arbitration Court attached to the Chamber of Commerce and Industry of the Republic of Moldova.

PC46.2 Appointment (if not agreed) to be made by: Ministry of Economy of the Republic of Moldova

PC46.5 Rules of procedure for arbitration proceedings:

(a) Contracts with foreign contractors:

All disputes arising in connection with the present Contract shall be finally settled under the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with said Rules.

(b) Any dispute between the Employer and a Contractor who is a national of the Employer's country arising in connection with the present Contract shall be referred to adjudication or arbitration in accordance with the laws of the Employer's country

New Clause

Meetings

General

The Project Manager shall summon all parties concerned to the first site meeting where he shall decide upon the future meetings. It is anticipated that site meetings will take place on a regular basis. The purpose of the site meetings is to co-ordinate the various work components with the Contractor, to register the progress in relation to the program and to record agreements made.

The Contractor will be required to participate in the site meetings. The Contractor shall be represented at all meetings by a representative who has the power to commit the Contractor in all matters concerning the Contract.

Minutes of Site Meetings

Any objections to the minutes of a site meeting shall be raised at the succeeding site meeting.

Agreements recorded in the minutes of the meetings are binding on all parties, if objections to the minutes have not been given in due time (three weeks upon issuance).

General Conditions

A. Contract and Interpretation

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

"Contract" means the Contract Agreement entered into between the Employer and the Contractor, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

"Contract Documents" means the documents listed in Article 1.1 (Contract Documents) of the Contract Agreement (including any amendments thereto).

"GC" means the General Conditions hereof.

"PC" means the Particular Conditions.

"day" means calendar day.

"year" means 365 days.

"month" means calendar month.

"Party" means the Employer or the Contractor, as the context requires, and "Parties" means both of them.

"Employer" means the person **named as such in the PC** and includes the legal successors or permitted assigns of the Employer.

"Project Manager" means the person appointed by the Employer in the manner provided in GC Sub-Clause 17.1 (Project Manager) hereof and **named as such in the PC** to perform the duties delegated by the Employer.

"Contractor" means the person(s) whose bid to perform the Contract has been accepted by the Employer and is named as Contractor in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

"Contractor's Representative" means any person nominated by the Contractor and approved by the Employer in the manner provided in GC Sub-Clause 17.2 (Contractor's Representative and Construction Manager) hereof to perform the duties delegated by the Contractor.

"Construction Manager" means the person appointed by the Contractor's Representative in the manner provided in GC Sub-Clause 17.2.4.

"Subcontractor," including manufacturers, means any person to whom execution of any part of the Facilities, including

preparation of any design or supply of any Plant, is sub-contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns.

“Dispute Board” (DB) means the person or persons named as such in the PC appointed by agreement between the Employer and the Contractor to make a decision with respect to any dispute or difference between the Employer and the Contractor referred to him or her by the Parties pursuant to GC Sub-Clause 46.1 (Dispute Board) hereof.

“The Bank” means the financing institution **named in the PC**.

“Contract Price” means the sum specified in Article 2.1 (Contract Price) of the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

“Facilities” means the Plant to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract.

“Plant” means permanent plant, equipment, machinery, apparatus, materials, articles and things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts to be supplied by the Contractor under GC Sub-Clause 7.3 hereof), but does not include Contractor’s Equipment.

“Installation Services” means all those services ancillary to the supply of the Plant for the Facilities, to be provided by the Contractor under the Contract, such as transportation and provision of marine or other similar insurance, inspection, expediting, site preparation works (including the provision and use of Contractor’s Equipment and the supply of all construction materials required), installation, testing, Pre-commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training, etc. as the case may require.

“Contractor’s Equipment” means all facilities, equipment, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant, or other things intended to form or forming part of the Facilities.

“Country of Origin” means the countries and territories eligible under the rules of the Bank as further **elaborated in the PC**.

“Site” means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified in the Contract as forming part of the Site.

"Effective Date" means the date of fulfillment of all conditions stated in Article 3 (Effective Date) of the Contract Agreement, from which the Time for Completion shall be counted.

"Time for Completion" means the time within which Completion of the Facilities as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) is to be attained, as referred to in GC Clause 8 and in accordance with the relevant provisions of the Contract.

"Completion" means that the Facilities (or a specific part thereof where specific parts are specified in the Contract) have been completed operationally and structurally and put in a tight and clean condition, that all work in respect of Pre-commissioning of the Facilities or such specific part thereof has been completed, and that the Facilities or specific part thereof are ready for Commissioning as provided in GC Clause 24 (Completion) hereof.

"Pre-commissioning" means the testing, checking and other requirements specified in the Employer's Requirements that are to be carried out by the Contractor in preparation for Commissioning as provided in GC Clause 24 (Completion) hereof.

"Commissioning" means operation of the Facilities or any part thereof by the Contractor following Completion, which operation is to be carried out by the Contractor as provided in GC Sub-Clause 25.1 (Commissioning) hereof, for the purpose of carrying out Guarantee Test(s).

"Guarantee Test(s)" means the test(s) specified in the Employer's Requirements to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Appendix to the Contract Agreement titled Functional Guarantees, in accordance with the provisions of GC Sub-Clause 25.2 (Guarantee Test) hereof.

"Operational Acceptance" means the acceptance by the Employer of the Facilities (or any part of the Facilities where the Contract provides for acceptance of the Facilities in parts), which certifies the Contractor's fulfillment of the Contract in respect of Functional Guarantees of the Facilities (or the relevant part thereof) in accordance with the provisions of GC Clause 28 (Functional Guarantees) hereof and shall include deemed acceptance in accordance with GC Clause 25 (Commissioning and Operational Acceptance) hereof.

"Defect Liability Period" means the period of validity of the warranties given by the Contractor commencing at Completion of the Facilities or a part thereof, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in GC Clause 27 (Defect Liability) hereof.

A handwritten signature in blue ink, appearing to read "Hanson", is located in the bottom right corner of the page.

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- 2. Contract Documents** 2.1 Subject to Article 1.2 (Order of Precedence) of the Contract Agreement, all documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole.
- 3. Interpretation** 3.1 In the Contract, except where the context requires otherwise:
- (a) words indicating one gender include all genders;
 - (b) words indicating the singular also include the plural and words indicating the plural also include the singular;
 - (c) provisions including the word "agree," "agreed," or "agreement" require the agreement to be recorded in writing;
 - (d) the word "tender" is synonymous with "bid," "tenderer," with "bidder," and "tender documents" with "bidding documents," and
 - (e) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

3.2 Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of Parties thereunder shall be as prescribed by *Incoterms*.

- *Incoterms* means international rules for interpreting trade terms published by the International Chamber of Commerce (latest edition), 38 Cours Albert 1^{er}, 75008 Paris, France.

3.3 Entire Agreement

Subject to GC Sub-Clause 16.4 hereof, the Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations and agreements (whether written or oral) of Parties with respect thereto made prior to the date of Contract.

3.4 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each Party hereto.

3.5 Independent Contractor

The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership,

joint venture or other joint relationship between the Parties hereto. Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Subcontractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and the Employer.

3.6 Non-Waiver

3.6.1 Subject to GC Sub-Clause 3.6.2 below, no relaxation, forbearance, delay or indulgence by either Party in enforcing any of the terms and conditions of the Contract or the granting of time by either Party to the other shall prejudice, affect or restrict the rights of that Party under the Contract, nor shall any waiver by either Party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.6.2 Any waiver of a Party's rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the Party granting such waiver, and must specify the right and the extent to which it is being waived.

3.7 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

3.8 Country of Origin

"Origin" means the place where the plant and component parts thereof are mined, grown, produced or manufactured, and from which the services are provided. Plant components are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that is substantially in its basic characteristics or in purpose or utility from its components.

4. **Communications**

4.1 Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:

- (a) in writing and delivered against receipt; and
- (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract Agreement.



When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Project Manager, a copy shall be sent to the Project Manager or the other Party, as the case may be.

5. **Law and Language**
- 5.1 The Contract shall be governed by and interpreted in accordance with laws of the country **specified in the PC**.
- 5.2 The ruling language of the Contract shall be that **stated in the PC**.
- 5.3 The language for communications shall be the ruling language unless otherwise **stated in the PC**.
6. **Fraud and Corruption**
- 6.1 If the Employer determines that the Contractor or its agents (whether declared or not), or its Subcontractors, subconsultants, services providers, suppliers and any personnel thereof, has engaged in corrupt, fraudulent, collusive coercive, or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 42 shall apply as if such expulsion had been made under Sub-Clause 42.2.1 (c).
- 6.2 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.

B. Subject Matter of Contract

7. **Scope of Facilities**
- 7.1 Unless otherwise expressly limited in the Employer's Requirements, the Contractor's obligations cover the provision of all Plant and the performance of all Installation Services required for the design, and the manufacture (including procurement, quality assurance, construction, installation, associated civil works, Pre-commissioning and delivery) of the Plant, and the installation, completion and commissioning of the Facilities in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in the Section, Employer's Requirements. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment, spare parts (as specified in GC Sub-Clause 7.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); and storage, except for those supplies, works and services that will be provided or performed by the Employer, as set forth in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer.
- 7.2 The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can

be reasonably inferred from the Contract as being required for attaining Completion of the Facilities as if such work and/or items and materials were expressly mentioned in the Contract.

- 7.3 In addition to the supply of Mandatory Spare Parts included in the Contract, the Contractor agrees to supply spare parts required for the operation and maintenance of the Facilities for the period **specified in the PC** and the provisions, if any, **specified in the PC**. However, the identity, specifications and quantities of such spare parts and the terms and conditions relating to the supply thereof are to be agreed between the Employer and the Contractor, and the price of such spare parts shall be that given in Price Schedule No. 6, which shall be added to the Contract Price. The price of such spare parts shall include the purchase price therefor and other costs and expenses (including the Contractor's fees) relating to the supply of spare parts.
- 8. Time for Commencement and Completion**
- 8.1 The Contractor shall commence work on the Facilities within the period **specified in the PC** and without prejudice to GC Sub-Clause 26.2 hereof, the Contractor shall thereafter proceed with the Facilities in accordance with the time schedule specified in the Appendix to the Contract Agreement titled Time Schedule.
- 8.2 The Contractor shall attain Completion of the Facilities or of a part where a separate time for Completion of such part is specified in the Contract, within the time **stated in the PC** or within such extended time to which the Contractor shall be entitled under GC Clause 40 hereof.
- 9. Contractor's Responsibilities**
- 9.1 The Contractor shall design, manufacture including associated purchases and/or subcontracting, install and complete the Facilities in accordance with the Contract. When completed, the Facilities should be fit for the purposes for which they are intended as defined in the Contract.
- 9.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Facilities including any data as to boring tests provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site if access thereto was available and of other data readily available to it relating to the Facilities as of the date twenty-eight (28) days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Facilities.
- 9.3 The Contractor shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and



entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GC Sub-Clause 10.3 hereof and that are necessary for the performance of the Contract.

- 9.4 The Contractor shall comply with all laws in force in the country where the Facilities are to be implemented. The laws will include all local, state, national or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GC Sub-Clause 10.1 hereof.
- 9.5 Any Plant and Installation Services that will be incorporated in or be required for the Facilities and other supplies shall have their origin as specified under GC Clause 1 (Country of Origin). Any subcontractors retained by the Contractor shall be from a country as specified in GC Clause 1 (Country of Origin).
- 9.6 The Contractor shall permit the Bank to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Bank, if so required by the Bank.
- 9.7 If the Contractor is a joint venture, or association (JVA) of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfillment of the provisions of the Contract, unless otherwise specified in the PC, and shall designate one of such persons to act as a leader with authority to bind the JVA. The composition or the constitution of the JVA shall not be altered without the prior consent of the Employer.
- 9.8 The Contractor shall permit, and shall cause its Subcontractors and subconsultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site, the Contractor's offices and all accounts and records relating to the performance of the Contract and the submission of the Bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Contractor's and its Subcontractors' and subconsultants' attention is drawn to Sub-Clause 6.1 [Fraud and Corruption] which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 9.8 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).

10. Employer's Responsibilities

- 10.1 All information and/or data to be supplied by the Employer as described in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer, shall be deemed

to be accurate, except when the Employer expressly states otherwise.

- 10.2 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in that Appendix.
- 10.3 The Employer shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which (a) such authorities or undertakings require the Employer to obtain in the Employer's name, (b) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract, and (c) are specified in the Appendix (Scope of Works and Supply by the Employer).
- 10.4 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state or national government authorities or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain.
- 10.5 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Employer shall provide sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, utilities, lubricants, chemicals, catalysts, other materials and facilities; and shall perform all work and services of whatsoever nature, including those required by the Contractor to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer, at or before the time specified in the program furnished by the Contractor under GC Sub-Clause 18.2 hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.
- 10.6 The Employer shall be responsible for the continued operation of the Facilities after Completion, in accordance with GC Sub-Clause 24.8, and shall be responsible for facilitating the Guarantee Test(s) for the Facilities, in accordance with GC Sub-Clause 25.2.



10.7 All costs and expenses involved in the performance of the obligations under this GC Clause 10 shall be the responsibility of the Employer, save those to be incurred by the Contractor with respect to the performance of Guarantee Tests, in accordance with GC Sub-Clause 25.2.

10.8 In the event that the Employer shall be in breach of any of his obligations under this Clause, the additional cost incurred by the Contractor in consequence thereof shall be determined by the Project Manager and added to the Contract Price.

C. Payment

11. Contract Price

11.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement.

11.2 Unless an adjustment clause is **provided for in the PC**, the Contract Price shall be a firm lump sum not subject to any alteration, except in the event of a Change in the Facilities or as otherwise provided in the Contract.

11.3 Subject to GC Sub-Clauses 9.2, 10.1 and 35 hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

12. Terms of Payment

12.1 The Contract Price shall be paid as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement and in the Appendix to the Contract Agreement titled Terms and Procedures of Payment, which also outlines the procedures to be followed in making application for and processing payments.

12.2 No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of the Facilities or any part(s) thereof.

12.3 In the event that the Employer fails to make any payment by its respective due date or within the period set forth in the Contract, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the rate(s) shown in the Appendix to the Contract Agreement titled Terms and Procedures of Payment, for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.

12.4 The currency or currencies in which payments are made to the Contractor under this Contract shall be specified in the Appendix to the Contract Agreement titled Terms and Procedures of Payment, subject to the general principle that payments will be made in the currency or currencies in which the Contract Price has been stated in the Contractor's bid.

13. Securities

13.1 Issuance of Securities

The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the amount, manner and form specified below.

13.2 Advance Payment Security

13.2.1 The Contractor shall, within twenty-eight (28) days of the notification of contract award, provide a security in an amount equal to the advance payment calculated in accordance with the Appendix to the Contract Agreement titled Terms and Procedures of Payment, and in the same currency or currencies.

13.2.2 The security shall be in the form provided in the bidding documents or in another form acceptable to the Employer. The amount of the security shall be reduced in proportion to the value of the Facilities executed by and paid to the Contractor from time to time, and shall automatically become null and void when the full amount of the advance payment has been recovered by the Employer. The security shall be returned to the Contractor immediately after its expiration.

13.3 Performance Security

13.3.1 The Contractor shall, within twenty-eight (28) days of the notification of contract award, provide a security for the due performance of the Contract in the amount **specified in the PC**.

13.3.2 The performance security shall be denominated in the currency or currencies of the Contract, or in a freely convertible currency acceptable to the Employer, and shall be in the form provided in **Error! Reference source not found.**, corresponding to the type of bank guarantee stipulated by the Employer in the PC, or in another form acceptable to the Employer.

13.3.3 Unless otherwise specified in the PC, the security shall be reduced by half on the date of the Operational Acceptance. The Security shall become null and void, or shall be reduced pro rata to the Contract Price of a part of the Facilities for which a separate Time for Completion is provided, five hundred and forty (540) days after Completion of the Facilities or three hundred and sixty five (365) days after Operational Acceptance of the Facilities, whichever occurs first; provided, however, that if the Defects Liability Period has been extended on any part of the Facilities pursuant to GC Sub-Clause 27.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration, provided, however, that if the Contractor, pursuant to GC Sub-Clause 27.10, is liable for an extended defect



liability obligation, the performance security shall be extended for the period specified in the PC pursuant to GC Sub-Clause 27.10 and up to the amount specified in the PC.

13.3.4 The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract. The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim.

14. Taxes and Duties

14.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies and charges assessed on the Contractor, its Subcontractors or their employees by all municipal, state or national government authorities in connection with the Facilities in and outside of the country where the Site is located.

14.2 Notwithstanding GC Sub-Clause 14.1 above, the Employer shall bear and promptly pay

(a) all customs and import duties for the Plant specified in Price Schedule No. 1; and

(b) other domestic taxes such as, sales tax and value added tax (VAT) on the Plant specified in Price Schedules No. 1 and No. 2 and that is to be incorporated into the Facilities, and on the finished goods, imposed by the law of the country where the Site is located.

14.3 If any tax exemptions, reductions, allowances or privileges may be available to the Contractor in the country where the Site is located, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.

14.4 For the purpose of the Contract, it is agreed that the Contract Price specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement is based on the taxes, duties, levies and charges prevailing at the date twenty-eight (28) days prior to the date of bid submission in the country where the Site is located (hereinafter called "Tax" in this GC Sub-Clause 14.4). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, Subcontractors or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or

deduction therefrom, as the case may be, in accordance with GC Clause 36 hereof.

D. Intellectual Property

15. License/Use of Technical Information

- 15.1 For the operation and maintenance of the Plant, the Contractor hereby grants a non-exclusive and non-transferable license (without the right to sub-license) to the Employer under the patents, utility models or other industrial property rights owned by the Contractor or by a third Party from whom the Contractor has received the right to grant licenses thereunder, and shall also grant to the Employer a non-exclusive and non-transferable right (without the right to sub-license) to use the know-how and other technical information disclosed to the Employer under the Contract. Nothing contained herein shall be construed as transferring ownership of any patent, utility model, trademark, design, copyright, know-how or other intellectual property right from the Contractor or any third Party to the Employer.
- 15.2 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third Party, including suppliers of materials, the copyright in such materials shall remain vested in such third Party.

16. Confidential Information

- 16.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other Party hereto, divulge to any third Party any documents, data or other information furnished directly or indirectly by the other Party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GC Clause 16.
- 16.2 The Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Employer for any purpose other than the design, procurement of Plant, construction or such other work and services as are required for the performance of the Contract.
- 16.3 The obligation of a Party under GC Sub-Clauses 16.1 and 16.2 above, however, shall not apply to that information which



- (a) now or hereafter enters the public domain through no fault of that Party
- (b) can be proven to have been possessed by that Party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other Party hereto
- (c) otherwise lawfully becomes available to that Party from a third Party that has no obligation of confidentiality.

16.4 The above provisions of this GC Clause 16 shall not in any way modify any undertaking of confidentiality given by either of the Parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

16.5 The provisions of this GC Clause 16 shall survive termination, for whatever reason, of the Contract.

E. Execution of the Facilities

17. Representatives 17.1 Project Manager

If the Project Manager is not named in the Contract, then within fourteen (14) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager. The Employer may from time to time appoint some other person as the Project Manager in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the Facilities. Such appointment shall only take effect upon receipt of such notice by the Contractor. The Project Manager shall represent and act for the Employer at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract shall be given by the Project Manager, except as herein otherwise provided.

All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager, except as herein otherwise provided.

17.2 Contractor's Representative & Construction Manager

17.2.1 If the Contractor's Representative is not named in the Contract, then within fourteen (14) days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within fourteen (14) days, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within fourteen (14) days

giving the reason therefor, then the Contractor shall appoint a replacement within fourteen (14) days of such objection, and the foregoing provisions of this GC Sub-Clause 17.2.1 shall apply thereto.

- 17.2.2 The Contractor's Representative shall represent and act for the Contractor at all times during the performance of the Contract and shall give to the Project Manager all the Contractor's notices, instructions, information and all other communications under the Contract.

All notices, instructions, information and all other communications given by the Employer or the Project Manager to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided.

The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in GC Sub-Clause 17.2.1.

- 17.2.3 The Contractor's Representative may, subject to the approval of the Employer which shall not be unreasonably withheld, at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager.

Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GC Sub-Clause 17.2.3 shall be deemed to be an act or exercise by the Contractor's Representative.

- 17.2.4 From the commencement of installation of the Facilities at the Site until Completion, the Contractor's Representative shall appoint a suitable person as the Construction Manager. The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper performance of the Contract. Whenever the Construction Manager is absent from the



Site, a suitable person shall be appointed to act as the Construction Manager's deputy.

17.2.5 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be incompetent or negligent, or may commit a serious breach of the Site regulations provided under GC Sub-Clause 22.3. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Facilities.

17.2.6 If any representative or person employed by the Contractor is removed in accordance with GC Sub-Clause 17.2.5, the Contractor shall, where required, promptly appoint a replacement.

18. Work Program

18.1 Contractor's Organization

The Contractor shall supply to the Employer and the Project Manager a chart showing the proposed organization to be established by the Contractor for carrying out work on the Facilities within twenty-one (21) days of the Effective Date. The chart shall include the identities of the key personnel and the curricula vitae of such key personnel to be employed shall be supplied together with the chart. The Contractor shall promptly inform the Employer and the Project Manager in writing of any revision or alteration of such an organization chart.

18.2 Program of Performance

Within twenty-eight (28) days after the Effective Date, the Contractor shall submit to the Project Manager a detailed program of performance of the Contract, made in a form acceptable to the Project Manager and showing the sequence in which it proposes to design, manufacture, transport, assemble, install and precommission the Facilities, as well as the date by which the Contractor reasonably requires that the Employer shall have fulfilled its obligations under the Contract so as to enable the Contractor to execute the Contract in accordance with the program and to achieve Completion, Commissioning and Acceptance of the Facilities in accordance with the Contract. The program so submitted by the Contractor shall accord with the Time Schedule included in the Appendix to the Contract Agreement titled Time Schedule, and any other dates and periods specified in the Contract. The Contractor shall update and revise the program as and when appropriate or when required by the Project Manager, but without modification in the Times for Completion specified in the PC pursuant to Sub-Clause 8.2 and any extension granted in accordance with GC Clause 40, and shall submit all such revisions to the Project Manager.

18.3 Progress Report

The Contractor shall monitor progress of all the activities specified in the program referred to in GC Sub-Clause 18.2 above, and supply a progress report to the Project Manager every month.

The progress report shall be in a form acceptable to the Project Manager and shall indicate: (a) percentage completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

18.4 Progress of Performance

If at any time the Contractor's actual progress falls behind the program referred to in GC Sub-Clause 18.2, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager, prepare and submit to the Project Manager a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion under GC Sub-Clause 8.2, any extension thereof entitled under GC Sub-Clause 40.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

18.5 Procedures

The Contract shall be executed in accordance with the Contract Documents including the procedures given in the Forms and Procedures of the Employer's Requirements.

The Contractor may execute the Contract in accordance with its own standard project execution plans and procedures to the extent that they do not conflict with the provisions contained in the Contract.

19. Subcontracting

19.1 The Appendix to the Contract Agreement titled List of Major Items of Plant and Installation Services and List of Approved Subcontractors, specifies major items of supply or services and a list of approved Subcontractors against each item, including manufacturers. Insofar as no Subcontractors are listed against any such item, the Contractor shall prepare a list of Subcontractors for such item for inclusion in such list. The Contractor may from time to time propose any addition to or deletion from any such list. The Contractor shall submit any such list or any modification thereto to the Employer for its approval in sufficient time so as not to impede the progress of work on the Facilities. Such approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties or responsibilities under the Contract.



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- 19.2 The Contractor shall select and employ its Subcontractors for such major items from those listed in the lists referred to in GC Sub-Clause 19.1.
- 19.3 For items or parts of the Facilities not specified in the Appendix to the Contract Agreement titled List of Major Items of Plant and Installation Services and List of Approved Subcontractors, the Contractor may employ such Subcontractors as it may select, at its discretion.
- 19.4 Each sub-contract shall include provisions which would entitle the Employer to require the sub-contract to be assigned to the Employer under GC 19.5 (if and when applicable), or in event of termination by the Employer under GC 42.2.
- 19.5 If a sub-contractor's obligations extend beyond the expiry date of the relevant Defects Liability Period and the Project Manager, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.

20. Design and Engineering

20.1 Specifications and Drawings

20.1.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good engineering practice.

The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

20.1.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Project Manager.

20.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied subject to approval by the Employer and shall be treated in accordance with GC Clause 39.

20.3 Approval/Review of Technical Documents by Project Manager

20.3.1 The Contractor shall prepare or cause its Subcontractors to prepare, and furnish to the Project Manager the documents listed in the Appendix to the Contract Agreement titled List of Documents for Approval or Review, for its approval or review as specified and in accordance with the requirements of GC Sub-Clause 18.2 (Program of Performance).

Any part of the Facilities covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof.

GC Sub-Clauses 20.3.2 through 20.3.7 shall apply to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for its review only.

20.3.2 Within fourteen (14) days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GC Sub-Clause 20.3.1, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Project Manager proposes.

If the Project Manager fails to take such action within the said fourteen (14) days, then the said document shall be deemed to have been approved by the Project Manager.

20.3.3 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with the Contract or that it is contrary to good engineering practice.

20.3.4 If the Project Manager disapproves the document, the Contractor shall modify the document and resubmit it for the Project Manager's approval in accordance with GC Sub-Clause 20.3.2. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), whereupon the document shall be deemed to have been approved.

20.3.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the Parties within a reasonable period, then such dispute or difference may be referred to a Dispute Board for determination in accordance with GC Sub-Clause 46.1 hereof. If such dispute or difference is referred to a Dispute Board, the



Project Manager shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Dispute Board upholds the Contractor's view on the dispute and if the Employer has not given notice under GC Sub-Clause 46.3 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Dispute Board shall decide, and the Time for Completion shall be extended accordingly.

20.3.6 The Project Manager's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager.

20.3.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manager an amended document and obtained the Project Manager's approval thereof, pursuant to the provisions of this GC Sub-Clause 20.3.

If the Project Manager requests any change in any already approved document and/or in any document based thereon, the provisions of GC Clause 39 shall apply to such request.

21. Procurement

21.1 Plant

Subject to GC Sub-Clause 14.2, the Contractor shall procure and transport all Plant in an expeditious and orderly manner to the Site.

21.2 Employer-Supplied Plant

If the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer, provides that the Employer shall furnish any specific items to the Contractor, the following provisions shall apply:

21.2.1 The Employer shall, at its own risk and expense, transport each item to the place on or near the Site as agreed upon by the Parties and make such item available to the Contractor at the time specified in the program furnished by the Contractor, pursuant to GC Sub-Clause 18.2, unless otherwise mutually agreed.

21.2.2 Upon receipt of such item, the Contractor shall inspect the same visually and notify the Project Manager of any

detected shortage, defect or default. The Employer shall immediately remedy any shortage, defect or default, or the Contractor shall, if practicable and possible, at the request of the Employer, remedy such shortage, defect or default at the Employer's cost and expense. After inspection, such item shall fall under the care, custody and control of the Contractor. The provision of this GC Sub-Clause 21.2.2 shall apply to any item supplied to remedy any such shortage or default or to substitute for any defective item, or shall apply to defective items that have been repaired.

- 21.2.3 The foregoing responsibilities of the Contractor and its obligations of care, custody and control shall not relieve the Employer of liability for any undetected shortage, defect or default, nor place the Contractor under any liability for any such shortage, defect or default whether under GC Clause 27 or under any other provision of Contract.

21.3 Transportation

- 21.3.1 The Contractor shall at its own risk and expense transport all the materials and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances.
- 21.3.2 Unless otherwise provided in the Contract, the Contractor shall be entitled to select any safe mode of transport operated by any person to carry the materials and the Contractor's Equipment.
- 21.3.3 Upon dispatch of each shipment of materials and the Contractor's Equipment, the Contractor shall notify the Employer by telex, cable, facsimile or electronic means, of the description of the materials and of the Contractor's Equipment, the point and means of dispatch, and the estimated time and point of arrival in the country where the Site is located, if applicable, and at the Site. The Contractor shall furnish the Employer with relevant shipping documents to be agreed upon between the Parties.
- 21.3.4 The Contractor shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of the materials and the Contractor's Equipment to the Site. The Employer shall use its best endeavors in a timely and expeditious manner to assist the Contractor in obtaining such approvals, if requested by the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any claim for damage to roads, bridges or any other traffic facilities that may be caused by the transport of the materials and the Contractor's Equipment to the Site.



21.4 Customs Clearance

The Contractor shall, at its own expense, handle all imported materials and Contractor's Equipment at the point(s) of import and shall handle any formalities for customs clearance, subject to the Employer's obligations under GC Sub-Clause 14.2, provided that if applicable laws or regulations require any application or act to be made by or in the name of the Employer, the Employer shall take all necessary steps to comply with such laws or regulations. In the event of delays in customs clearance that are not the fault of the Contractor, the Contractor shall be entitled to an extension in the Time for Completion, pursuant to GC Clause 40.

22. Installation

22.1 Setting Out/Supervision

22.1.1 **Bench Mark:** The Contractor shall be responsible for the true and proper setting-out of the Facilities in relation to bench marks, reference marks and lines provided to it in writing by or on behalf of the Employer.

If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level or alignment of the Facilities, the Contractor shall forthwith notify the Project Manager of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the Project Manager. If such error is based on incorrect data provided in writing by or on behalf of the Employer, the expense of rectifying the same shall be borne by the Employer.

22.1.2 **Contractor's Supervision:** The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand.

22.2 Labor:

22.2.1 Engagement of Staff and Labor

Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labor, local or otherwise, and for their payment, housing, feeding and transport.

The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is

encouraged to use local labor that has the necessary skills.

The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labor and personnel to be employed on the Site into the country where the Site is located. The Employer will, if requested by the Contractor, use his best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national or government permission required for bringing in the Contractor's personnel.

The Contractor shall at its own expense provide the means of repatriation to all of its and its Subcontractor's personnel employed on the Contract at the Site to the place where they were recruited or to their domicile. It shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor.

22.2.2 Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labor from amongst the Employer's Personnel.

22.2.3 Labor Laws

The Contractor shall comply with all the relevant labor Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.

The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.

The Contractor shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor.

22.2.4 Rates of Wages and Conditions of Labor

The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those



established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.

The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages and allowances as are chargeable under the Laws for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws.

22.2.5 Working Hours

No work shall be carried out on the Site on locally recognized days of rest, or outside the normal working hours **stated in the PC**, unless:

- (a) otherwise stated in the Contract,
- (b) the Project Manager gives consent, or
- (c) the work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Project Manager.

If and when the Contractor considers it necessary to carry out work at night or on public holidays so as to meet the Time for Completion and requests the Project Manager's consent thereto, the Project Manager shall not unreasonably withhold such consent.

This Sub-Clause shall not apply to any work which is customarily carried out by rotary or double-shifts.

22.2.6 Facilities for Staff and Labor

Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification.

The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

22.2.7 Health and Safety

The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the performance of the Contract, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send to the Project Manager, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

The Contractor shall throughout the contract (including the Defects Notification Period): (i) conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labor (including all the Contractor's employees, all Sub-Contractors and Employer's and Project Manager's employees, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behavior with respect to of Sexually Transmitted Diseases (STD)—or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labor as appropriate; and (iii) provide for STI and HIV/AIDS screening, diagnosis, counseling and referral to a dedicated national STI and HIV/AIDS program, (unless otherwise agreed) of all Site staff and labor.

The Contractor shall include in the program to be submitted for the execution of the Facilities under Sub-Clause 18.2 an alleviation program for Site staff and labor and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted



Diseases (STD) including HIV/AIDS. The STI, STD and HIV/AIDS alleviation program shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-Clause and the related specification. For each component, the program shall detail the resources to be provided or utilized and any related sub-contracting proposed. The program shall also include provision of a detailed cost estimate with supporting documentation. Payment to the Contractor for preparation and implementation this program shall not exceed the Provisional Sum dedicated for this purpose.

22.2.8 Funeral Arrangements

In the event of the death of any of the Contractor's personnel or accompanying members of their families, the Contractor shall be responsible for making the appropriate arrangements for their return or burial, unless otherwise **specified in the PC**.

22.2.9 Records of Contractor's Personnel

The Contractor shall keep accurate records of the Contractor's personnel, including the number of each class of Contractor's Personnel on the Site and the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis in a form approved by the Project Manager and shall be available for inspection by the Project Manager until the Contractor has completed all work.

22.2.10 Supply of Foodstuffs

The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.

22.2.11 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.

22.2.12 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

22.2.13 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift barter or disposal by Contractor's Personnel.

22.2.14 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

22.2.15 Prohibition of All Forms of Forced or Compulsory Labor

The contractor shall not employ "forced or compulsory labor" in any form. "Forced or compulsory labor" consists of all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.

22.2.16 Prohibition of Harmful Child Labor

The Contractor shall not employ any child to perform any work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

22.3 Contractor's Equipment

22.3.1 All Contractor's Equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Project Manager's consent that such Contractor's Equipment is no longer required for the execution of the Contract.

22.3.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site and any surplus materials remaining thereon.

22.3.3 The Employer will, if requested, use its best endeavors to assist the Contractor in obtaining any local, state or national government permission required by the Contractor for the export of the Contractor's Equipment imported by the Contractor for use in the execution of the Contract that is no longer required for the execution of the Contract.

22.4 Site Regulations and Safety



The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. The Contractor shall prepare and submit to the Employer, with a copy to the Project Manager, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld.

Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety of the Facilities, gate control, sanitation, medical care, and fire prevention.

22.5 Opportunities for Other Contractors

22.5.1 The Contractor shall, upon written request from the Employer or the Project Manager, give all reasonable opportunities for carrying out the work to any other contractors employed by the Employer on or near the Site.

22.5.2 If the Contractor, upon written request from the Employer or the Project Manager, makes available to other contractors any roads or ways the maintenance for which the Contractor is responsible, permits the use by such other contractors of the Contractor's Equipment, or provides any other service of whatsoever nature for such other contractors, the Employer shall fully compensate the Contractor for any loss or damage caused or occasioned by such other contractors in respect of any such use or service, and shall pay to the Contractor reasonable remuneration for the use of such equipment or the provision of such services.

22.5.3 The Contractor shall also so arrange to perform its work as to minimize, to the extent possible, interference with the work of other contractors. The Project Manager shall determine the resolution of any difference or conflict that may arise between the Contractor and other contractors and the workers of the Employer in regard to their work.

22.5.4 The Contractor shall notify the Project Manager promptly of any defects in the other contractors' work that come to its notice, and that could affect the Contractor's work. The Project Manager shall determine the corrective measures, if any, required to rectify the situation after inspection of the Facilities. Decisions made by the Project Manager shall be binding on the Contractor.

22.6 Emergency Work

If, by reason of an emergency arising in connection with and during the execution of the Contract, any protective or remedial work is necessary as a matter of urgency to prevent damage to

the Facilities, the Contractor shall immediately carry out such work.

If the Contractor is unable or unwilling to do such work immediately, the Employer may do or cause such work to be done as the Employer may determine is necessary in order to prevent damage to the Facilities. In such event the Employer shall, as soon as practicable after the occurrence of any such emergency, notify the Contractor in writing of such emergency, the work done and the reasons therefor. If the work done or caused to be done by the Employer is work that the Contractor was liable to do at its own expense under the Contract, the reasonable costs incurred by the Employer in connection therewith shall be paid by the Contractor to the Employer. Otherwise, the cost of such remedial work shall be borne by the Employer.

22.7 Site Clearance

22.7.1 Site Clearance in Course of Performance: In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, rubbish or temporary works from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract.

22.7.2 Clearance of Site after Completion: After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, rubbish and debris of any kind from the Site, and shall leave the Site and Facilities in a clean and safe condition.

22.8 Watching and Lighting

The Contractor shall provide and maintain at its own expense all lighting, fencing, and watching when and where necessary for the proper execution and the protection of the Facilities, or for the safety of the owners and occupiers of adjacent property and for the safety of the public.

23. **Test and Inspection**

23.1 The Contractor shall at its own expense carry out at the place of manufacture and/or on the Site all such tests and/or inspections of the Plant and any part of the Facilities as are specified in the Contract.

23.2 The Employer and the Project Manager or their designated representatives shall be entitled to attend the aforesaid test and/or inspection, provided that the Employer shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

23.3 Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give a reasonable



advance notice of such test and/or inspection and of the place and time thereof to the Project Manager. The Contractor shall obtain from any relevant third Party or manufacturer any necessary permission or consent to enable the Employer and the Project Manager or their designated representatives to attend the test and/or inspection.

- 23.4 The Contractor shall provide the Project Manager with a certified report of the results of any such test and/or inspection.

If the Employer or Project Manager or their designated representatives fails to attend the test and/or inspection, or if it is agreed between the Parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Project Manager with a certified report of the results thereof.

- 23.5 The Project Manager may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of work on the Facilities and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.

- 23.6 If any Plant or any part of the Facilities fails to pass any test and/or inspection, the Contractor shall either rectify or replace such Plant or part of the Facilities and shall repeat the test and/or inspection upon giving a notice under GC Sub-Clause 23.3.

- 23.7 If any dispute or difference of opinion shall arise between the Parties in connection with or arising out of the test and/or inspection of the Plant or part of the Facilities that cannot be settled between the Parties within a reasonable period of time, it may be referred to an Dispute Board for determination in accordance with GC Sub-Clause 6.1.

- 23.8 The Contractor shall afford the Employer and the Project Manager, at the Employer's expense, access at any reasonable time to any place where the Plant are being manufactured or the Facilities are being installed, in order to inspect the progress and the manner of manufacture or installation, provided that the Project Manager shall give the Contractor a reasonable prior notice.

- 23.9 The Contractor agrees that neither the execution of a test and/or inspection of Plant or any part of the Facilities, nor the attendance by the Employer or the Project Manager, nor the issue of any test certificate pursuant to GC Sub-Clause 23.4, shall release the Contractor from any other responsibilities under the Contract.

23.10 No part of the Facilities or foundations shall be covered up on the Site without the Contractor carrying out any test and/or inspection required under the Contract. The Contractor shall give a reasonable notice to the Project Manager whenever any such parts of the Facilities or foundations are ready or about to be ready for test and/or inspection; such test and/or inspection and notice thereof shall be subject to the requirements of the Contract.

23.11 The Contractor shall uncover any part of the Facilities or foundations, or shall make openings in or through the same as the Project Manager may from time to time require at the Site, and shall reinstate and make good such part or parts.

If any parts of the Facilities or foundations have been covered up at the Site after compliance with the requirement of GC Sub-Clause 23.10 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating, and making good the same shall be borne by the Employer, and the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been delayed or impeded in the performance of any of its obligations under the Contract.

24. Completion of the Facilities

24.1 As soon as the Facilities or any part thereof has, in the opinion of the Contractor, been completed operationally and structurally and put in a tight and clean condition as specified in the Employer's Requirements, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer in writing.

24.2 Within seven (7) days after receipt of the notice from the Contractor under GC Sub-Clause 24.1, the Employer shall supply the operating and maintenance personnel specified in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer for Pre-commissioning of the Facilities or any part thereof.

Pursuant to the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer, the Employer shall also provide, within the said seven (7) day period, the raw materials, utilities, lubricants, chemicals, catalysts, facilities, services and other matters required for Pre-commissioning of the Facilities or any part thereof.

24.3 As soon as reasonably practicable after the operating and maintenance personnel have been supplied by the Employer and the raw materials, utilities, lubricants, chemicals, catalysts, facilities, services and other matters have been provided by the Employer in accordance with GC Sub-Clause 24.2, the Contractor shall commence Pre-commissioning of the Facilities or the relevant part thereof in preparation for Commissioning, subject to GC Sub-Clause 25.5.



24.4 As soon as all works in respect of Pre-commissioning are completed and, in the opinion of the Contractor, the Facilities or any part thereof is ready for Commissioning, the Contractor shall so notify the Project Manager in writing.

24.5 The Project Manager shall, within fourteen (14) days after receipt of the Contractor's notice under GC Sub-Clause 24.4, either issue a Completion Certificate in the form specified in the Employer's Requirements (Forms and Procedures), stating that the Facilities or that part thereof have reached Completion as of the date of the Contractor's notice under GC Sub-Clause 24.4, or notify the Contractor in writing of any defects and/or deficiencies.

If the Project Manager notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in GC Sub-Clause 24.4.

If the Project Manager is satisfied that the Facilities or that part thereof have reached Completion, the Project Manager shall, within seven (7) days after receipt of the Contractor's repeated notice, issue a Completion Certificate stating that the Facilities or that part thereof have reached Completion as of the date of the Contractor's repeated notice.

If the Project Manager is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor's repeated notice, and the above procedure shall be repeated.

24.6 If the Project Manager fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GC Sub-Clause 24.4 or within seven (7) days after receipt of the Contractor's repeated notice under GC Sub-Clause 24.5, or if the Employer makes use of the Facilities or part thereof, then the Facilities or that part thereof shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of the Employer's use of the Facilities, as the case may be.

24.7 As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

24.8 Upon Completion, the Employer shall be responsible for the care and custody of the Facilities or the relevant part thereof, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof.

25. Commissioning and Operational Acceptance

25.1 Commissioning

- 25.1.1 Commissioning of the Facilities or any part thereof shall be commenced by the Contractor immediately after issue of the Completion Certificate by the Project Manager, pursuant to GC Sub-Clause 24.5, or immediately after the date of the deemed Completion, under GC Sub-Clause 24.6.
- 25.1.2 The Employer shall supply the operating and maintenance personnel and all raw materials, utilities, lubricants, chemicals, catalysts, facilities, services and other matters required for Commissioning.
- 25.1.3 In accordance with the requirements of the Contract, the Contractor's and Project Manager's advisory personnel shall attend the Commissioning, including the Guarantee Test, and shall advise and assist the Employer.

25.2 Guarantee Test

- 25.2.1 Subject to GC Sub-Clause 25.5, the Guarantee Test and repeats thereof shall be conducted by the Contractor during Commissioning of the Facilities or the relevant part thereof to ascertain whether the Facilities or the relevant part can attain the Functional Guarantees specified in the Appendix to the Contract Agreement titled Functional Guarantees. The Employer shall promptly provide the Contractor with such information as the Contractor may reasonably require in relation to the conduct and results of the Guarantee Test and any repeats thereof.
- 25.2.2 If for reasons not attributable to the Contractor, the Guarantee Test of the Facilities or the relevant part thereof cannot be successfully completed within the period from the date of Completion **specified in the PC** or any other period agreed upon by the Employer and the Contractor, the Contractor shall be deemed to have fulfilled its obligations with respect to the Functional Guarantees, and GC Sub-Clauses 28.2 and 28.3 shall not apply.

25.3 Operational Acceptance

- 25.3.1 Subject to GC Sub-Clause 25.4 below, Operational Acceptance shall occur in respect of the Facilities or any part thereof when
- (a) the Guarantee Test has been successfully completed and the Functional Guarantees are met; or
 - (b) the Guarantee Test has not been successfully completed or has not been carried out for reasons not attributable to the Contractor within the



period from the date of Completion specified in the PC pursuant to GC Sub-Clause 25.2.2 above or any other period agreed upon by the Employer and the Contractor; or

- (c) the Contractor has paid the liquidated damages specified in GC Sub-Clause 28.3 hereof; and
- (d) any minor items mentioned in GC Sub-Clause 24.7 hereof relevant to the Facilities or that part thereof have been completed.

25.3.2 At any time after any of the events set out in GC Sub-Clause 25.3.1 have occurred, the Contractor may give a notice to the Project Manager requesting the issue of an Operational Acceptance Certificate in the form provided in the Employer's Requirements (Forms and Procedures) in respect of the Facilities or the part thereof specified in such notice as of the date of such notice.

25.3.3 The Project Manager shall, after consultation with the Employer, and within seven (7) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.

25.3.4 If within seven (7) days after receipt of the Contractor's notice, the Project Manager fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Project Manager has not issued the Operational Acceptance Certificate, the Facilities or the relevant part thereof shall be deemed to have been accepted as of the date of the Contractor's said notice.

25.4 Partial Acceptance

25.4.1 If the Contract specifies that Completion and Commissioning shall be carried out in respect of parts of the Facilities, the provisions relating to Completion and Commissioning including the Guarantee Test shall apply to each such part of the Facilities individually, and the Operational Acceptance Certificate shall be issued accordingly for each such part of the Facilities.

25.4.2 If a part of the Facilities comprises facilities such as buildings, for which no Commissioning or Guarantee Test is required, then the Project Manager shall issue the Operational Acceptance Certificate for such facility when it attains Completion, provided that the Contractor shall thereafter complete any outstanding minor items that are listed in the Operational Acceptance Certificate.

25.5 Delayed Pre-commissioning and/or Guarantee Test

25.5.1 In the event that the Contractor is unable to proceed with the Pre-commissioning of the Facilities pursuant to Sub-

Connections	Flanged or threaded
Pump house material	Bronze or stainless steel
Pump axis	Stainless steel or ceramic

The pumps shall operate without noise and vibrations.

The pumps shall be insulated with prefabricated removable insulation.

3.1.6.3. Pump control and electrical conditions

The installation should conform to all Moldovan electric and safety regulations.

The pumps shall provide the necessary dust and water splash protection class.

The pumps shall be equipped with necessary electrical control and protection, including switches, thermal and current overload protection, accidental access protection, safety switches and fuses, indicators for pump status.

The system shall ensure:

- All necessary safety and protection functions
- Automatic and manual on-off power control (with switches automatic/manual/off on the control panel)
- Automatic restart of the pumps after power failure
- The control panel shall display the status of each pump – on/off/failure
- The pumps shall be protected from operating with no water in the system. The pumps shall be automatically stopped via pressure switches (pressostat) in case of no pressure or if the pressure on the suction side is below the allowable limits.

3.1.7. Shut-off valves

3.1.7.1. Valves for DH, SH and ventilation

All the valves for DH, SH and ventilation shall be high quality modern steel ball valves of welded construction (with stainless steel ball) for DH purposes and for welded installation (or flanged installation where necessary and where approved by the Employer). Sealing/gaskets of the valves shall not require any maintenance, adjustments or lubrication during operation.

The shut-off valves shall follow the requirements for the valves to be used in the DH system, see 3.2.10 "Shut-off valves".

3.1.7.2. Valves for DHW and CW

The valves for DHW and CW shall be high quality ball valves with bronze or dezinkstabilized brass body and stainless steel ball, for domestic hot- and, respectively, cold water applications. Sealing/gaskets of the valves shall not require any maintenance during operation. Connections shall be threaded or flanged.

3.1.8. Two-way control valves with actuator

The below shall be taken into account when selecting control valves:

- The control valves for heating (SH, ventilation) and DHW shall have electrical actuators with manual override capabilities. The actuators shall be able to close against a differential pressure of 0.7 MPa
- Flow through the control valves should not exceed 3.5 m/s or a lower value to achieve noise-free operation.
- Control valve authority shall be at least 50% at maximum flow

- Connections shall be flanged or threaded. Control valves larger than DN25 shall be supplied with flanges or they shall be possible to install between flanges
- Material of the valve body shall be steel, ductile iron or bronze
- Material of the seat, cone and stem shall be stainless steel
- Control range shall be 100:1

Control valve behavior in case of power failure:

- for SH and ventilation: fixing the valve in the "as-is" position
- for DHW: returning to closed position (spring return)

The control valves actuators shall be compatible with controllers, selected and supplied with the valve body as one assembly.

Running time from closed to open – ca. 120 seconds for the SH and ventilation actuators and 30 seconds for the DHW actuators.

3.1.9. Safety relief valves

Each heat exchanger shall have its own safety relief valve installed on the secondary side before the first set of shut-off valves for protection against excess pressure when the shut-off valves are closed and heat supplied to the primary side. The valve shall be selected for thermal expansion of the fluid and have a connection size of minimum DN20.

Safety relief valves shall also be installed for protection of the building systems.

3.1.10. Check valves

The check valves shall be selected for reliable and long-term operation. The types, connections (threaded, flanged or between flanges) and materials shall suit the system/installation conditions.

The check valves for DHW, DHWRC and CW shall be made of stainless steel, bronze or dezinkstabilized brass materials.

3.1.11. Air releases

3.1.11.1. Manual

Manual air releases shall be accomplished by a pipe with a valve, welded on top of the pipe subject to air release and routed appropriately to avoid splashing of equipment.

3.1.11.2. Automatic

Automatic air release valves shall be rated to the system operating temperatures and pressures.

Automatic air release valves shall be connected via a shut-off ball valve for service and replacement without the need to drain the system.

Automatic air-release valves shall be installed in the substations in the primary circuit in the highest point and in other locations where necessary.

3.1.12. Drainage valves

Drainage valves shall be installed to provide the possibility to drain the substations and systems completely. The ball valves to be used shall have the same rating as the other valves in the respective system.

3.1.13. Strainers

Strainers shall be installed on all pipes with the flow towards heat exchangers and meters, as indicated in the relevant principle schematic and in other locations as necessary.

Opening of the strainer for cleaning shall be possible without wetting or spraying equipment or insulation in the prefabricated unit.

Location	Material	Mesh screen	Connection
DH	Steel or ductile iron	0.8 – 1 mm *) , stainless steel	Flanged
SH, ventilation	Steel, ductile iron or bronze	0.8 – 1 mm *) , stainless steel	Flanged or threaded
DHW, CW	Bronze, stainless steel	0.8 – 1 mm *) , stainless steel	Flanged or threaded

* Note: the size of the mesh shall correspond to the recommendations of the heat exchanger manufacturer.

The mesh shall be manufactured of stainless steel.

Where necessary, strainers shall have flushing ball valves with outlet pipe to avoid spraying insulation and equipment. The strainers shall have the stainless steel mesh basket detachable for cleaning when necessary.

3.1.14. Expansion tanks

The Contractor shall supply and install, together with the substations, expansion tanks for the SH and (where applicable) ventilations systems.

The expansion tanks shall be closed type, pressurized bladder (membrane) expansion tanks. The volume of the expansion tanks shall be calculated based on the water volume of the respective SH and ventilation systems.

3.1.15. Control units

The substations shall be designed for automatic operation and shall be equipped with all the necessary control/automation and safety equipment. The control units shall ensure automatic operation of the substations and shall keep the parameters within the normal limits.

The controllers shall ensure automatic adjustment of the temperature supplied to the SH and (where applicable) ventilation systems based on the outside temperature and shall maintain the set DHW temperature.

The controllers shall have display and keypad and shall allow setting of the necessary parameters. The controllers shall display the operating parameters, set values and information about malfunctions.

The controllers shall ensure:

- Automatic adjustment of the temperature supplied to the SH and (where applicable) ventilation systems of the buildings in accordance with a pre-set curve in relation to the outdoor temperature. The curves shall be selected/adjusted in accordance with the temperature schedules of the respective systems of the buildings and shall be user-selectable/adjustable from the control unit. The building's time constant and related delay in temperature response shall be able to be chosen individually. The settings shall be adjustable from the control unit;
- The controllers shall keep the supply temperature to the SH and ventilation systems of the buildings according to the temperature schedule curves, with a maximum deviation of not more than $\pm 2^{\circ}\text{C}$ from the necessary schedule value;
- During operation, if/when necessary (e.g. after reconstruction of building systems, etc.), the temperature schedules and other parameters shall be able to be adjusted



individually for each building according to the actual needs and the substations shall have the necessary capabilities for changing the settings / adjustments in their control units;

- The control units shall stop the circulation pumps for heating (SH, ventilation) at pre-set outside temperatures. The pre-set values shall be able to be selected from the control unit;
- The control unit shall automatically regulate and maintain the DHW supply temperature within $\pm 2^{\circ}\text{C}$ from the set-point from minimum to design flow range. Temperature of the DHW, regardless of the season, shall be kept at typically 55°C . The temperature shall be user-selectable/adjustable from the control unit depending on the needs (available range: $50\text{-}65^{\circ}\text{C}$);
- Night-time, off-hours, off-days energy-saving temperature reduction function shall be available based on a weekly program (settings to be available from the control unit of each substation), etc.
- The substations shall provide the DHW-priority function. This function shall, in conditions of the available primary DH flow, give priority to the DHW function, temporarily reducing the primary flow for SH in order to ensure the necessary DHW temperature during peaks in DHW consumption. Thus, if the DHW temperature drops to a minimum acceptable limit (e.g. 50°C , the value shall be adjustable from the controller) because of insufficient primary DH flow, the controller shall reduce the primary DH flow for SH accordingly, in order to maintain the necessary DHW temperature.

In addition, the control equipment shall:

- Ensure protection of the pumps from running without water;
- Control the operation of the pumps, control valves, etc.;
- Display the status of the pumps (on/off/failure), etc.

In each substation room, sensors signaling water leakage (on the floor) shall be installed.

The control unit shall provide visual alarms and alarm signals for:

- Deviation of more than $\pm 5^{\circ}\text{C}$ (adjustable value) of the actual supply temperature to the SH and (where applicable) ventilation systems compared to the value necessary according to the preset temperature schedule;
- Deviation of more than $\pm 5^{\circ}\text{C}$ (adjustable value) of the actual DHW supply temperature compared to the preset value;
- Pressure drop below the lower normal pressure limit in the secondary heating and ventilation circuits;
- Pump failure;
- Power failure;
- Water leakage on the floor of the substation;
- Unauthorized intrusion into the substation room.

The control units shall have alarm signal outputs for alarm signals transmission. See 3.1.21 "Data transmission" for more information.

The control units shall be password protected to prevent unauthorized manipulation.

In case of power failure, all settings and the registered data shall be preserved. After power failure, the substations shall automatically restart their operation.

3.1.16. Temperature and pressure sensors/pressostats

The substations shall be equipped with the necessary temperature and pressure sensors / pressostats, including:

- Outdoor temperature sensors: compatible with the controller, design and protection level appropriate for outside installation. The sensors shall be installed on the northern side of buildings, protected from direct sunlight and precipitations;
- Temperature sensors shall be installed on the secondary supply pipes for SH, ventilation;
- DHW temperature sensors. Temperature sensors shall monitor the actual temperature even when there is no DHW consumption and recirculation – to prevent unnecessary opening of the control valve and circulation of DH heat carrier through the primary side of the heat exchanger. For this reason, the temperature sensor shall be installed inside the heat exchanger through the DHW supply outlet. The pocket for the sensor shall be installed through a T-piece or other similar arrangement, so that it reaches the necessary depth in the heat exchanger channel. The Contractor shall ensure that the primary flow is practically zero when there is no DHW consumption and no recirculation with the chosen solution for the installation of the sensor;
- Pressure sensors / adjustable pressure switches (pressostats) on the SH return lines to monitor the pressure in the SH and (where applicable) ventilation systems;
- Separate pressure sensors / adjustable pressure switches (pressostats) for protection of the pumps from running without water or with at low pressure – to be installed before the pumps, on the suction side. In case the pressure drops to a level endangering the pump, the pump shall automatically stop.

3.1.17. Filling and adding make-up water for SH and ventilation systems

The substations shall provide manual filling/adding of make-up water to the SH and (where applicable) ventilation systems of the buildings from the DH system.

The filling / make-up water equipment shall include (see the included indicative schematics for each building):

- Ball shut-off valves
- Strainer
- Water meter
- Check valve
- Pressure control valve (to protect secondary systems)

The equipment shall be rated for 16 bar, 120°C.

The filling / make-up water line shall be connected to the DH return line or, where the pressure in the DH return line is insufficient for the building, to the DH supply line.

3.1.18. Manometers and thermometers

3.1.18.1. Manometers

Specifications for manometers:

Location	Scale	Size
DH	0-1.6 MPa	$\phi \geq 50$ mm
SH, ventilation	0-1 MPa	$\phi \geq 50$ mm



DHW, CW	0-1 MPa	$\phi \geq 50$ mm
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Manometers shall have a scale in MPa, bar or kgf/cm². The manometers shall follow DIN 16005 class 1,0.

The manometers shall be metrologically tested.

3.1.18.2. Thermometers

All thermometers shall be installed immersed. Clamp-on thermometers are not acceptable. The resolution of the thermometer scale shall be 1°C. Precision of the thermometers shall follow DIN 12786.

Thermometers shall be installed in the pipes via metal pockets. Where thermometers are installed in vertical pipes, the pockets shall be angled for such installation.

Specification for thermometers:

Location	Scale	Scale size minimum
DH	0-120°C*	L=120 mm, immersed
SH, ventilation	0-100°C*	L=120 mm, immersed
DHW, CW	0-80°C*	L=120 mm, immersed

* Note: The exact scale shall be agreed with the Employer/Beneficiary.

The scale of the thermometers shall be close to the operating conditions and shall be able to display the maximum system parameters.

The thermometers shall be metrologically tested.

3.1.19. Thermal energy and water meters

The substations shall contain the following meters:

- Thermal energy meter
- CW meter for metering CW used for DHW preparation
- Hot water meter on the filling / make-up water line

The meters shall be metrologically tested.

3.1.20. Thermal energy meters

The thermal energy meters shall be according to European norm EN 1434, certified in the Republic of Moldova for commercial metering and approved by the Employer for commercial metering.

The thermal energy meters shall have ultrasonic flow meters and matched pairs of temperature sensors.

The thermal energy meters shall be installed in accordance with the manufacturer's recommendations with all wiring supported properly.

The meters shall have a battery ensuring at least eight years of operation.

The meters shall permit registration and reading on the display of the temperatures, instantaneous load in kW, instantaneous flow (in m³/h), accumulated energy and flow, actual time and accumulated time, etc.

The hourly readings shall be stored for at least 1 200 hours, daily readings – for at least 450 days, monthly readings – for at least 30 months and yearly readings – for at least 10 years.

The thermal energy meters shall include modules for data transmission of all registered parameters.

The parameters to be sent via the data transmission modules shall include also the readings of the filling/make-up water meters and of the CW meters for metering the CW used for DHW preparation.

3.1.20.1. Cold water meters

The CW meters to be used for metering of the CW used for DHW preparation shall be ultrasonic and shall be certified in the Republic of Moldova for commercial metering.

The meters shall permit reading on the display instantaneous flow, the accumulated flow, etc. The meters shall have outputs for data transmission.

3.1.20.2. Filling/make-up water meters

The hot water meters to be used for metering amount of the DH water used for filling / adding make-up water to the secondary (SH and ventilation) systems shall be certified in the Republic of Moldova for commercial metering.

Mechanical meters for hot water are acceptable. The meters shall have signal outputs.

3.1.21. Data transmission

The Contractor shall install data transmission modules using wireless or other technology acceptable to the Employer (the technology to be used shall be agreed with the Employer) in each substation for data transmission to the Employer's data/dispatch center. The data transmission modules shall provide transmission of the following parameters:

- All data registered by the thermal energy meters, filling/make-up water meters and CW meters for DHW preparation. The data shall be transmitted upon request from the server;
- Temperatures: DH supply and DH return (from the thermal energy meter), SH supply, SH return, DHW supply, other relevant parameters as agreed. The data shall be transmitted upon request from the dispatch center server;
- All alarm signals, as previously described (see 3.1.15 "Control units"). The alarm data shall be transmitted to the server in case of an alarm event; status information shall be transmitted upon request from the server.

The Contractor shall provide the necessary hardware and software to be installed on the Employer's server in the data/dispatch center (the computer/server will be provided by the Employer) – to enable reception of the data from the substations and metering points, display and store the information. The Contractor shall provide to the Employer a proper description of the data protocols and databases to enable the Employer to integrate the data into the Employer's existing data/dispatch systems.

The Contractor shall provide installation versions of the relevant software (e.g. installation CDs) with licenses for the sufficient number of computers/users.

3.1.22. Thermal insulation

All piping, fittings, valves, heat exchangers and pumps and other equipment in the substations shall be insulated. The DH, SH, ventilation (thermal energy supply to ventilation systems), DHW, DHWRC pipes to be installed for connecting the substations to the respective systems shall also be insulated. Exempted from insulation are pipes with lengths < 100 mm, strainers, flanges. Where flanges are used, the insulation shall allow disconnection of the flanges without damaging the insulation.



The insulation shall be carried out with due consideration to access to instrumentation. All equipment which is required to be inspected or dismantled shall be insulated with removable insulation.

The heat exchangers and pumps shall be insulated with prefabricated pre-molded removable insulation.

Non-flammable mineral wool or other applicable insulation materials (approved by the Employer) that meet the requirements for fire safety shall be used for the pipes, fittings and valves. The thermal insulation shall be covered with non-corrosive metal sheet cover. The insulation material shall not contain components that may cause corrosion to the steel pipes or the equipment. The insulation protection cover shall protect the insulation from moisture and physical damage.

The heat transfer coefficient of the insulation shall be less than $0.041 \text{ W/m}^2\text{K}$.

Insulation ends shall be protected by aluminum (or other applicable non-corrosive metal) collars fastened by wire.

The thickness of pipe insulation shall be calculated to ensure the requirements according to the applicable norms and to minimize heat losses.

Prior to mounting the insulation, the steel pipes shall be cleaned and painted with corrosion protective paint (with appropriate layers of base-coat paint and top-coat paint).

The paintwork includes all installations, pipes and equipment, fixtures and accessories etc. which are not surface finished from factory/assembling plant. The colors shall be agreed with the Employer.

3.1.23. Compact wall-mounted prefabricated substations

If/where applicable (for buildings with small loads), small capacity substations shall be provided as prefabricated compact wall-mounted units. The use of such units shall be examined and agreed with the Employer in each specific case.

The compact wall-mounted prefabricated substations shall correspond to the same temperature and pressure conditions, and have the same functionality as required in the present document.

The design shall provide independent/indirect connection of SH systems and DHW preparation using heat exchangers, necessary control equipment and control panel, etc. – as described in the present document.

3.1.24. Pressure testing of prefabricated substations

The assembled prefabricated substations (prior to any disassembly into parts for transportation) shall be tested in the factory with 20°C water to at least 21 bar on the primary side and at least 13 bar on the secondary side. The tests shall be performed for 1 (one) hour and no pressure losses will be accepted. Any equipment that cannot withstand the pressure shall be isolated prior to the test.

Minutes of the tests (in which the identity of each substation is recorded) shall be provided for each prefabricated substation to the Employer. Authorized persons responsible for the tests shall sign the minutes.

Pressure testing of the complete installations shall be carried out after installation of the substations in the buildings and their connection to the systems.

3.2. DH pipes

The outside DH pipe networks (including pipe entrances into buildings) shall be made using pre-insulated pipes to be installed underground.

The DH pipes to be installed inside the buildings shall be steel pipes with non-flammable mineral wool or other applicable insulation and non-corrosive metal plate protection cover, or pre-insulated steel pipes.

3.2.1. Pre-insulated pipes

The pipe material (pipes and fittings) shall be pre-insulated bonded pipe system for underground hot water networks. The pipe assembly shall be of steel service pipes, polyurethane thermal insulation and outer casing of high-density polyethylene.

The pre-insulated pipes, fittings, valves, other elements shall be manufactured in factory conditions.

The following European norms shall be met by the complete system:

- EN 253 Pre-insulated bonded pipes
- EN 448 Fittings assemblies
- EN 488 Valves assemblies
- EN 489 Joint assemblies

All pipes, fittings, valves and other equipment supplied for the distribution system shall be designed and approved for at least 16 bar working pressure, at least 25 bar testing pressure and 120°C continuous operating conditions with occasional peak temperature up to 140°C.

3.2.2. Quality assurance

The manufacturer shall operate a quality assurance system according to ISO 9001.

3.2.3. Service steel pipes

The steel service pipes shall be either welded pipe with a quality stated in ISO 9330-1 or seamless pipes with a quality stated in ISO 9329-1 (or equivalent).

The type of steel used for the pipes, fittings and other elements shall be P265GH according to European standards or Steel 20 (Сталь 20) according to GOST standards.

During manufacturing and prior to insulation, the outer surface of the pipe shall be cleaned so that it is free from rust, mill scale, oil, grease, dust, paint, moisture and other contaminants. This should preferably be achieved by sand blasting in order to obtain a clean surface and to ensure optimum adhesion between pipe and insulation.

The same requirements as for the straight pipes shall apply to pre-insulated elbows, T-pieces, fixed supports and other pre-insulated elements.

3.2.4. External casing pipes

The external high density polyethylene casing pipes shall follow the requirements of EN 253, including the quality of material, density, wall thickness, etc.

During manufacturing of the pre-insulated pipes and other elements and prior to foaming, corona-treatment shall be used for appropriate adhesion between the foam and the polyethylene jacket.

3.2.5. Dimensions of pre-insulated pipes and fittings

The steel service pipe diameters, minimum wall thicknesses and casing pipe diameters shall be according to the table below.

Nominal diameter DN	Steel service pipe dimensions		Casing pipe minimum outside diameter, mm
	Outside diameter*, mm	Minimum nominal wall thickness, mm	
20	26.9	3.0	110
25	33.7	3.0	110
32	42.4	4.0	125
40	48.3	4.0	125
50	60.3	4.0	140

65	76.1	4.0	160
80	88.9	4.0	180
100	114.3	4.0	225
125	139.7	5.0	250
150	168.3	5.0	280
200	219.1	6.0	355
250	273.0	6.0	450
300	323.9	6.0	500
350	355.6	6.0	560
400	406.4	7.0	630
450	457.0	7.0	630
500	508.0	8.0	710
600	610.0	8.0	800
700	711.0	9.0	900

*Note: Standard outside diameters according to GOST standards referring to the same DN sizes are also acceptable (e.g. for DN 100 both 114.3 mm and 108 mm outside diameters are acceptable).

3.2.6. Polyurethane rigid foam insulation (PUR)

The core density of the PUR shall be not less than 60 kg/m³. The thermal conductivity shall not exceed 0.028 W/m*K at 50°C.

The foam insulation must be produced without using CFC, HCFC or CO₂.

3.2.7. Joint assemblies

All joints shall comply with the requirements of EN 489.

The joints shall have a double-sealing design for maximum security against failing and shall have the possibility to be tested prior to foaming.

3.2.8. Leak detection system

The DH pipes shall be equipped with built-in leak detection wires, compliant to EN 14419:2009, which shall enable the systems to be monitored for moisture in the insulation and identification of the location of leaks.

The wires shall be connected to provide appropriate electric connection during the lifetime of the pipes. Soldering shall be used.

At the ends of the new pre-insulated pipe network segments the ends of the wires shall be available to be further continued / connected to a leak detection system / equipment.

The scope of the contract does not include supply of detection or location units.

3.2.9. Fittings

The pre-insulated fittings shall be prefabricated, with insulation and alarm wires, ready to be installed and compliant with EN 448.

The fittings shall correspond to the same requirements as described above for the straight pipes.

3.2.10. Shut-off valves

The shut-off valves shall be high quality modern steel ball valves of welded construction, designed for DH systems and for welded installation. The sealing of the valves shall not require any maintenance, adjustments or lubrication during operation.

Valves with sizes \geq DN200 shall be equipped with a gear box.

Tight class: EN 12266 class A

Body material: Carbon steel

Ball material: Stainless steel

Shut-off valves shall be made of materials with expected long service life. The valves shall ensure water tightness and reliable operation without any leaks or jamming.

Where the valves will be installed buried without chambers, the valves shall be pre-insulated, comply with the EN 488 and have manholes for operating the valves.

3.2.11. DH pipes through buildings

For installation of DH pipes through buildings (mostly – through basements of buildings) shall be used steel pipes with non-flammable mineral wool insulation (or other applicable insulation materials, approved by the Employer, and which meet the requirements for fire safety) and non-corrosive metal sheet protection cover.

The requirements for the steel pipes and fittings (quality of steel, dimensions, wall thickness, etc.) to be installed through the buildings shall be the same as described above for the steel pipes to be used within the pre-insulated pipes and fittings.

The heat transfer coefficient of the insulation shall be less than 0.041 W/m°C.

The thickness of pipe insulation shall be calculated to ensure the requirements according to the applicable norms and to minimize heat losses.

Pre-insulated pipes, corresponding to the fire-safety requirements, can also be used.

3.2.12. Underground SH, DHW and DHWRC pipes

In several cases (see Item 8 “Specific Object Information and Drawings”) underground SH, DHW and DHWRC pipes shall be installed from substations to neighboring buildings (where buildings, usually without basements or space for installation of a substation, shall be connected to a substation installed in another building).

For SH shall be used pre-insulated pipes (as described above for DH systems).

For DHW and DHWRC shall be used pre-insulated cross-linked polyethylene (PEX) pipes intended for DHW systems (maximum working temperature at least 90°C, PN10).

3.2.13. SH and DHW distribution systems in residential apartment buildings

The pipes to be used for the new SH and DHW distribution systems (for individual connection of apartments) shall be as follows:

SH horizontal pipes through basements, vertical risers through common areas, connections to the distribution boxes on each floor:

- Polypropylene pipes intended for heating systems with oxygen barrier (with internal aluminum layer), with maximum temperature at least 95°C, PN20,
- Carbon steel or Zink-galvanized steel.

The specific materials (from the list above) for the different parts of the SH distribution systems in buildings shall be agreed with the Employer.

DHW and DHWRC horizontal pipes through basements, vertical risers through common areas, connections to the distribution boxes on each floor:

- Polypropylene pipes intended for DHW systems, with maximum temperature at least 90°C, PN20.

The thickness of pipe insulation shall be calculated to ensure the requirements according to the applicable norms and to minimize the heat losses. The type of insulation materials and the thickness of the insulation shall be agreed with the Employer.



The shutoff valves to be used – ball valves.

The pipes to be installed through the common areas of the buildings – the risers and the pipes up to the distribution boxes on each floor shall be enclosed in prefabricated metal protection channels. The metal channels shall be Zink-galvanized or factory-painted.

4. Execution

4.1. General

4.1.1. Permits and approval by authorities

The Contractor shall be responsible for obtaining all permits and approvals from Moldavian authorities that are necessary for the performance of the Contract. The Contractor shall cover all costs for the permits applicable for his work. The Contractor shall comply with all design, construction, sanitary-hygienic, environmental, safety and other laws and regulations in force in the Republic of Moldova affecting the performance of the Contract.

The Contractor shall obtain, and cover the costs for, obtaining all permits, approvals and any other documents from Moldavian authorities, necessary for performing the design works, the installation works and any other activities under the Contract (including the necessary approvals and the State Expertise for the design), and shall arrange for applicable authority inspections.

In case certain permits/approvals are, according to the regulations, obtainable only by the Employer, the Contractor shall prepare the necessary documents and shall obtain the respective permits/approvals on behalf of the Employer. The costs for the permits/ approvals shall be paid by the Contractor. The Employer shall support the Contractor by providing the necessary power of attorney for this purpose or shall delegate a representative for resolving the formalities together with the Contractor.

Any additional materials and labor required to conform to any of these rules and regulations shall be furnished under the Contract by the Contractor at no additional cost to the Employer.

Prior to any execution and procurement, and prior to submission of design documentation to official authorities for approval and expertise (State Expertise), the Employer shall review and approve the design documentation and equipment selection.

4.1.2. Transportation and unloading

The Contractor shall be responsible for transportation, moving and temporary storage of all equipment included in the Contract.

The Contractor shall handle and store equipment in the proper manner to ensure that all materials and coatings are not damaged.

Contractor shall be responsible for the safety and integrity of the equipment and pipes during storage.

Substations, pipes and other equipment delivered shall be stored in a clean and dry area. Precautions should be taken to ensure that the equipment remains in good condition during storage.

4.2. Installation of DH pipes

4.2.1. General

The scope of works includes all civil / construction works, earthworks, mechanical works, etc. for installation of the new DH pipes.

The scope of works also includes demolition of any existing pipes and equipment. Old underground pipes can be left in the ground where the new pipe routing will differ from the old pipe routing.

The existing old pipes to be removed are typically: steel pipes with mineral wool insulation installed in underground concrete channels with removable covers; in some cases – aboveground pipes with mineral wool insulation with metal plate or cement-asbestos mortar cover.

Based on the design documentation to be developed, the Contractor shall select the necessary amounts of pipes, fittings, valves, supports and other elements for the DH networks to be installed.

The scope of works shall include warning and identification / marker tape for the DH pipes, to be placed in the backfilling.

4.2.2. Civil works for underground installation of DH pipes

The civil work for installation of DH pipes includes, but is not limited to:

- Obtaining all necessary approvals, preparing the site and performing existing excavation works;
- Preparation of the site;
- Cutting and removing of asphalt where necessary, transportation to disposal;
- Excavation works;
- Removing the existing pipes, fittings, valves (installed underground and/or aboveground) etc. and transportation to the Employer's storage facility (or other location indicated by the Employer);
- Transporting of the non-reusable soil and waste materials to disposal;
- Using the existing concrete channels for installation of the pre-insulated pipes as buried pipes (in sand layer without the concrete cover) or with the existing concrete covers to be applied (as agreed with the Employer); the channels shall be cleaned, repaired and adapted if/where necessary;
- Using existing (where available) or new concrete channels with covers where installation in channels is required by the norms (because of specific soil or other special conditions), the existing channels shall be repaired/adapted if/where necessary;
- Performing the necessary excavation for the buried installation of pre-insulated pipes where the existing routing will not be maintained, where new pipe routings will be used (and where concrete channels are not required);
- Cleaning and repairing the existing chambers if/where necessary;
- Supplying temporary bridges for passage, necessary fencing and marking of the works site;
- Supplying sand for sand-bed around the pipes and back-filling to the ground surface in accordance with the pipe manufacturer's typical trench section drawings and installation requirements and working design drawings;
- Backfilling and surface restoration, including restoration of asphalt, pavement, fertile soil, grass, and other types of surfaces;
- Core drilling of holes in building walls for pipe entrances, where necessary;
- Restoring and sealing of holes after pipe installation through building walls;
- Supply and installation of the pre-insulated pipes, fittings, shutoff valves, fixed supports, mobile supports, compensators, concrete channels (where necessary), drainage and air-release vales, etc.;

- Providing and maintaining signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work that may require attention. Also, reporting to / obtaining approvals from the police and the fire department for approval if necessary;
- Any other necessary works needed for a complete installation of DH pipes networks, restoration of the surfaces and territory arrangement, etc.

The method of partial digging of trenches where existing concrete channels with covers in good conditions are available can be used – to be agreed with the Employer. This shall include digging out segments of trenches, removal of old pipes (and pulling out the old pipes from the segments that were not dug out), installation of new pipes (including pushing of new pre-insulated pipes through the segments that were not dug out, without damaging the casing pipe), connection of the pipes, etc. The methods used shall exclude any damages to the pipes and casing and shall ensure that all the pipes are properly supported in the channels.

4.2.3. Mechanical work for installation of pipes

The pre-insulated pipes delivered by the pipe manufacturer shall follow EN 253 for straight pipes, EN 448 for pipe fittings, EN 488 for valves and EN 489 for joints.

The Contractor shall perform:

- Complete installation of the pre-insulated DH pipes in the ground and inside the outside wall of the buildings to be connected to the DH system;
- X-ray testing, pressure testing, installation of the sleeves and end-caps and foaming of the joints and end-caps;
- Installation and testing of the leak detection systems in the piping system; etc.

4.2.4. Leak detection system

The moisture detection wires shall be connected (using soldering) prior to foaming of the pipe joints. Specially calibrated tools shall be used for the wire joints. Each joint shall be mechanically tested by the installer to ensure proper connection. The wires position shall be fixed with spacing elements at the joint to prevent accidental contact with the steel pipe during the foaming of the sleeve.

The Contractor shall perform all jointing of the wires to form a complete surveillance system and commissioning of the system. The insulation of the system shall be verified by using a Megger with 1 000 V. The insulation resistance shall be $> 200 \text{ M}\Omega$.

4.2.5. Installation of joint-sleeves

The installation of sleeves for the DH pipes shall be carried out in accordance with the specifications provided by the manufacturer of the DH pipes and sleeves and shall ensure a correct joint. Work shall not be done during wet weather or too strong winds without using a protection tent. The joints shall ensure water-tightness of the piping system.

4.3. Installation of substations and piping in buildings

4.3.1. Installation of prefabricated substations

The substations shall be installed so that they are accessible for inspection, operation and maintenance. Sufficient space shall be provided for access to equipment.

The prefabricated substation units and other equipment (such as expansion tanks) shall be installed on appropriate foundations and supports.

Measures shall be taken to minimize noise and vibration, to ensure silent operation of the equipment and to exclude propagation of any vibration through the building or systems. Anti-vibration elements and fittings shall be installed to prevent propagation of vibration.

Other requirements for installation of substations, described earlier in this Section, "Employer's Requirements" shall be followed.

4.3.2. Installation of pipes in basements of buildings and in the substation rooms

The Contractor shall plan and install all pipe runs to fit neatly into the space available with due consideration to other services and systems, installations and equipment and to allow access for maintenance purposes.

Pipes shall, if installed on the floor, be equipped with a step-over (cat-walk) made of steel.

All pipe work shall be free from burns and shall be thoroughly cleaned before erection. Butt ends of pipe shall be reamed out to their original bore before fitting. Ends of pipe left open during installation shall be sealed with proper plugs or caps.

Parallel horizontal pipe runs must have their supports (including any insulation) at a common level. Horizontal runs shall have a slight gradient to facilitate venting and draining of the system.

Reduction of pipe sizes shall be carried out with reducing tees, reducers or sockets. Bushing down will not be accepted. Horizontal pipes shall have eccentric fittings to maintain a linear bottom surface. Vertical pipes may have concentric fittings.

The Contractor shall allow free space for pipe expansion and contraction in the layout. Supports and hangers must allow space for the necessary movements of the pipes and, if needed, expansion loops and fittings shall be included in the piping.

4.3.2.1. Pipe sleeves

In all cases where pipes pass through walls, floors, ceilings, etc. metal sleeves shall be inserted in the building structure. The sleeves shall have a diameter one dimension larger than the pipe, or in case of insulated pipes, one size larger than the finished insulation.

4.3.2.2. Pipe hangers and supports

Pipe hangers and supports shall be premanufactured galvanized. Unfinished carbon steel supports shall be painted accordingly.

Pipe supports shall be provided on both sides of equipment that will be serviced and maintained, i.e., pumps, strainers, etc. The equipment shall allow dismantling without leaving the piping hanging loose.

Anchoring of pipes shall be according to the manufacturer's recommendations.

The use of perforated bands or wire chain as hangers is not acceptable.

Support clamps for pipes and riser clamps shall be premanufactured and installed as per the manufacturer's recommendations.

4.3.2.3. Drainage and air venting of systems

The Contractor shall provide drainage and venting for all installations. The drain points shall be located at low points in the installation. Drains shall have hose connections enabling draining to the nearest floor drain.

Venting of pipes shall be arranged for manual and automatic operation. For manual air venting, a welded valve on top of the pipe subject to venting shall be arranged, routed along the nearest wall or column down to approximately one meter where a ball valve shall be installed. The outlet from the valve shall continue down to 400 mm above the floor and be capped with a threaded plug.

Automatic air release valves shall be installed together with shut-off valves for service and maintenance without the need for system draining.



4.3.3. *Painting*

Prior to mounting the insulation, the steel pipes, fittings, flanges and weld necks shall be cleaned and painted with a 40 µm layer zinc dust corrosion protective paint and one 80 µm layer of surface finish vinyl- or acryl color paint. The corrosion protective paints shall be applied in accordance with the paint manufacturer's instructions and in accordance with good practice for paintwork.

The paintwork includes that on all steel installations, pipes and equipment, supports, fixtures, hangers and accessories, etc. which are not surface finished from the factory/assembling plant. The colors shall be approved by the Employer.

All painting shall be carried out prior to commencing insulation.

4.3.4. *Insulation and insulation cover*

The insulation shall be carried out with due consideration to access to field instrumentation. All equipment which is possible to inspect or dismantle shall be insulated with removable insulation.

The insulation materials must not contain components which may decompose in case of insulation becoming wet. The operation temperature shall be taken into account.

Pipe insulation shall be fastened with hot-galvanized steel bands (insulation > 200 mm) or wires.

Due consideration shall be given to the design of the protective cover at locations in which the pipe is moving, i.e. directional changes, L or U shaped expansion loops, branch points, etc.

Parts subject to high temperature shall be protected from human touch.

Piping of the primary and secondary side of a substation shall be insulated. Short pipe sections (less than 100 mm) that do not present a hazard to operating and maintenance staff do not require insulation.

Pipes connecting the substation to the systems shall be insulated.

The insulation cover (non-corrosive metal sheet) shall be installed by professional journeymen.

4.3.5. *Equipment and pipe marking and identification*

All installed equipment shall be provided with text signs which clearly describe their function and operation.

All valves, pumps, etc. shall have an identification tag made of plastic with an engraved number. The numbering system shall be agreed with the Employer

Pipe identification shall be applied as plastic bands with flow direction and system name at each end and every 10 meters and minimum one identification in each room. The system names shall be in Romanian and according to a specification agreed with the Employer.

The labeling system shall be systematically developed and agreed with the Employer.

The Contractor shall install in each substation room (on the wall) a schematic of the respective substation, enclosed in plastic, readable size (not less than A2 format). The schematic shall reflect the equipment identification/tagging used for the equipment and pipes.

4.3.6. *Works for electrical systems*

4.3.6.1. *Cable installation*

All cable installations shall be neat and well-arranged for easy service and maintenance and be in accordance with "good workmanship".

Cables shall fulfill IEC codes and shall be rated according to the application. Cables shall run in parallel with the structural lines of the constructions and shall be supported along their full lengths by proper cable support facilities designed for this purpose, e.g. cable trays or cable ladders. All cables shall be fixed by cable elates of an approved type in such a manner that no undue strain is

put upon them. Directional changes must be made in accordance with the cable manufacturer's guidelines.

Cables shall be laid in one continuous length. No splicing or joints will be permitted other than in junction boxes. Cable entries to cabinets must be provided with properly designed and sized cable glands to maintain the class of enclosure protection.

All cables must be labeled at both ends.

All cables must be terminated in terminal blocks with only one core in each terminal. Spare cores shall also be terminated. The terminal blocks shall be designed for the size and type of the cable core terminated.

Power cables for connection of motors to VSDs shall be shielded cables.

Power cables shall be rated to accommodate any starting currents.

Power cables and signal/control cables must be routed so that electromagnetic, noise disturbance, etc. is prevented from being transmitted to the signal/control cables.

Signal/control cables shall be installed to avoid interference from power cables.

All cables to be used shall have copper wires.

4.3.6.2. Earthing for power system

The electrical systems shall include protection earthing wires, to be connected to the electrical equipment.

It is the responsibility of the Contractor to provide appropriate protection earthing and secure earth impedance ($< 0.1 \text{ Ohm}$) for correct and safe operation of the equipment.

Earth fault breakers shall be installed where necessary. Under all conditions, the time of automatic disconnection of the faulty circuit shall be \leq one second.

Additional earth connecting points that may be required to guarantee safe disengagement of the equipment in case of earth faults and in general fault-free operation of all equipment and installations shall be established.

4.4. Welding and testing of welds

4.4.1. Qualification of welders

Welding shall be carried out by welders certified by Moldovan authorities for pressure vessels and welding of DH pipes.

All welds in heating pipes shall be permanently marked with the welders' identification.

The Contractor shall furnish the welder's qualifications to the Employer.

4.4.2. Non-destructive testing of piping welds

Moldovan norms for welding, inspection and testing of welds shall be followed;

Radiographic or other equivalent non-destructive inspection / testing shall be performed by the Contractor in the presence of the Employer representative on 100% of the welds, on the total weld length.

4.5. Pressure testing

These pressure testing requirements applies to both DH pipes, DH substations and the new SH and DHW (including DHWRC) distribution systems in buildings.

Pressure testing shall be carried out prior to painting and insulation of pipes and installations in buildings and prior to sealing and foaming of joints in outside DH pipes.



- Test pressure shall be in accordance with Moldovan regulations, but not less than 1.3 x system design pressure (at least 21 bar for DH systems and the DH side of the substations, and at least 13 bar for secondary side of the substations);
- 24 hours written notice of the date for tests shall be given;
- Work shall only be insulated or concealed after testing and approval by the Project Manager;
- Tests shall be conducted in the presence of the Project Manager;
- Costs for re-testing and making good shall be borne by the Contractor;
- General: test pressure shall be maintained without loss for two hours, unless otherwise specified;
- Hydraulic test of piping systems shall be carried out according to relevant norms and regulations;
- Prior to tests, all equipment or other parts that are not designed to withstand test pressures or test medium shall be isolated. Existing systems of the buildings shall be isolated prior to pressure test;
- Pressure and leak test reports signed by the Construction Manager shall be delivered prior to Completion.

5. Documentation

The complete documentation shall be delivered in two copies.

5.1. DH Pipes

The Contractor shall provide the design and other technical documentation in the Romanian language, including but not limited to:

- Technical documentation for the equipment with specifications of the materials used, including their types/grades and chemical compositions of metals and/or alloys used for manufacturing of pipes and other components;
- Certificates of conformity;
- Complete design documentation with necessary approvals and Expertise/verification;
- As-built drawings;
- Design (including all necessary schematics) of the leak detection system;
- Complete installation manuals;
- Complete operating manuals;
- Maintenance and repair manuals with specification of regular works, their scopes and terms;
- Minutes from tests;
- Other documents required according to the Moldovan legislation.

5.2. DH Substations

The Contractor shall provide the design and other technical documentation in the Romanian language, including but not limited to:

- Technical documentation for the equipment with specifications of the materials used, including their types/grades and chemical compositions of metals and/or alloys used for manufacturing the principal components;
- Complete design documentation with necessary approvals;
- Complete design documentation from the manufacturer for the prefabricated substations, including schematics, equipment specification, layout drawings, detailed electrical schematics, minutes from factory tests, etc.;
- As-built drawings;
- Technical documentation for the data transmission systems;
- Technical “passport” of the equipment;
- Complete installation manuals;
- Complete operating manuals;
- Maintenance and repair manuals with specification of regular works, their scopes and terms;
- Necessary documents and certificates for the meters;
- Other documents required according to the Moldovan legislation.

5.3. New SH and DHW distribution systems for residential buildings

The Contractor shall provide the complete design and other technical documentation for the SH, DHW (including DHWRC) and CW distribution systems for residential apartment buildings, including:

- The design of the new SH, DHW, DHWRC and CW pipes through the basements, starting from the DH substations and from the connection points to the CW system;
- The design of the new SH, DHW, DHWRC and CW risers through the common areas of the buildings;
- The design of the distribution boxes for each floor, including the SH, DHW and CW meters for each apartment/customer and all the other necessary elements;
- The design of the optimal pipe routing from the distribution boxes to each apartment on the respective floor.

The documentation shall be in the Romanian language.

6. Training activities

The Contractor shall organize, within the scope of the contract, training activities, involving qualified specialists.

The training activities shall cover all systems supplied within the Contract including the DH pipes with moisture detection systems, the DH substations, control, data transmission and monitoring systems.

The maintenance and operation personnel of the Employer and of the connected buildings shall receive sufficient training prior to the commissioning. It is the Contractor’s duty to arrange for and plan the training activities and have the training program approved by the Project Manager. The training activities shall take place at the respective objects.



As part of the training, the Contractor shall conduct problem solving exercises of trouble-shooting and guidance related to the new equipment and systems with the aim of ensuring that the Plant is operating smoothly and at optimal performance.

7. Inspections, Testing, Precommissioning, Commissioning and Guarantee Tests

7.1. General

The Contractor shall carry out all necessary adjustments of the Plant to ensure optimum operation, ensuring the required parameters, under all possible operating conditions.

The Contractor shall conduct all tests required to ensure that the Plant shall conform to these Employer's Requirements and is in compliance with the requirements of applicable codes and standards.

In the substation rooms, the noise level from the equipment shall be low and there shall be no vibrations propagating from the equipment. There shall be no noise or vibrations from the substations or other equipment in the rooms adjacent to the substation rooms. The noise and vibration levels from the equipment shall be measured and recorded. The noise levels shall be documented in the test reports.

In general, the inspections, testing, precommissioning, commissioning and the Guarantee Test shall establish that:

- The Plant is complete with all equipment, facilities, etc. in compliance with the Contract, the norms and regulations;
- The equipment is new, not damaged and is fully functional and can operate and be controlled as required;
- The Plant has been properly constructed;
- The Plant can be operated in a stable and safe manner, in automatic operation modes as prescribed, with all user-adjustable settings available, ensuring the required operating parameters, functionality, etc., and that the equipment, where appropriate, can operate in all possible DH operating conditions at the object during the year, at both upper and lower limits regarding voltage, pressures, temperatures, capacities, etc.

The SH and DHW functions, the control, safety, protection, metering, alarm, data transmission, etc. systems shall be tested and shall operate as required.

All the activities – inspections, tests, acceptance procedures, precommissioning and commissioning activities shall be performed according to the Moldovan norms and regulation and in accordance to the requirements of the present document.

The activities shall include the following acceptance procedures, as required by and described in the Moldovan norms and regulations:

- Acceptance upon completion of works (Recepție la terminarea lucrărilor); and
- Final acceptance (Recepție finală).

7.2. Inspections

All inspections required to be performed by the supervision authorities shall be carried out. The Contractor shall organize for the respective inspections to be carried out.

7.3. Testing

All the necessary testing activities shall be performed for the substations and the piping systems, including hydraulic / pressure tests, testing of the electricity and control systems, testing all the functions, capacities of the substations, etc.

7.4. Precommissioning and Commissioning

7.4.1. Precommissioning plan and checklist

Precommissioning shall be performed according to Moldovan norms and regulations for such activities, as well as in accordance with the provisions of the Contract.

All project components shall be precommissioned according to a coordinated plan that shall be prepared by the Contractor and submitted for approval by the Employer prior to Precommissioning.

The Contractor shall prepare in advance detailed checklists of activities to be undertaken during Precommissioning. The checklists shall be in compliance with equipment manufacturers' instructions/guidelines and applicable norms and regulations and shall be submitted to the Employer at least two weeks in advance of the planned Precommissioning, together with such instructions/guidelines referred to.

Such checklists shall be applied for Precommissioning of each specific installation and during the course of Precommissioning each particular activity shall be duly marked/commented by the person in charge and the Employer and all checklists shall be signed by both parties. All the technical documentation shall be prepared and submitted to the Employer.

7.4.2. Precommissioning

7.4.2.1. Precommissioning of the main and auxiliary equipment

Prior to Precommissioning, each substation shall have a principle schematic readable size (not less than A2 format), in plastic cover in an appropriate location within each substation room. Identification numbers shall comply with the component tags.

Prior to Precommissioning, all the system drawings for the DH pipes shall be provided to the Employer. The drawings shall contain all information on the piping system, including situation plan, trench sections, pipe sizes, type, etc.

The systems shall be filled with chemically cleaned, softened and deaerated water (from the DH system).

Precommissioning of substations shall comply with all relevant national standards, rules and regulations.

Precommissioning of the substations includes the following procedures:

7.4.2.2. Preparatory works

- Organizational and preparatory design works; clarification of design data based on local conditions and inspection results;
- Verification of the quantity, technical parameters and complete arrangement of the substations equipment for compliance with the design;
- Fulfillment of proving thermal engineering calculations for clarification of load and operation mode parameters;
- Check of the process and auxiliary flows, main characteristics of equipment and its components, pipe layouts, diameters, inclinations, valves for compliance with requirements of national rules, codes and manufacturer's instructions; check of control



systems and instruments for compliance with the requirements of all relevant regulations;

- Preparing the list of all violations and deviations of the rules and regulations; working out proposals and recommendations on remediation of these deviations.

7.4.2.3. Individual tests

- Item-by-item inspection of installation workmanship;
- Individual equipment tests according to the Moldovan construction codes (e.g., hydraulic tests);
- Safety systems and valves inspection and tests (e.g., opening pressure of safety valves is checked);
- Preparation of the list of all violations and deviations of the rules and regulations; working out proposals and recommendations on elimination of these deviations.

The defects and faults, as well as the equipment defects discovered during the individual tests, should be eliminated prior to start-up works.

Minutes of all pressure testing shall be provided to the Employer.

The Contractor shall prepare a report on Precommissioning of each specific installation, including copies of the completed checklists from Precommissioning. The report shall be provided in two copies in English and two copies in the Romanian language.

Precommissioning is considered completed only when the above-mentioned checklist has been completed and all items have been approved by both parties and all other conditions referred to precommissioning, specified in the Contract are satisfied.

The Contractor shall bear all the costs of Precommissioning. The costs for electricity, water and consumables shall also be borne by the Contractor.

7.4.3. Works prior to Commissioning

Prior to Commissioning, all adjustments and tests of equipment, units and installations shall have been satisfactorily completed, all pipes and strainers, etc. shall have been cleaned and all electrical installations and control and instrumentation shall have been connected.

7.4.4. Commissioning plan and checklist

Prior to Commissioning, the commissioning plan for the Plant (DH pipes, substations, etc.) shall be submitted to the Employer for approval.

The Contractor shall prepare in advance detailed checklists of activities to be undertaken during Commissioning. The checklists shall be in compliance with equipment manufacturers' instructions/guidelines and applicable norms and regulations and shall be submitted to the Employer at least two weeks in advance of the planned Commissioning together with such instructions/guidelines.

Such checklists shall be applied for Commissioning and during the course of Commissioning each particular activity shall be duly marked/commented by the person in charge and the Employer and all checklists shall be signed by both parties. All the technical documentation shall be prepared and submitted to the Employer.

Commissioning shall be performed according to Moldovan norms and regulations for such activities, as well as in accordance with the provisions of the Contract.

7.4.5. Commissioning

The Contractor, in co-operation with the Employer and under the Employer's responsibility, shall conduct Commissioning. The Employer shall provide operators for trial run. The Contractor shall appoint a qualified person to advice during Commissioning who shall be on site during Commissioning.

Representatives of relevant authorities shall be invited as appropriate.

The Contractor shall provide and install all required instruments and tools for carrying out Commissioning in order to ensure the safe and stable operation of the Plant.

Before the commissioning activities, all the internal heating systems shall be flushed, filled, air vented, heated to highest possible temperature and vented at all high points with the circulation pump shut-off. The process shall be repeated as necessary. Normal operation of the existing internal heating systems with the new substations shall be verified.

All functions and parameters shall be verified (for the substations, leak detection systems, etc.). Various failure situations (e.g. pump failure, power failure, etc.) situations shall be verified.

Set values for the controllers shall be recorded in the minutes.

Noise from pumps, control valves or other equipment shall be addressed in the minutes.

The leak detection systems shall be commissioned in the presence of the Employer and shall include verification of all resistances of the leak detection wires. The results shall be recorded in minutes and included on the distribution system layout drawings.

Control and alarm panels functions shall be verified.

7.4.5.1. Start-up works

Start-up works shall include, but shall not be limited to:

- Development and agreement with the Employer and corresponding inspecting organizations of the start-up works program and schedule;
- Employer's staff briefing in the equipment maintenance methods;
- Start-up of the substations equipment;
- Pre-adjustment of the heating water flow to the consumers (adjustment of pumps operation mode);
- Supervision of operation condition and response of all equipment units at idle work, supervision of load preset by the Employer for complex test of equipment;
- Preparation of a list of all defects and omissions revealed in the process of start-up of the equipment and utilities lines; working out proposals and recommendations on elimination of these defects.

All defects and omissions revealed in the process of start-up, shall be eliminated prior to trial run.

As soon as the individual substation or any part thereof has been completed operationally and structurally, the Contractor shall notify the Employer in writing.

7.4.5.2. Trial run

All the substations equipment shall be adjusted and tuned before a trial run. Adjustment and tuning of the measuring and control equipment shall be carried out at the same time as the trial run.

The purpose of the trial run is to demonstrate that the substation can be operated by the local automatics and all installation works have been fulfilled properly and the substation is completely ready for operation.

The trial run durability shall not be less than two days (48 hours). The last 24 hours should be uninterrupted operation. If any interruptions take place due to the Contractor, the above mentioned continuous trial run shall be started again.

During the continuous trial run, all control, metering, protecting and alarm systems and devices shall be switched on and operate properly. In case of any malfunction, the trial run shall be interrupted and started again after the malfunction is repaired.

Start and end of trial run is evidenced at site with a protocol signed by the Employer and Contractor.

After all trial runs are completed and all the defects are eliminated, the Contractor shall inform the Employer by sending a corresponding notification in writing.

Trial run shall include, but shall not be limited to:

- Determination and agreement with the Employer of the program and schedule of the trial run of the equipment;
- Employer's personnel briefing on the equipment operation methods;
- Controller programming for designed load, tuning/adjustment of the substations control system for operation at the designed temperatures;
- Supervision of operation of all items of the equipment, its components, elements and service lines at the preset rate;
- Test of the equipment under load according to the requirements of relevant regulations, rules and codes at the rate designed or set by the Employer (pressure drop and temperature fluctuations of the heating water nominal flow are measured in the primary and secondary circuits of heat exchangers; control equipment is tested: operation under power failure, operation of the timer, etc.);
- Preparation of the Trial run Report.

After Commissioning, the Plant shall be able to operate automatically and fulfill all the requirements stipulated in the Contract.

All design documentation, drawings, electrical diagrams, detailed data sheets, etc. shall be available on site during Commissioning.

The Contractor shall prepare a report on Commissioning, including copies of the completed checklists from Commissioning. The report shall be provided in two copies in English and two copies in the Romanian language.

7.5. Guarantee Test

For the substations, the Contractor shall provide the following Functional Guarantees:

- The necessary capacities corresponding to the heat loads for SH, ventilation and DHW for each building;
- Static and dynamic performances and ensuring the temperature conditions/regimes in accordance with the requirements of this Section, "Employer's Requirements";
- Appropriate automatic operation of all of the equipment, control systems, metering, data transmission, etc.

7.5.1. Guarantee test

The Guarantee Test shall verify the compliance of the Facilities to the Functional Guarantees.

The Guarantee Test shall be performed according to Moldovan norms and regulations for such activities, as well as in accordance with the provisions of the Contract.

The Guarantee Test shall be conducted over the entire range of operation of the Plant. All the functions and the capacities of the substations shall be tested.

All the necessary measurements shall be performed, including temperatures, flows, loads and other relevant parameters.

The pressure tests of the piping systems and substations shall have been successfully performed and minutes of the tests developed and signed.

The Guarantee Test shall be performed in the presence of the Employer and relevant authorities.

The Contractor shall prepare a report on the Guarantee Test. The report shall be provided in two copies in English and two copies in the Romanian language.

The exact time and detailed conditions of the Guarantee Test shall be agreed between the Employer and the Contractor.

The Guarantee Test shall be performed over a period of time necessary to test the necessary parameters and capacities. The Guarantee Test shall be performed during the heating season when there is enough heat consumption. If the Guarantee Test cannot be finalized because of insufficient heat load (i.e. due to insufficiently cold weather) such tests shall be postponed and performed later during the heating season.

The temperature at the DHW output of the substations shall be set to 55°C. The capacity shall be tested at maximum DHW flow.

For additional details see Section IX "Contract Forms", Appendix 8 "Functional Guarantees".

The commissioning activities shall not be considered to be completed until such Test has been performed successfully.

8. Specific Object Information and Drawings

The specific Object information includes:

- Drawings, reflecting the DH pipes (in some cases also external SH, DHW and DHWRC pipes) to be reconstructed/installed within the Contract and the indicative location of the substations to be installed in each building;
- The heat loads of the buildings and other information for the buildings (number of floors, number of entrances and apartments in residential buildings);
- Other specific information.

Items 8.1.1. – 8.1.19. below include the specific Object information and drawings for Lot 1.

Items 8.2.1. – 8.2.34. below include the specific Object information and drawings for Lot 2.

Item 8.3. includes the Principle Schematic for the DH substations (IHSs), relevant for both Lot 1 and for Lot 2.

Item 8.4. includes the conceptual Schematic for the new SH and DHW distribution systems for residential buildings, relevant for both Lot 1 and for Lot 2.

8.1. List of Objects, specific Object information and drawings for Lot 1

Object	IHS No.	Address



Object 1.1	S1-1	str. Calea Ieșilor, 11
	S1-2	str. Ion Neculce 1/2 s. 1
	S1-3	str. Ion Neculce, 1/2 s.2
Object 1.2	S1-4	str. Sportivă, 8, (Kindergarten)
	S1-5	str. Ion Neculce, 1
	S1-6	str. Ion Neculce, 3
	S1-7	str. I.Neculce, 3/2 + P.Stefanuca,12
	S1-8	str. Ion Neculce, 5 s.1
	S1-9	str. Ion Neculce, 5 s.2
	S1-10	str. E.Coca, 30a + E.Coca, 30b
	S1-11	str. E.Coca, 28 bl.A (Admin. building)
	S1-12	str. E.Coca, 28 bl.B (Admin. building)
	S1-13	str. E.Coca, 28 bl.C (Admin. building)
Object 1.3	S1-14	str. Ion Neculce, 7
	S1-15	str. Ion Neculce, 9
	S1-16	str. Lisabona, 8 (Kindergarten)
	S1-17	str. Ion Neculce, 11
	S1-18	str. Ion Neculce, 59 (Tennis School)
Object 1.4	S1-19	str. Calea Ieșilor, 13 s.1
	S1-20	str. Calea Ieșilor, 13 s.2
	S1-21	str. Milano, 10 (Admin. building)
	S1-22	str. Milano, 2
Object 1.5	S1-23	str. Calea Ieșilor, 21 (Lyceum)
	S1-24	str.Calea Ieșilor, 23 s.1
	S1-25	str.Calea Ieșilor, 23 s.2
	S1-26	str.27 Martie 1918, 3
Object 1.6	S1-27	str.Calea Ieșilor, 49 a (Dormitory)
	S1-28	str.Calea Ieșilor, 49 b (Dormitory)
	S1-29	str.Calea Ieșilor, 49 g (Dormitory)
	S1-30	str.Calea Ieșilor, 49 v (Dormitory)
	S1-31	str.Calea Ieșilor, 51/1
	S1-32	str.Calea Ieșilor, 51/2
	S1-33	str.Calea Ieșilor, 51/3 s.1
	S1-34	str.Calea Ieșilor, 51/3 s.2
	S1-35	str.Calea Ieșilor, 51/4
	S1-36	str.Calea Ieșilor, 51/5
	S1-37	str. Drumul Crucii, 100
	S1-38	str. Drumul Crucii, 101 s.1
	S1-39	str. Drumul Crucii, 101 s.2
	S1-40	str. Drumul Crucii, 95
	S1-41	str. Drumul Crucii, 95/2
	S1-42	str. Drumul Crucii, 96
	S1-43	str. Drumul Crucii, 97/1
	S1-44	str. Drumul Crucii, 97/2 s.1
	S1-45	str. Drumul Crucii, 97/2 s.2
	S1-46	str. Drumul Crucii, 98 s.1
	S1-47	str. Drumul Crucii, 98 s.2
S1-48	str. Drumul Crucii, 99	
S1-49	str. Drumul Crucii, 99/4 (Kindergarten)	
Object 1.7	S1-50	str.Calea Ieșilor, 55 s.1
	S1-51	str.Calea Ieșilor, 55 s.2
	S1-52	str.Calea Ieșilor, 55 s.3
	S1-53	str.Calea Ieșilor, 55/2 s.1
	S1-54	str.Calea Ieșilor, 55/2 s.2
	S1-55	str.Calea Ieșilor, 55/2 s.3
	S1-56	str.Calea Ieșilor, 55/2 s.4
	S1-57	str.Calea Ieșilor, 55/2 s.5
	S1-58	str.Calea Ieșilor, 57/2 (Kindergarten)
	S1-59	str.Calea Ieșilor, 59/1 s.1
	S1-60	str.Calea Ieșilor, 59/1 s.2

	S1-61	str.Calea leșilor, 59/1 s.3
	S1-62	str.Calea leșilor, 61/1 s.1
	S1-63	str.Calea leșilor, 61/1 s.2
	S1-64	str.Calea leșilor, 61/4
	S1-65	str.Calea leșilor, 61/5
	S1-66	str.Calea leșilor, 61/6
	S1-67	str. Țărinei, 107
	S1-68	str. Țărinei, 107/1
	S1-69	str. Țărinei, 107/2
	S1-70	str. Calea leșilor, 63/1
Object 1.8	S1-71	str. Calea leșilor, 69+69/1
	S1-72	str. Calea leșilor, 69 v
	S1-73	str. Calea leșilor, 69 a
	S1-74	str. Calea leșilor, 69 (Admin.building)
Object 1.9	S1-75	str. Calea leșilor, 41 a
	S1-76	str. Calea leșilor, 41 b
	S1-77	str. Calea leșilor, 43/1
	S1-78	str. Calea leșilor, 47/2 s.1
	S1-79	str. Calea leșilor, 47/2 s.2
	S1-80	str. Calea leșilor, 47/2 s.3
	S1-81	str. Bariera Sculeni, 2/1
	S1-82	str. Bariera Sculeni, 2/2
	S1-83	str. Calea leșilor, 45
	S1-84	str. Calea leșilor, 47
Object 1.10	S1-85	str. Calea leșilor, 19 s.1
	S1-86	str. Calea leșilor, 19 s.2
	S1-87	str. Calea leșilor, 17
	S1-88	str. Calea leșilor, 15
	S1-89	str.Truseni, 3 (Lyceum)
	S1-90	str.Calea leșilor, 19/2 (Kindergarten /school)
Object 1.11	S1-91	str. Calea leșilor, 37
	S1-92	str. Calea leșilor, 39
Object 1.12	S1-93	str. Caragiale, 1 (Center of family doctors)
	S1-94	str. Caragiale, 2 (Diagnostics Center)
Object 1.13	S1-95	str. Bucureiei, 12 a (Admin. building)
	S1-96	str. Bucureiei, 14 (Greenhouse)
Object 1.14	S1-97	str. Bucureiei, 14 (Admin. building)
Object 1.15	S1-98	str. Mitropolit Dosoftei, 156
	S1-99	str. Mitropolit Dosoftei, 115
Object 1.16	S1-100	str. I. Creangă,1 bl.A
	S1-101	str. I. Creangă,1 bl.B
	S1-102	str. I. Creangă,1 bl.C
	S1-103	str. I. Creangă,1 bl.D
	S1-104	str. I. Creangă,1 bl.E
	S1-105	str. I. Creangă,1 bl.F
	S1-106	str. I. Creangă,1 bl.G
Object 1.17	S1-107	str. Mesager, 2
	S1-108	str. Mesager, 7
Object 1.18	S1-109	str. Iablocichin, 5 (University)
	S1-110	str. Iablocichin, 5 a
Object 1.19	S1-111	str. Mesager, 5/1 (Dormitory)
	S1-112	str. Mesager, 5/2 (Dormitory)
	S1-113	str. Mesager, 5/3
	S1-114	str. Mesager, 5/4
	S1-115	str. Mesager, 5 (bl. A)
	S1-116	str. Mesager, 5 (bl. B)
	S1-117	str. Mesager, 5 (bl. V)
	S1-117	str. Mesager, 5 (Archive)

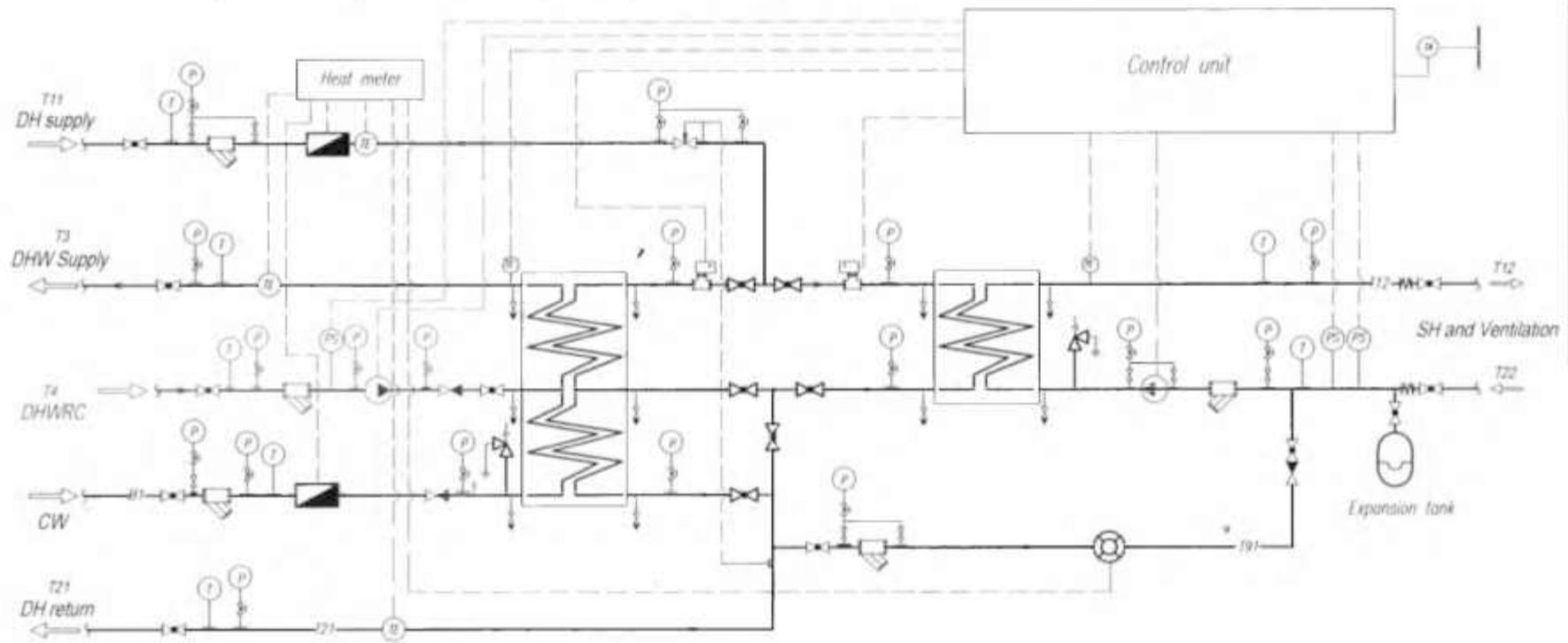
8.2. List of Objects, specific Object information and drawings for Lot 2

Object	IHS No.	Address
Object 2.1	S2-1	str. N. Testemițanu, 29/2
Object 2.2	S2-2	str. N. Testemițanu, 11
	S2-3	str. N. Testemițanu, 13
	S2-4	str. N. Testemițanu, 13/1 (Dormitory)
	S2-5	str. N. Testemițanu, 13/2
Object 2.3	S2-6	șos. Hincești, 22 a
	S2-7	șos. Hincești, 22 b
	S2-8	șos. Hincești, 20 sec. 1
	S2-9	șos. Hincești, 20 sec. 2
	S2-10	șos. Hincești, 20 sec. 3
	S2-11	șos. Hincești, 24 (Kindergarten)
	S2-12	str. V. Dicescu, 47
	S2-13	str. V. Dicescu, 49
Object 2.4	S2-14	str. Soroceanu, 40 (Kindergarten)
	S2-15	str. Soroceanu, 42 (Kindergarten)
Object 2.5	S2-16	str. Nistor, 28 b
Object 2.6	S2-17	str. G. Cașu, 2/8
	S2-18	str. G. Cașu, 20/1
	S2-19	str. G. Cașu, 20/2
	S2-20	str. G. Cașu, 20/3
	S2-21	str. G. Cașu, 20/4
	S2-22	str. G. Cașu, 32 (USM, bl.5)
	S2-23	str. G. Cașu, 32 (Dormitory)
	S2-24	str. G. Cașu, 32 (Dormitory)
	S2-25	str. G. Cașu, 32 (Garage)
	S2-26	str. N. Testemițanu, 6 (USM, bl.6)
Object 2.7	S2-27	str. A. Cosmescu, 3, bl.A
	S2-28	str. A. Cosmescu, 3, bl.B
	S2-29	str. A. Cosmescu, 3, bl.Z+Garage
	S2-30	str. A. Cosmescu, 3, Virusology
Object 2.8	S2-31	str. N. Testemițanu, 27
	S2-32	str. N. Testemițanu, 25
Object 2.9	S2-33	str. Mitr. G. Grosu, 4 (Lyceum)
Object 2.10	S2-34	str. Lomonosov, 47
Object 2.11	S2-35	str. Sprincenoaia, 1/1
Object 2.12	S2-36	str. L. Kaczynski, 2/1
	S2-37	str. L. Kaczynski, 2/2
	S2-38	str. L. Kaczynski, 2/3
	S2-39	str. L. Kaczynski, 2/4
	S2-40	str. L. Kaczynski, 4 (Lyceum)
Object 2.13	S2-41	str. Gh. Cașu, 37 (Hospital)
	S2-42	str. Gh. Cașu, 37 (Hospital)
Object 2.14	S2-43	str. Miorița, 14
	S2-44	str. Miorița, 10
	S2-45	str. Miorița, 12 (reconstructed)
Object 2.15	S2-46	str. Hincești, 2/1, sec.1
	S2-47	str. Hincești, 2/1, sec.2
	S2-48	str. Hincești, 2 (+ restaurant)
	S2-49	str. V. Dicescu, 45
Object 2.16	S2-50	str. Muncești, 52
	S2-51	str. Muncești, 54
	S2-52	str. Muncești, 56
Object 2.17	S2-53	Decebal, 1, s.1 (Dormitory)
	S2-54	Decebal, 1, s.2 (Dormitory)
	S2-55	Decebal, 2

	S2-56	Decebal, 2/1
	S2-57	Decebal, 3
Object 2.18	S2-58	str. Cuza Vodă, 3 (Dormitory, s.1)
	S2-59	str. Cuza Vodă, 3 (Dormitory, s.2)
	S2-60	str. Cuza Vodă, 3 (Dormitory, s.3)
Object 2.19	S2-61	str. Cuza Vodă, 18
Object 2.20	S2-62	str. V. Pîrcălab, 23 (Polyclinic)
Object 2.21	S2-63	str. Cuza Vodă, 15/1, sec.1
	S2-64	str. Cuza Vodă, 15/1, sec.2
	S2-65	str. Cuza Vodă, 15/1, sec.3
Object 2.22	S2-66	bd. Dacia, 49/1, sec.1
	S2-67	bd. Dacia, 49/1, sec.2
	S2-68	bd. Dacia, 51
	S2-69	bd. Dacia, 51/1, sec.1
	S2-70	bd. Dacia, 51/1, sec.2
	S2-71	bd. Dacia, 51/1, sec.3
Object 2.23	S2-72	str. M. Sadoveanu, 1 (Kindergarten)
Object 2.24	S2-73	bd. Mircea cel Bătrîn, 40/1
	S2-74	bd. Mircea cel Bătrîn, 42/1
	S2-75	bd. Mircea cel Bătrîn, 44/1
Object 2.25	S2-76	bd. Mircea cel Bătrîn, 58
Object 2.26	S2-77	str. Podul Înalt, 8/1
	S2-78	str. Podul Înalt, 10/1
Object 2.27	S2-79	str. Moscova, 2 sec.1, including shop
	S2-80	str. Moscova, 2 sec.2
Object 2.28	S2-81	str. B. Voievod, 2, sec. 1
	S2-82	str. B. Voievod, 2, sec. 2
	S2-83	str. B. Voievod, 2, sec. 3
	S2-84	str. B. Voievod, 2, sec. 4
	S2-85	str. B. Voievod, 2, sec. 5
	S2-86	str. B. Voievod, 2, sec. 6
	S2-87	str. B. Voievod, 2, sec. 7
	S2-88	str. B. Voievod, 2 a
	S2-89	bd. Moscova, 3
Object 2.29	S2-90	bd. Moscova, 1/1
	S2-91	bd. Moscova, 1/2
	S2-92	bd. Moscova, 1/3
Object 2.30	S2-93	bd. Moscova, 3/1, sec.1
	S2-94	bd. Moscova, 3/1, sec.2
	S2-95	bd. Moscova, 3/1, sec.3
	S2-96	bd. Moscova, 3/2, sec.1
	S2-97	bd. Moscova, 3/2, sec.2
	S2-98	bd. Moscova, 3/2, sec.3
	S2-99	bd. Moscova, 3/3, sec.1
	S2-100	bd. Moscova, 3/3, sec.2
	S2-101	bd. Moscova, 3/3, sec.3
Object 2.31	S2-102	str. Haltei, 21/1
	S2-103	str. Haltei, 21/2
	S2-104	str. Haltei, 21/3
Object 2.32	S2-105	str. Mateevici, 87
Object 2.33	S2-106	str. Mateevici, 111
Object 2.34	S2-107	str. Cuza Vodă, 40, s.1
	S2-108	str. Cuza Vodă, 40, s.2
	S2-109	str. Grenoble, 203 s.1
	S2-110	str. Grenoble, 203 s.2
	S2-111	str. Grenoble, 205 s.1
	S2-112	str. Grenoble, 205 s.2
	S2-113	str. Grenoble, 209 s.1
	S2-114	str. Grenoble, 209 s.2

8.3. Principle Schematics for the DH substations (IHSs), relevant for both Lot 1 and for Lot 2

8.3.1. Drawing: IHS Principle Schematic (2-stage schematic).

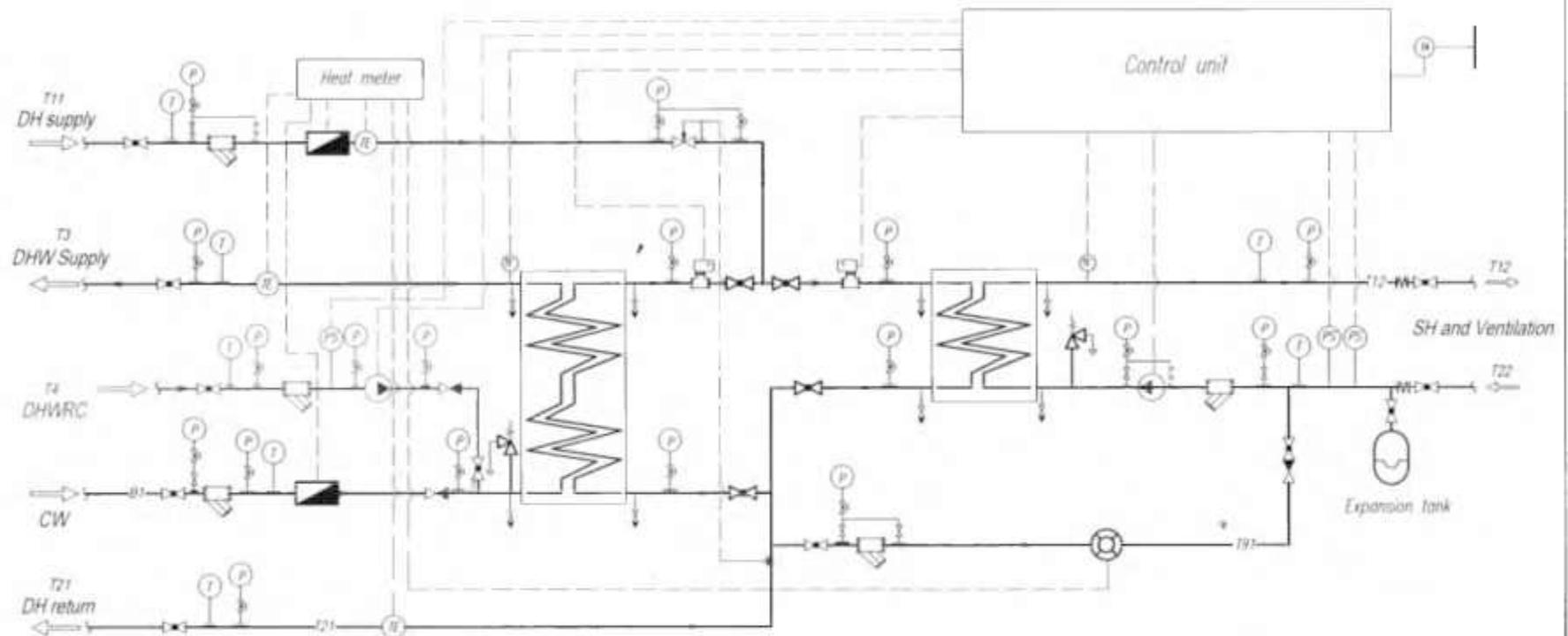


- Legend:**
- Monometer
 - Thermometer
 - Temperature sensor
 - Outside air temperature sensor
 - Pressure sensor / pressostat
 - Water meter
 - Antivibration element
 - Safety pressure relief valve
 - Check valve
 - Ultrasonic flow meter
 - Shutoff ball valve
 - Pressure control valve
 - 2-way control valve with electrical actuator
 - Strainer
 - Electrical pump
 - Plate heat exchanger
 - Differential pressure control valve

Notes:

1. The substations shall contain the necessary pressure control valves in order to ensure normal operation in the different possible pressure conditions in the DH system – differential pressure control valves, additional pressure control valves on the supply and/or on the return lines (not shown on the drawing), as necessary.
2. The components on the DHWRC line, marked with red color, shall be included in case of the substations where DHWRC pumps shall be provided in the scope of supply (see the specific information for each substation in the Object information).

8.3.2. Drawing: IHS Principle Schematic (parallel schematic, with 1-stage heat exchanger for DHW preparation).



Legend:

	-Manometer		-Check valve
	-Thermometer		-Ultrasonic flow meter
	-Temperature sensor		-Shutoff ball valve
	-Outside air temperature sensor		-Pressure control valve
	-Pressure sensor / pressostat		-2-way control valve with electrical actuator
	-Water meter		-Strainer
	-Antivibration element		-Electrical pump
	-Safety pressure relief valve		-Plate heat exchanger
			-Differential pressure control valve

Notes:

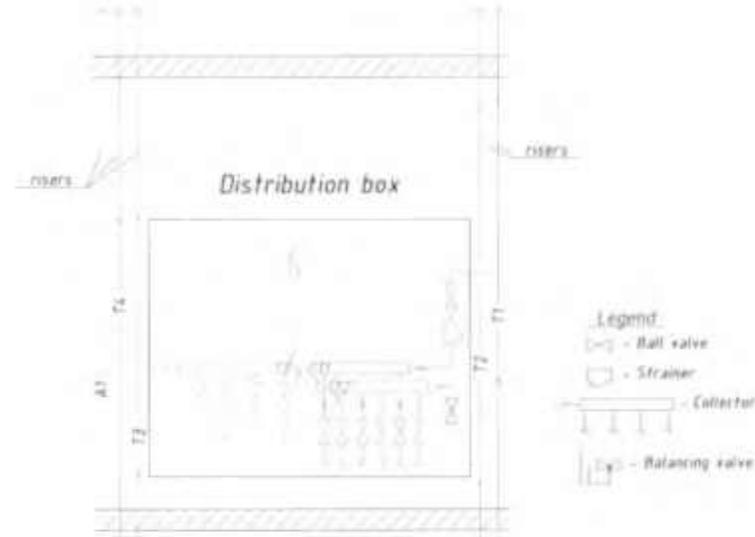
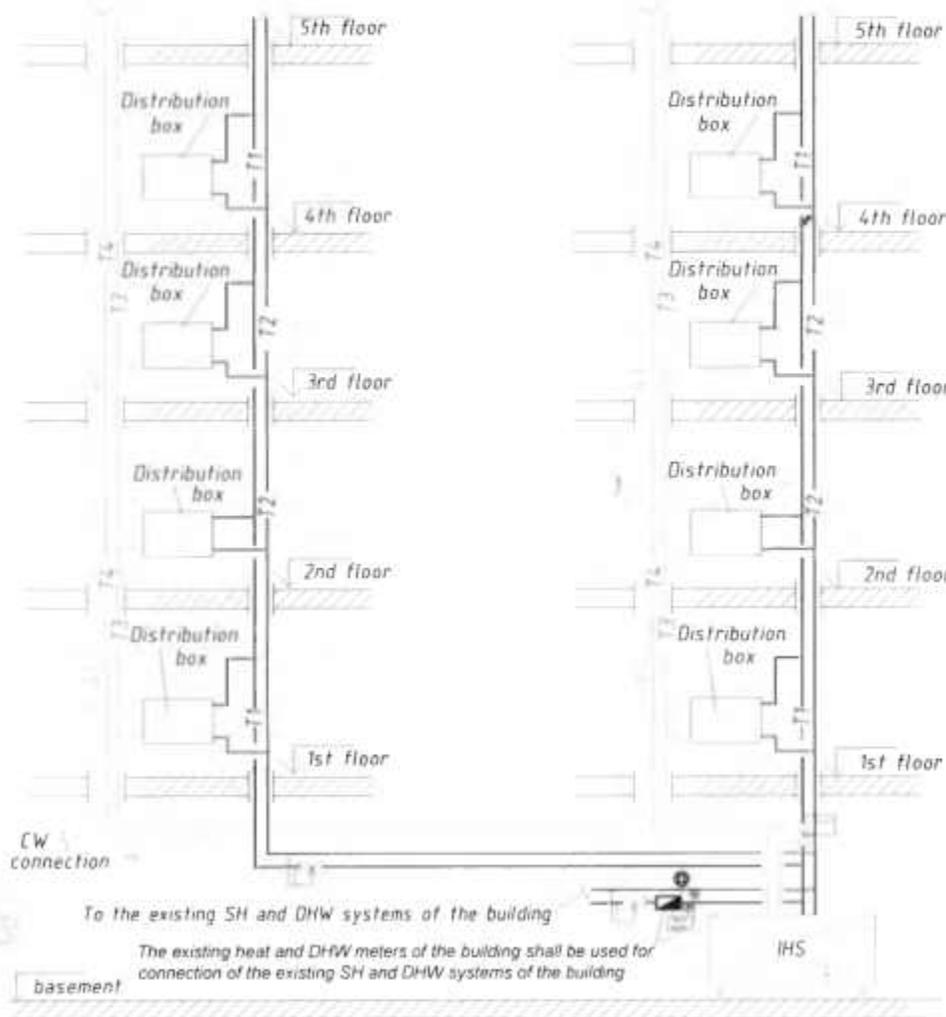
1. The substations shall contain the necessary pressure control valves in order to ensure normal operation in the different possible pressure conditions in the DH system – differential pressure control valves, additional pressure control valves on the supply and/or on the return lines (not shown on the drawing), as necessary.

2. The components on the DHWRC line, marked with red color, shall be included in case of the substations where DHWRC pumps shall be provided in the scope of supply (see the specific information for each substation in the Object information).

8.4. Conceptual schematic of SH and DHW distribution systems for residential buildings

Building entrance 1

Building entrance 2



Legend:

- T1 - SH supply pipe
- T2 - SH return pipe
- T3 - DHW supply pipe
- T4 - DHWRC pipe
- A1 - Cold water pipe (not included into the scope of supply)

Notes:

- The present conceptual schematic illustrates the new SH and DHW distribution systems to be designed, supplied and installed in selected residential buildings.
- The schematic also illustrates the new cold water distribution system - to be included into the scope of design, but not included into the scope of supply.
- The scope of design shall include the complete design of the distribution boxes (including the heat and water meters, the heat and water meters for each apartment are not illustrated on the present schematic and not included into the scope of supply)
- The present conceptual schematic illustrates an example of a building with 2 entrances. The schematic does not define the number of floors or the number of apartments on each floor.
- Balancing valves shall be installed for each set of new SH risers and for the connection of the existing SH systems of the building

8.4. Conceptual Schematic for the new SH and DHW distribution systems for residential buildings, relevant for both Lot 1 and for Lot 2

Wasson

9. Health and safety

Before commencing construction, the Contractor shall prepare and submit to the MEPIU a document entitled "Environment and Health and Safety Plan".

This Plan shall describe clearly the measures which the Contractor will be taking to obtain a good health and safety and environment standard throughout the site of the Works.

9.1. EHS Applicable laws and other requirements

The main EHS applicable laws to projects are:

- Environment protection law no. 1515-XII of 16.06.1993;
- EIA law no. 86 of 29.05.2014;
- Soil Code no 828-XIII of 25.12.1991;
- Public health state monitoring no. 10-XVI of 03.02.2009;
- Law on State Protected Natural Areas Fund no. 1538-XIII of 25.02.1998;
- Occupational health and safety no 186 of 10.07.2008;
- Firefighting and protection law no 267 of 09.11.1994;
- Water law no. 271 of 23.12.2011;
- Access to information law no. 982-XIV of 11.05.2000;
- Payment for pollution law no. 1540-XIII din 25.02.1998;
- Vegetal kingdom law no. 239-XVI din 08.11.2007;
- Urbanism principles and territory arrangement law no. 835-XIII of 17.05.1996;
- Production and household wastes law no. 1347-XIII of 09.10.1997;
- Atmospheric air protection law no. 1422-XIII of 17.12.1997;
- Industrial safety of dangerous industrial objects law no. 116 of 18.05.2012;
- Quality of construction law no. 721-XIII of 02.02.1996;
- Authorization of Construction law no. 163 din 09.07.2010.

Government Decision (GD) and specific for project implementation:

- The concept of sustainable development in Republic of Moldova GD no. 1492 of 2002;
- Public Health State Survey GD no. 384 of 12 May 2010;
- Sanitary norms regarding prevention of atmospheric air pollution in localities (1998);
- Rising operational safety of buildings, installations, equipment and pipes which presents sources of high risks (1996);
- Minimum HS requirements for the protection of workers from risks arising from exposure to noise and in particular the risk to hearing GD no. 362 of 27.05.2014;
- Minimum HS requirements for the use of work equipment by workers at work GD no. 603 of 11.08.2011;
- Minimum HS requirements for signaling at the working places GD no. 918 of 18.11.2013;
- Minimum HS requirements for temporary and mobile sites GD no. 80 of 09.02.2012;

- Health and Safety Committee implementation of HS law 186 GD 95 of 05.02.2009.

9.2. Environmental and Health and Safety Principles

The general principles of project's risks prevention are the following:

- Avoiding risks;
- Evaluating the risks;
- Combating the risks at source;
- Adapting the work to the individual;
- Adapting to technical progress;
- Replacing the dangerous by the non- or the less dangerous;
- Developing a coherent overall prevention policy;
- Prioritizing collective protective measures (over individual protective measures);
- Giving appropriate instructions to the workers;

9.3. Contractor's Responsibilities

With recommendations outlined in the MEPIU's EMP and GD 80 for temporary and mobile sites, the Contractor is responsible to comply with the following key requirements:

- Prepare a Contractor's EHS Plan (CEHSP) for each area (both on and off the Site) of environmental impact resulting from Contractor's operations; an EHSP will be developed to be approved by the MEPIU;
- Take comprehensive initial land/boundary condition photos of all construction sites, etc., and submit these together with the initial EHS report. These will be used by the MEPIU in conjunction with the final environmental and EHS inspections at the end of the construction period;
- Inform the MEPIU should significant environmental issues or non-compliance to the EHSP occur, e.g., dumping, pollution, littering, and other damage to the environment beyond the scope of the works;
- Find solutions to EHS problems that may arise during construction;
- Carry out and oversee the mitigation and rehabilitation measures presented in the EMP and CEHSP and ensure compliance with any conditions of authorization from relevant Government agencies;
- Perform all tasks as specified in the CEHSP to the satisfaction of the MEPIU. This will include, but not be limited to, implementation of specific mitigation measures as laid out in the EMP, and reporting on final monitoring results and close out complaints from communities or other stakeholders;
- Provide education and awareness-raising of the staff regarding the EHS sensitivity of each work area;
- Develop and reporting EHS performance to MEPIU that addresses compliance with the EMP and CEHSP.

9.4. Appointment of EHS Specialist(s)/Coordinator(s)

The Contractor/Subcontractor shall designate a competent, trained and experienced specialist to act as EHS Specialist/Coordinator, who will administer and be responsible for the implementation of the EHS Plan. The EHS Specialist/Coordinator must have at least 5 years of working experience

as EHS Specialist/Coordinator. He shall carry out frequent and regular safety inspections on the working areas, materials and equipment.

The name and qualifications of the EHS Specialist/Coordinator shall be submitted for approval to the MEPIU prior to his appointment.

9.5. Duties of EHS Specialist/Coordinator

The Specialist(s)/Coordinator(s) for EHS matters, during the project execution stage, shall:

- Coordinate implementation of the general principles of prevention and safety;
- Coordinate implementation of the relevant provisions in order to ensure that employers and, if necessary for the protection of workers, self-employed persons;
- Keeping the construction site in good order and in a satisfactory state of cleanliness;
- Choosing the location of workstations bearing in mind how access to these workplaces is obtained, and determining routes or areas for the passage and movement and equipment;
- The conditions under which various materials are handled;
- Technical maintenance, pre-commissioning checks and regular checks on installations and equipment with a view to correcting any faults which might affect the safety and health of workers;
- The demarcation and laying-out of areas for the storage of various materials, in particular where dangerous materials or substances are concerned;
- The conditions under which the dangerous materials used are removed;
- The storage and disposal or removal of waste and debris;
- The adaptation, based on progress made with the site, of the actual period to be allocated for the various types of work or work stages;
- Cooperation between employers and self-employed persons;
- Interaction with industrial activities at the place within which or in the vicinity of which the construction site is located;
- Make, or cause to be made, any adjustments required to the safety and health plan to take account of the progress of the work and any changes which have occurred;
- Organize cooperation between employers, including successive employers on the same site, coordination of their activities with a view to protecting workers and preventing accidents and occupational health hazards and reciprocal information, ensuring that self-employed persons are brought into this process where necessary;
- Coordinate arrangements to check that the working procedures are being implemented correctly;
- Take the steps necessary to ensure that only authorized person are allowed onto the construction site.

9.6. Structure of Environmental and Health and Safety Plan

The Contractor shall prepare and submit for the MEPIU's approval the Contractor's Environmental, Health, and Safety Plan (CEHSP) within 30 days of the Commencement Date.

The CEHSP shall include a minimum requirement for on-site workstations and on-site outdoor workstations, described in chapter 9.7.

In addition, the CEHSP shall be developed based on methodology known as Plan-Do-Check-Act (PDCA). CEHSP shall be formulated to meet the requirements specified below under the following headings:

Health and Safety Policy (Statement): The CEHSP submitted by the Contractor shall provide a signed statement from the Contractor's Managing Director(s). The signed Statement will attest to a commitment that all EHS issues and mitigation measures will be given highest priority in the discharge of contractual obligations and certifying a commitment to the provisions in the CEHSP as approved by the MEPIU.

The CESMP shall provide a statement attesting the firm's understanding of, and means of ensuring due compliance with the statutory regulations relating to construction work in Moldova, specifically in regard to compliance with applicable EHS laws and other requirements.

Identify hazards related to specific risks, assess risks and keep risks under control

The Contractor shall identify dangers, evaluate risks and establish measures for keeping them under control. Risk management shall be identified all aspects related to EHS such as: subcontractors, suppliers, visitors and stakeholders, etc. The main risk for Contractor is Subcontractors, which works for on behalf of the Contractor. Subcontractors may disrupt EHS Contractor's Commitment and objective and can have an impact on business continuity and employers reputation.

HS legal and other requirements applicable for C 1.6 project

The legal and other requirements are presented at the chapter 9.1.

Resources, roles, responsibilities and authority

The CEHSP shall indicate the name of the proposed EHS Specialist/Coordinator. The EHS Specialist shall be responsible for day-to-day EHS management on the site.

The CEHSP shall certify that:

- The EHS Specialist/Coordinator will be appointed and assigned duties throughout the period of the Contract connected with the EHS activities on the Site;
- The proposed EHS Specialist/Coordinator is suitably qualified and experienced to supervise and monitor compliance with the CEHSP and will, in particular but without limitation, carry out auditing/inspection of the operation of the CEHSP in accordance with a rolling program to be submitted, from time to time, to the MEPIU for his consent;
- The EHS Specialist/Coordinator will not be removed from the site without the express written permission of the MEPIU. Within fourteen (14) days of any such removal or notice of intent of removal, a replacement EHS Specialist will be nominated for approval by the MEPIU;
- The EHS Specialist/Coordinator will be provided with supporting staff in accordance with the staffing levels set out in the Plan. The supporting staff shall include at least one (1) Deputy EHS Specialist/Coordinator whose appointment shall also be subject to approval by the MEPIU. The Deputy EHS Specialist/Coordinator shall be capable of assuming the duties and functions of the EHS Specialist/Coordinator whenever necessary;
- The EHS Specialist/Coordinator shall be empowered to instruct employees of the Contractor and Subcontractors to cease operations and shall take the appropriate action as is necessary and within his limits of delegation by informing others as may be appropriate to prevent unsafe working practices or other infringements of the Plan or the statutory regulations;



- The EHS Specialist/Coordinator shall maintain a daily site diary comprehensively recording all relevant matters concerning site environmental management, safety and traffic control, inspections and audits, related incidents and the like. The site diary shall be available at all times for inspection by the MEPIU and his staff;
- Contact information for all EHS Staff shall be provided in the CEHSP;
- Curriculum vitae (CVs) and other relevant information explaining the qualifications of the proposed staff and demonstrating their ability to perform the duties assigned shall be provided with the CEHSP.

Competence, training and awareness of personnel

The Contractor shall ensure that any Person(s) performing tasks for it or on its behalf that have the potential to cause a significant EHS impact(s) identified by MEPIU's EMP and Contractor's health and safety risks is(are) competent on the basis of appropriate educations, training or experience.

Before starting the work, The Contractor shall submit or describe in CEHSP the following issues:

- The list of attested workers issued by competent State Authorities or International Agencies for industrial safety (copies of industrial safety certificate for welders, electricians, crane operators, gas welders, load binders, working at heights permits, etc.);
- Industrial safety certificate for cranes, bulldozers and other equipment, etc.
- Maintenance of equipment and tools;
- Proof of Competence of Subcontractors' personnel and equipment.

Reporting on implementation of EHS Plan

The following EHS reports shall be submitted to MEPIU:

- Initial EHS Baseline Report: The Contractor shall carry out an initial assessment of EHS baseline conditions as part of the Contractor's EHS Plan. The CEHSP baseline assessment shall contain an evaluation of EHS conditions at the work sites. This initial report shall be submitted within 56 days of the Commencement Date;
- Regular EHS weekly Reports. The Contractor shall undertake EHS inspections and report weekly and shall provide copies of such reports to the MEPIU each month for the duration of the Contract;
- EHS Project Monthly Reports. Summaries of these reports will be included in the Project's Monthly Progress Reports;
- Contractor shall prepare a final EHS Report including all aspects for closing down of the site.

Operational procedure to control high risks:

The CEHSP shall include site plans and written operational procedures indicating the locations and arrangements of all storage areas and work sites subject to activities that may result in environmental impacts. At a minimum, the site plans must indicate the following: The Basic Site Organization, Hard Surface Areas, Waste Disposal and Site Drainage Systems, Locations of Fuelling Operations, Management of Asbestos Materials, Management of Volatile Organic Compounds, etc.

Emergency preparedness and control

The Contractor shall develop an Emergency Preparedness and Response Plan for credible scenarios identified at the risk analysis. The Plan shall define roles and responsibilities and measure to action in case of emergency.

Monitoring and measurement of project's risks

The following provisions shall apply concerning routine periodic monitoring during the Contract in conformity with EMP:

- Environmental aspects as complying with EMP;
- Working environment (comply with chapter 9.7);
- Health and Safety issues for on-site workstation and on-site outdoor workstations.

Evaluation of compliance with legal and other requirements

The Contractor shall comply with laws, standards and regulations of the Government of Moldova. In instances in which the requirements of the Specifications and those of the Government of Moldova differ (if any), the more stringent shall apply.

Noncompliance with applicable EHS laws, EMP requirements and the present Technical Specification with EHS requirements will be applied penalties by competent EHS State Authorities in conformity with the Crime Code of Republic of Moldova.

Nonconformities, corrective and preventive actions (incident investigation and notification).

The Contractor shall to investigate and report nonconformity(ies), determine their cause(s) and take actions in order to avoid their recurrence. The result on incident investigation shall be reported to MEPIU.

Control of records

The Contractor has to periodic review, including updating of the CEHSP during the Works.

9.7. General Health and Safety requirements for on-site workplaces

These minimum HS requirements for on-site outdoor workstations must contained but not limited to when develops HSP: ^

- **Stability and solidity:** Materials, equipment and, more generally, any component which, when moving in any way, may affect the safety and health of workers must be stabilized in an appropriate and safe manner. Access to any surface involving insufficiently resistant materials is not authorized unless appropriate equipment or means are provided to enable the work to be carried out safely;
- **Energy distribution installations:** The installations must be designed, constructed and used so as not to present a fire or explosion hazard; persons must be adequately protected against the risk of electrocution caused by direct or indirect contact. The design, construction and choice of equipment and protection devices must take account of the type and power of the energy distributed, external conditions and the competence of persons with access to parts of the installation;
- **Emergency routes and exits:** Emergency routes and exits must remain clear and lead as directly as possible to a safe area. In the event of danger, it must be possible for workers to evacuate all workstations quickly and as safely as possible. The number, distribution and dimensions of emergency routes and exits depend on the use, equipment and dimensions of the site and of the rooms and the maximum number of persons that may be present. Specific emergency routes and exits must be indicated by signs in accordance with the GD 918 for minimum HS for signaling at the working places. Such signs must be sufficiently resistant and be placed at appropriate points.

Emergency routes and exits, and the traffic routes and doors giving access to them, must be free from obstruction so that they can be used at any time without hindrance. Emergency routes and exits requiring illumination must be provided with emergency lighting of adequate intensity in case the lighting fails;

- **Fire detection and fire fighting:** Depending of the characteristics of the site, the dimensions and use of the rooms, the on-site equipment, the physical and chemical properties of the substances present and the maximum potential number of people present, an adequate number of appropriate fire-fighting devices and, where required, fire detectors and alarm systems must be provided. These fire-fighting devices, fire detectors and alarm systems must be regularly checked and maintained. Appropriate tests and drills must take place at regular intervals. Non-automatic fire-fighting equipment be easily accessible and simple to use. The equipment must be indicated by signs in accordance with the law 267 for Fire Protection and GD 1159 of 2007 for Firefighting and protection in Republic of Moldova. Such signs must be sufficiently resistant and placed at appropriate points;
- **Ventilation:** Steps shall be taken to ensure that there is sufficient fresh air, having regard to the working methods used and the physical demands placed on the workers. If a forced ventilation system is used, it must be maintained in working order and must not expose workers to draughts which are harmful to health. Any breakdown must be indicated by a control system where this is necessary for workers' health;
- **Exposure to particular risks (chemicals):** Workers must not be exposed to harmful levels of noise or to harmful external influences (e.g. gases, vapors, dust). If workers have to enter an area where the atmosphere is liable to contain a toxic or harmful substance or to have an insufficient oxygen level or to be inflammable, the confined atmosphere must be monitored and appropriate steps taken to prevent any hazards. A worker may not in any circumstances be exposed to a high-risk confined atmosphere. He must at least be watched at all times from outside and all appropriate precautions must be taken to ensure that he can be assisted effectively and immediately;
- **Temperature:** During working hours, the temperature must be appropriate for human beings, having regard to the working methods used and the physical demands placed on the workers;
- **Natural and artificial lighting of workstations, rooms and traffic routes on the site:** Workstations, rooms and traffic routes must as far as possible have sufficient natural lighting and be provided with appropriate and sufficient artificial lighting at night and when natural daylight is inadequate; where necessary, portable light sources that are protected against impact must be used. The color of artificial light used must not alter or affect the perception of signals or signposts. Lighting installations for rooms, workstations and traffic routes must be placed in such a way that there is no risk of accident to workers as a result of the type of lighting fitted. Rooms, workstations and traffic routes where workers are especially exposed to risks in the event of artificial lighting must be provided with emergency lighting of adequate intensity;
- **Doors and gates:** Sliding doors must be fitted with a safety device to prevent them from being derailed and falling over. Doors and gates opening upwards must be fitted with a mechanism to secure them against falling back. Doors and gates along escape routes must be appropriately marked. In the immediate vicinity of gates intended primarily for vehicle traffic, there must be doors for pedestrian traffic unless it is safe for pedestrians to cross; such doors must be clearly marked and kept free at all times. Mechanical doors and gates must operate without any risk of accident to workers. They must be fitted with emergency stop devices which are easily identifiable and accessible

and, unless they open automatically in the event of a power-cut, it must be possible for them to be opened manually;

- **Traffic routes - danger areas:** Traffic routes, including stairs, fixed ladders and loading bays and ramps, must be calculated, located, laid out and made negotiable to ensure easy, safe and appropriate access in such a way as not to endanger workers employed in the vicinity of these traffic routes. Routes used for pedestrian traffic and/or goods traffic including those used for loading and unloading must be dimensioned in accordance with the number of potential users and the type of activity concerned. If means of transport are used on traffic routes, a sufficient safety clearance or adequate protective devices must be provided for other site users. Routes must be clearly marked, regularly checked and properly maintained. Sufficient clearance must be allowed between vehicle traffic routes and doors, gates, passages for pedestrians, corridors and staircases. If the site includes limited-access areas, these must be equipped with devices to prevent unauthorized workers from entering. Appropriate measures must be taken to protect workers who are authorized to enter the danger areas. Danger areas must be clearly signposted;
- **Loading bays and ramps:** Loading bays and ramps must be suitable for the dimensions of the loads to be transported. Loading bays must have at least one exit point. Loading ramps must be sufficiently safe to prevent workers from falling off;
- **Freedom of movement at the workstation:** The floor area at the workstation must be such as to allow workers sufficient freedom of movement to perform their work, taking account of any necessary equipment or appliances present;
- **First aid:** The Contractor must ensure that first aid can be provided, and that the staff trained to provide it can be called upon, at any time. Measures must be taken to ensure that workers who have had an accident or have suddenly been taken ill can be removed for medical treatment. One or more first-aid rooms must be provided where the scale of the works or the types of activity being carried out so require. First-aid rooms must be fitted with essential first-aid installations and equipment and be easily accessible to stretchers. They must be signposted in accordance with the law 186 for Health and safety. In addition, first-aid equipment must be available at all places where working conditions so require. This equipment must be suitably marked and easily accessible. The address and telephone number of the local emergency service must be clearly displayed.

Sanitary equipment:

- **Changing rooms and lockers:** Appropriate changing rooms must be provided for workers if they have to wear special work clothes and if, for reasons of health or propriety, they cannot be expected to change in another area. Changing rooms must be easily accessible, be of sufficient capacity and be provided with seating. Changing rooms must be sufficiently large and have facilities to enable each worker, where necessary, to dry his working clothes as well as his own clothing and personal effects and to lock them away. If circumstances so require (e.g. dangerous substances, humidity, dirt), facilities must be provided to enable working clothes to be kept in a place separate from workers' own clothes and personal effects. Provisions must be made for separate changing rooms or separate use of changing rooms for men and women. If changing rooms are not required as referred to above, each worker must be provided with a place in which he can lock away his own clothes and personal effects;
- **Showers and washbasins:** Suitable showers in sufficient numbers must be provided for workers if required by the nature of the work or for health reasons. Provisions must be made for separate shower rooms or separate use of shower rooms for men and



women. The shower rooms must be sufficiently large to permit each worker to wash without hindrance in conditions of an appropriate standard of hygiene. The showers must be equipped with hot and cold running water. Where showers are not required, a sufficient number of suitable washbasins with running water (hot water if necessary) must be provided in the vicinity of the workstations and the changing rooms. Provisions must be made for separate washbasins, or separate use of washbasins for men and women when so required for reasons of propriety. Where the rooms housing the showers or washbasins are separate from the changing rooms, there must be easy communication between the two. Lavatories and washbasins Special facilities with an adequate number of lavatories and washbasins must be provided for workers in the vicinity of workstations, rest rooms, changing rooms and rooms housing showers or washbasins. Provisions must be made for separate lavatories or separate use of lavatories for men and women;

- **Rest rooms and/or accommodation areas:** Where the safety or health of workers, in particular because of the type of activity carried out or the presence of more than a certain number of employees as well as the remote nature of the site, so require, workers must be provided with easily accessible rest rooms and / or accommodation areas. Rest rooms and/ or accommodation areas must be large enough and equipped with an adequate number of tables and seats with backs for the number of workers concerned. If there are no facilities of this kind, other facilities must be provided in which workers can stay during interruptions in work. Fixed accommodation areas unless used only in exceptional cases, must have sufficient sanitary equipment, a rest room and a leisure room. They must be equipped with beds, cupboards, tables and seats with backs taking account of the number of workers, and be allocated taking account, where appropriate, of the presence of workers of both sexes. Appropriate measures should be taken for the protection of non-smokers against discomfort caused by tobacco smoke in rest rooms and/or accommodation areas;
- **Pregnant women and nursing mothers:** Pregnant women and nursing mothers must be able to lie down to rest in appropriate conditions;
- **Handicapped workers:** Workplaces must be organized to take account of handicapped workers, if necessary. The provision applies in particular to the doors, passageways, staircases, showers, washbasins, lavatories and workstations used or occupied directly by handicapped persons;
- **Miscellaneous provisions:** The surroundings and the perimeter of the site must be signposted and laid out so as to be clearly visible and identifiable. Workers must be provided at the site with a sufficient quantity of drinking water and possibly another suitable non-alcoholic beverage both in occupied rooms and in the vicinity of workstations. Workers must be provided with facilities enabling them to take their meals in satisfactory conditions, where appropriate, be provided with facilities enabling them to prepare their meals in satisfactory conditions.

9.7.1. Health and Safety requirements for on-site workstations

These minimum HS requirements for on-site workstations must be considered when establishes HSP:

- **Stability and solidity:** Premises must have a structure and stability appropriate to the nature of their use;
- **Emergency doors:** Emergency doors must open outwards. Emergency doors must not be so locked or fastened that they cannot be easily and immediately opened by any

person who may require to use them in an emergency. Sliding or revolving doors are not permitted if intended as emergency exits;

- **Ventilation:** If air-conditioning or mechanical ventilation installations are used, they must operate in such a way that workers are not exposed to draughts which cause discomfort. Any deposit or dirt likely to create an immediate danger to the health of workers by polluting the atmosphere must be removed without delay;
- **Temperature:** The temperature in rest areas, rooms for duty staff, sanitary facilities, canteens and first-aid rooms must be appropriate to the particular purpose of such areas. Windows, skylights and glass partitions should allow excessive effects of sunlight to be avoided, having regard to the nature of the work and the use of the room;
- **Natural and artificial lighting:** Workplaces must as far as possible have sufficient natural light and be equipped with the means of providing artificial lighting which is adequate for the purposes of protecting workers' safety and health;
- **Floors, walls, ceilings and roofs of rooms:** The floors of workplaces must have no dangerous bumps, holes or slopes and must be fixed, stable and not slippery. The surfaces of floors, walls and ceilings in rooms must be such that they can be cleaned or refurbished to an appropriate standard of hygiene. Transparent or translucent walls, in particular all-glass partitions, in rooms or in the vicinity of workplaces and traffic routes must be clearly indicated and made of safety material or be shielded from such places or traffic routes to prevent workers from coming into contact with walls or being injured should the walls shatter;
- **Windows and skylights:** It must be possible for workers to open, close, adjust or secure windows, skylights and ventilators in a safe manner. When open, they must not be positioned so as to constitute a hazard to workers. Windows and skylights must be designed in conjunction with equipment or otherwise fitted with devices allowing them to be cleaned without risk to the workers carrying out this work or to workers present;
- **Doors and Gates:** The position, number and dimensions of doors and gates, and the materials used in their construction, are determined by the nature and use of the rooms or areas. Transparent doors must be appropriately marked at a conspicuous level. Swing doors and gates must be transparent or have see-through panels. If transparent or translucent surfaces in doors and gates are not made of safety material and if there is a danger that workers may be injured if a door or gate should shatter, the surfaces must be protected against breakage;
- **Traffic routes:** Where the use and equipment of rooms so requires for the protection of workers, traffic routes must be clearly identified;
- **Specific measures for escalators and travelators:** Escalators and travelators must function safely. They must be equipped with any necessary safety devices. They must be fitted with easily identifiable and accessible emergency shut-down devices;
- **Room dimensions and air space in rooms:** Workrooms must have sufficient surface area and height to allow workers to perform their work without risk to their safety, health or well-being.

9.7.2. Health and Safety Requirements for on-site outdoor workstations

Minimum requirements for HSP for on-site outdoor workstations must contained but not limited to:

- **Stability and solidity:** High-level or low-level movable or fixed workstations must be solid and stable, taking account of:



- the number of workers occupying them,
- the maximum loads they may have to bear and the weight distribution,
- the outside influences to which they may be subject.

If the support and the other components of these workstations are not intrinsically stable, their stability will have to be ensured by appropriate and safe methods of fixing to avoid any untimely or spontaneous movement of the whole or of parts of the workstations. Checking Stability and solidity must be checked appropriately and especially after any change in the height or depth of the workstation;

- **Energy distribution installations:** On-site energy distribution installations, especially those subject to outside influences, must be regularly checked and maintained. Installations existing before the site began must be identified, checked and clearly signposted. Whenever possible, where overhead electric power lines exist, either they must be redirected away from the area of the site or else the current must be cut off. If this is not possible, there will be barriers or notices to ensure that vehicles and installations are kept away. Suitable warnings and suspended protections must be provided where vehicles have to pass beneath the lines;
- **Atmospheric influences:** Workers must be protected against atmospheric influences which could affect their health and safety;
- **Falling objects:** Wherever technically feasible, workers must be protected by collective methods against falling objects. Materials and equipment must be laid out or stacked in such a way as to prevent their collapsing or overturning. Where necessary, there must be covered passageways on the side or access to danger areas must be made impossible;
- **Falls from a height:** Falls from a height must be physically prevented in particular by means of solid cradles which are sufficiently high and have at least an end-board, a main handrail and an intermediate handrail or an equivalent alternative. In principle, work at a height must be carried out only with appropriate equipment or using collective protection devices such as cradles, platforms or safety nets. If the use of such equipment is not possible because of the nature of the work, suitable means of access must be provided and safety harnesses or other anchoring safety methods must be used;
- **Scaffolding and leaders:** All scaffolding must be properly designed, constructed and maintained to ensure that it does not collapse or move accidentally. Work platforms, gangways and scaffolding stairways must be constructed, dimensioned, protected and used in such a way as to prevent people from falling or being exposed to falling objects. Scaffolding must be inspected by a competent person:
 - (a) before being put into service;
 - (b) subsequently, at periodic intervals;
 - (c) after any modification period without use, exposure to bad weather or seismic tremors, or any other circumstance which may have affected its strength or stability.
- Ladders must be sufficiently strong and correctly maintained. They must be correctly used, in appropriate places and in accordance with their intended purpose. Mobile scaffolding must be secured against spontaneous movements;
- **Lifting equipment:** All lifting devices and accessories, including their component parts, attachments, anchoring and supports, must be:

- (a) properly designed and constructed and sufficiently strong for the use to which they are put;
 - (b) correctly installed and used;
 - (c) maintained in good working order;
 - (d) checked and subjected to periodic tests and inspections in accordance with current legislation'.
 - (e) operated by qualified workers who have received appropriate training.
- All lifting devices and accessories must clearly display their maximum load values. Lifting equipment and accessories may not be used for other than their intended purposes;
 - **Excavating and materials-handling vehicles and machinery:** All excavating and materials-handling vehicles and machinery must be:
 - (a) properly designed and constructed taking account, as far as possible, of the principles of ergonomics;
 - (b) kept in good working order;
 - (c) used correctly.
 - Drivers and operators of excavating and materials-handling vehicles and machinery must be specially trained. Preventive measures must be taken to ensure that excavating and materials-handling vehicles and machinery do not fall into the excavations or into water. Where appropriate, excavating machinery and materials-handling machinery must be fitted with structures to protect the driver against being crushed if the machine overturns, and against falling objects;
 - **Installations, machinery, equipment:** Installations, machinery and equipment, including hand tools whether power-driven or not, must be:
 - (a) properly designed and constructed taking accounts, as far as possible, of the principle of ergonomics;
 - (b) kept in good working order;
 - (c) used solely for the work for which they were designed;
 - (d) operated by workers who have received appropriate training.
 - Installations and equipment under pressure must be checked and subjected to regular tests and inspections in accordance with Industrial Safety law no. 116;
 - **Excavations, wells, underground works, tunnels and earthworks:** Suitable precautions must be taken in an excavation, well, underground, working or tunnel:
 - (a) using an appropriate support or embankment;
 - (b) to prevent hazards entailed in the fall of a person, materials or objects, or flooding;
 - (c) to provide sufficient ventilation at all workstations so as to ensure a breathable atmosphere which is not dangerous or harmful to health;
 - (d) to enable workers to reach safety in the event of fire or inrush of water or materials.
 - Before excavation starts, measures must be taken to identify and reduce to a minimum any hazard due to underground cables and other distribution systems. Safe routes into



and out of the excavation must be provided. Piles of earth, materials and moving vehicles must be kept away from the excavation; appropriate barriers must be built if necessary;

- **Demolition work:** Where the demolition of a building or construction may present a danger:
 - (a) appropriate precautions, methods and procedures must be adopted;
 - (b) the work must be planned and undertaken only under the supervision of a competent person.
- **Metal or concrete frameworks, shuttering and heavy prefabricated components:** Metal or concrete frameworks and their components, shuttering, prefabricated components or temporary support, and buttresses must be erected and dismantled only under the supervision of a competent person. Adequate precautions must be taken to protect workers against risks arising from the temporary fragility or instability of a structure. Shuttering, temporary supports and buttresses must be devised and designed, installed and maintained so as to safely withstand any strains and stresses which may be placed on them;
- **Cofferdams and caissons:** All cofferdams and caissons must be:
 - (a) well constructed, of appropriate, solid materials of adequate strength;
 - (b) appropriately equipped so that workers can gain shelter in the event of an irruption of water and materials.
- The construction, installation, transformation or dismantling of a cofferdam or caisson must take place only under the supervision of a competent person. All cofferdams and caissons must be inspected by a competent person at regular intervals;
- **Work on roofs:** Where necessary to avert a risk, collective preventive measures must be taken to prevent workers, and tools or other objects or materials, from falling. Where workers have to work on or near a roof or any other surface made of fragile materials through which it is possible to fall, preventive measures must be taken to ensure that they do not inadvertently walk on the surface made of fragile materials, or fall to the ground.

9.8. Compliance with Project's EMP

The Contractor shall abide by the requirements of the MEPIU's Environmental Management Plan (EMP) provided with the Tender Documents. The Contractor shall develop a Contractor's EHS Plan (CEHSP) for approval by the MEPIU prior to start of the permanent works.

The structure of Contractor EHS Plan is presented at the paragraph 5.6. The EHS Plan must include the minimum EHS requirements described in points 5.7 and 5.8. The CEHSP will be used by the MEPIU to assess the Contractor's compliance with the EMP.

9.9. Contractor's purchasing procedure (supplying materials and equipment)

Contractor shall submit to MEPIU for approval purchasing documents for materials and equipment such as quality certificates, Conformity Certificates, Safety Certificate, Material Safety Data Sheet (MSDS) and other issued documents by the suppliers in order to prevent health and safety incident and environment pollution.

MEPIU shall analyze and give "No Objections" for supplying materials and equipment which will be used for civil works at the Contract C 1.6.

Supplying materials and equipment shall not damage to direct and indirect workers and community and the following safety and environmental aspects shall be taken into consideration:

- 1) Fire hazard;
- 2) Toxicity hazard (release of solvents and other chemicals in the process of work, etc.);
- 3) Reactivity (acid or alkaline) hazard;
- 4) Asbestos containing materials and other fibers mixed with ACM;
- 5) Electrical equipment (class of energy using, type of oil, noise and vibration, etc.);
- 6) Equipment with Freon (CFCs);
- 7) Stability and solidity of materials and equipment;
- 8) Etc.

9.10. Contractor's Method Statement

Contractor shall establish Method Statements for civil work as it is specified in the Technical Specification for each projects phases and shall submit to MEPIU for approval. Method Statements shall be established before starting the work on-sites and direct⁸ and indirect⁹ workers shall be trained with the specific risks of the project's phase.

Method Statement shall contain the following items but not limited to:

- Scope of Work;
- Method of work for specific tasks in conformity with Contractor's Work Program and TS;
- Responsibilities (workforce) for carrying out the work;
- Responsibility of Contractor's supervisor;
- Identified specific risks and risk control;
- Safety audit (before starting the job to check if comply with the Contractor EHS Plan);
- Workforce competence (name, surname and number of training certificate, etc.);
- Equipment, installation and machinery used and proof of safety compliance (equipment must have Safety Certificate issued by competent authorities of Republic of Moldova or country of origin);
- Subcontractors;
- Toolbox meeting and training (risks communication);
- HSSE aspects and measures to keep risks under control;
- Emergency arrangements;
- Permit to Work requirements for major hazards (working at heights, pressure system, fire permit, etc.);
- Other specific issues, which can appear in the process of work, etc.

The Contractor is responsible to establish and submit document to MEPIU for approval.

⁸ Direct workers: Workers engaged by the Company based on working contract.

⁹ Indirect workers: Workers that works on behalf of the Company based on working contract and represent Subcontractor.

10. Extracts from EIA and EMP for DHEIP Project

Extracts from the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for DHEIP Project are included below:

Environmental Aspects

The environmental issues likely to be associated with Project activities include: noise generation; impact on water quality and resources; impact on water by the construction run-offs; disturbance of traffic during construction and rehabilitation works; construction dust; and workers' safety. However, these adverse impacts will be temporary and site specific and could be easily mitigated through implementing adequate avoidance and/or mitigation measures.

The **Environmental Management Plan** elaborated for Project implementation (EMP) consists of: (a) **Environmental Mitigation Plan** - mitigation measure to address potential adverse environmental and social impacts; (b) **Environmental Monitoring Plan** - civil works supervision methods and monitoring actions; and (c) **Implementing arrangements**.

Impacts during Construction/Rehabilitation Phase and magnitude			
Construction phase			
Sector	Impacts	Magnitude	
		Duration	Significance
a. <i>Water Quality</i>	Unauthorized dumping of wastewater. Handling chemical materials surface/ground water pollution.	Short-term	Regional moderate
b. <i>Air Quality</i>	Dust generated from asphalt removals, earth excavation, loading, hauling, and unloading. Dust generated by the movement of vehicles and heavy machinery on unpaved access and haul roads. Exhaust discharged from vehicles and equipment. Dust emission associated with site conditions (soil, weather, or seasons). Dust generated by the vehicles delivering granular and/or fine materials to the sites.	Short-term	Local (city), moderate
c. <i>Noise</i>	Significant increase in noise is expected during works, due to various construction and transport activities.	Short-term	Local, high
d. <i>Soil Quality</i>	Rainfall runoff from the construction sites may pollute the soil in the parks whereby the mainline heating pipe will be rehabilitated. Welding or cutting pipes will get splinters of iron that will impact on the ground. The same soil pollution can be from oil spills from transport equipment and machinery used in the work that contain oils. Small particles of mineral wool and polyurethane can remain on the ground.	Short-term	Local, moderate

e. <i>Ecosystem</i>	Air pollution caused by emissions from vehicle and machinery might affect the vegetation along the transportation road and around the site. These impacts are short-term and are considered as on the eco-environment.	Short-term	Local, minor
f. <i>Solid Wastes</i>	The solid wastes generated from the construction are old pipes, abandoned construction materials, scattered sands/stones, concretes and domestic wastes. Emissions from equipment / machinery for welding, gas metal cutting, drilling. When carrying out welding or cutting pipes will get splinters of iron that will impact on the ground. The same soil pollution can be from oil spills from transport equipment and machinery used in the work that contain oils. Small particles of mineral wool and polyurethane can remain on the ground.	Short-term	Local, moderate
g. <i>Construction Traffic</i>	Construction activities and traffic could lead to traffic congestion and inconvenience to the public due to: (i) increased vehicles for materials and solid wastes transportation, and (ii) deterioration of the roads condition after excavation and leveling. It might bring negative effects to the narrower road and cause larger vehicle flux.	Short-term	Local, moderate
h. <i>Public and Safety</i>	Due to fact that the all the project activities will be in Chisinau urban area a high risk of accidents and injures for public may occur. During works inside the buildings risk of explosions, pollution and inhalation of gases is high especially during welding works.	Short-term	Local, low
i. <i>Cultural Properties</i>	Archaeological findings during the excavation works.	Short-term	Local, minor, low probability
Operation phase			
j. <i>Water Quality</i>	Handling chemical materials surface/ground water pollution.	Short-term	Regional moderate
k. <i>Air Quality</i>	Exhaust discharged from vehicles and equipment during small repairs and maintenance. Dust emission associated with site conditions (soil, weather, or seasons) during small repairs and maintenance.	Short-term	Local, minor



<i>l. Noise</i>	Increase of noise is expected during works, due to various small repairs, maintenance and transport activities.	Short-term	Local, minor
<i>m. Soil Quality</i>	Impacts are associated with small repairs, maintenance and transport activities: <ul style="list-style-type: none"> - Rainfall runoff from the construction sites may pollute the soil in the parks whereby the mainline heating pipe will be rehabilitated. - Welding or cutting pipes will get splinters of iron that will impact on the ground. The same soil pollution can be from oil spills from transport equipment and machinery used in the work that contain oils. - Small particles of mineral wool and polyurethane can remain on the ground. 	Short-term	Local, minor
<i>n. Ecosystem</i>	Air pollution caused by emissions from vehicle and machinery might affect the vegetation along the transportation road and around the site. These impacts are short-term and are considered as on the eco-environment.	Short-term	Local, minor
<i>o. Solid Wastes</i>	The solid wastes generated from the construction are old pipes, abandoned construction materials, scattered sands/stones, concretes and domestic wastes. Emissions from equipment / machinery for welding, gas metal cutting, drilling; When carrying out welding or cutting pipes will get splinters of iron that will impact on the ground. The same soil pollution can be from oil spills from transport equipment and machinery used in the work that contain oils. Small particles of mineral wool and polyurethane can remain on the ground.	Short-term	Local, moderate
<i>p. Public and Safety</i>	Due to fact that the all the operations activities will be in Chisinau urban area a high risk of accidents and injures for public may occur. Due to small works inside the buildings risk of explosions, pollution and inhalation of gases is high especially during welding works.	Short-term	Local, high

The following mitigation activities cover all identified impacts and are focused on avoiding and reducing potential adverse impacts.

Water Quality - During pipe replacement, pumping stations and other equipment's maintenance water from pipes and heat system will become wastewater. Surface and groundwater pollution during construction will occur due to following: (i) discharge of the residential sewage and wastewater from the work sites, (ii) washing water from the vehicle and machinery maintenance; and (iii) muddy runoff along with particles in rainy days. Leakage of water from heating system will be prevented as much as possible.

Environment-friendly mobile toilets and oil separation tanks will be installed on the construction camp. Wastewater from oily waste tanks will be collected by an authorized company. Similarly, the wastewater from mobile toilets will be collected and treated in septic tanks and discharged to an existing sewer system by authorized for this purpose city company. Unauthorized discharge of wastewater will be prohibited.

An Operational instruction on handling chemical materials (e.g., store the chemical away from watercourses and provision of retention areas to contain accidental spills of such toxic and harmful construction materials as caustic and acidic substances, oil and petroleum products) will be prepared and applied to prevent soil and surface/ground water pollution. A prevention and emergency response plan will be developed and implemented to train the workers on safe and diligent handling of chemicals to avoid accidental spills and on emergency response when a spill would occur.

Air Quality - Anticipated sources of air pollution from construction activities on site include dust generated from/by: a) earth excavation, loading, hauling, and unloading; the movement of vehicles and heavy machinery on unpaved access and haul roads; b) aggregate preparation, concrete-mixing, and haulage activities; and c) exhaust from vehicles and equipment.

Dust emission is associated with site conditions, mechanization and management of the construction works. The vehicles delivering granular and/or fine materials to the sites will be covered with protective sheets. Overloading of these vehicles should be avoided. Vehicle speed will be controlled on construction sites.

Water trucks will be used to wet the construction roads twice a day if dry conditions may occur, according to a daily schedule and taking weather conditions into consideration. These urban areas (streets) will be kept clean, solid, smooth, and clear of all dust, mud, or extraneous materials dropped from transportation vehicles.

Noise - A significant increase in noise is expected during underground works, various construction and transport activities. Construction facilities and equipment will include excavators, stabilizers, concrete mixers, drills, rollers, poker vibrations, concrete pumps, loading machines, and other heavy machineries.

It is recommended to avoid any temporary barracks constructions for living destination near the construction sites because all the works will be in Chisinau city and is very close to several hotel/residential areas and the workers can be located there.

Large amounts of construction waste materials will be transported to and from the construction sites, frequently during the 8-10 h workday for the construction period. Therefore, ensuring the tracks and other transportation machinery do not exceed noise standards are essential for construction activities to meet Moldovan noise criteria and to protect the local population.

Construction machinery will be properly maintained to minimize noise. Noise reduction devices or methods (the use of temporary hoarding or noise barriers and vibration-proof equipment) will be applied to shield noise sources where piling equipment is operating. Noise from equipment and machinery will comply with Noise standard limits (GOST 12.1.003-83) for construction site according to national legislation. In accordance with noise standard, the sites for concrete-mixing plants and similar activities should be located at least 1 km away from sensitive areas such as residences, schools, and hospitals. But it is strongly recommended using prepared concrete from specialized concrete plants from Chisinau region.

The operation of machinery generating high levels of noise, such as piling, will be restricted near the sensitive areas (hospitals, schools, administrative buildings etc.) and stopped between 10:00 p.



m. and 6:00 a.m. in accordance with Moldovan regulations. The movement of heavy vehicles along urban and adjacent roads will also be restricted to between 10:00 p.m. and 6:00 a.m. Adequate route for large trucks will be selected to keep away from residential areas.

Construction activities will be scheduled to minimize the impact of machinery noise. Also suitable measures will be taken to protect workers' hearings while operating heavy equipment according to the worker health protection law of the Republic of Moldova.

Soil Quality - Rainfall runoff from the construction sites may pollute the soil. Secondly, one important task is to protect storm drains so that soil washed out of the construction site does not go into them, thus eventually polluting the waters that these storm drains eventually empty into. Therefore, during rainstorm days the excavation activities should be avoided. Stripped topsoil will be stockpiled. A drainage system will be built to minimize the soil erosion. The soils on the tires of construction vehicles will be regularly cleaned. After the construction, the excavated soils will be refilled on construction site. As soon as refill and land leveling is done, re-vegetation with trees and grasses will be undertaken.

Solid Wastes - The solid wastes generated from the construction are abandoned construction materials, scattered sands/stones, concretes and domestic wastes. These solid wastes are harmless, however, it will affect environmental sanitation of the construction site, hamper the traffic and transportations, damage the surface of roads, further increase idle exhaust emissions of cars, and pollute the ambient air. The solid wastes must be collected regularly by the contractors and cleaned up in a timely manner and sorted, transported to the municipal landfill.

Construction Traffic - Construction activities and traffic could lead to traffic congestion and inconvenience to the public due to: (i) increased vehicles for materials and solid wastes transportation, and (ii) deterioration of the roads condition after asphalt milling and excavation and leveling. It might bring negative effects to the narrower road and cause larger vehicle flux. In conjunction with the local traffic management authority, traffic flow regulation plans will be prepared before construction begins, if necessary. Proper transportation time and route will be selected to avoid rush hours and reduce traffic congestion.

Health and Safety - Health & Sanitation is a key public health issue during construction. Sanitation services will be maintained, including air quality, food quality and water supply. Medical first aid kits and health services will also be provided.

Contractors will be required to take safety measures at the construction site to protect the workers and the public, including provision of appropriate personal protective equipment for workers and arrangement of warning signs to alert the public of potential safety risks in and around the construction sites.

The potential environmental risks during operation of the project infrastructure are related to accidental spills and leakage of wastewater that may cause less serious surface and ground water pollution that receive the water from construction site in case of high flow of water used in large diameter heating pipes. Automated flow meter and water quality monitoring system will be advisable to be installed. However, the regularly basic water tests will be done by the existing laboratory of Termoelectrica SA or State Ecological Inspectorate (SEI)/Apa Canal Chisinau. Specific measures should be taken if any potential incidents or illegal discharge is found during regular inspection and maintenance. Standby equipment and pipes should be installed in such a way that will reduce the risk of accidental overflow. Furthermore, an emergency response plan for accidental water overflows or spills will be also prepared.

An operation and maintenance manual for equipment will be provided by the suppliers. The equipment operators and plant manager will be continuously trained in operational safety, maintenance of the facilities, emergency procedures and contingency plans will be prepared. Periodic training and practice sessions in safe operating procedures will be held during the DH system operation.

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Environmental Mitigation Plan

Phase : Pre-construction – P-C Construction - C Operation – O Decommissioning - D	Environmental Impact	Mitigating Measure(s)	Cost		Institutional Responsibility		Significance & probability of occurrence	Comment
			Install	Operate	Install	Operate		
General issues								
P-C	Permanent or temporary withdrawal of land sites	Selection of optimal location of site and routes for access roads, pipes	To be determined	N/A	Termoelectrica SA	N/A	Significant	Subject of RAP
		Use proper temporary storage of construction materials	To be determined	N/A	Contractor	N/A	Moderate-Possible	
		Ensure a sufficient land, spaces and access for project activities	To be determined	N/A	Local authorities, Termoelectrica SA	N/A	Significant	Subject of RAP
C	Injury to contractor's workers and other persons during works	Safe working procedures to be written and followed by contractor	Bill of Q	N/A	Contractor	N/A	Moderate-Possible	
		Working areas to be temporarily out of bounds to non-works	To be determined	N/A	Contractor	N/A	Moderate-Possible	
		Special equipment and clothing corresponding to type of work to be assured	Bill of Q	N/A	Contractor	N/A	Moderate-Possible	
C, O, D	Injury to contractor's workers and others from unsafe storage of waste	All waste material to be stored in a secure, designated area prior to removal to a designated waste landfill site	To be determined	N/A	Contractor	Termoelectrica SA	Moderate-Possible	
		No easy flammable waste will be stored on/near site	To be determined	N/A	Contractor	Termoelectrica SA	Significant	
C, O, D	Pollution (visual and other) caused by improper	Waste to be disposed of at a designated waste landfill site.	To be determined	N/A	Contractor	Termoelectrica SA	Moderate-Possible	
		Recycling of materials will be allowed if is the case	To be determined	N/A	Contractor	Termoelectrica SA	Minimal	

Phase : Pre-construction - P-C Construction - C Operation - O Decommissioning - D	Environmental Impact	Mitigating Measure(s)	Cost		Institutional Responsibility		Significance & probability of occurrence	Comment
			Install	Operate	Install	Operate		
	disposal of waste materials	Workers will be instructed regarding waste management procedures	To be determined	N/A	Contractor	Termoelectrica SA	Moderate-Possible	
C	Destroying of green areas	Manage accurate works activities in order to damage as minimum and restore after completion	N/A	N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
C, D	Soil, surface water, air pollution with transported materials	Cover the trucks transporting the fine materials or waste	N/A	N/A	Contractor	Not applicable	Moderate-Possible	
C	Loss of topsoil leading to increased soil erosion	Separation of topsoil and subsoil during excavation works, with careful replacement of topsoil after pipe is laid	Bill of Q	N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
		No long time storage of topsoil will be allowed	N/A	N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
		Avoid topsoil erosion from temporary storage, to insure measures against overflow in case of heavy rainfall	N/A	N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
C, D	Oil pollution of soil and water at construction site	Daily checks of machinery for leaking oil	N/A	N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
		No washing of machinery at urban construction site	N/A	N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
C, D	Noise pollution on site	Works performed strictly during normal weekday working hours	Bill of Q	N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	

Phase : Pre-construction - P-C Construction - C Operation - O Decommissioning - D	Environmental Impact	Mitigating Measure(s)	Cost		Institutional Responsibility		Significance & probability of occurrence	Comment
			Install	Operate	Install	Operate		
C, D	Noise pollution on adjacent localities	Works performed strictly during normal weekday working hours	Bill of Q	N/A	Contractor, Construction supervision	Not applicable	Minimal	
		No explosion materials have to be used		N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
C, D	Temporary air pollution (CO ₂ , NO _x , dust etc.) from construction works and increased traffic	Minimize dust and traffic emissions by good operation management and site supervision		N/A	Contractor, Construction supervision	Not applicable	Moderate-Possible	
		Apply dust suppression measures (water sprinkling) especially during long dry periods	Bill of Q	N/A	Contractor	Not applicable	Significant	
C	Pollution and damages of the construction site in case of flooding	Construction of fence / safety dams (if applicable)	Bill of Q	N/A	Contractor	Not applicable	Significant	
C	Archaeological "chance finds"	If any archaeological artifacts are found, work must stop immediately and the respective local authorities and experts informed	To be determined	N/A	Contractor, Construction supervision	Not applicable	Significant	
Rehabilitation of Main Heating Networks								
C	Pollution by waste gas from construction machinery and transport vehicles	Repair and maintenance of construction machinery and transport vehicles will be strengthened at normal time; traffic control will be properly done to avoid traffic jam and reduce gas emission	To be determined	N/A	Contractor, State Sanitary Inspection, Ecological Inspection,	Termoelectrica SA	Significant	

Phase : Pre-construction - P-C Construction - C Operation - O Decommissioning - D	Environmental Impact	Mitigating Measure(s)	Cost		Institutional Responsibility		Significance & probability of occurrence	Comment
			Install	Operate	Install	Operate		
					Termoelectrica SA			
C	Noise pollution/ vibrations from hauling tracks/ moving vehicles and working equipment	Control construction methods and used machinery and equipment Careful timing of works in residential areas/ restrict construction to certain hours To avoid loud beep signals in residential areas / to minimize disturbance to residents	To be determined	N/A	Contractor, State Sanitary Inspection, Ecological Inspection, Termoelectrica SA	Termoelectrica SA	Significant	
C	Littering of territory adjacent/roads damage to landscape due to waste & excavated materials disposals/ stockpiling of materials	To plan carefully construction works to minimize impact on parks and street flora, careful siting, alignment, design of associated infrastructure to minimize impacts	To be determined	N/A	Contractor, Termoelectrica SA	Termoelectrica SA	Significant	
C	Rehabilitation and construction works will possibly result in removal or relocation of trees and vegetation along or within the	To plan carefully construction works to minimize impact on flora, habitats/ careful siting, alignment, design of associated infrastructure to minimize impacts Replanting trees and vegetation after heating infrastructure rehabilitation	To be determined	N/A	Contractor, Termoelectrica SA	Spatii Verzi	Moderate-Possible	

Phase : Pre-construction – P-C Construction - C Operation – O Decommissioning - D	Environmental Impact	Mitigating Measure(s)	Cost		Institutional Responsibility		Significance & probability of occurrence	Comment
			Install	Operate	Install	Operate		
	construction sites.							
C	Human health /settlements	<ul style="list-style-type: none"> To train personnel on occupational safety and measures towards compliance with occupational safety requirements; Appropriately experienced contractor, good supervision, careful planning and scheduling of work activities; Excavated potholes should be either covered with crushed stone or sand or fenced if they are going to be left opened over night; Avoid working during unfavorable weather conditions to minimize risk of accidents/ bitumen should not be applied during strong winds or heavy rains. <p>To ensure accident prevention for population in residential areas/ to plan carefully construction works to minimize impact on local residents</p>	To be determined	N/A	Contractor, State Sanitary Inspection, Ecological Inspection, Labor Inspection, Termoelectrica SA	Termoelectrica SA	Moderate-Possible	
P-C / C	Health impact on workers due to work with hazardous materials	<ul style="list-style-type: none"> Incorporation of safety and environmental requirements in contract documents/ providing of workers with uniforms, glasses, gloves, etc. Foreseeing compensations in case of health damage; 	To be determined	N/A	Contractor, State Sanitary Inspection, Ecological Inspection, Labor Inspection, Termoelectrica SA	Termoelectrica SA	Moderate-Possible	

Phase : Pre-construction – P-C Construction – C Operation – O Decommissioning – D	Environmental Impact	Mitigating Measure(s)	Cost		Institutional Responsibility		Significance & probability of occurrence	Comment
			Install	Operate	Install	Operate		
		<ul style="list-style-type: none"> Fencing of dangerous areas (stockpiling of hazardous materials). 						
P-C / C	Fire and explosion hazards due to accidents during works	<ul style="list-style-type: none"> Incorporation of safety and environmental requirements in contract documents/ providing of workers with uniforms, glasses, gloves, etc. Foreseeing compensations in case of health damage; Fencing of dangerous areas (stockpiling of hazardous materials); To train personnel on occupational safety and measures towards compliance with occupational safety requirements; Appropriately experienced contractor, good supervision, careful planning and scheduling of work activities. 	To be determined	N/A	Contractor, State Sanitary Inspection, Ecological Inspection, Fire service Construction supervision	Termoelectrica SA	Moderate-Possible	
P-C / C	Impact of accidental discharge of pollutant	<p>Emergency measures for specific accidents will be worked out, so that control and solution can be done promptly in case of an accident;</p> <p>In case of an accident, the cause will be found out as soon as possible, to organize prompt repair and to solve the problem in the shortest possible time, to prevent spreading of pollution.</p> <p>To prevent leaks/spills during transportation/ loading-unloading of waste materials.</p>	To be determined	N/A	Contractor, State Sanitary Inspection, Ecological Inspection, Construction supervision	Termoelectrica SA	Moderate-Possible	

Phase : Pre-construction - P-C Construction - C Operation - O Decommissioning - D	Environmental Impact	Mitigating Measure(s)	Cost		Institutional Responsibility		Significance & probability of occurrence	Comment
			Install	Operate	Install	Operate		
		To plan carefully construction works to minimize air / water / soil pollution						
	Complying with the technical design documents and effective construction norms	<p>To be certain that the project implementation is complying with the technical design documents and effective construction norms.</p> <p>Verify if:</p> <p>Appropriate human health and worker safety measures during construction are developed and implemented by the construction company, which will be responsible for these measures;</p> <p>The documents prepared for specific works by the construction company are correct;</p> <p>The reconstruction works are conducted in accordance with construction norms and according to construction technologies.</p>	To be determined	N/A	Contractor, construction supervision, State Sanitary Inspection, Ecological Inspection,	Termoelectrica SA	Significant	

Environmental Monitoring Plan

Phase	What (Is the parameter to be monitored?)	Where (Is the parameter to be monitored?)	How (Is the parameter to be monitored?)	When (Define the frequency / or continuous?)	Why (Is the parameter being monitored?)	Cost (if not included in project budget)	Who (Is responsible for monitoring?)
During preparation							
Potential tree losses	Trees to be cut	Survey on site during detailed design	Visual monitoring, mapping of trees, include in detail design	During detailed design Before works starts.	Constructions may affect municipal green zones	Construction costs	Termoelectrica SA, Design Company, SEI
Air quality	Dust, smog, waste burning	To be determined during design	Visual monitoring	During works Daily	Air pollution prevention	Construction costs	Termoelectrica SA, SEI
Top soil preservation	Soil	In parks, green areas	visual monitoring	Monthly	Soil pollution prevention, Aesthetic view	To be included in BoQ	Termoelectrica SA, SEI
During implementation							
Potential tree losses	Trees to be cut Trees to be planted	Survey on site during works Green areas	Visual monitoring, Obtain cutting trees permits	Permanently Before works starts,	Constructions may affect municipal green zones	Construction costs	Termoelectrica SA, Design Company, Construction Supervision, SEI
Air quality	Dust, smog, waste burning	Survey on site during works	Visual monitoring	During works Daily	Air pollution prevention	Operation costs	Contractor, Termoelectrica SA, CPH, SEI
Air pollution from improper maintenance of equipment	Technical condition	Car parking area Onsite	Regular technical inspection	During works Daily	Air pollution prevention	Operation costs	Contractor, CPH, SEI
Top soil preservation	Soil	In parks, green areas	Visual monitoring	Monthly	Soil pollution prevention, Aesthetic view	To be included in BoQ	Termoelectrica SA, SEI
Worker's safety and health	Workers safety	Works sites	Accident register Training register Provide PPE Organize adequate works planning	Permanently	To protect worker's safety and health	Construction costs	Contractor, Labor Inspection, Engineer

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Phase	What (Is the parameter to be monitored?)	Where (Is the parameter to be monitored?)	How (Is the parameter to be monitored?)	When (Define the frequency / or continuous?)	Why (Is the parameter being monitored?)	Cost (if not included in project budget)	Who (Is responsible for monitoring?)
Material transport	Are the truck loads covered or wetted? Compliance with legislation (restricted working hours; haul routes) dust suppression methods where required	Job site/municipal streets	Supervision	Unannounced inspections during work	Avoid dust and split of fine material Avoid damage and pollution of municipal routes.	Construction costs	Construction Supervision (Engineer), Road police
During supervision							
Planting trees	Regular monitoring and control of successful growth of new planted trees	At locations of new planted trees	Replanting of trees that have died	Monitoring to be conducted in autumn so as to allow for replacement of failures	Successful grow of trees	Construction costs in BoQ	Contractor 1 st Year / Municipal agency "Spatii Verzi" subsequent year(s)

Implementing Arrangements

Supervision and monitoring activities - During subproject implementation Termoelectrica SA will have overall supervision responsibility for assuring that the measures indicated in the EMP are being properly performed. In collaboration with the local environmental authorities will perform the subproject environmental monitoring during both construction and operation phases as specified in the monitoring plan of the EMP.

Contractors' responsibilities - The contractor will be required to operate in full compliance with national environmental legislation and with the EMP requirements. Further, the contractors are obliged to follow regulative requirements of the Moldavian law related to traffic safety, occupational health and safety; fire safety; environmental protection; and community health and safety. All EMP associated activities will be financed by the contractors. The contractors will also be requested to designate a person in charge of environmental, health and safety issues and for implementing the EMP.

Integration of EA requirements into project documents - The bidding documents for selecting the contractors will include specifications that would ensure effective implementation of environmental, health and safety performance criteria by the winning bidder. The contract with winning bidder will include necessary conditions related to HSE compliance with EMP and an obligation to inform the Termoelectrica SA of any significant HSE accidents and events among subcontracted project workers.

The tender documents will, according to this EMP, require the winning bidder to:

- (i) develop an operational EMP that include measures to prevent/limit disturbance of soils and vegetation removal to the minimum; prevent soil compaction as well as other potential impacts;
- (ii) ensure that all ground disturbing activities are conducted consistent with the construction requirements;
- (iii) develop a traffic management plan that include measures to ensure work zone safety for construction workers and the travelling public; and
- (iv) the traffic management plan should be approved by the Traffic Police prior to commence of any construction/repair works.

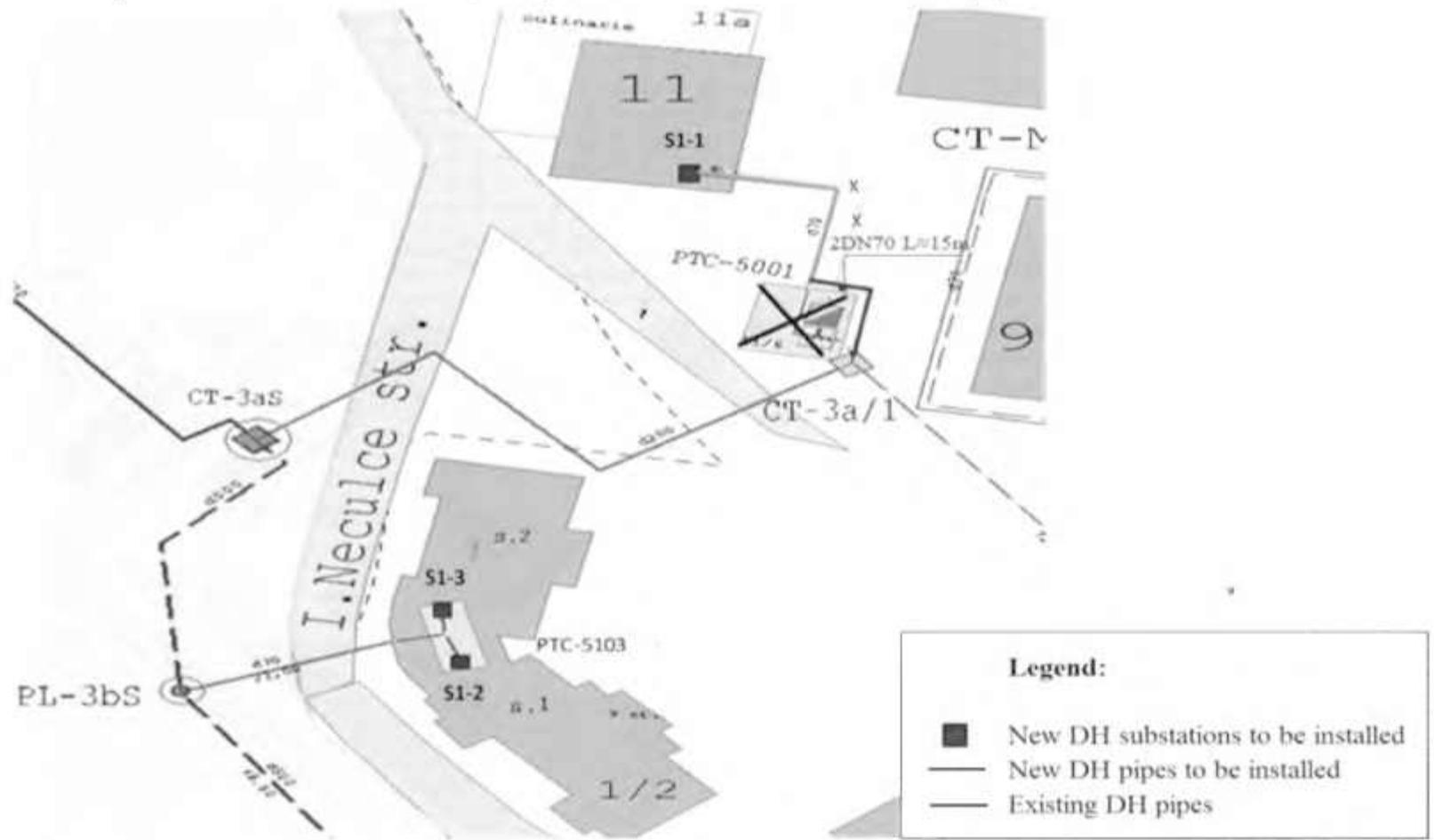
EMP implementation costs

During the (re)construction/implementation phase, the EMP implementation will be funded by the contractors. All (re)construction and installation activities will be provided by contracted companies. They are responsible for full and qualitative implementation of the EMP provisions.

EMP implementation costs are related with expenses of salaries, reporting, and supervision and monitoring costs. Also EMP cost are measures to reduce the pollution, impact to environment, preventive mitigation measures - all this expenses are included in overall construction costs.

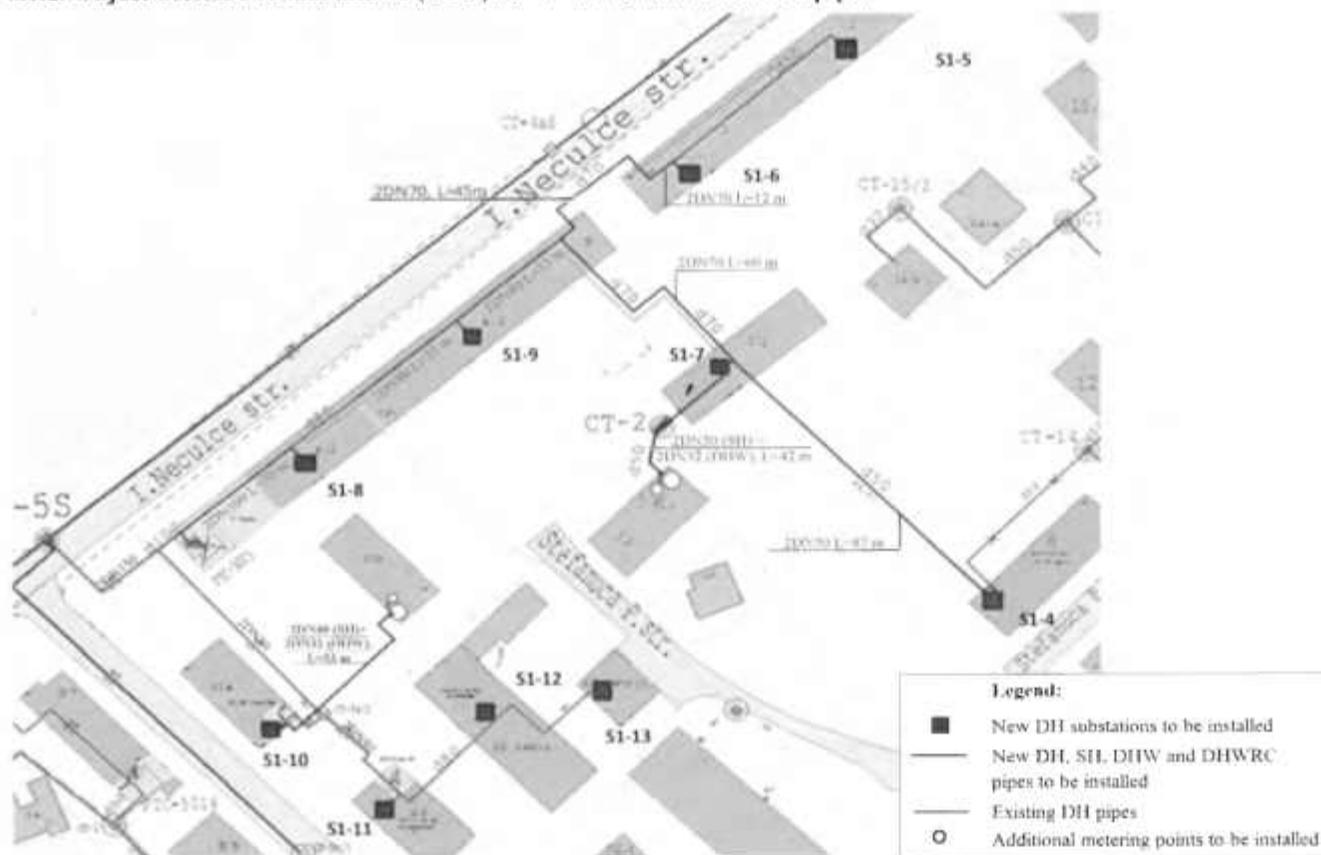
Drawings

8.1.1. Object no.1.1. DH substations (IHSs) S1-1 – S1-3 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-1	str. Calea Ieșilor, 11	1	11	53	240	117	102	37	113	54	94	63	2-stage	-
S1-2	str. Ion Neculce, 1/2 s.1	1	9	36	172	97	105	35	115	56	96	65	2-stage	+
S1-3	str. Ion Neculce, 1/2 s.2	1	9	36	172	97							2-stage	+

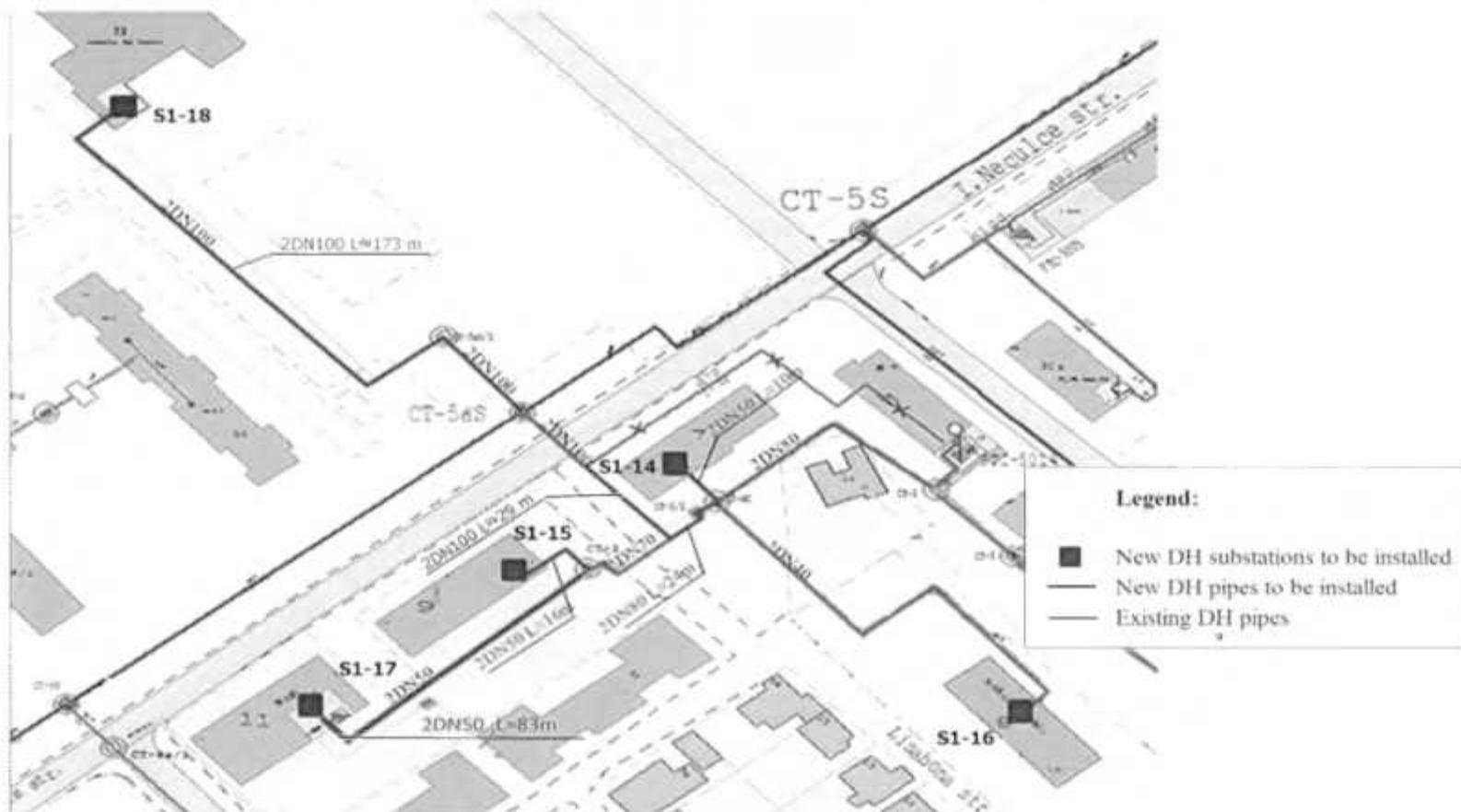
8.1.2. Object no.1.2. DH substations (HISs) S1-4 – S1-13 and associated pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressures, m				DHW preparation schematic	DHWRC pump to be included		
					SH-vent.	DHW	Heating season		Summer period				Transition periods	
							H1	H2	H1	H2			H1	H2
S1-4	str. Sportivă, 8 (Kindergarten)		2		100*	150*	80	53	100	49	89	58	2-stage	+
S1-5	str. Ion Neculce, 1	2	5	34	192	94	81	50					2-stage	+
S1-6	str. Ion Neculce, 3	2	5	45	192	104	84	48					2-stage	+
S1-7	str. I. Neculce, 3/2 + P. Stefanuca, 12	2+2	5+2	60+15	201	137	81	51					2-stage	+
S1-8	str. Ion Neculce, 5 s 1	3	5	34	125	94	96	35					2-stage	+
S1-9	str. Ion Neculce, 5 s 2	3	5	34	125	94	89	43					2-stage	+
S1-10	str. E. Coca, 30a + E. Coca, 30b	1+1	2+2	16+16	82	92	95	37					2-stage	+
S1-11	str. E. Coca, 28 bl A (Admin. building)		2		60*	40*	93	39					2-stage	-
S1-12	str. E. Coca, 28 bl B (Admin. building)		4		220*	140*							2-stage	+
S1-13	str. E. Coca, 28 bl C (Admin. building)		2		35*	30*							2-stage	-

Note: The heat loads marked with an asterisk () shall be recalculated during the design

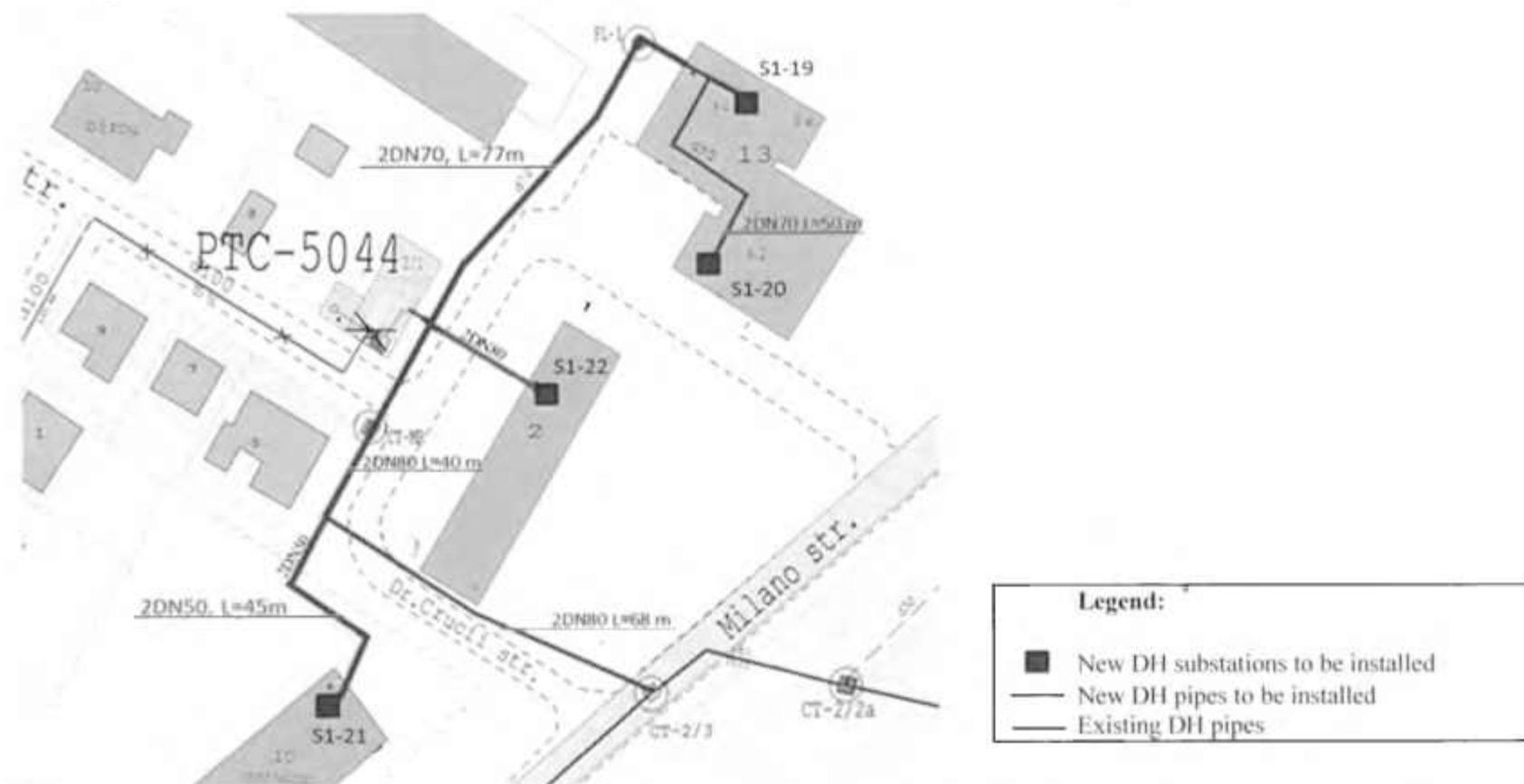
8.1.3. Object no.1.3. DH substations (IHSs) S1-14 – S1-18 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressures, m				DHW preparation schematic	DHWRC pump to be included		
							Heating season		Summer period				Transition periods	
					SH+ Ventilation	DHW	H11	H12	H11	H12			H11	H12
S1-14	str. Ion Neculce, 7	2	5	44	204	104	86	36	103	44	84	54	2-stage	+
S1-15	str. Ion Neculce, 9	2	4	70	204	132	87	35		2-stage	-			
S1-16	str. Lisabona, 8 (Kindergarten)		2		86	70	85	38		2-stage	+			
S1-17	str. Ion Neculce, 11	2	5	60	190	120	75	25		2-stage	-			
S1-18	str. Ion Neculce, 59 (Tennis School)		2		165+412*	104*	91	30		103	44	84	54	2-stage

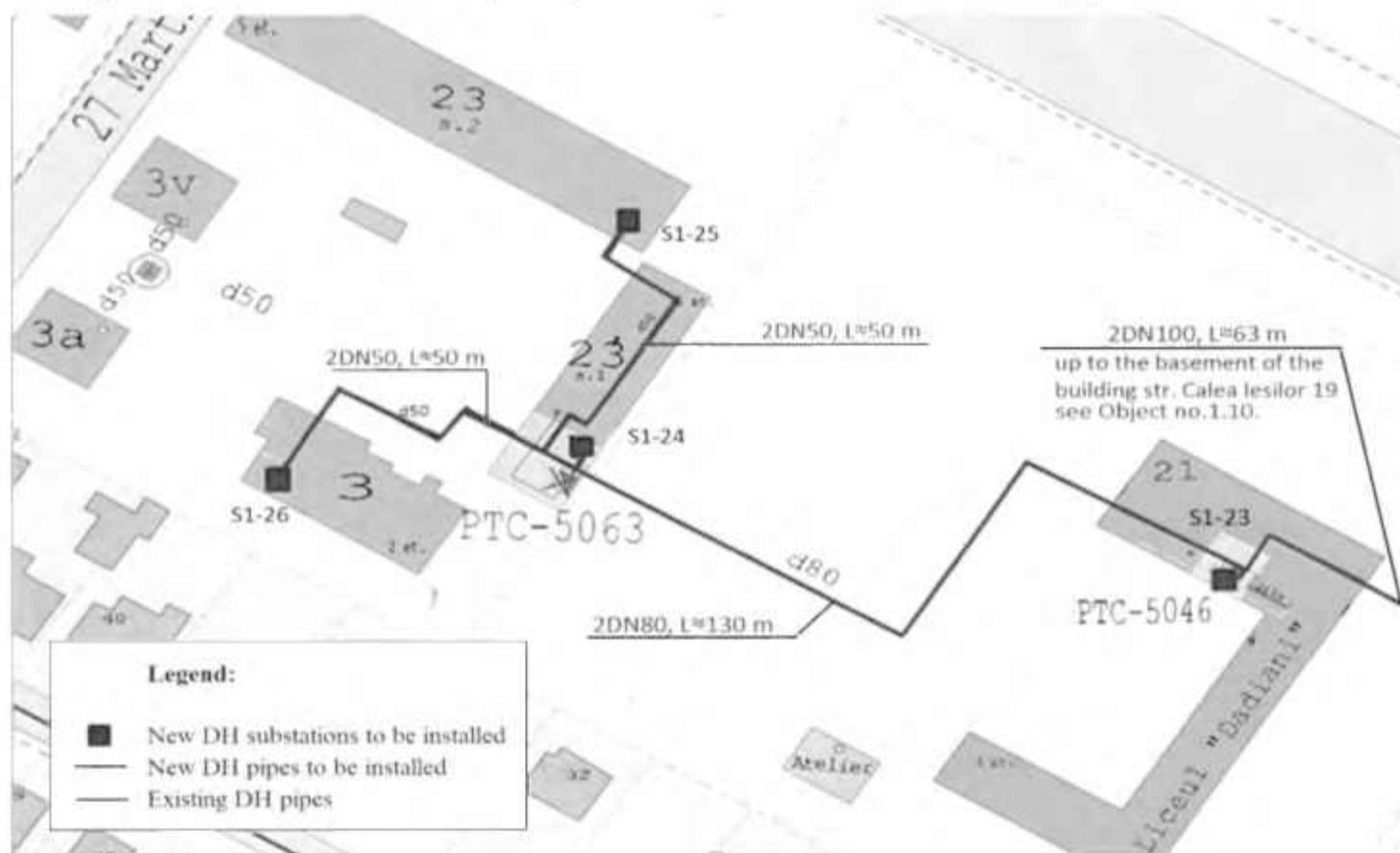
Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.1.4. Object no.1.4. DH substations (IHSs) S1-19 – S1-22 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
							H1	H2	H1	H2	H1	H2		
S1-19	str. Calea leșilor, 13 s.1	1	16	79	420	140	123	32	114	55	95	64	2-stage	-
S1-20	str. Calea leșilor, 13 s.2	1	16	79	420	140							2-stage	-
S1-21	str. Milano, 10 (Admin. building)		3		95	50							2-stage	-
S1-22	str. Milano, 2	2	9	72	385	135							2-stage	+

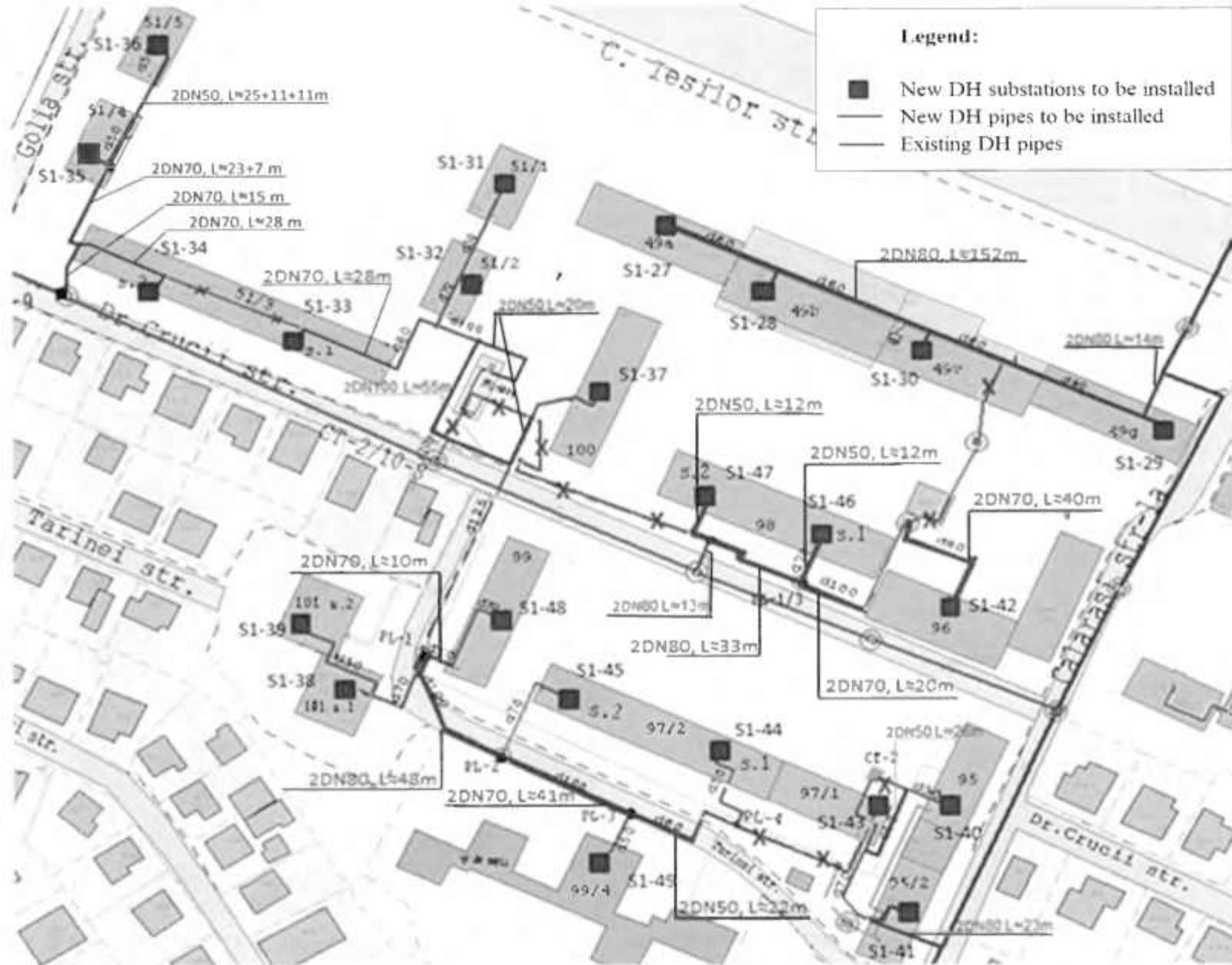
8.1.5. Object no.1.5. DH substations (IHSs) S1-23 – S1-26 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH-ventila-	DHW	H1	H2	H1	H2	H1	H2		
S1-23	str. Calea Ieșilor, 21 (Lyceum)		3		335+229*	121*	102	37	114	54	94	63	2-stage	+
S1-24	str. Calea Ieșilor, 23 s.1	3	5	40	174	100	101	38					2-stage	+
S1-25	str. Calea Ieșilor, 23 s.2	2	5	56	174	118	99	39					2-stage	+
S1-26	str. 27 Martie 1918, 3	1	2	30	112	87	100	38					2-stage	-

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.1.6. Object no.1.6. DH substations (IHSs) S1-27 – S1-49 and associated DH pipes

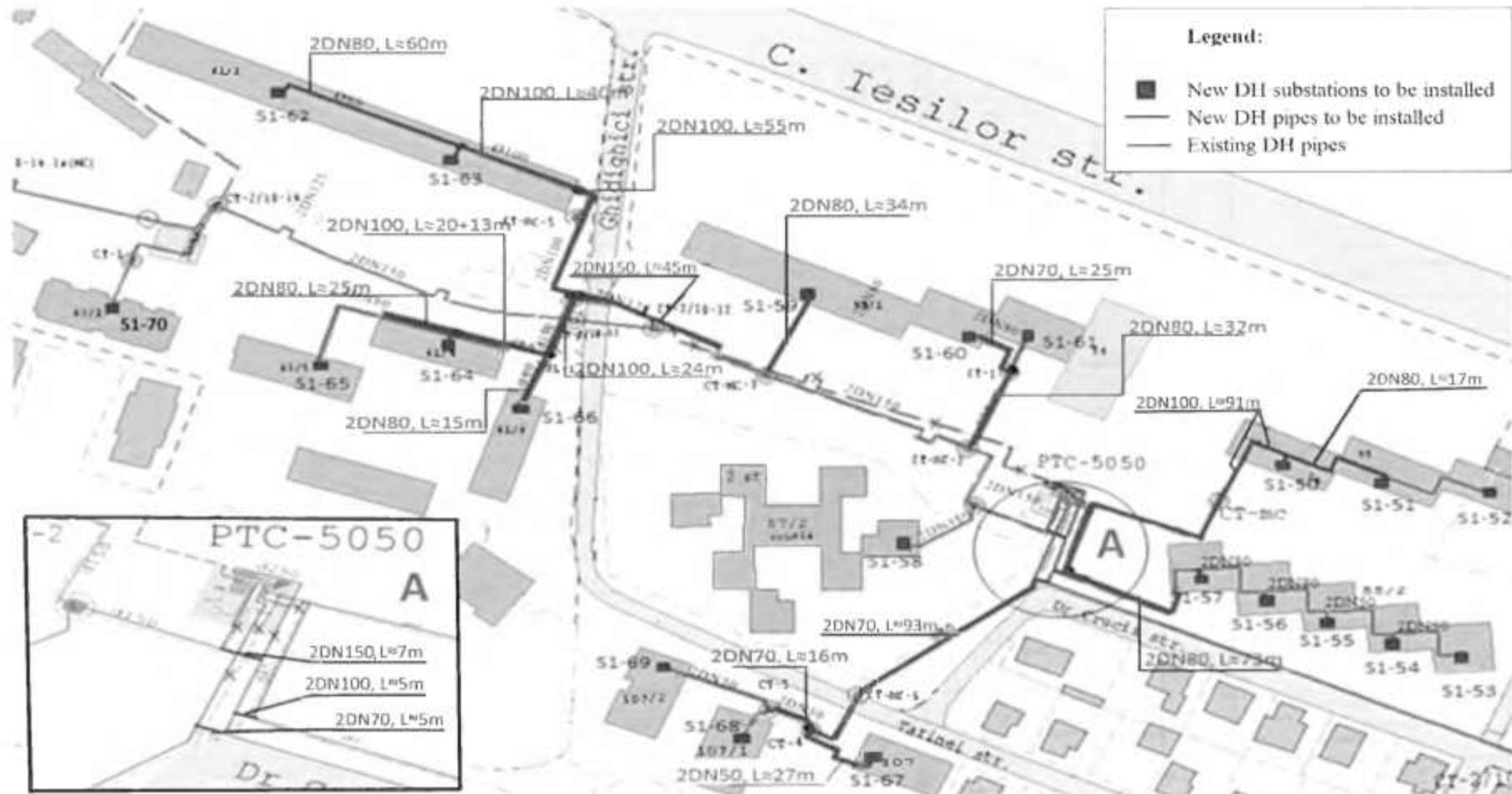


Object no.1.6.

Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-27	str. Calea Ieșilor, 49a (Dormitory)	1	5		186	100	88	44	111	53	90	64	2-stage	-
S1-28	str. Calea Ieșilor, 49b (Dormitory)	1	5		193	140	89	44					2-stage	-
S1-29	str. Calea Ieșilor, 49g (Dormitory)	1	5		190	100	97	50					2-stage	-
S1-30	str. Calea Ieșilor, 49v (Dormitory)	1	5		193	100	96	51					2-stage	-
S1-31	str. Calea Ieșilor, 51/1	1	9	36	140	97	85	52					2-stage	-
S1-32	str. Calea Ieșilor, 51/2	1	9	36	140	97	85	54					2-stage	-
S1-33	str. Calea Ieșilor, 51/3 s.1	2	9	72	326	134	87	57					2-stage	-
S1-34	str. Calea Ieșilor, 51/3 s.2	2	9	72	326	134	87	52					2-stage	-
S1-35	str. Calea Ieșilor, 51/4	1	9	36	140	97	87	52					2-stage	-
S1-36	str. Calea Ieșilor, 51/5	1	9	36	214	97	85	51					2-stage	-
S1-37	str. Drumul Crucii, 100	3	5	48	214	110	86	51					2-stage	-
S1-38	str. Drumul Crucii, 101 s.1	1	5	30	94	88	82	46					2-stage	+
S1-39	str. Drumul Crucii, 101 s.2	1	5	30	94	88	82	46					2-stage	+
S1-40	str. Drumul Crucii, 95	2	5	30	121	88	84	40					2-stage	+
S1-41	str. Drumul Crucii, 95/2	2	5	30	121	88	84	39					2-stage	+
S1-42	str. Drumul Crucii, 96	2	5	48	249	110	84	40					2-stage	-
S1-43	str. Drumul Crucii, 97/1	2	5	30	127	88	88	47					2-stage	+
S1-44	str. Drumul Crucii, 97/2 s.1	1	5	30	135	88	87	47					2-stage	-
S1-45	str. Drumul Crucii, 97/2 s.2	1	5	30	135	88	87	46					2-stage	-
S1-46	str. Drumul Crucii, 98 s.1	2	5	30	110	88	80	45					2-stage	+
S1-47	str. Drumul Crucii, 98 s.2	2	5	30	110	88	81	45					2-stage	+
S1-48	str. Drumul Crucii, 99	2	5	63	151	124	82	46					2-stage	+
S1-49	str. Drumul Crucii, 99/4 (Kindergarten)		2		272	150	80	46					2-stage	+

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8.1.7. Object no.1.7. DH substations (IHS) S1-50 – S1-70 and associated DH pipes

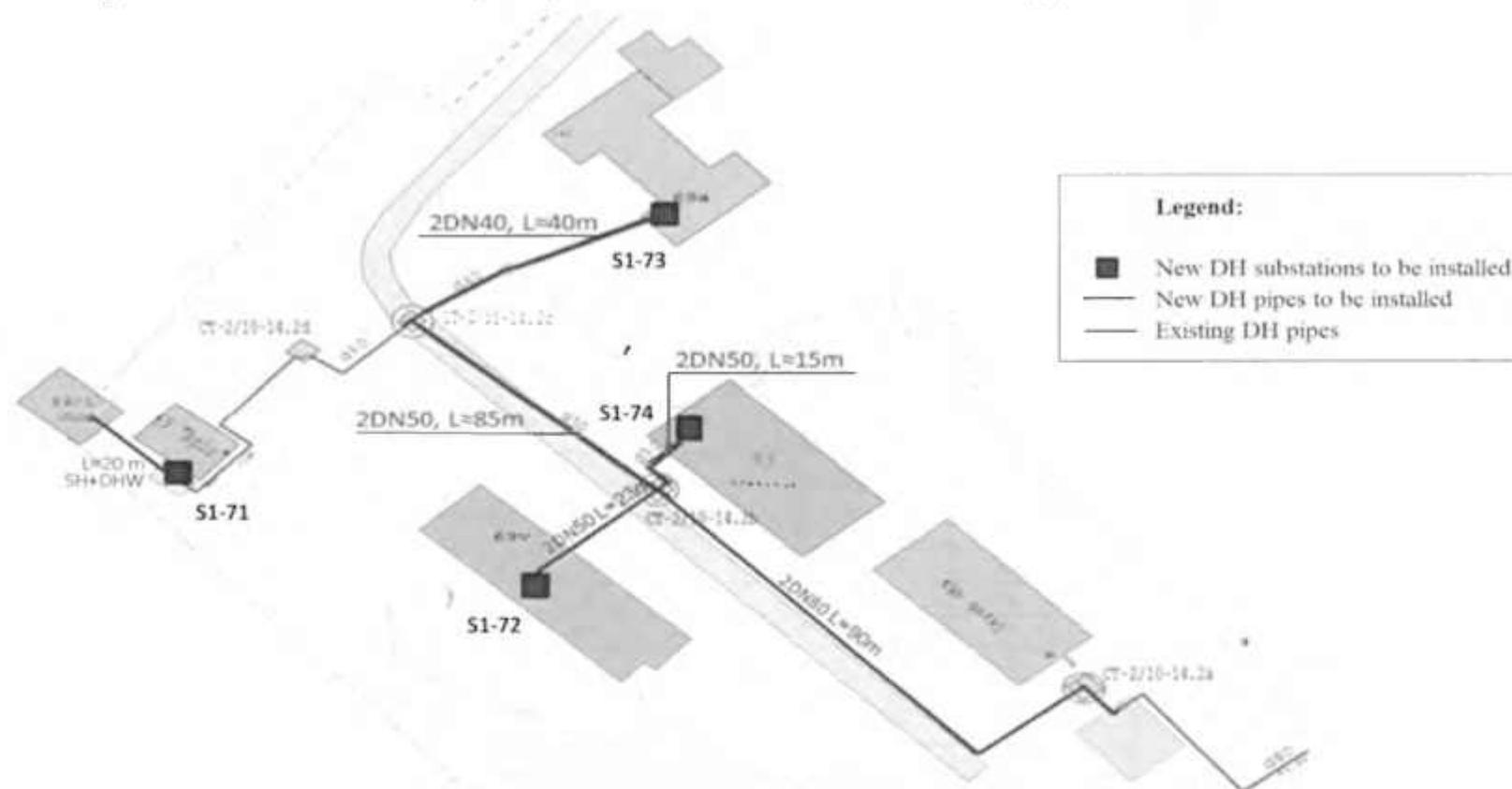


Object no. I.7.

Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m				DHW preparation schematic	DHWRC pump to be included		
							Heating season		Summer period				Transition periods	
					SH-ventilat.	DHW	H1	H2	H1	H2			H1	H2
S1-50	str. Calea Ieșilor, 55 s.1	1	5	24	150	80	87	60	110	52	88	61	2-stage	+
S1-51	str. Calea Ieșilor, 55 s.2	1	5	30	150	87	85	62					2-stage	+
S1-52	str. Calea Ieșilor, 55 s.3	1	5	24	150	80	84	63					2-stage	+
S1-53	str. Calea Ieșilor, 55/2 s.1	1	5	29	100	86	89	48					2-stage	+
S1-54	str. Calea Ieșilor, 55/2 s.2	1	5	29	100	86	89	48					2-stage	+
S1-55	str. Calea Ieșilor, 55/2 s.3	1	5	29	100	86	91	50					2-stage	+
S1-56	str. Calea Ieșilor, 55/2 s.4	1	5	29	100	86	92	51					2-stage	+
S1-57	str. Calea Ieșilor, 55/2 s.5	1	5	29	100	86	92	51					2-stage	+
S1-58	str. Calea Ieșilor, 57/2 (Kindergarten)		2		386	240	87	52					2-stage	-
S1-59	str. Calea Ieșilor, 59/1 s.1	2	9	108	371	170	87	61					2-stage	+
S1-60	str. Calea Ieșilor, 59/1 s.2	1	9	36	151	97	90	58					2-stage	+
S1-61	str. Calea Ieșilor, 59/1 s.3	1	9	36	151	97	90	58					2-stage	+
S1-62	str. Calea Ieșilor, 61/1 s.1	3	9	99	385	160	81	68					2-stage	-
S1-63	str. Calea Ieșilor, 61/1 s.2	3	9	99	385	160	82	67					2-stage	-
S1-64	str. Calea Ieșilor, 61/4	2	9	54	352	118	77	63					2-stage	+
S1-65	str. Calea Ieșilor, 61/5	2	9	54	352	118	77	63					2-stage	+
S1-66	str. Calea Ieșilor, 61/6	2	9	54	349	118	77	63					2-stage	+
S1-67	str. Țărinei, 107	1	4	16	87	68	75	51					2-stage	+
S1-68	str. Țărinei, 107/1	1	4	16	77	68	76	53					2-stage	+
S1-69	str. Țărinei, 107/2	1	4	16	77	68	76	53					2-stage	+
S1-70	str. Calea Ieșilor, 63/1	2	9	72	288	134	82	66	116	58	95	69	2-stage	-

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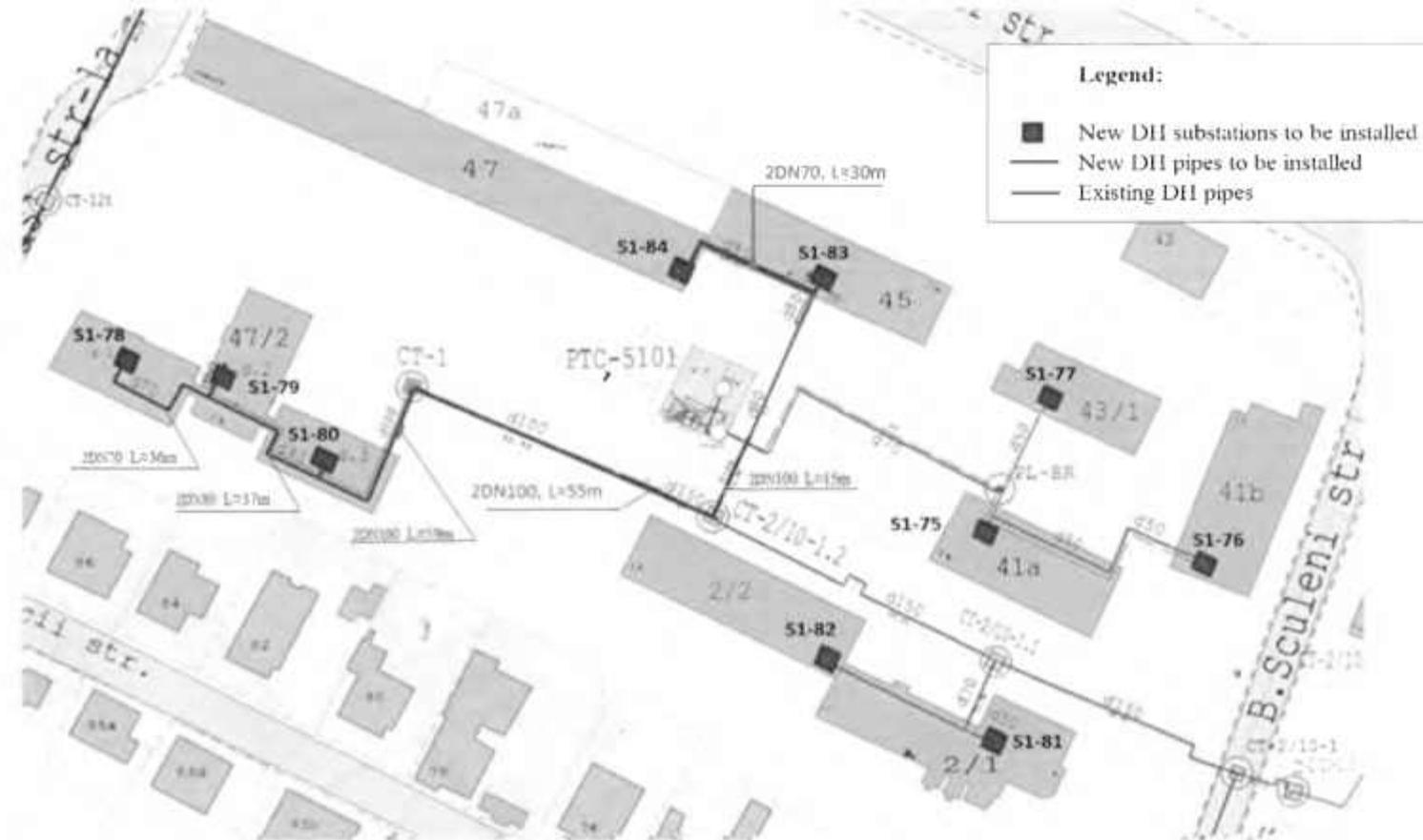
8.1.8. Object no.1.8. DH substations (IHSs) S1-71 – S1-74 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-71	str. Calea Ieşilor, 69+69/1		2		70*	35*	98	54	110	63	94	61	2-stage	—
S1-72	str. Calea Ieşilor, 69v	2	3	24	94	78	82	62	110	63	94	61	2-stage	—
S1-73	str. Calea Ieşilor, 69a	1	1	4	58	45	82	62	110	63	94	61	2-stage	—
S1-74	str. Calea Ieşilor, 69 (Admin.build.)		2		115	40	82	62	110	63	94	61	2-stage	—

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

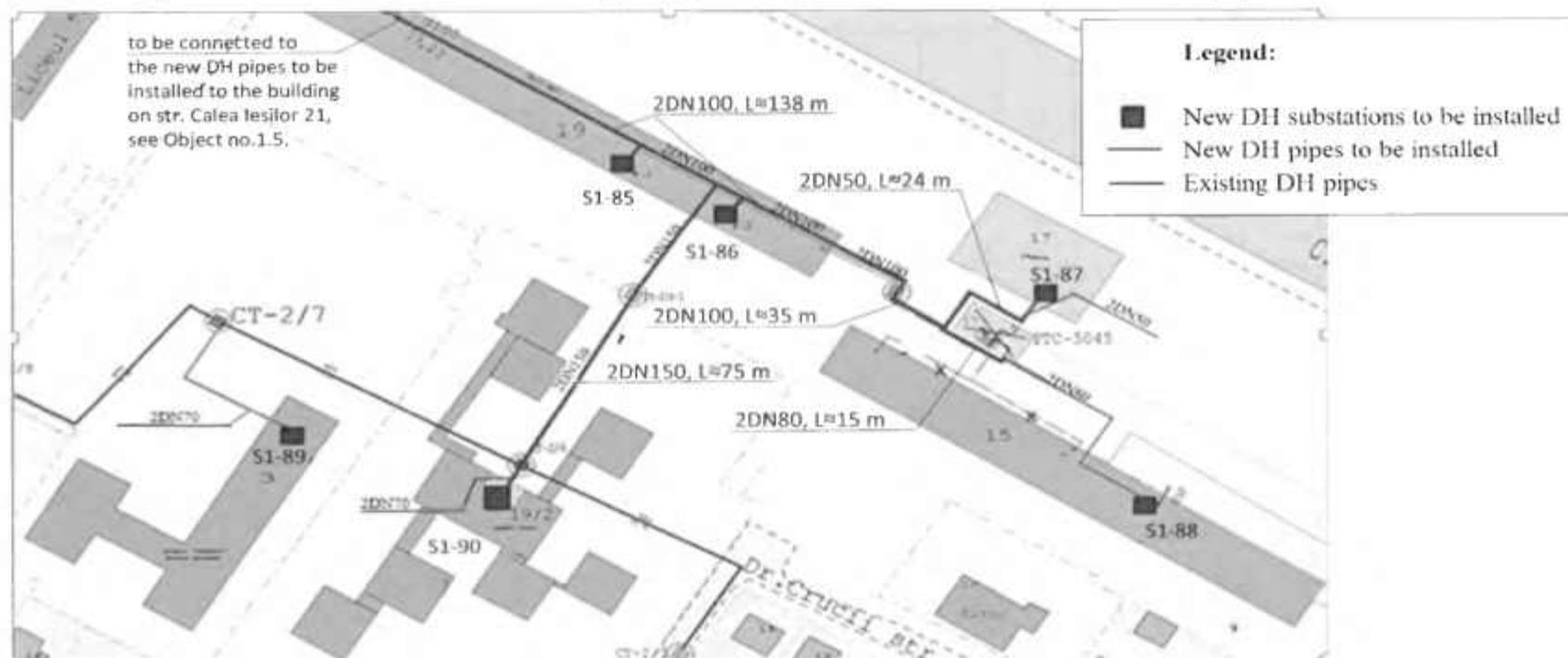
8.1.9. Object no.1.9. DH substations (IHSs) S1-75 – S1-84 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					S1+ ventilation	DHW	Heating season		Summer period		Transition periods			
							H1	H2	H1	H2	H1	H2		
S1-75	str. C. Ieșilor, 41a	1	2	14	81	65	121	29	111	52	92	62	2-stage	+
S1-76	str. C. Ieșilor, 41b	1	2	14	81	65							2-stage	+
S1-77	str. C. Ieșilor, 43/1	1	9	86	193	146							2-stage	-
S1-78	str. C. Ieșilor, 47/2 s.1	1	9	72	254	134							2-stage	+
S1-79	str. C. Ieșilor, 47/2 s.2	1	9	44	259	104							2-stage	+
S1-80	str. C. Ieșilor, 47/2 s.3	1	9	72	254	134	2-stage	+						
S1-81	str. Bariera Sculeni, 2/1	1	5	70	177	132	99	34	103	54	89	61	2-stage	-
S1-82	str. Bariera Sculeni, 2/2	1	5	90	150+144*	150							2-stage	-
S1-83	str. Calcea Ieșilor, 45	1	5	97	150	157	103	41	109	59	94	67	2-stage	-
S1-84	str. Calcea Ieșilor, 47	3	5	116	194	175							2-stage	-

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

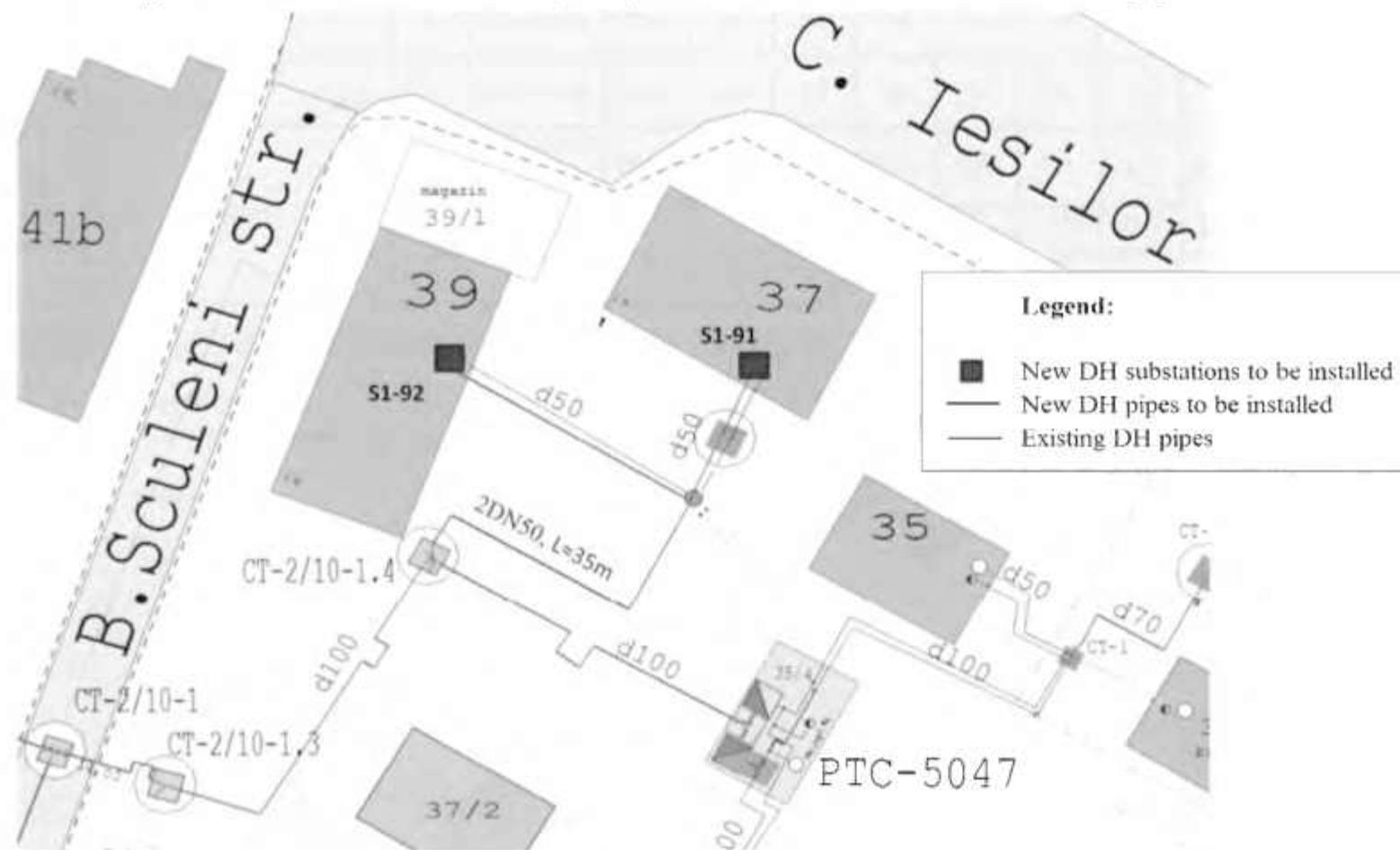
8.1.10. Object no.1.10. DH substations (IHSs) S1-85 – S1-90 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-85	str. Calea leșilor, 19 s.1	4	5	65	263	125	104	36	114	54	94	63	2-stage	+
S1-86	str. Calea leșilor, 19 s.2	4	5	65	263	125	104	36					2-stage	+
S1-87	str. Calea leșilor, 17		2		186	35*	103	37					1-stage*	+
S1-88	str. Calea leșilor, 15	7	5	108	459	180	102	38					2-stage	+
S1-89	str. Truseni, 3 (Lyceum)		3		238*	95*	102	32					2-stage	+
S1-90	str. C.leșilor, 19/2 (Kindergarten / school)		2		386	240	105	35					2-stage	+

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.1.11. Object no.1.11. DH substations (IHSs) S1-91 – S1-92 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH ⁺ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-91	str. Calea Ieșilor, 37	2	2	8	47	56	103	37	111	52	92	62	2-stage	+
S1-92	str. Calea Ieșilor, 39	2	2	16	56	68	103	37	111	52	92	62	2-stage	+

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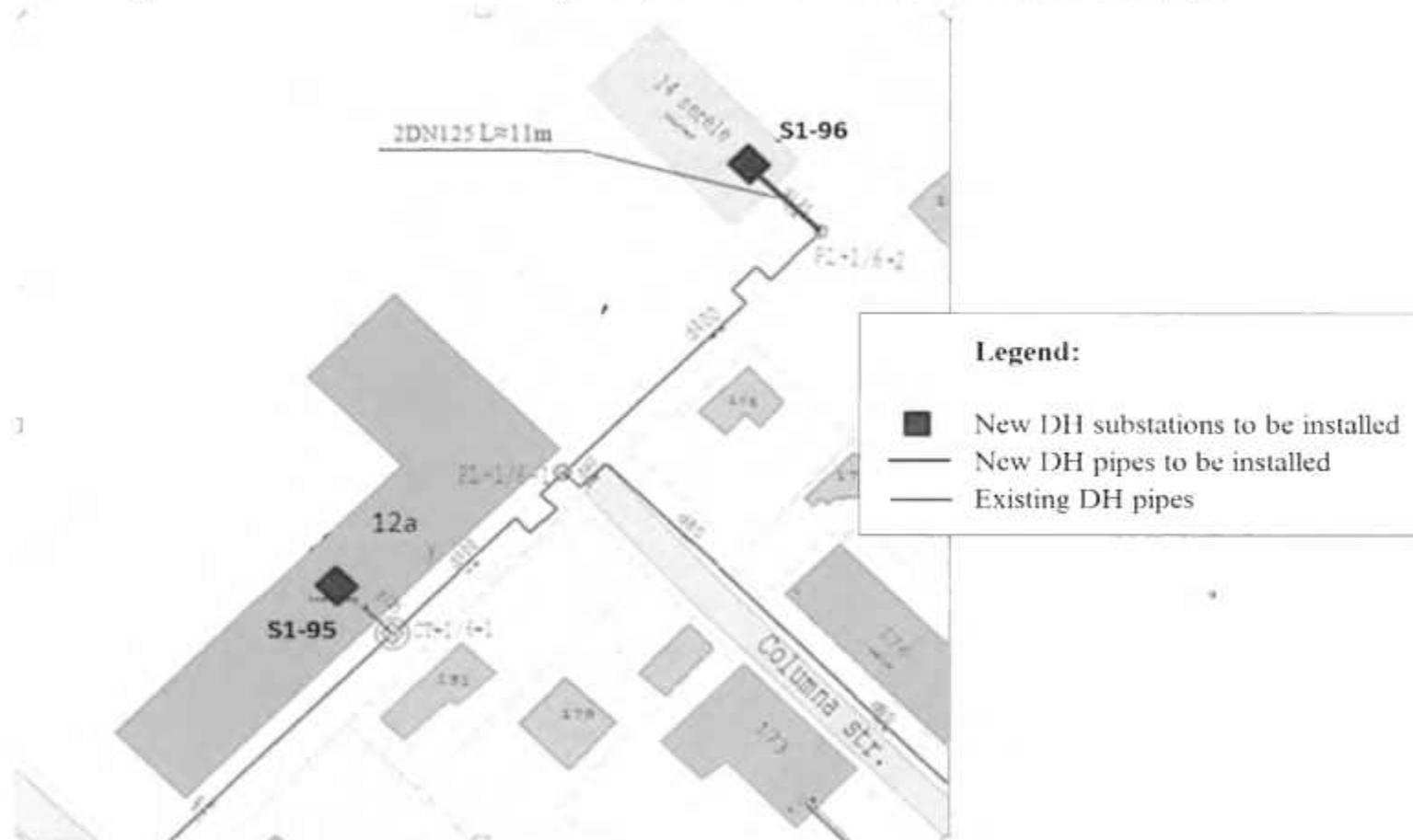
8.1.12. Object no.1.12. DH substations (IHSs) S1-93 – S1-94



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-93	str. Caragiale, 1 (Center of family doctors)	6	345+363*	230*	100	53	80	59	80	58	2-stage	–
S1-94	str. Caragiale, 2 (Diagnostics Center)	6	333+474*	230*	96	58	74	53	74	52	2-stage	–

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

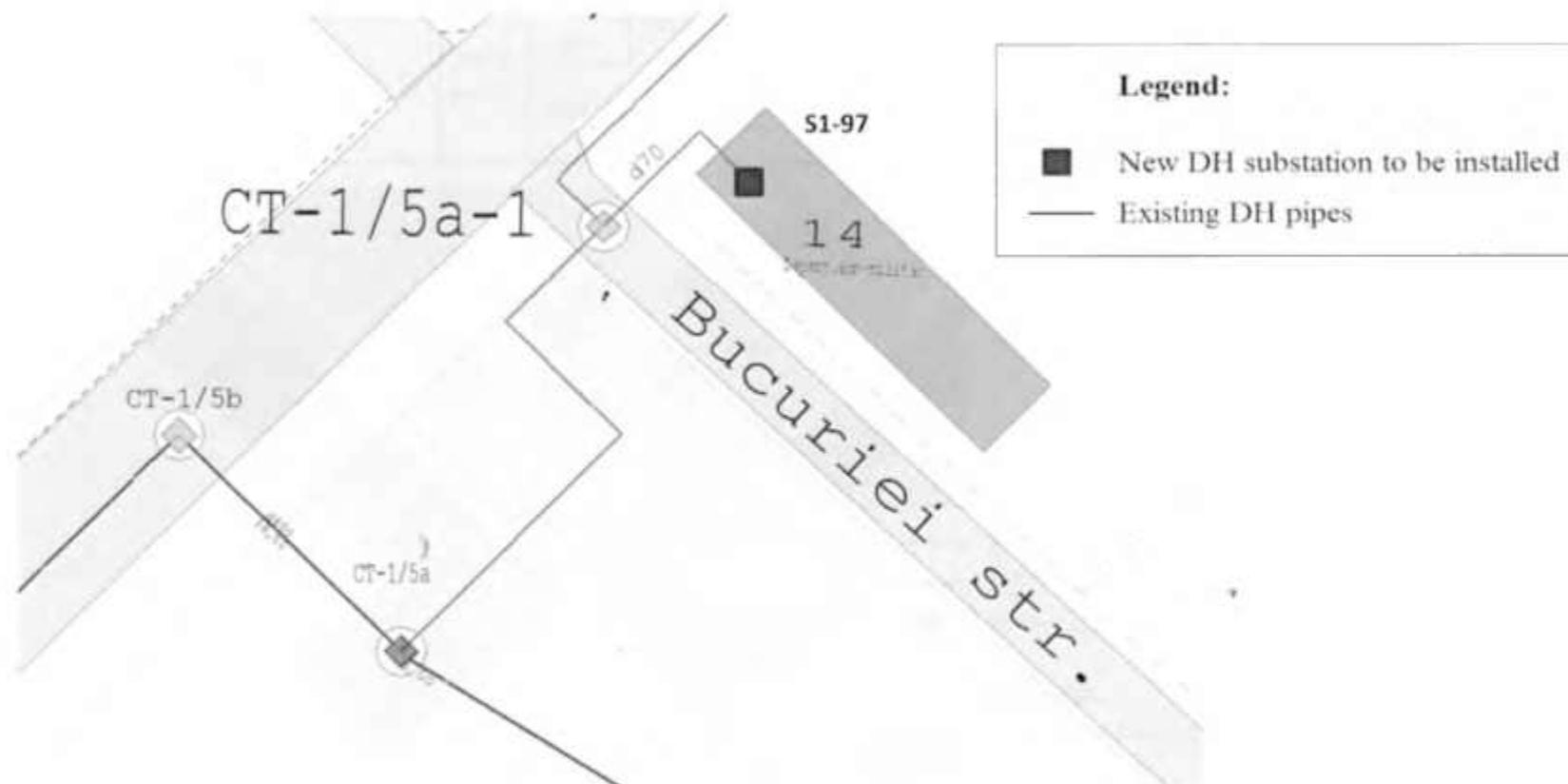
8.1.13. Object no.1.13. DH substations (IHSs) S1-95 – S1-96 and associated DH pipes



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ vent.	DHW	H1	H2	H1	H2	H1	H2		
S1-95	str. Bucuriei, 12a (Admin. build.)	5	245*	80*	104	36	118	57	102	63	2-stage	–
S1-96	str. Bucuriei, 14 (Greenhouses)	1	1628*	24*	107	41	118	57	102	63	1-stage	–

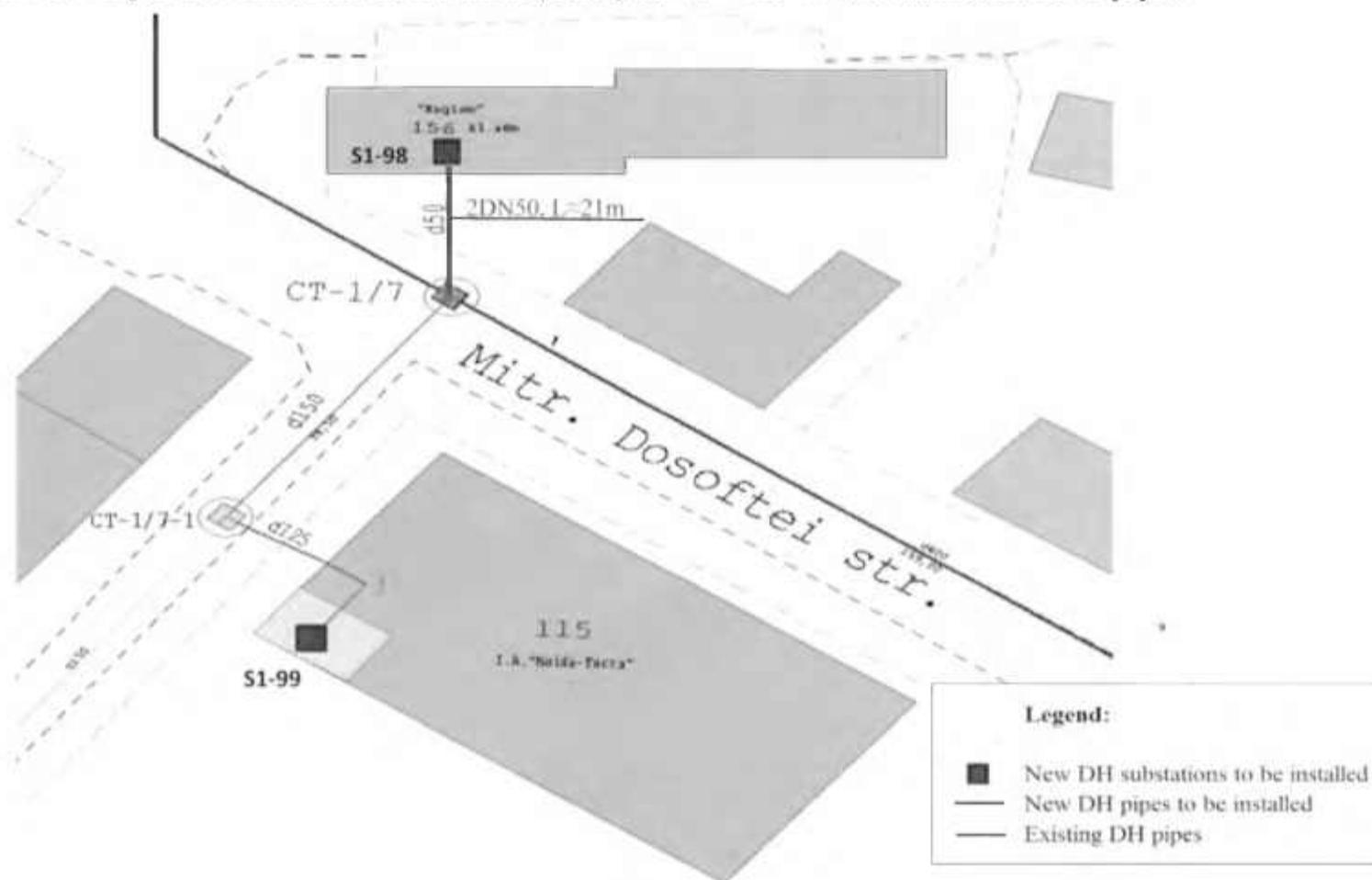
Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.1.14. Object no.1.14. DH substation (IHS) S1-97



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH	DHW	H1	H2	H1	H2	H1	H2		
S1-97	str. Bucuriei, 14 (Admin. build.)	3	274	80	109	41	119	58	103	65	2-stage	—

8.1.15. Object no.1.15. DH substations (IHSs) S1-98 – S1-99 and associated DH pipes

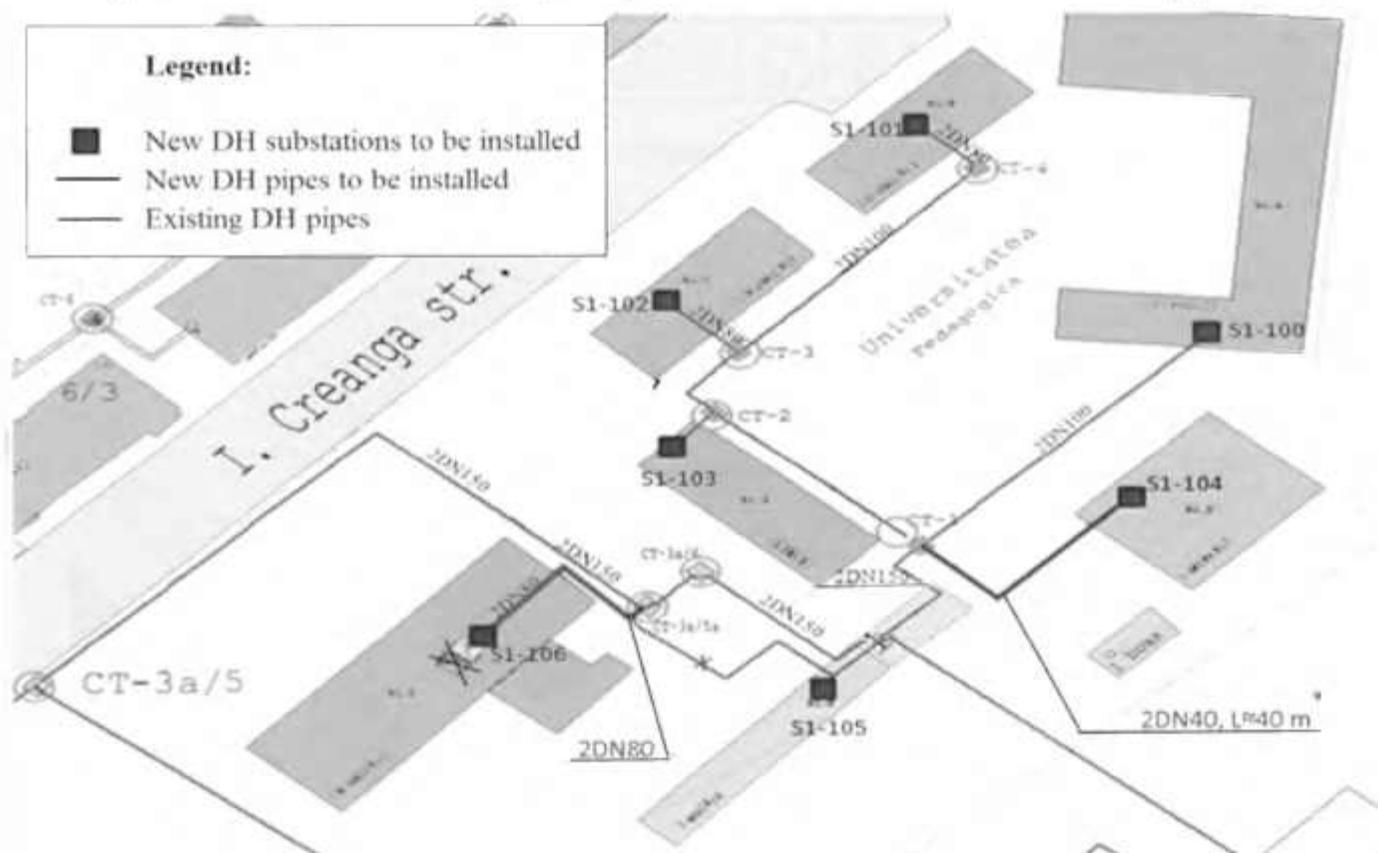


Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schemati	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+vent.	DHW	H1	H2	H1	H2	H1	H2		
S1-98	str. Mitropolit Dosoftei, 156	3	302+372*	80*	103	36	115	54	99	60	1-stage*	-
S1-99	str. Mitropolit Dosoftei, 115	4	1745*	200*	105	36	115	54	99	60	1-stage*	-

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

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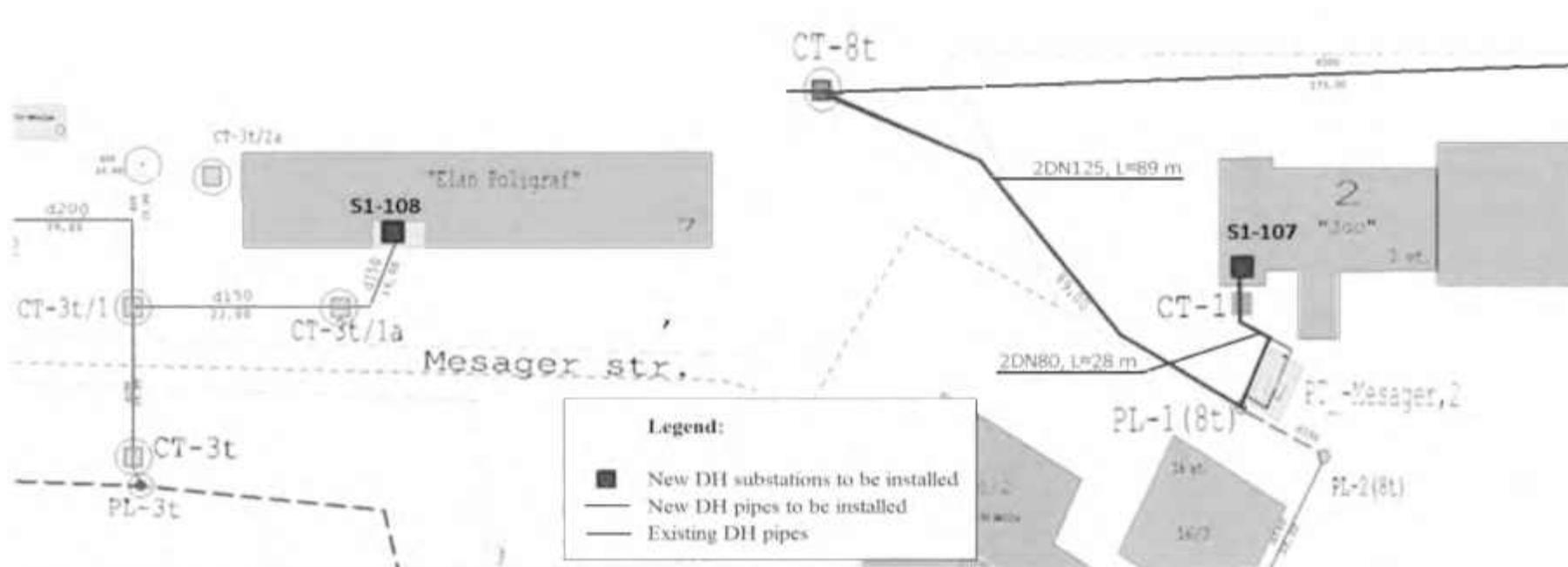
8.1.16. Object no.1.16. DH substations (IHSs) S1-100 – S1-106 and associated DH pipes



Substation No.	Address (State Pedagogical University "Ion Creanga")	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
			SH+ ventilation	DHW	Heating season		Summer period		Transition			
					H1	H2	H1	H2	H1	H2		
S1-100	str. I.Creanga, l. bl. A	3	209*	120*	125	32	114	55	96	65	2-stage	+
S1-101	str. I.Creanga, l. bl. B	2	100*	60*							2-stage	+
S1-102	str. I.Creanga, l. bl. C	2	90*	60*							2-stage	+
S1-103	str. I.Creanga, l. bl. D	3	90*	60*							2-stage	+
S1-104	str. I.Creanga, l. bl. E	3	60*	116*							1-stage*	—
S1-105	str. I.Creanga, l. bl. F	1	40*	24*							2-stage	—
S1-106	str. I.Creanga, l. bl. G	7	514+1065*	400*							2-stage	+

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.1.17. Object no.1.17. DH substations (IHSs) S1-107 – S1-108 and associated DH pipes



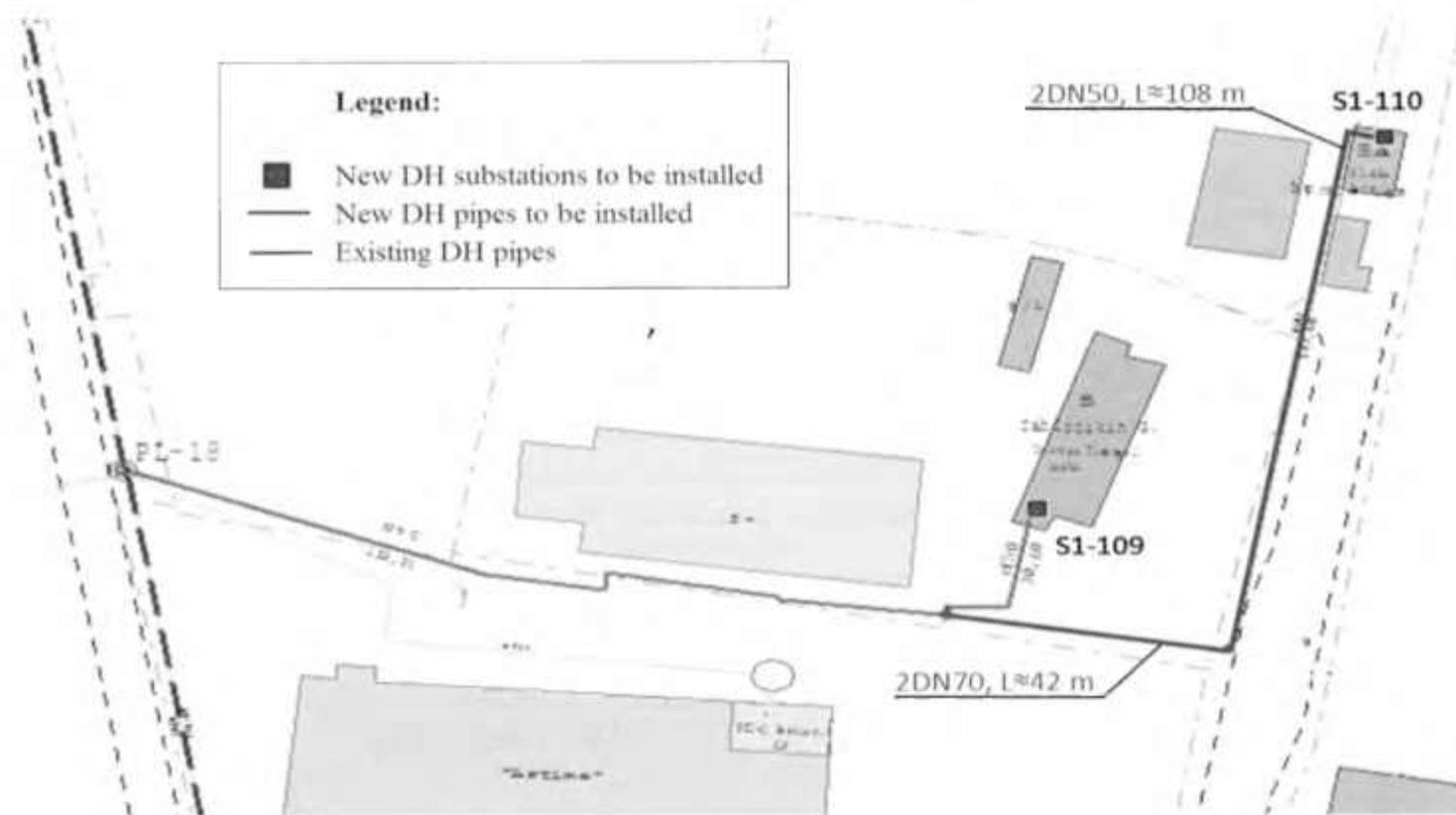
Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-107	str. Mesager, 2**	2	488*	147*	118	38	114	56	93	66	2-stage	+
S1-108	str. Mesager, 7	3	430*	310*	126	34	116	57	96	68	2-stage	-

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

**Note: The DH substation S1-107 shall be installed in the main building str. Mesager 2. If it occurs that there is no available space in the main building (this shall be examined and agreed with the Employer), the substation S1-107 shall be installed in the existing separate substation building (on the drawing above: "PT_-Mesager,2") and new SH, DHW and DHWRC pipes shall be installed to the main building.

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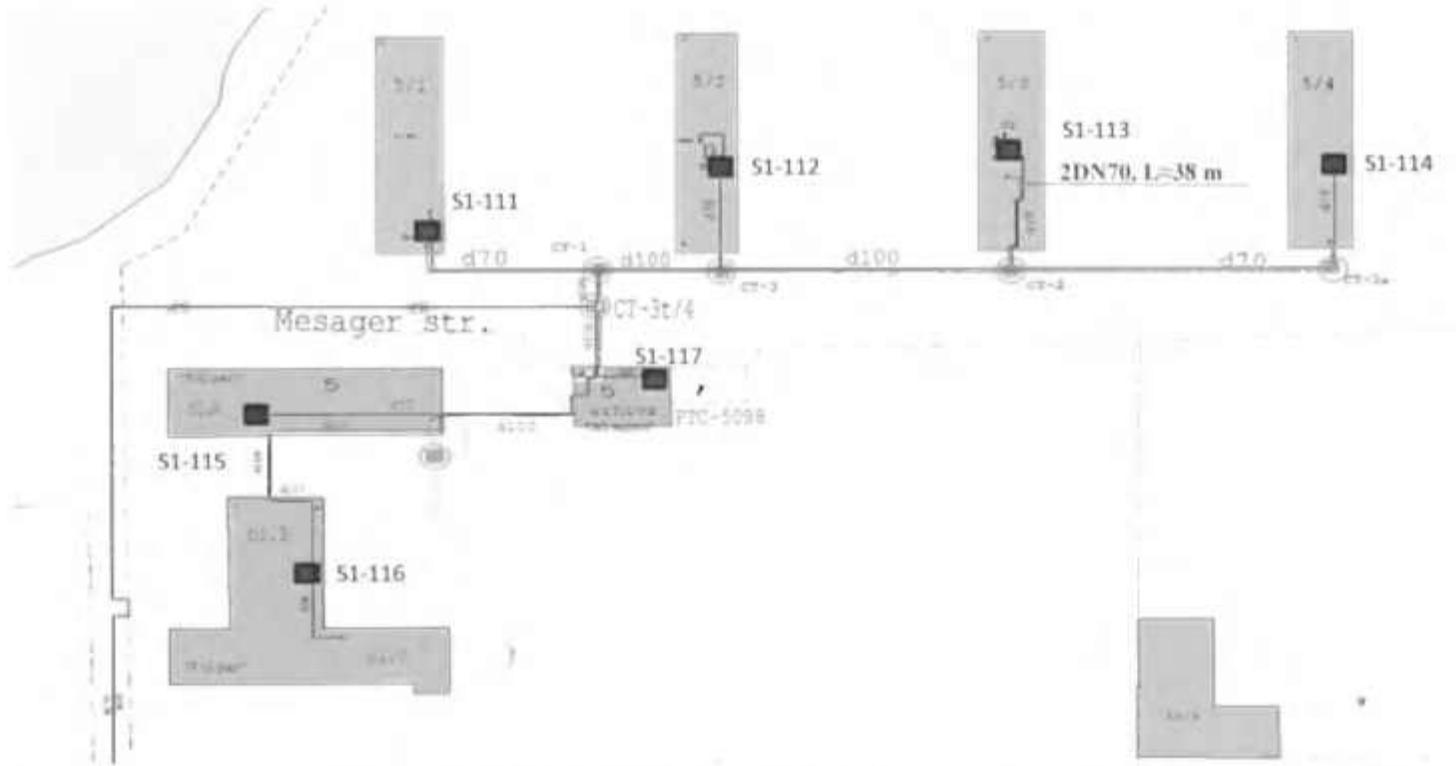
8.1.18. Object no.1.18. DH substations (IHSs) S1-109 – S1-110 and associated DH pipes



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S1-109	str. Iablocichin, 5 (University)	3	302+478*	120*	130	28	116	56	96	65	2-stage*	—
S1-110	str. Iablocichin, 5a	1	22*	24*	131	28	117	57	97	66	1-stage	—

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.1.19. Object no.1.19 DH substations (IHSs) S1-111 – S1-117 and associated DH pipes

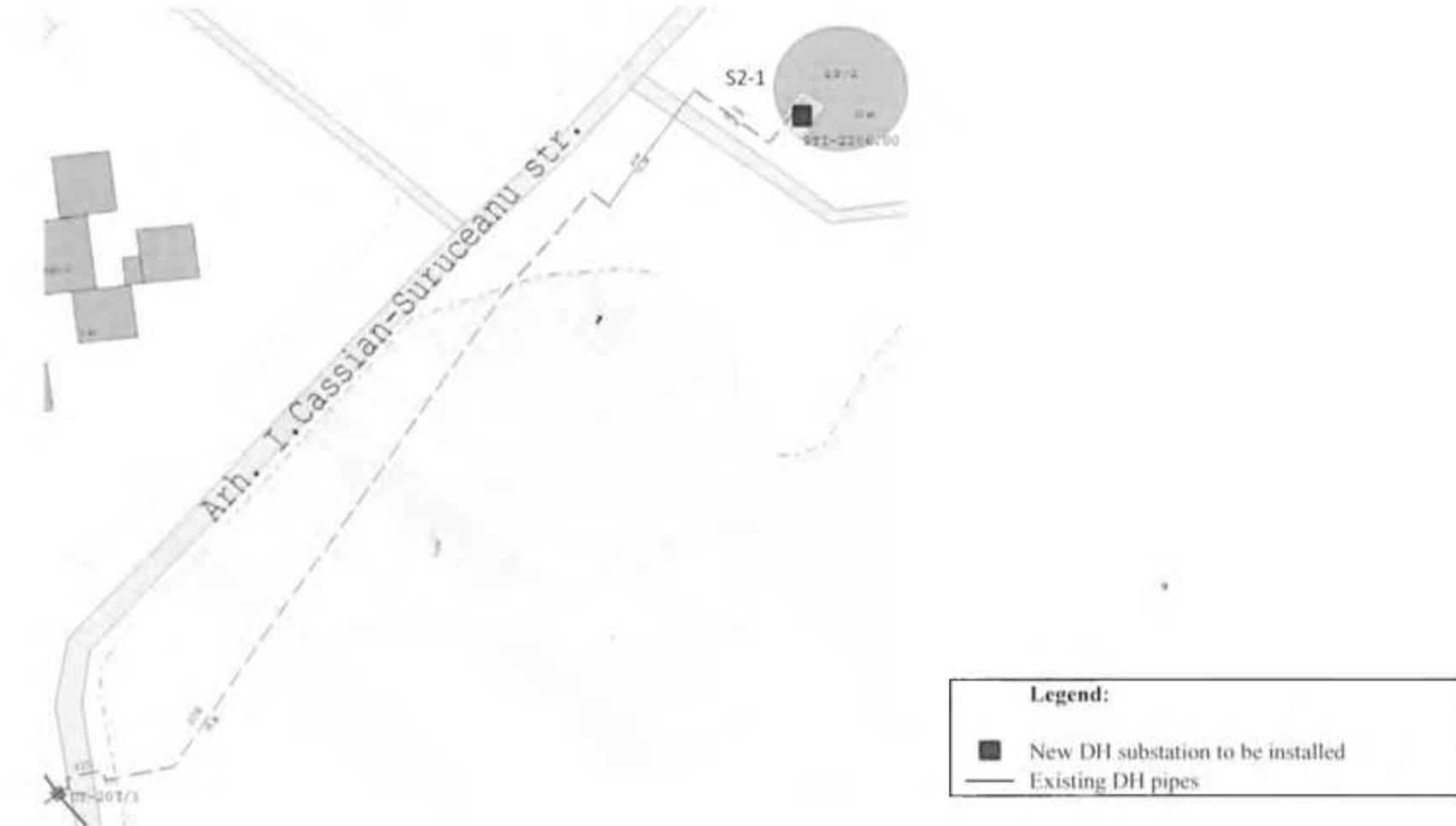


Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilat.	DHW	H1	H2	H1	H2	H1	H2		
S1-111	Mesager, 5/1 (Dormitory)	2	9		305	150	120	39	116	57	96	68	2-stage	+
S1-112	Mesager, 5/2 (Dormitory)	2	9		305	150							2-stage	-
S1-113	Mesager, 5/3	2	9	72	281	134							2-stage	+
S1-114	Mesager, 5/4	2	9	72	281	134							2-stage	+
S1-115	Mesager, 5 (bl. A)		3		377/302*	180*							2-stage	+
S1-116	Mesager, 5 (bl. B)		3		279/343*	180*							2-stage	+
	Mesager, 5 (bl. V)		3		188/116*	100*							2-stage	+
S1-117	Mesager, 5 (Archive)		1		12*	12*	1-stage	-						

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

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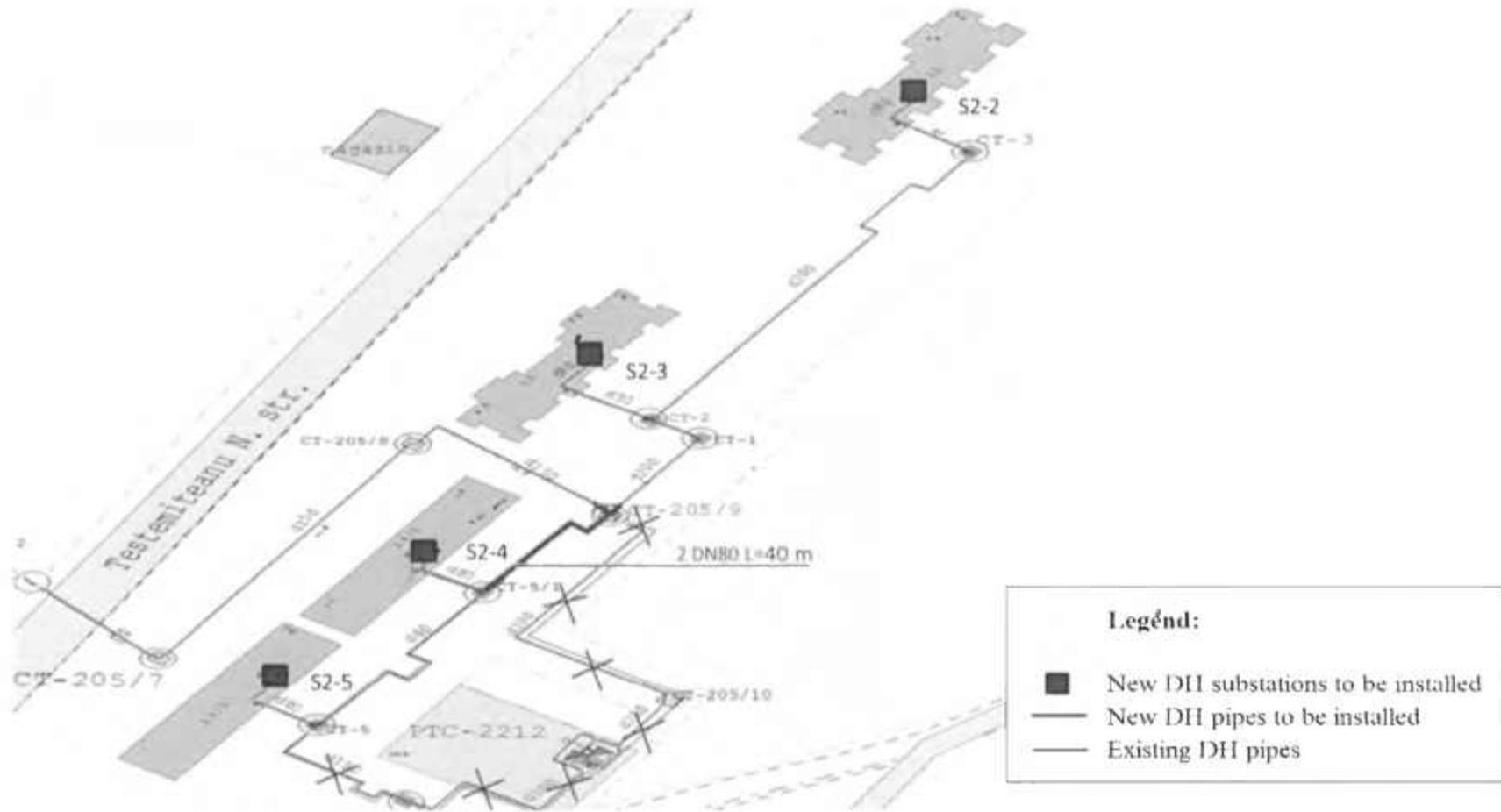
8.2.1. Object no.2.1. DH substation (IHS) S2-1



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H11	H12	H11	H12	H11	H12		
S2-1	str. N. Testemițanu, 29/2	1	22	173	823	250	117.8	60.4	58	11	43	1	2-stage	+

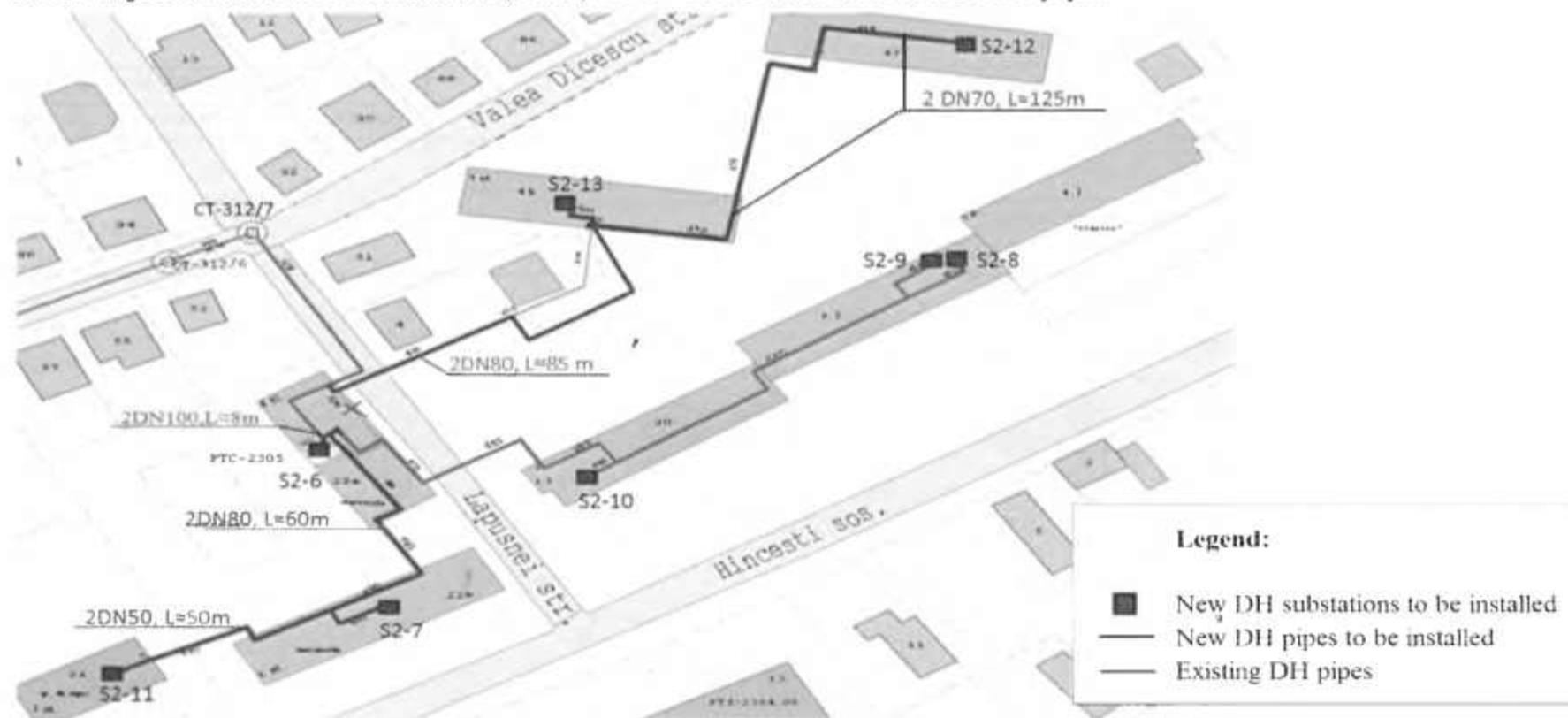
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8.2.2. Object no.2.2. DH substations (IHSs) S2-2 – S2-5 and associated DH pipes



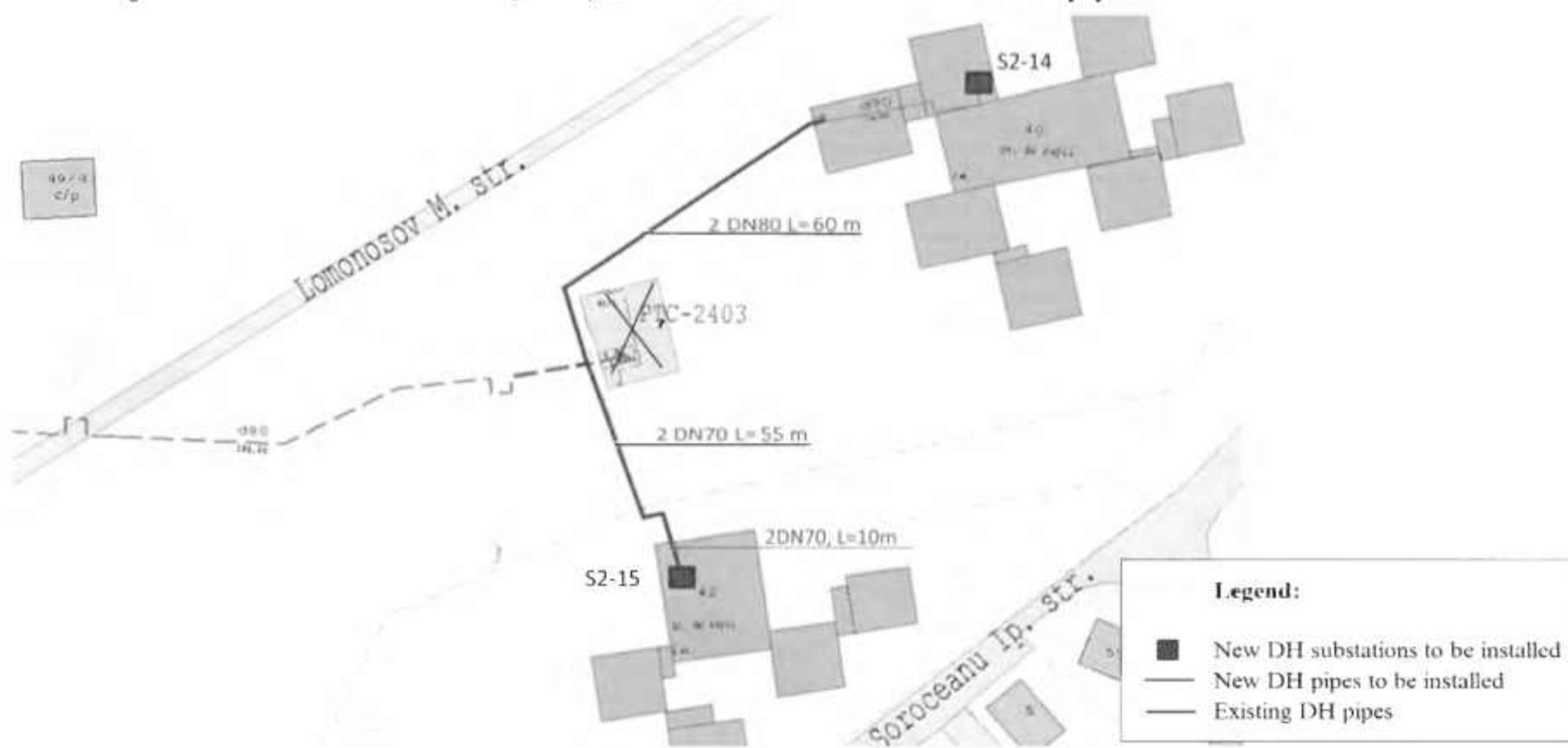
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m				DHW preparation schematic	DHWRC pump to be included		
							Heating season		Summer period				Transition periods	
					SH-ventilation	DHW	H11	H12	H1	H2			H11	H12
S2-2	str. N.Testemițanu, 11,	2	9	72	272	134	152	95	96	49	85	28	2-stage	-
S2-3	str. N.Testemițanu, 13,	2	9	72	272	134	148	88					2-stage	-
S2-4	str. N.Testemițanu, 13/1 (Dormitory)	2	9		318	150	142	86					2-stage	+
S2-5	str. N.Testemițanu, 13/2	2	9	70	318	132	143	83					2-stage	-

8.2.3. Object no.2.3. DH substations (IHSs) S2-6 – S2-13 and associated DH pipes



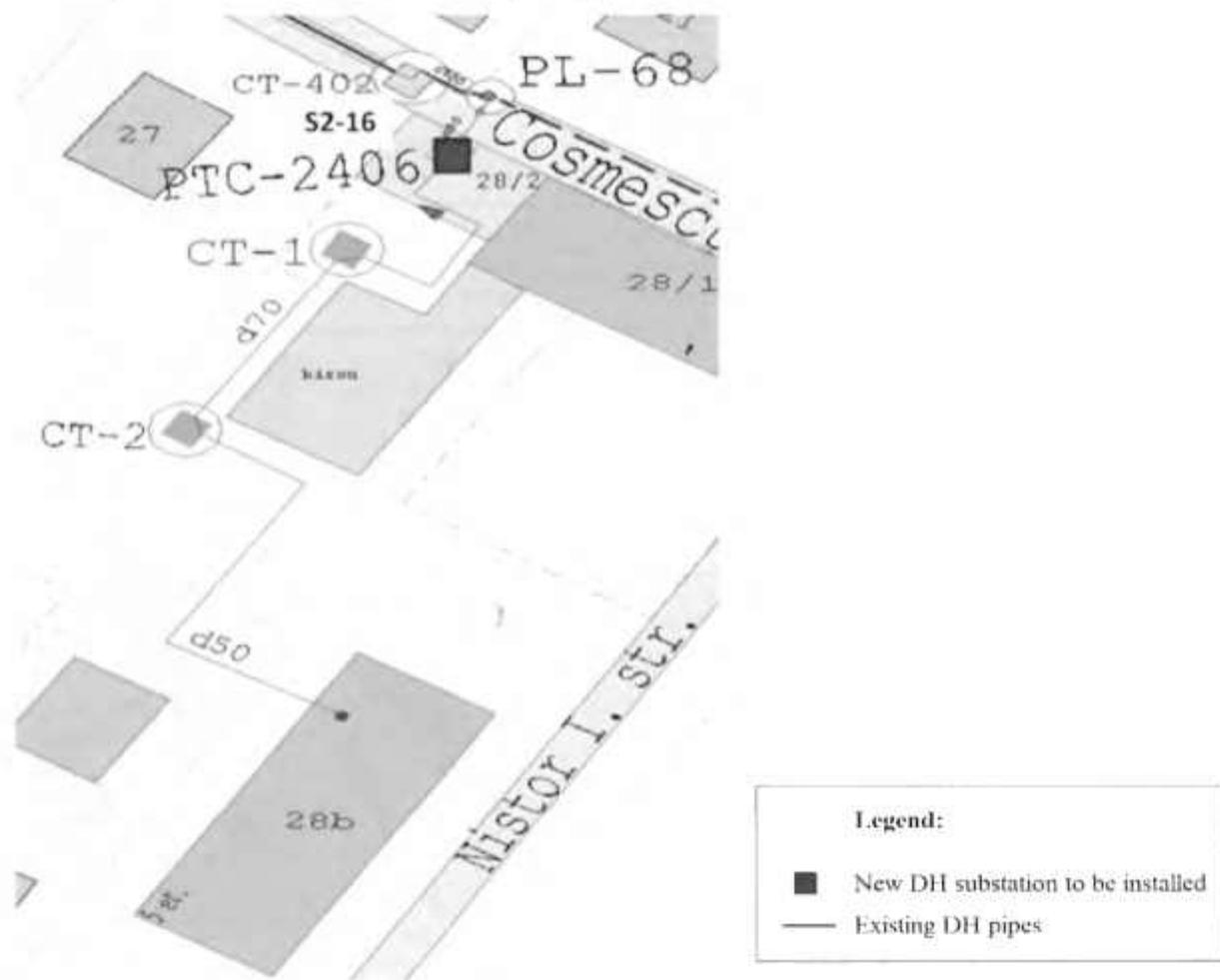
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m				DHW preparation schematic	DHWRC pump to be included		
							Heating season		Summer period				Transition periods	
					SH-ventilation	DHW	H1	H2	H1	H2			H1	H2
S2-6	șos. Hincești, 22a	2	4+1	50+14	180	124	94	51	90	50	76	65	2-stage	—
S2-7	șos. Hincești, 22b	3	4+1	56+12	207	130	94	51					2-stage	—
S2-8	șos. Hincești, 20, sec.1	2	5	44	145	104	96	57					2-stage	+
S2-9	șos. Hincești, 20, sec.2	2	5	44	145	104	97	59					2-stage	+
S2-10	șos. Hincești, 20, sec.3	2	5	44	145	104	97	59					2-stage	+
S2-11	șos. Hincești, 24 (Kindergarten)		2		86	70	93	51					2-stage	+
S2-12	str. V.Dicescu, 47	2	5	55	176	118	100	63					2-stage	+
S2-13	str. V.Dicescu, 49	2	5	60	176	122	98	57	2-stage	+				

8.2.4. Object no.2.4. DH substations (IHSs) S2-14 – S2-15 and associated DH pipes



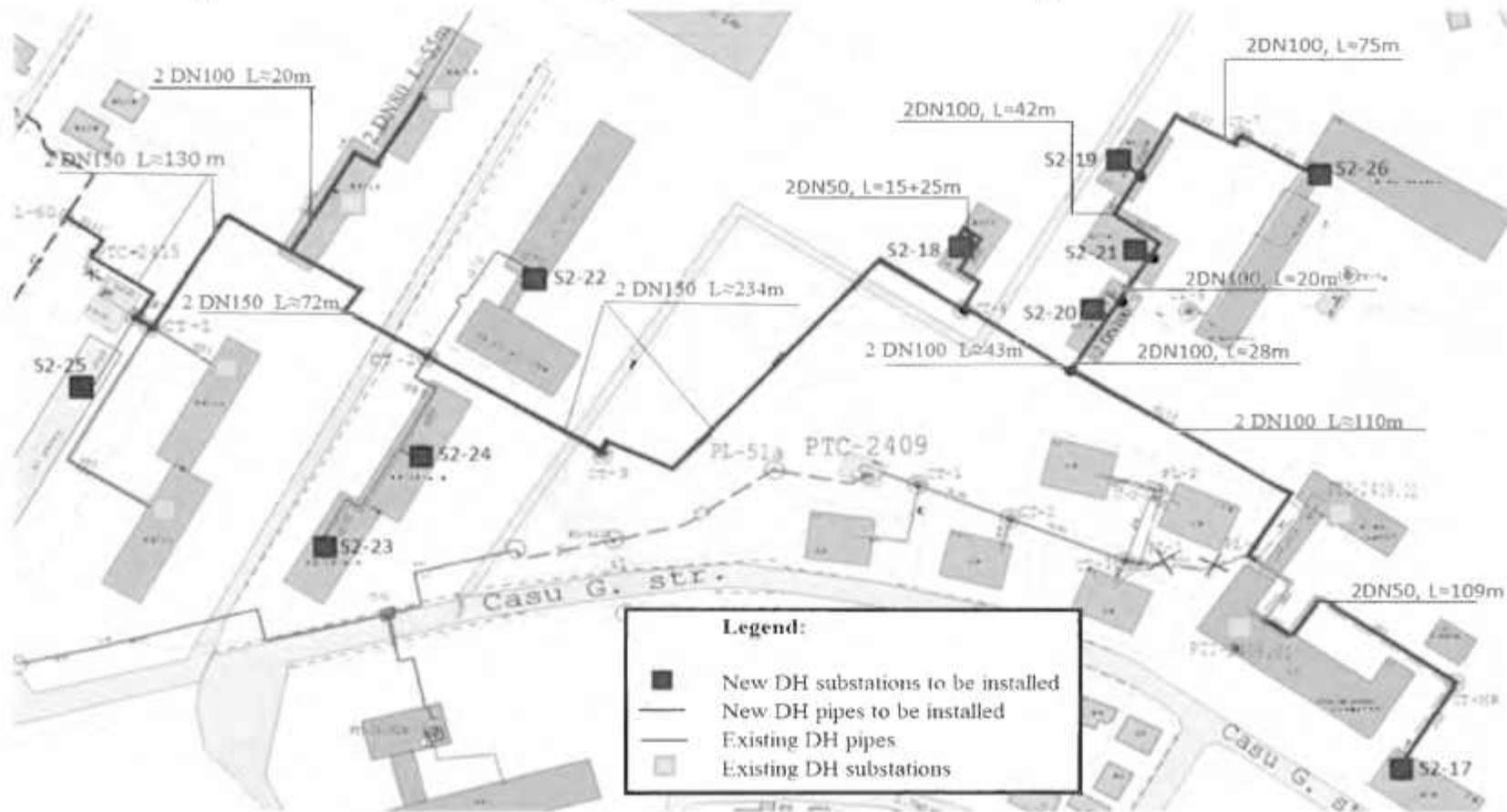
Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-14	str. Soroceanu, 40 (Kindergarten)	2	386	240	108	61	103	62	76	64	2-stage	+
S2-15	str. Soroceanu, 42 (Kindergarten)	2	272	150	95	48					2-stage	+

8.2.5. Object no.2.5. DH substation (IHS) S2-16



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH	DHW	H1	H2	H1	H2	H1	H2		
S2-16	str. Nistor, 28b	2	5	40	168	-	93	51	130	89	103	90	-	-

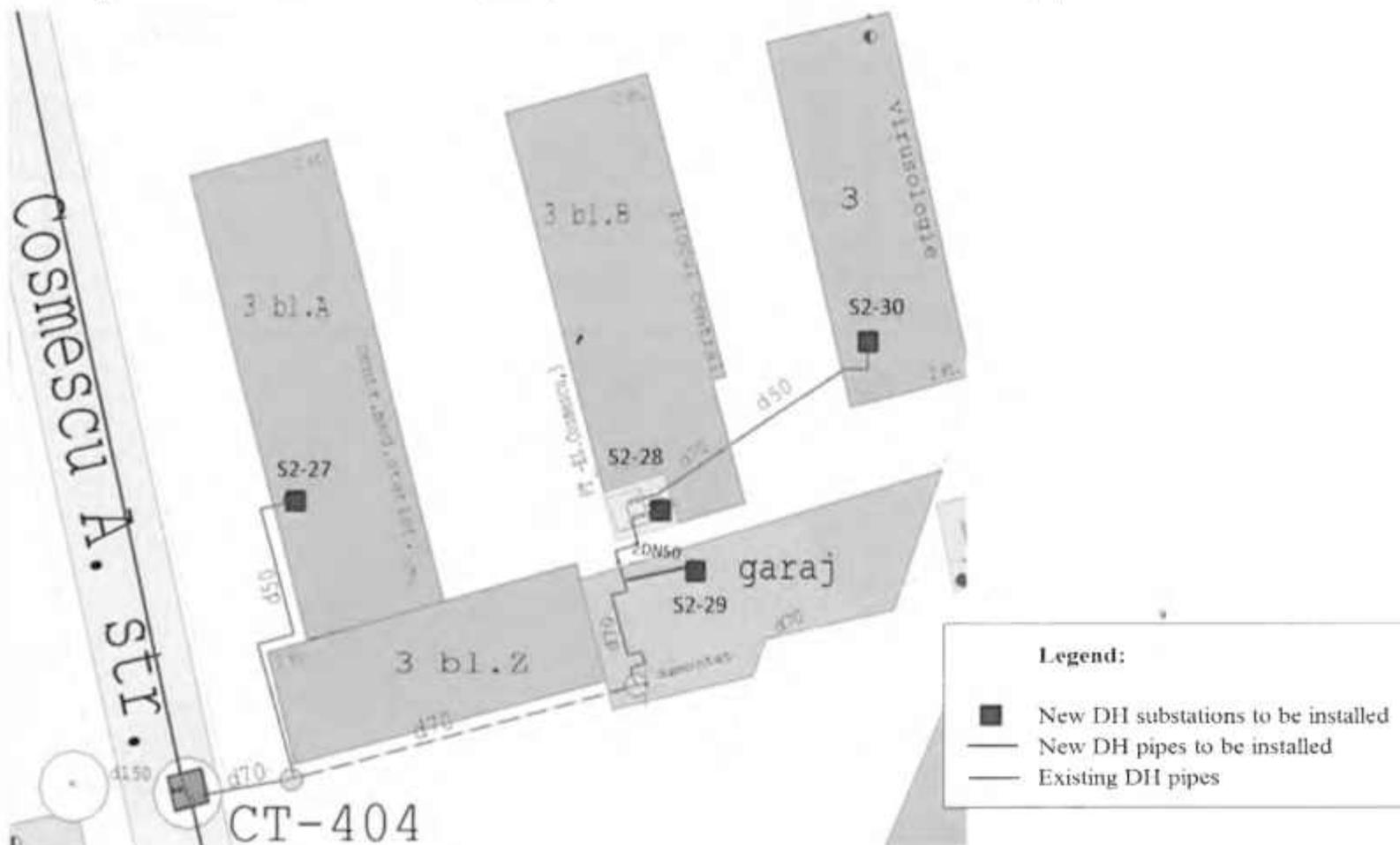
8.2.6. Object no.2.6. DH substations (HHS) S2-17 – S2-26 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m				DHW preparation schematic	DHWRC pump to be included		
					SH+ventilation	DHW	Heating season		Summer period				Transition periods	
							H11	H12	H11	H12			H11	H12
S2-17	str. G.Cașu, 2/8	1	2	8	56	56	73	45	128	87	101	88	2-stage	+
S2-18	str. G.Cașu, 20/1	1	9	76	193	138	88	58					2-stage	-
S2-19	str. G.Cașu, 20/2	1	9	94	193	157	88	57					2-stage	-
S2-20	str. G.Cașu, 20/3	1	9	104	193	165	89	57					2-stage	-
S2-21	str. G.Cașu, 20/4	1	2	11	70	60	89	56					2-stage	-
S2-22	str. G.Cașu, 32 (USM, bl.5)		3		158+242*	100*	81	44					2-stage	+
S2-23	str. G.Cașu, 32 (Dormitory)	2	5		146	120	80	43					2-stage	+
S2-24	str. G.Cașu, 32 (Dormitory)	2	5		146	120	80	43					2-stage	+
S2-25	str. G.Cașu, 32 (Garage)		1		209*	100*	94	52					2-stage	-
S2-26	str. N. Festemițanu, 6 (USM, bl.6)		3		337+230*	120*	92	60					2-stage	+

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

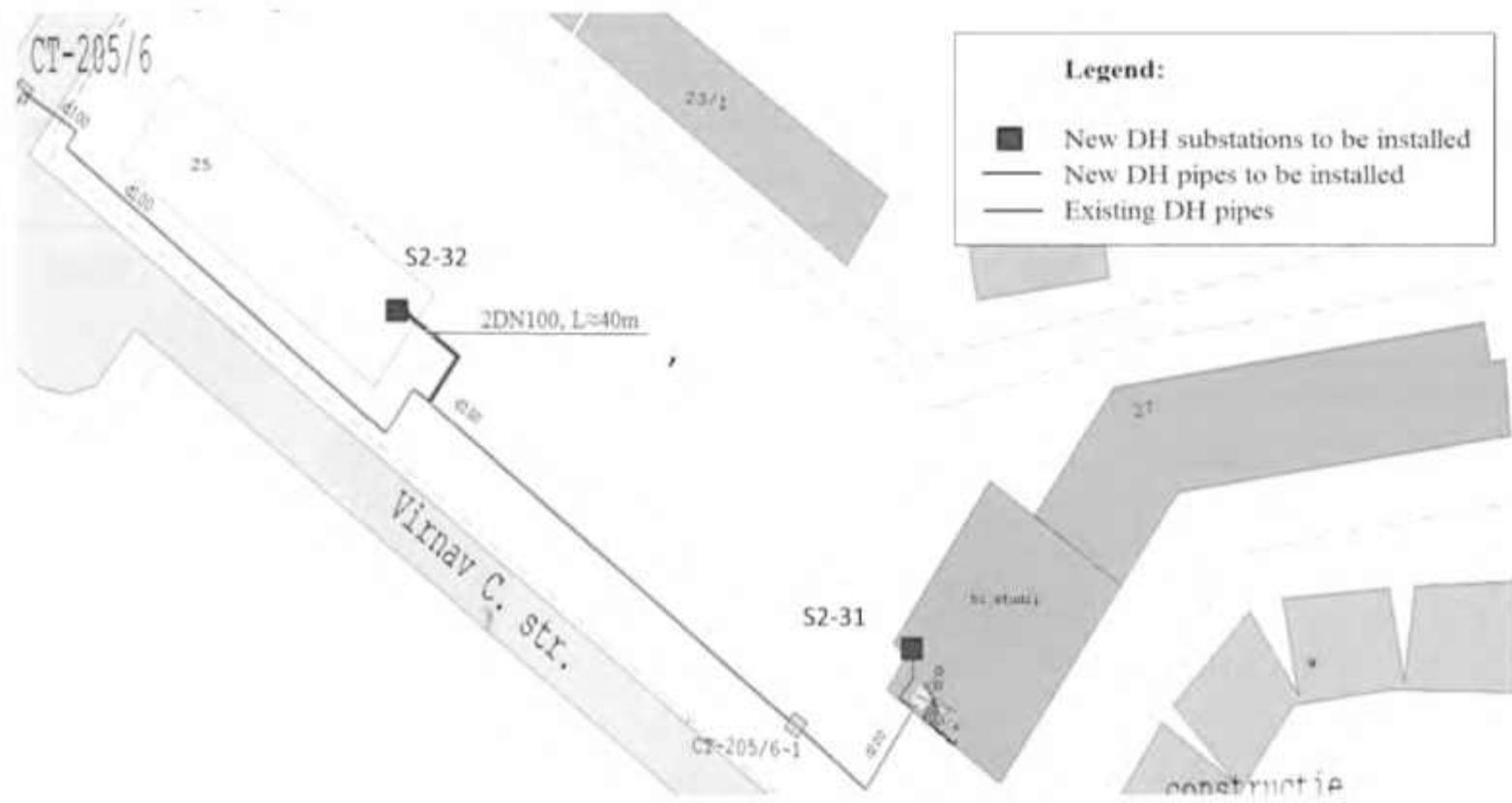
8.2.7. Object no.2.7. DH substations (IHSs) S2-27 – S2-30 and associated DH pipes



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-27	str. A.Cosmescu, 3, bl. A	2	60*	50*	79	36	113	72	86	73	2-stage	-
S2-28	str. A.Cosmescu, 3, bl. B	2	60*	50*		35					2-stage	-
S2-29	str. A.Cosmescu, 3, bl. Z+Garage	2	60*	50*		35					2-stage	-
S2-30	str. A.Cosmescu, 3, Virusology	2	80*	80*		36					2-stage	+

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

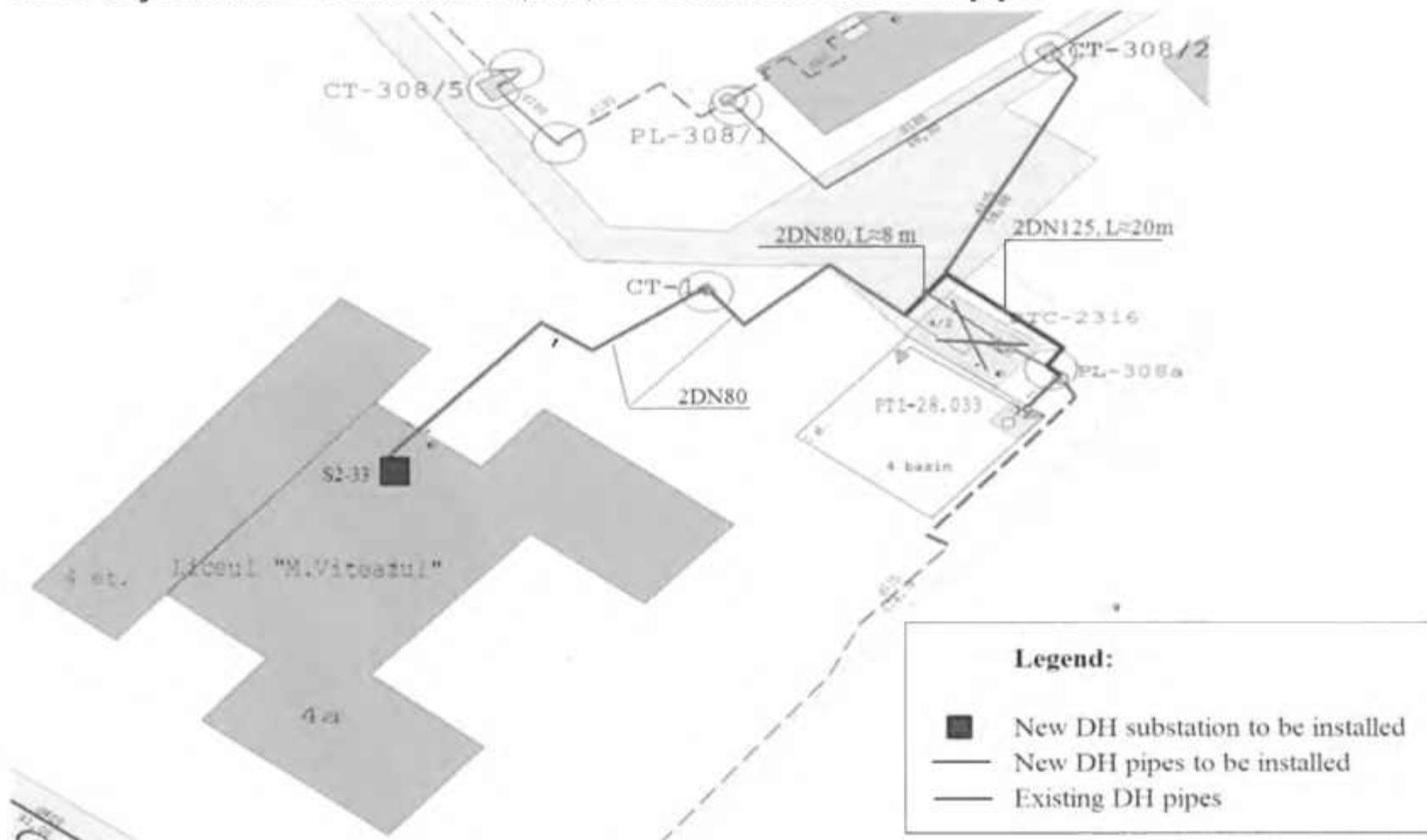
8.2.8. Object no.2.8. DH substations (IHSs) S2-31 – S2-32 and associated DH pipes



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-31	str. N.Testemițanu, 27	5	465+1047*	244*	126	63	79	31	66	8	2-stage	+
S2-32	str. N.Testemițanu, 25	2	109+113	180	126	63	79	31	66	8	2-stage	+

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

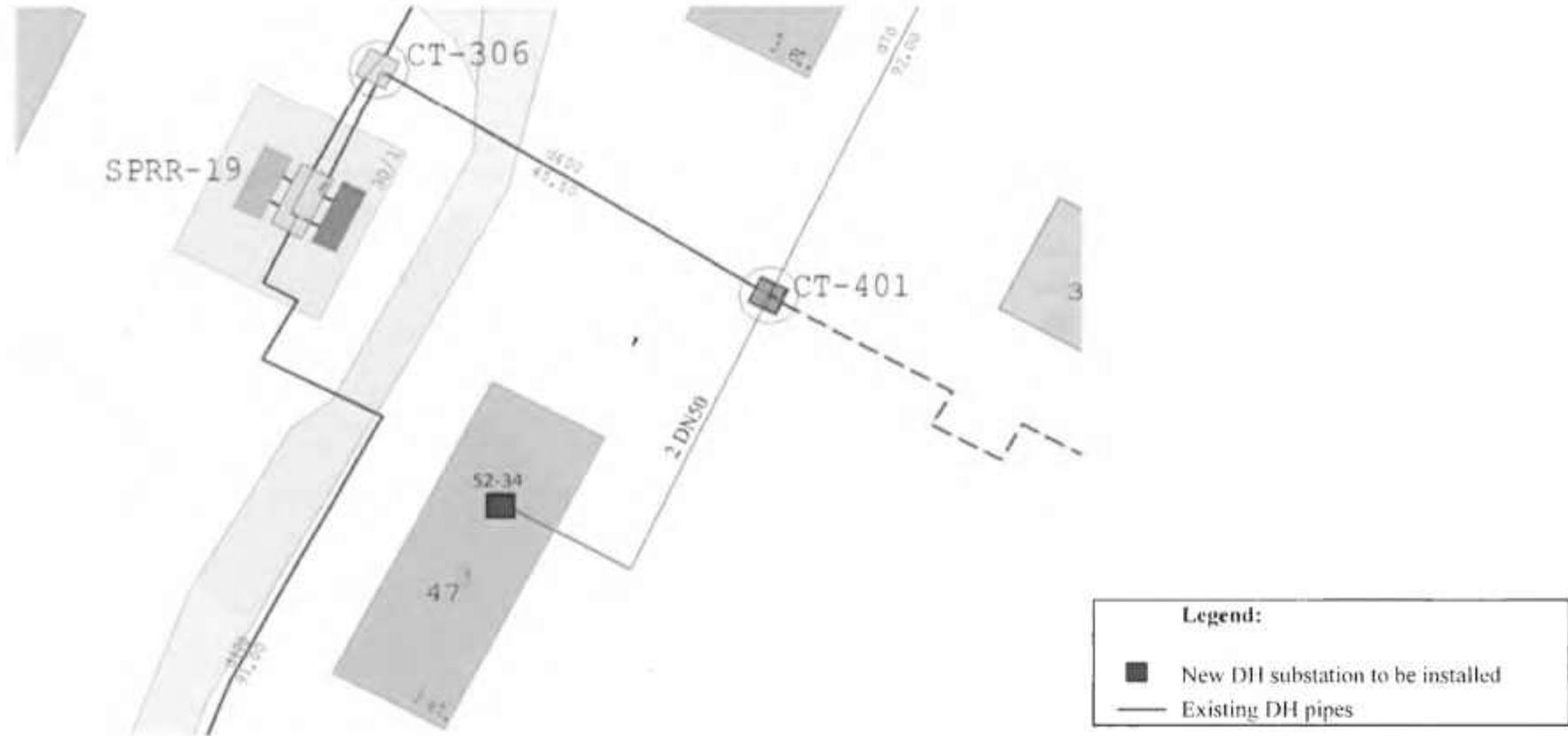
8.2.9. Object no.2.9. DH substation (IHS) S2-33 and associated DH pipes



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-33	str. Mitr.G.Grosu, 4 (Lyceum)	4	420+561*	488*	84	30	77	31	60	42	2-stage	+

Note: The heat loads marked with an asterisk () shall be recalculated during the design.

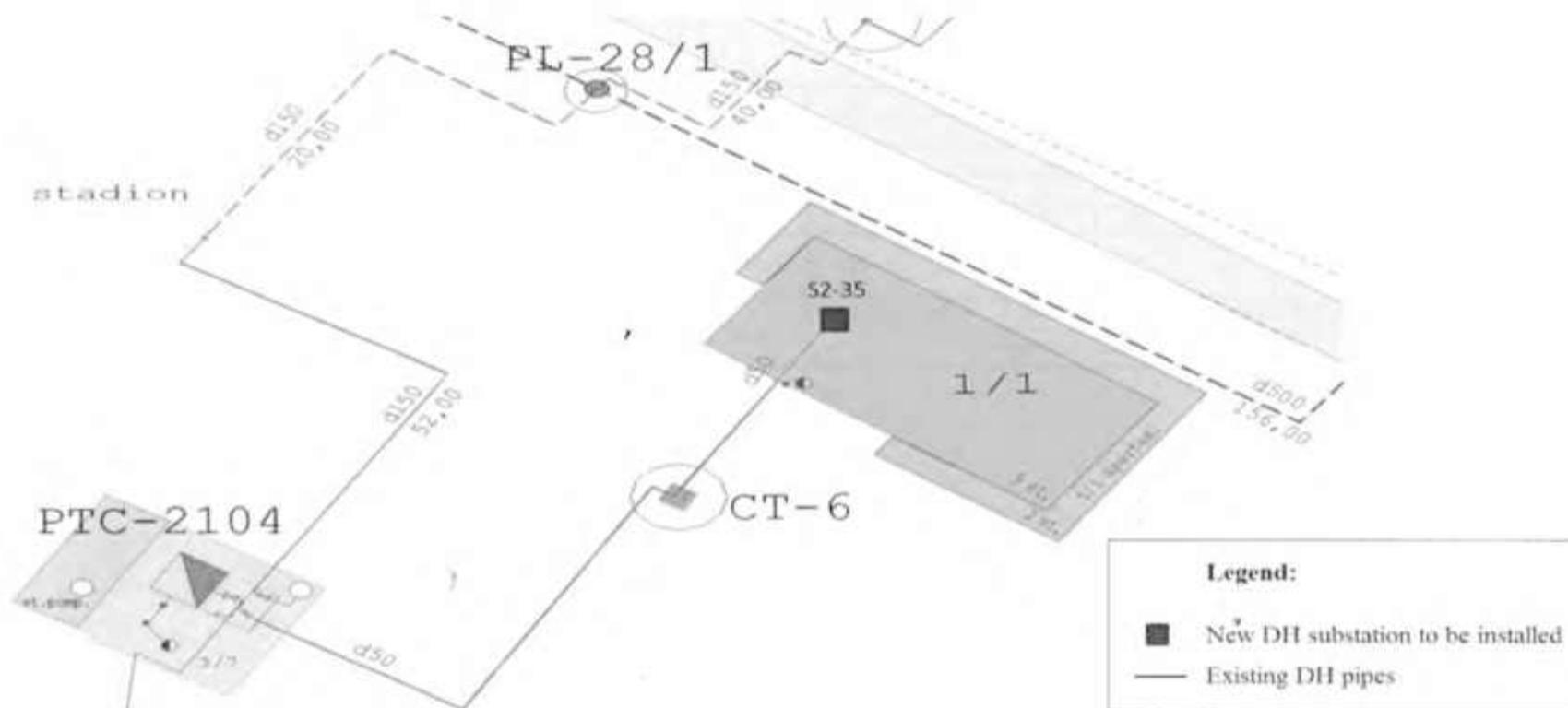
8.2.10. Object no.2.10. DH substation (IHS) S2-34



Legend:	
■	New DH substation to be installed
—	Existing DH pipes

Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-34	str. Lomonosov, 47	2	3	24	76	80	57	10	84	38	59	49	2-stage	—

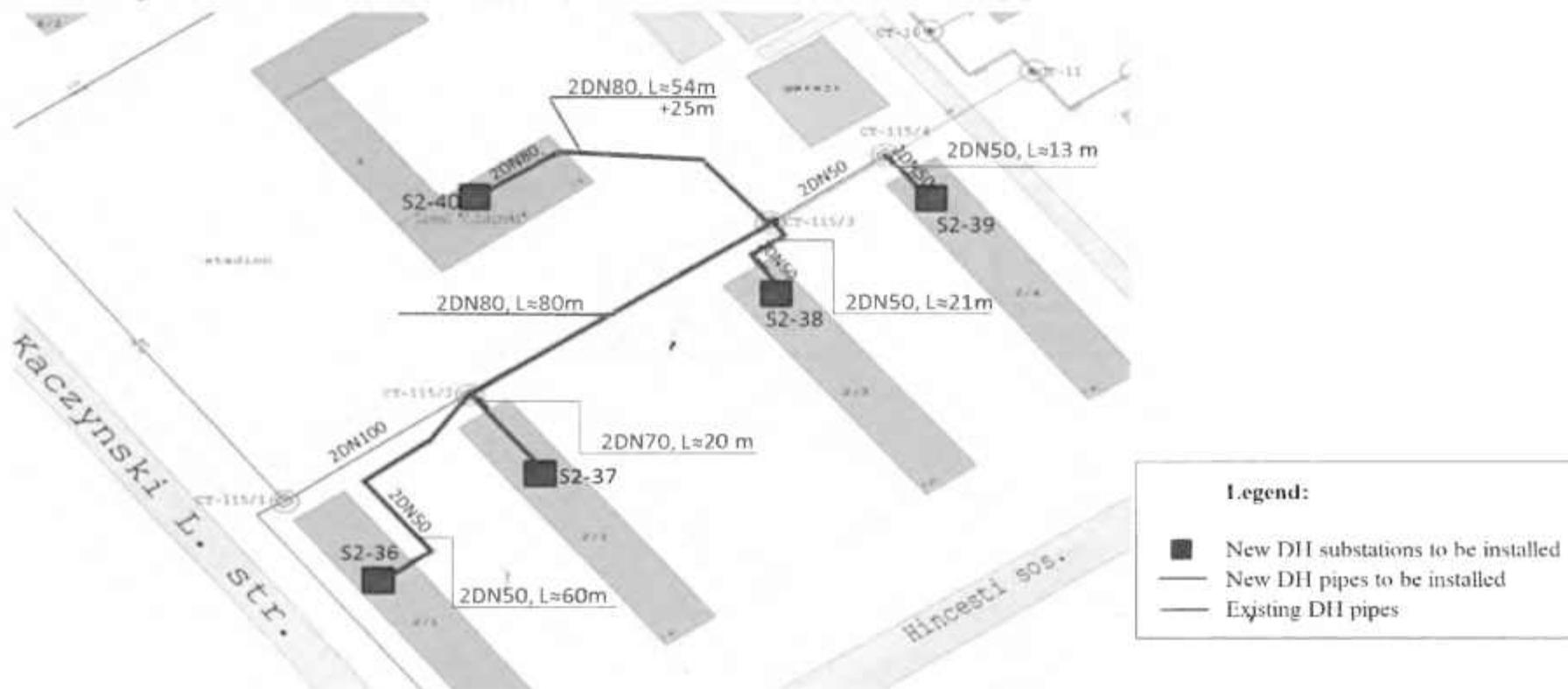
8.2.11. Object no.2.11. DH substation (IHS) S2-35



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					SH+ ventilation	DHW	Heating season		Summer period		Transition periods			
							H1	H2	H1	H2	H1	H2		
S2-35	str. Sprincenoaia, 1/1	1	9	87	220	150	69	8	49	27	26	11	2-stage	-

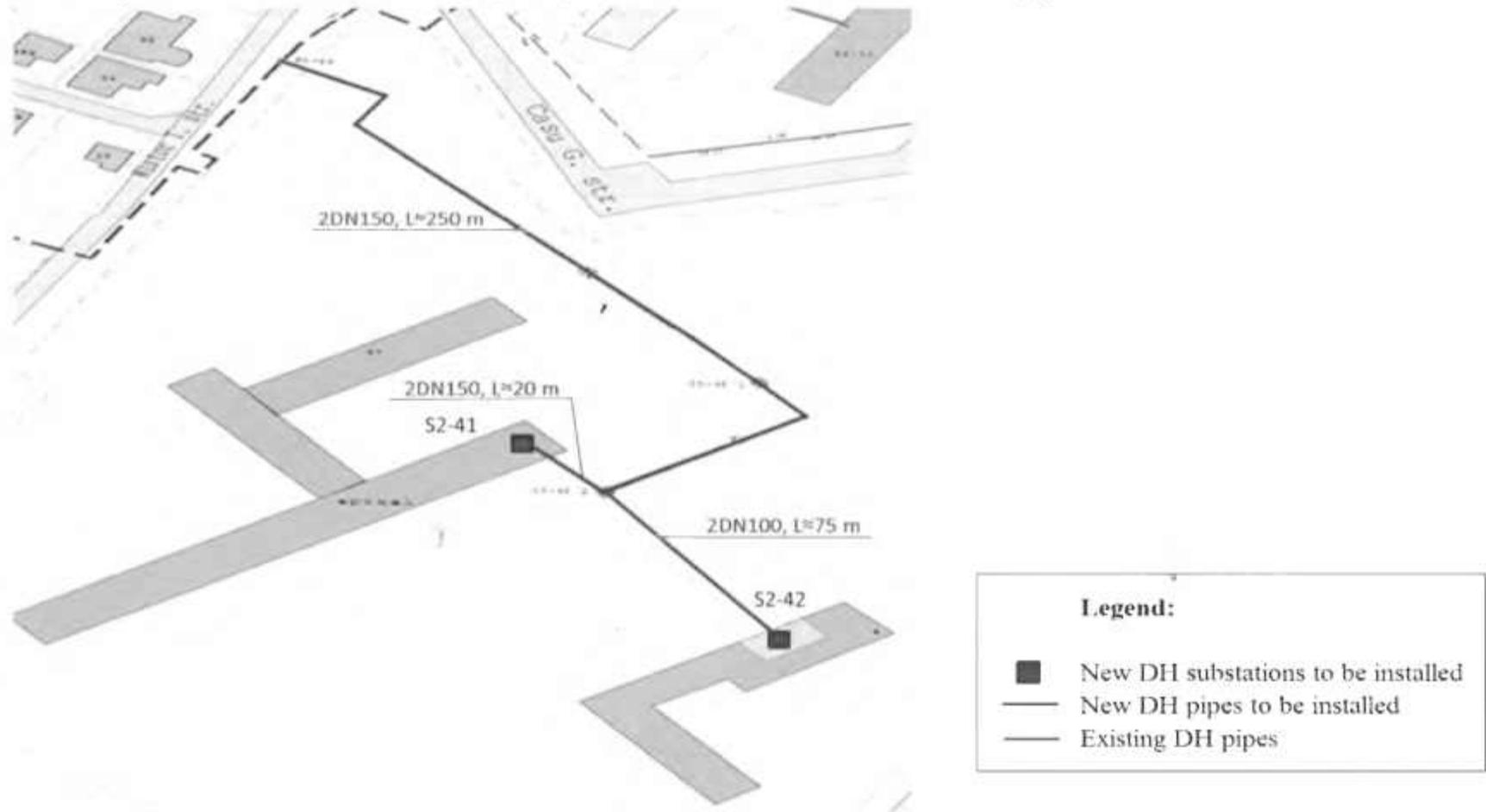
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8.2.12. Object no.2.12. DH substations (IHSs) S2-36 – S2-40 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH/ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-36	str. L.Kaczynski, 2/1	4	5	69	225	138	66	20	53	30	21	14	2-stage	+
S2-37	str. L.Kaczynski, 2/2	4	5	76	199	138	72	17	55	32	21	14	2-stage	+
S2-38	str. L.Kaczynski, 2/3	4	5	76	212	138	65	32	59	36	25	19	2-stage	+
S2-39	str. L.Kaczynski, 2/4	4	5	74	209	135	72	40	66	43	32	25	2-stage	+
S2-40	str. L.Kaczynski, 4 (Lyceum)		2		256	222	65	30	58	35	24	18	2-stage	+

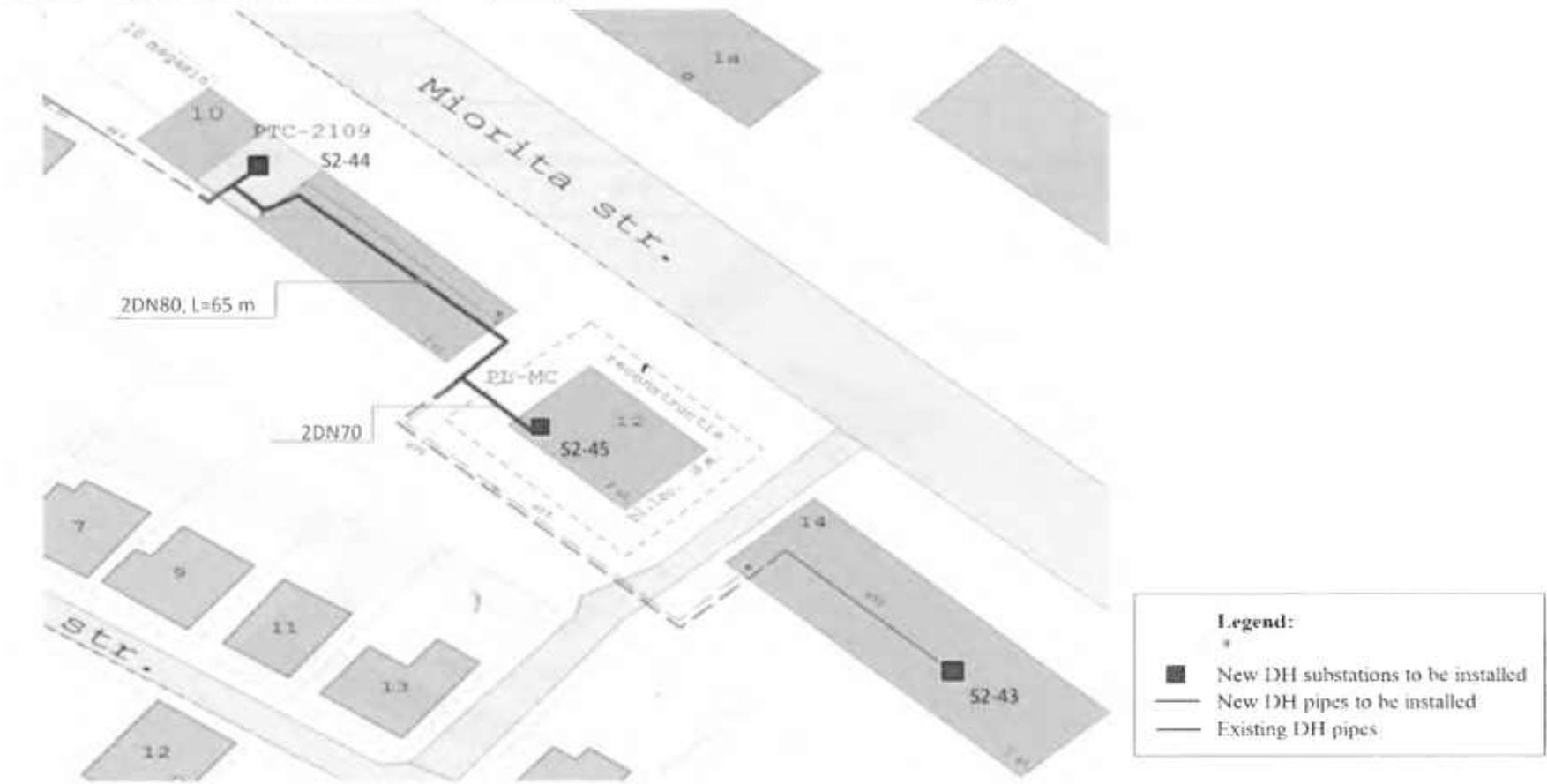
8.2.13. Object no.2.13. DH substations (IHSs) S2-41 – S2-42 and associated DH pipes



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-41	str. Gh.Casu, 37 (Hospital)	3	1047+1838*	930*	74	37	107	61	81	72	2-stage	+
S2-42	str. Gh.Casu, 37 (Hospital)	3			74	37	107	61	81	72		

* Note: The combined heat loads of both buildings are indicated. During the design the Contractor shall recalculate the heat loads and shall determine the heat loads separately for each building.

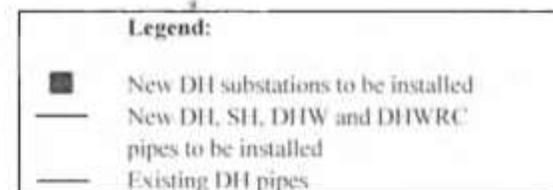
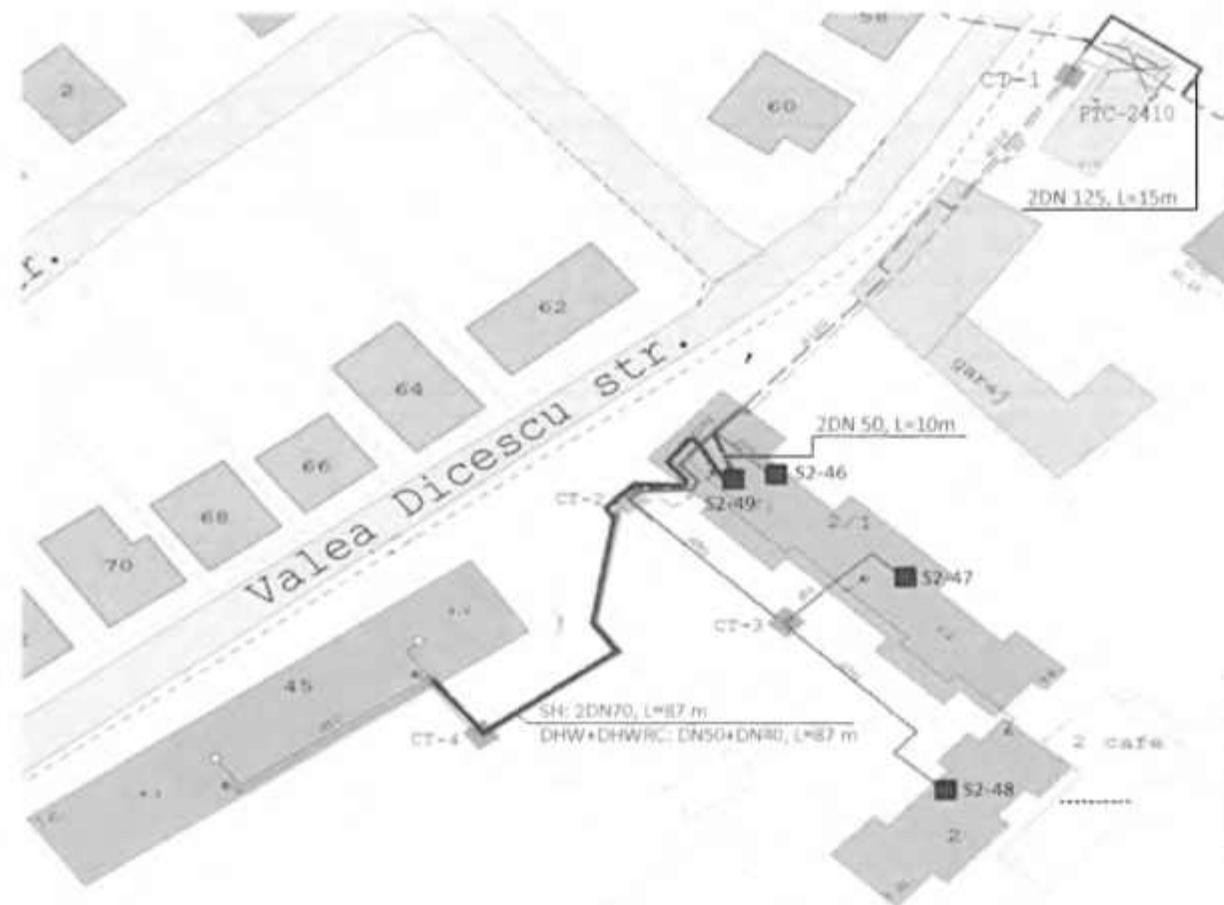
8.2.14. Object no.2.14. DH substations (IHSs) S2-43 – S2-45 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-43	str. Miorita, 14	3	5	51	177	110	48	22	43	21	12	6	2-stage	+
S2-44	str. Miorita, 10	2	5	54	207	120	48	17	43	21	12	6	2-stage	+
S2-45	str. Miorita, 12 (reconstructed)	1	10	40*	314*	110*	41	29	43	21	12	6	2-stage	+

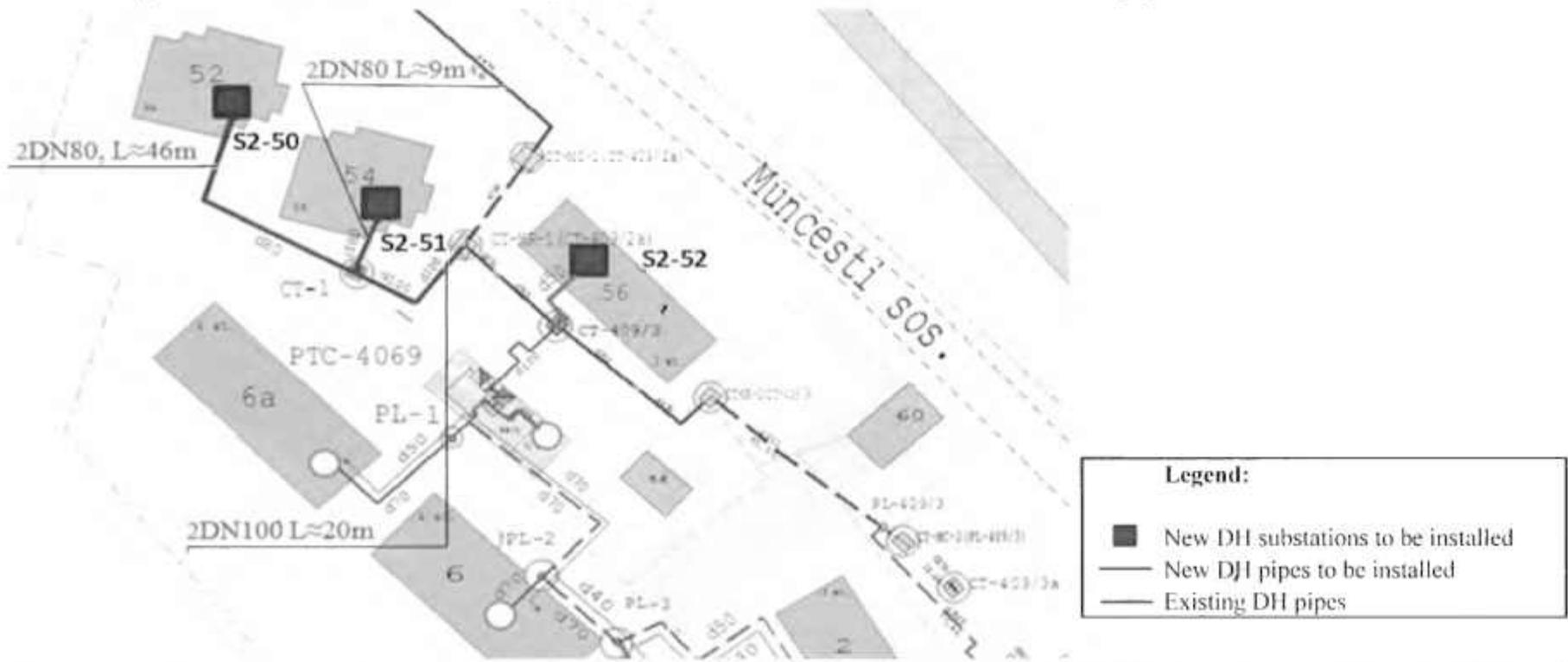
Note: The residential building on str. Miorita 12 is being reconstructed (to a 10-storied building). The heat loads marked with an asterisk () shall be recalculated during the design (or the Contractor shall obtain the heat loads from the design documentation for the reconstructed building, if available).

8.2.15. Object no.2.15. DH substations (IHSs) S2-46 – S2-49 and associated pipes



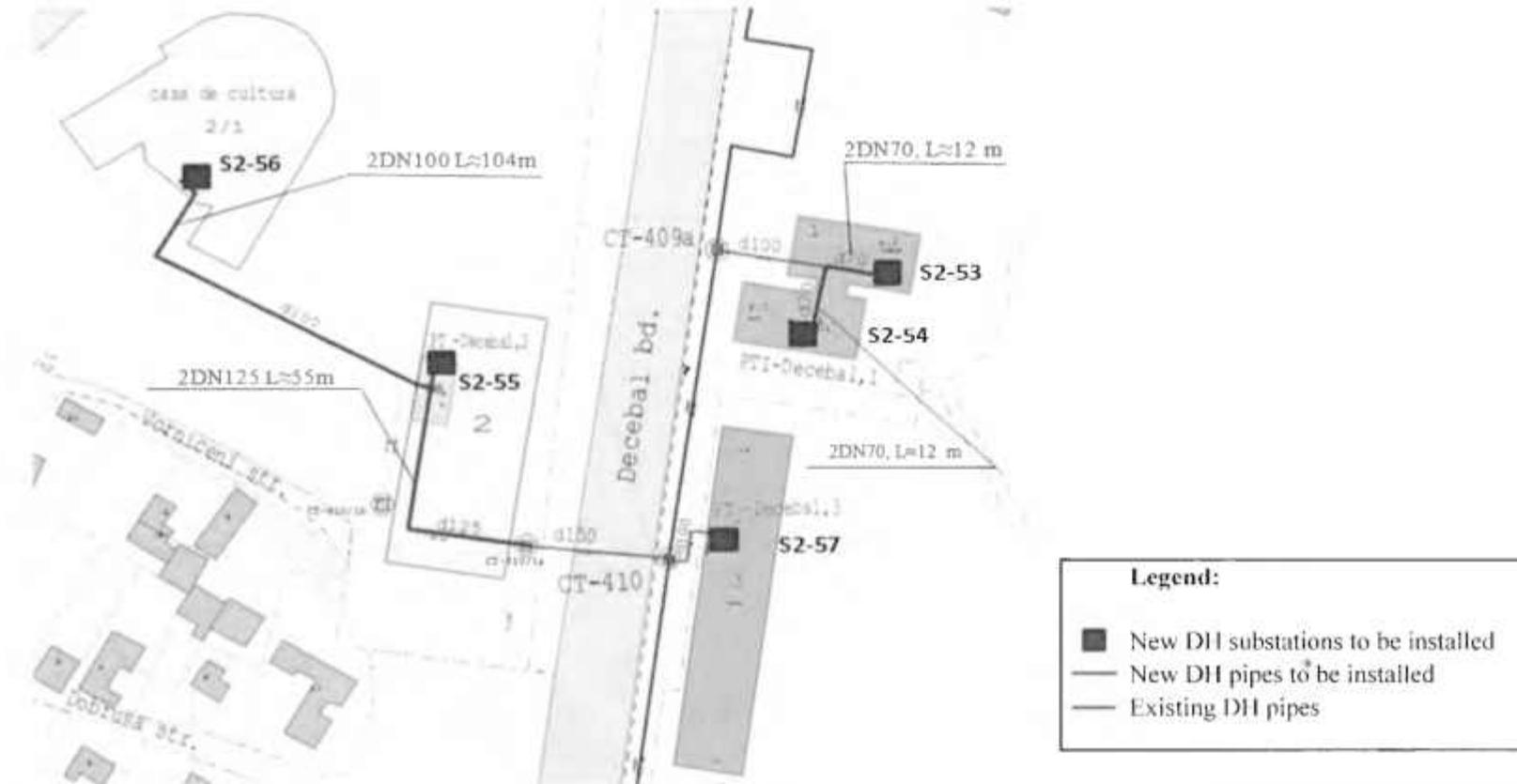
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					SH+ventilation	DHW	Heating season		Summer period		Transition periods			
							H1	H2	H1	H2	H1	H2		
S2-46	str. Hincești, 2/1, sec.1	1	9	34	159	96	67	33	114	73	87	74	2-stage	+
S2-47	str. Hincești, 2/1, sec.2	1	9	35	159	96	71	34					2-stage	+
S2-48	str. Hincești, 2 (+restaurant)	1	9	38	201	209	69	34					2-stage	+
S2-49	str. V.Dicescu, 45	2	5	66	290	128	71	34					2-stage	+

8.2.16. Object no.2.16. DH substations (IHSs) S2-50 – S2-52 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ ventilation	DHW	II1	II2	II1	II2	II1	II2		
S2-50	str. Muncești, 52	1	16	79	387	142	91	53	121	55	97	61	2-stage	—
S2-51	str. Muncești, 54	1	16	79	387	142	91	53			97	61	2-stage	—
S2-52	str. Muncești, 56	2	3	24	77	80	96	56			99	62	2-stage	—

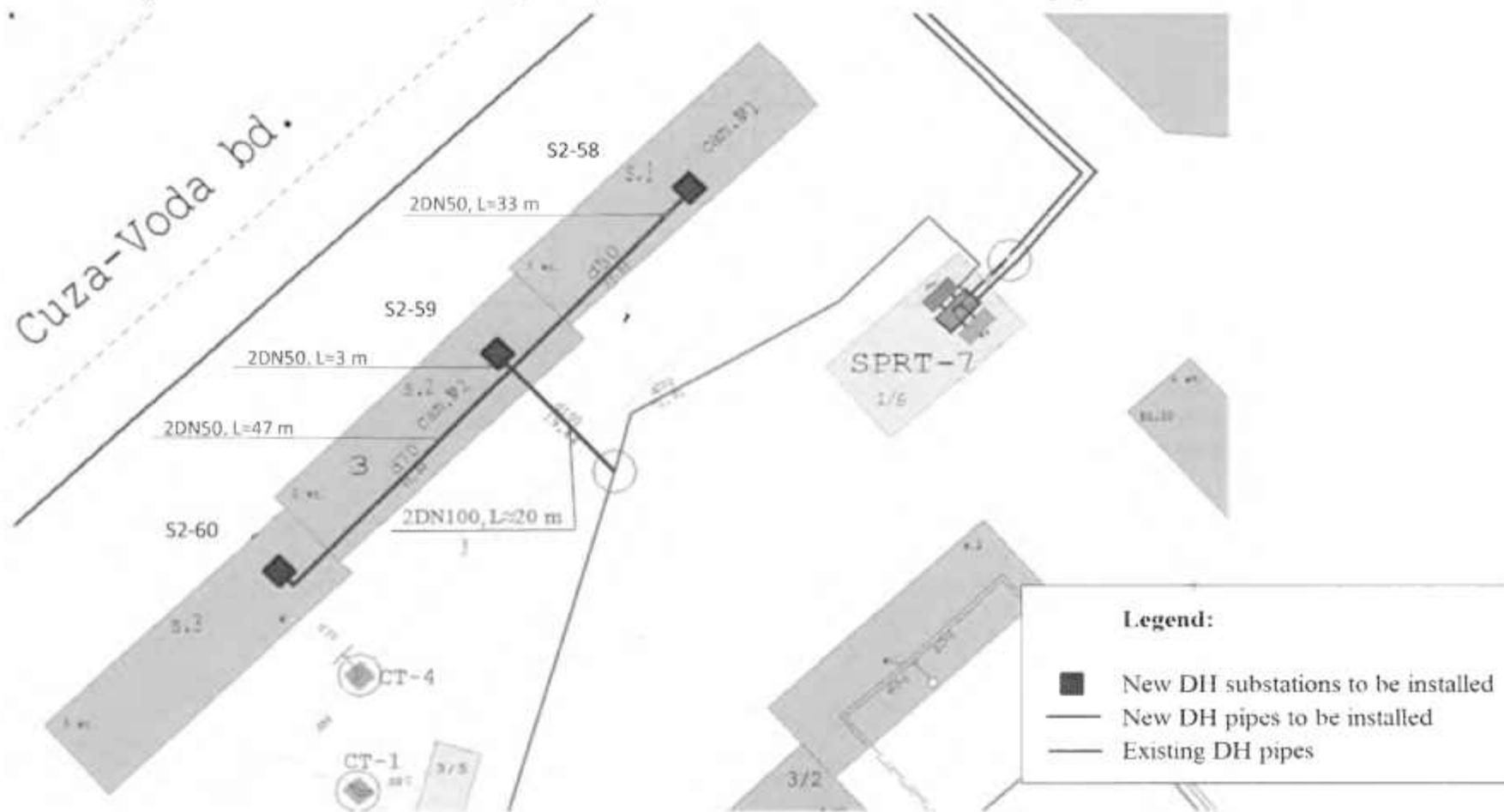
8.2.17. Object no.2.17. DH substations (IHSs) S2-53 – S2-57 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
						Heating season		Summer period		Transition periods			
				SH+ ventilation	DHW	II1	II2	III	II2	III	II2		
S2-53	Decebal, 1, s.1 (Dormitory)	1	9	173	147	97	59	123	57	100	66	2-stage	-
S2-54	Decebal, 1, s.2 (Dormitory)	1	9	173	147	97	59			99	65	2-stage	-
S2-55	Decebal, 2			517*	220*	96	60			100	66	2-stage	-
S2-56	Decebal, 2/1			742*	220*	95	61			99	65	2-stage	-
S2-57	Decebal, 3		5	1235*	280*	97	59			99	65	2-stage	-

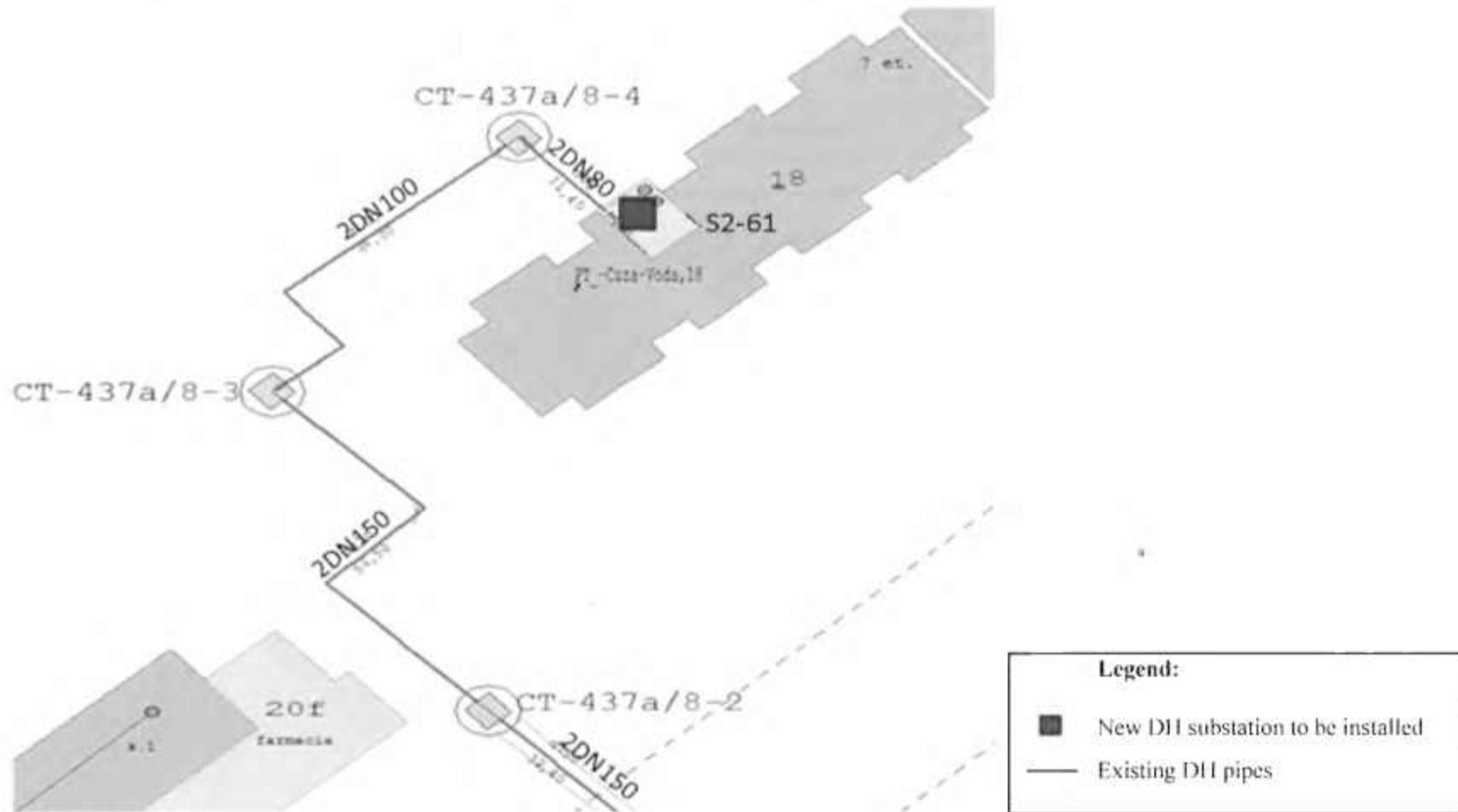
Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.2.18. Object no.2.18. DH substations (IHSs) S2-58 – S2-60 and associated DH pipes



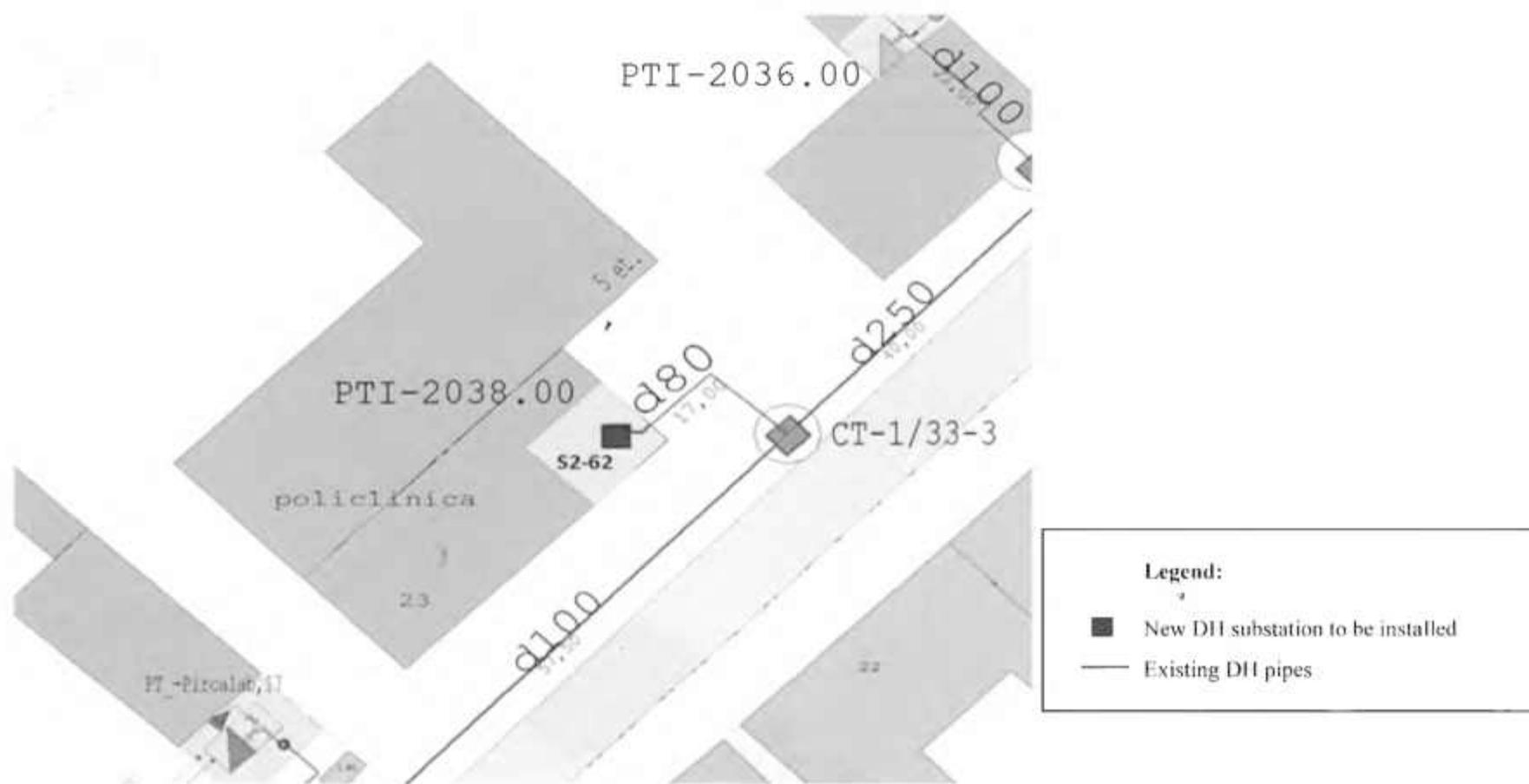
Substation No.	Address	No. of entrances	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
						Heating season		Summer period		Transition periods			
				SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-58	str. Cuza Vodă, 3 (Dormitory, s.1)	1	5	151	120	135	56	117	52	100	52	2-stage	+
S2-59	str. Cuza Vodă, 3 (Dormitory, s.2)	1	5	151	120	133	53					2-stage	+
S2-60	str. Cuza Vodă, 3 (Dormitory, s.3)	1	5	169	120	131	51					2-stage	+

8.2.19. Object no.2.19. DH substation (IHS) S2-61



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-61	str. Cuza-Voda,18	2	9	54	350	118	99	38	95	31	78	31	2-stage	+

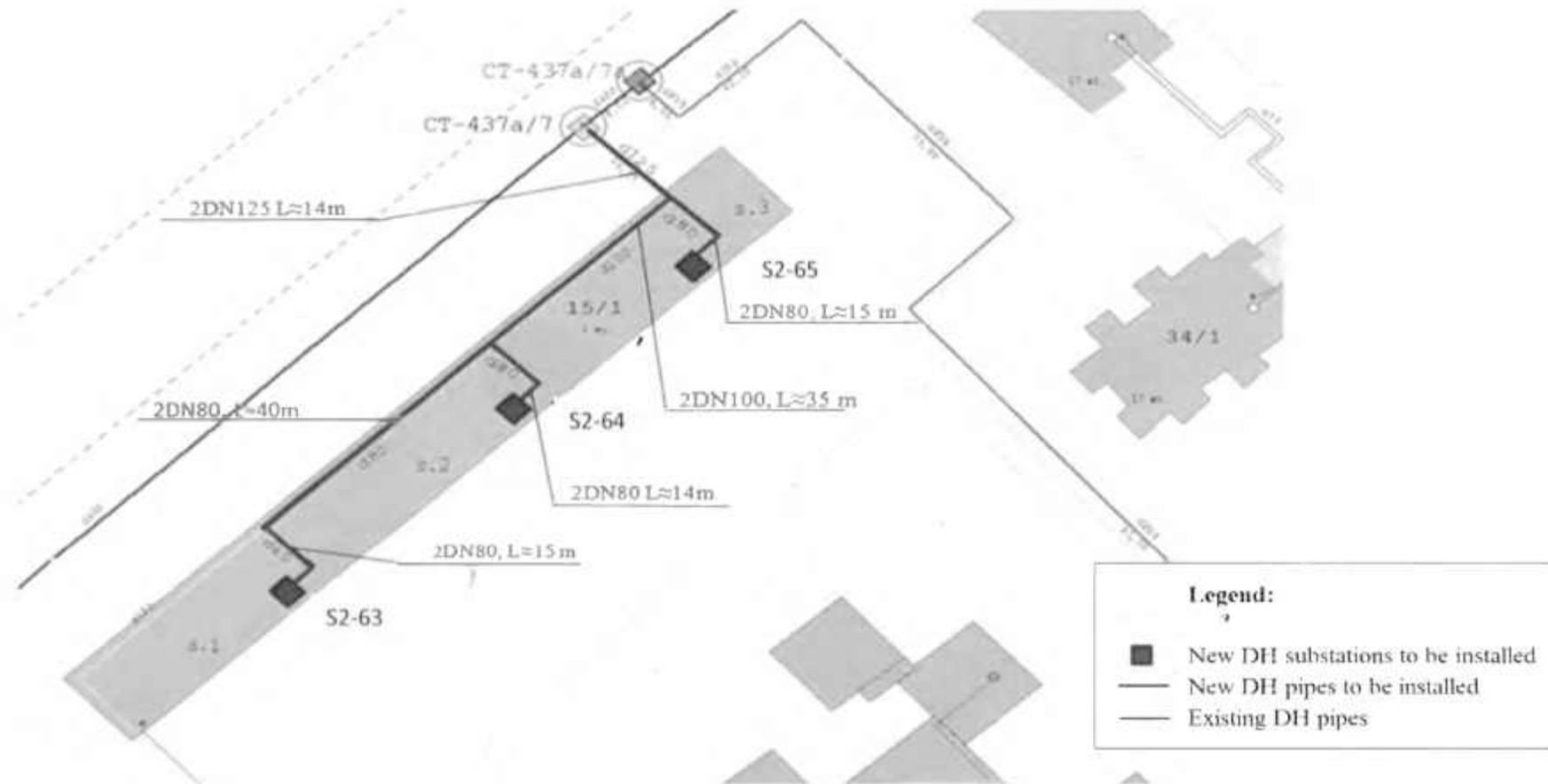
8.2.20. Object no.2.20. DH substation (IHS) S2-62



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-62	str. V.Pircalab, 23 (Policlinic)	5	305*	193*	55	0	59	24	74	0	2-stage	+

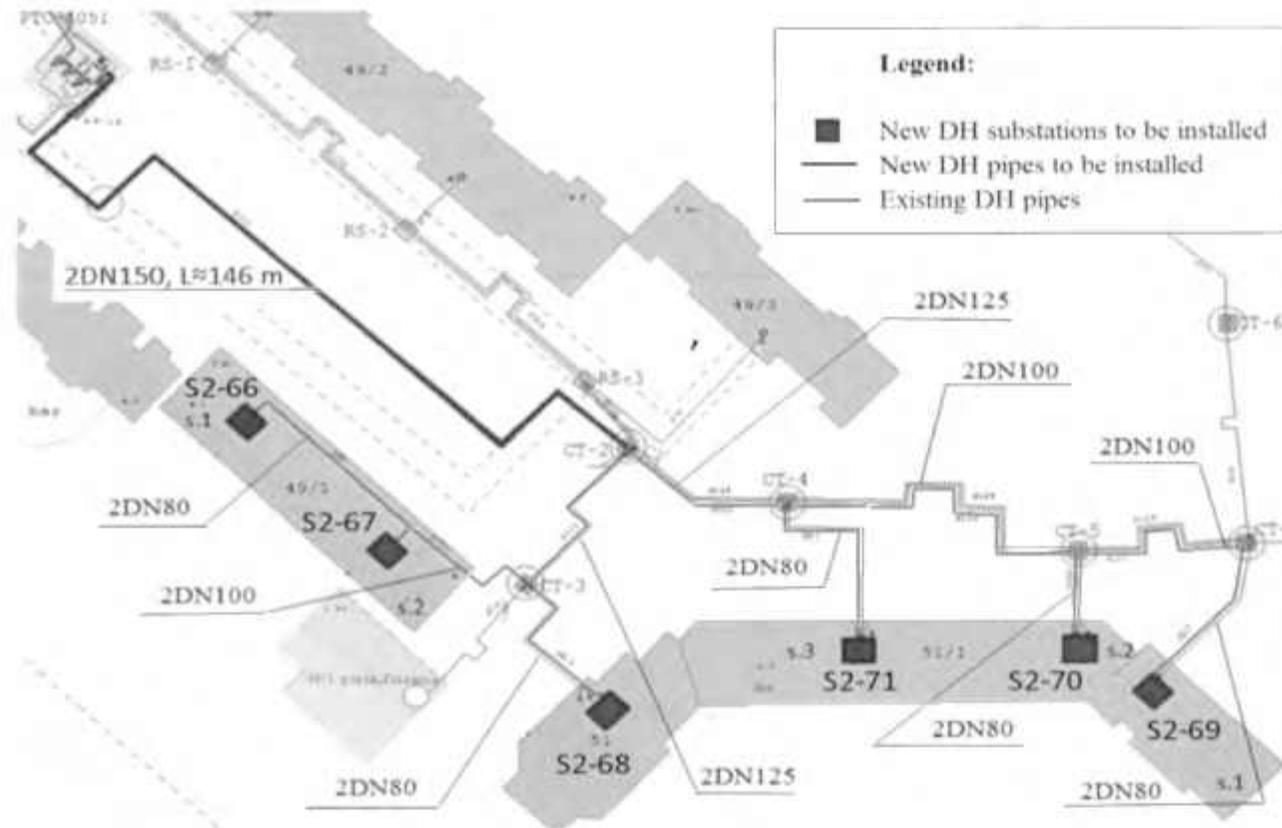
Note: The heat loads marked with an asterisk () shall be recalculated during the design.

8.2.21. Object no.2.21. DH substations (IHSs) S2-63 – S2-65 and associated DH pipes



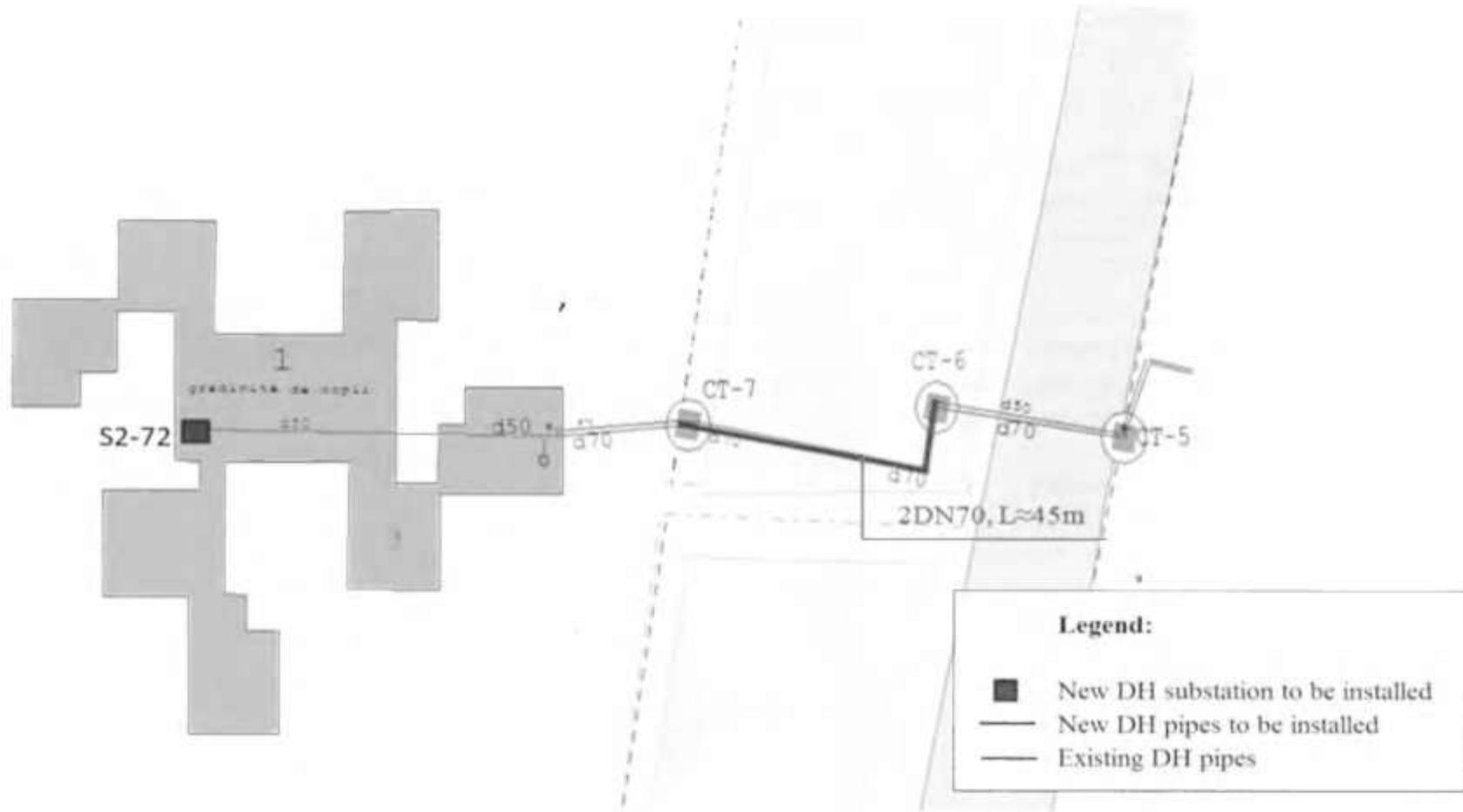
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-63	str. Cuza Vodă, 15/1, sec.1	2	9	54	355	118	88	21	88	23	70	24	2-stage	+
S2-64	str. Cuza Vodă, 15/1, sec.2	3	9	72	452	136	91	24					2-stage	+
S2-65	str. Cuza Vodă, 15/1, sec.3	2	9	54	374	118	94	26					2-stage	+

8.2.22. Object no.2.22. DH substations (IHSs) S2-66 – S2-71 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-66	bd. Dacia, 49/1, sec.1	2	9	63	423	125	109	38	102	31	83	26	2-stage	-
S2-67	bd. Dacia, 49/1, sec.2	2	9	63	423	125	109	38					2-stage	-
S2-68	bd. Dacia, 51	2	20	137	566	200	110	40					2-stage	+
S2-69	bd. Dacia, 51/1, sec.1	1	20	80	442	140	115	47					2-stage	+
S2-70	bd. Dacia, 51/1, sec.2	1	20	80	519	140	112	44					2-stage	+
S2-71	bd. Dacia, 51/1, sec.3	1	20	100	575	160	110	40					2-stage	+

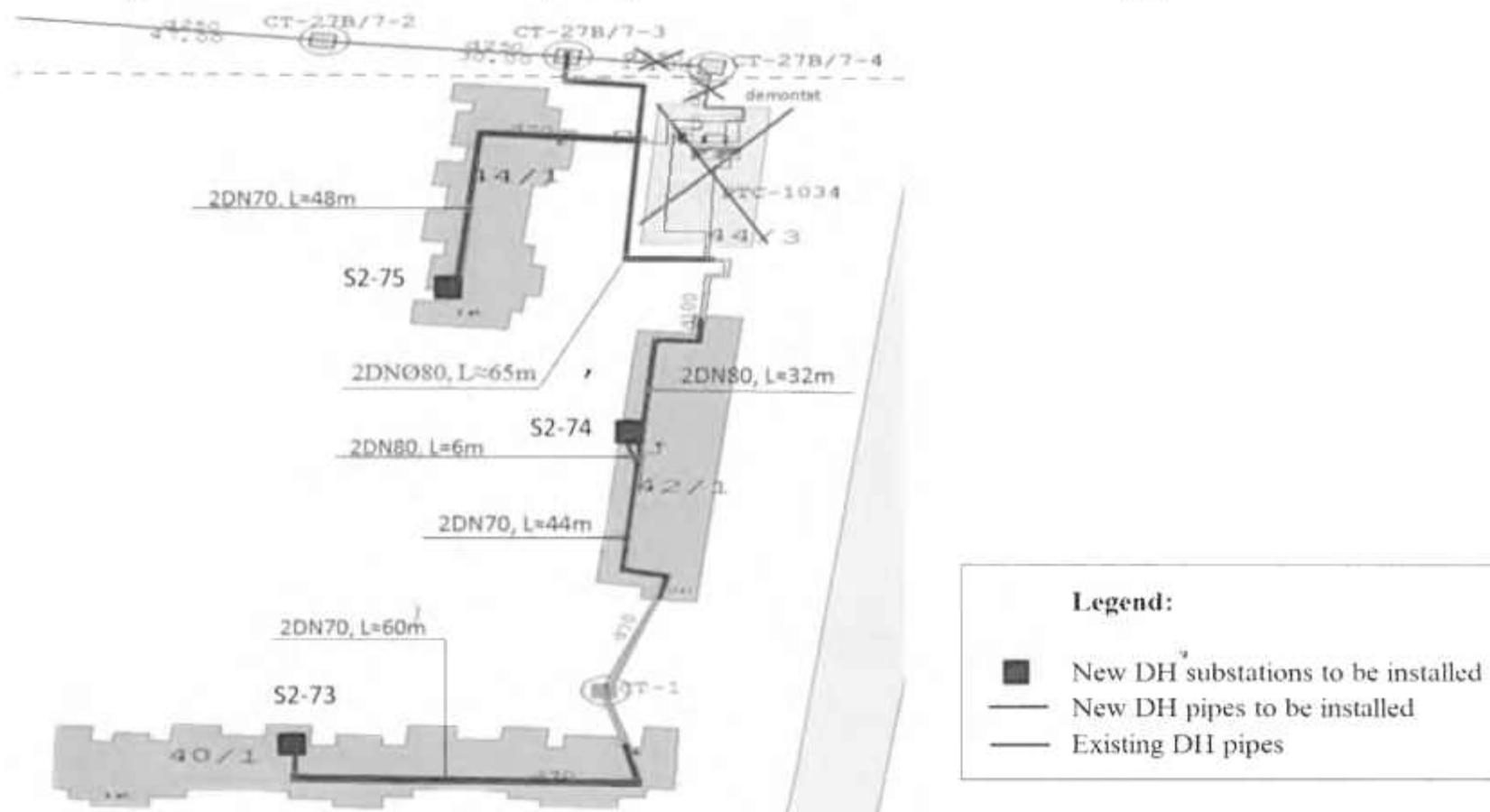
8.2.23. Object no.2.23. DH substation (IHS) S2-72 and associated DH pipes



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition periods			
			SH+ ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-72	str. M.Sadoveanu, 1 (Kindergarten)	2	386	240	70	40	73	14	70	5	2-stage	+

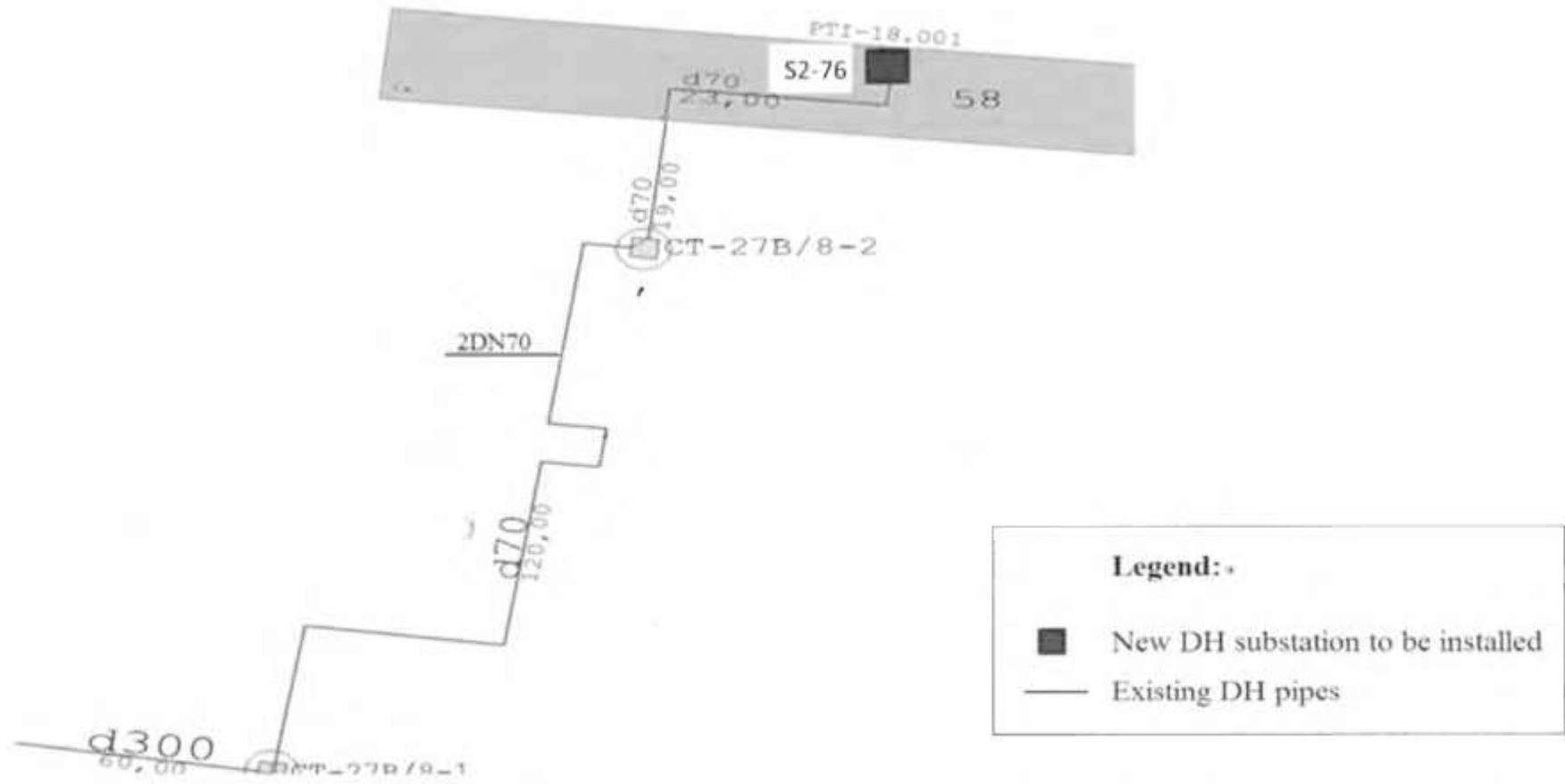
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8.2.24. Object no.2.24. DH substations (IHSs) S2-73 – S2-75 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SII+ventilation	DHW	H1	H2	H1	H2	H11	H12		
S2-73	bd. Mircea cel Bătrîn, 40/1	3	9	106	401	165	93	30	74	29	62	32	2-stage	+
S2-74	bd. Mircea cel Bătrîn, 42/1	1	16	191	573	250	95	29	76	29	68	32	2-stage	+
S2-75	bd. Mircea cel Bătrîn, 44/1	2	9	71	267	132	96	23	73	26	65	28	2-stage	-

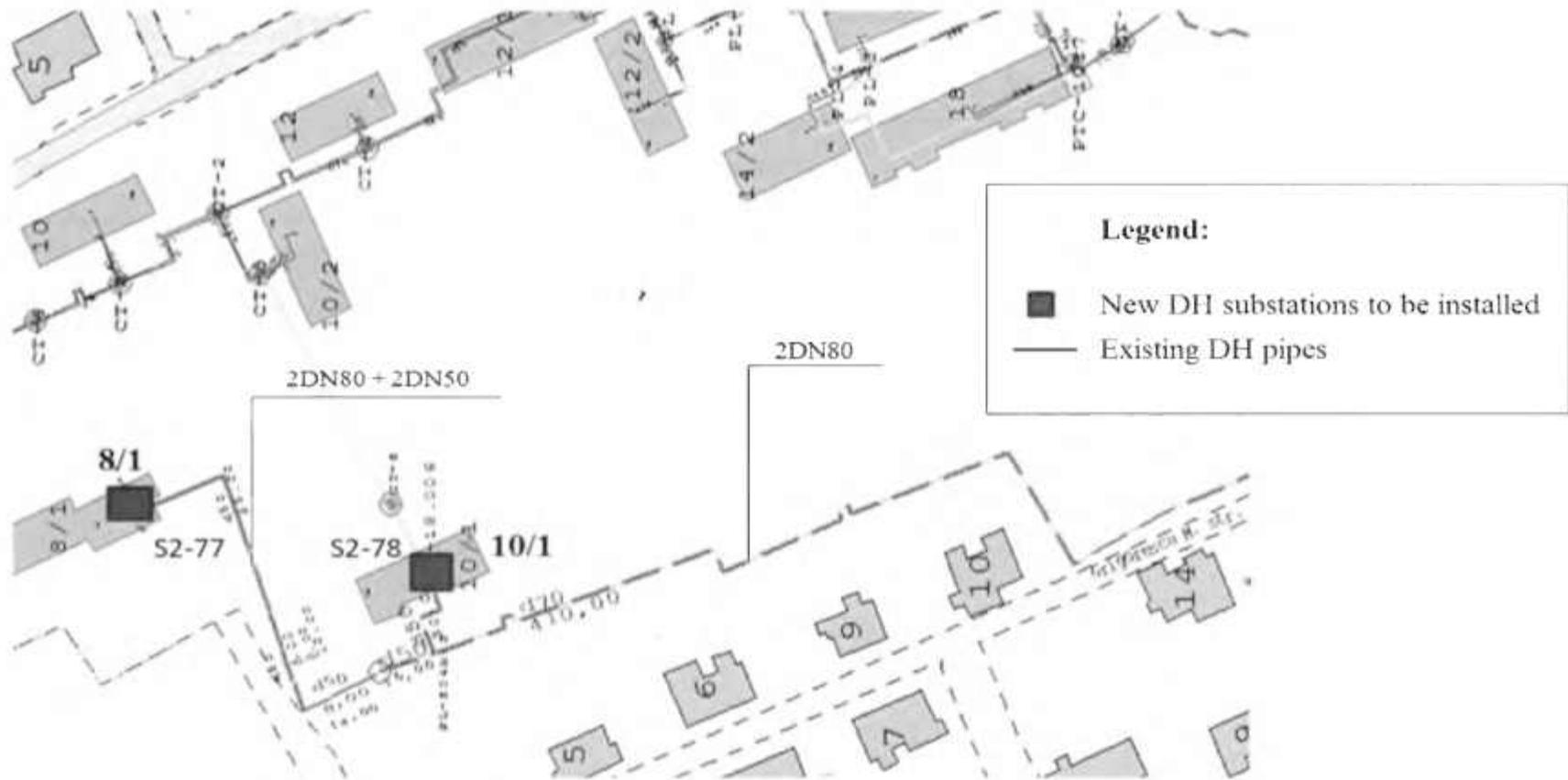
8.2.25. Object no.2.25. DH substation (IHS) S2-76



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-76	bd. Mircea cel Bătrîn, 58	3	9	106	419	165	89	22	70	22	64	25	2-stage	+

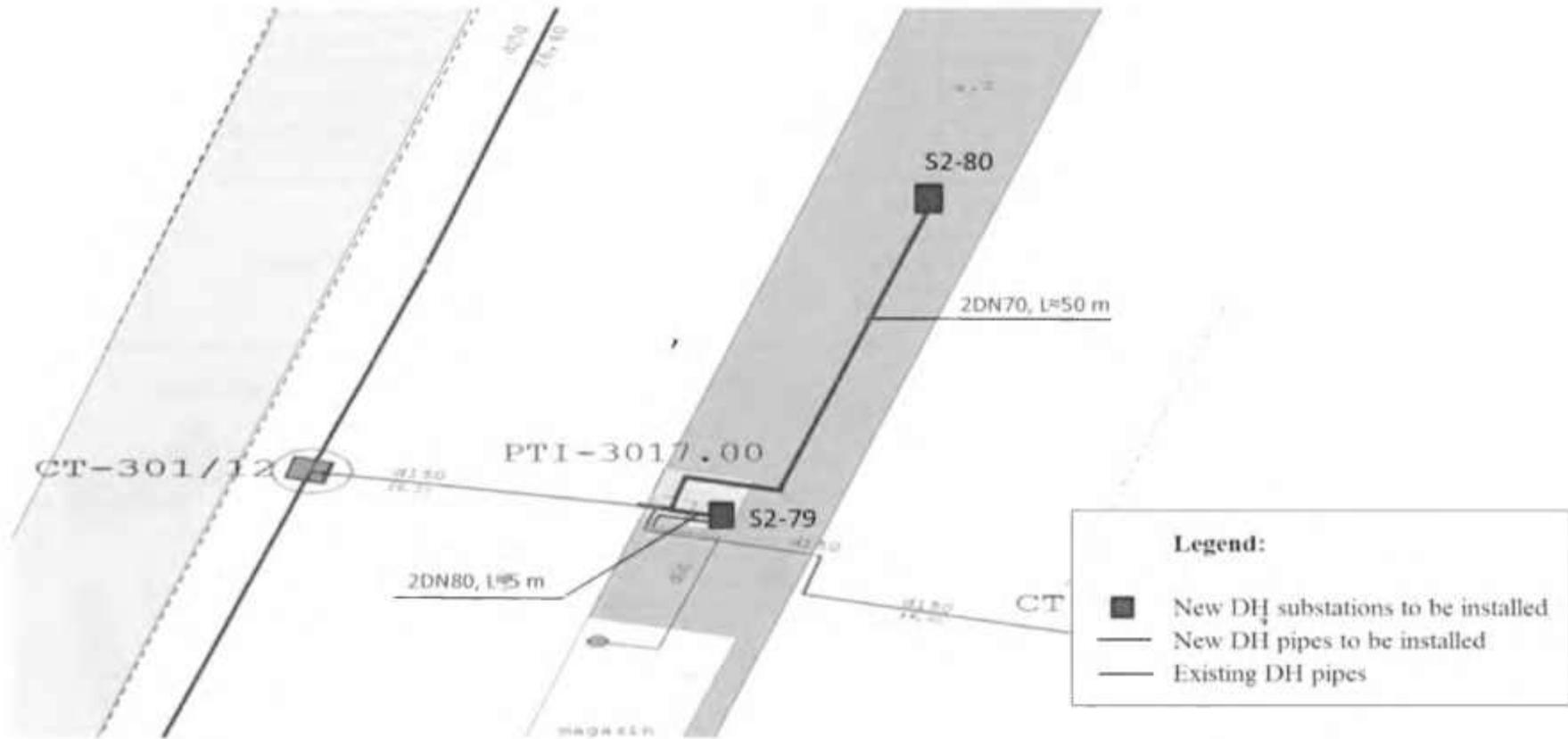
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8.2.26. Object no.2.26. DH substations (IHSs) S2-77 – S2-78



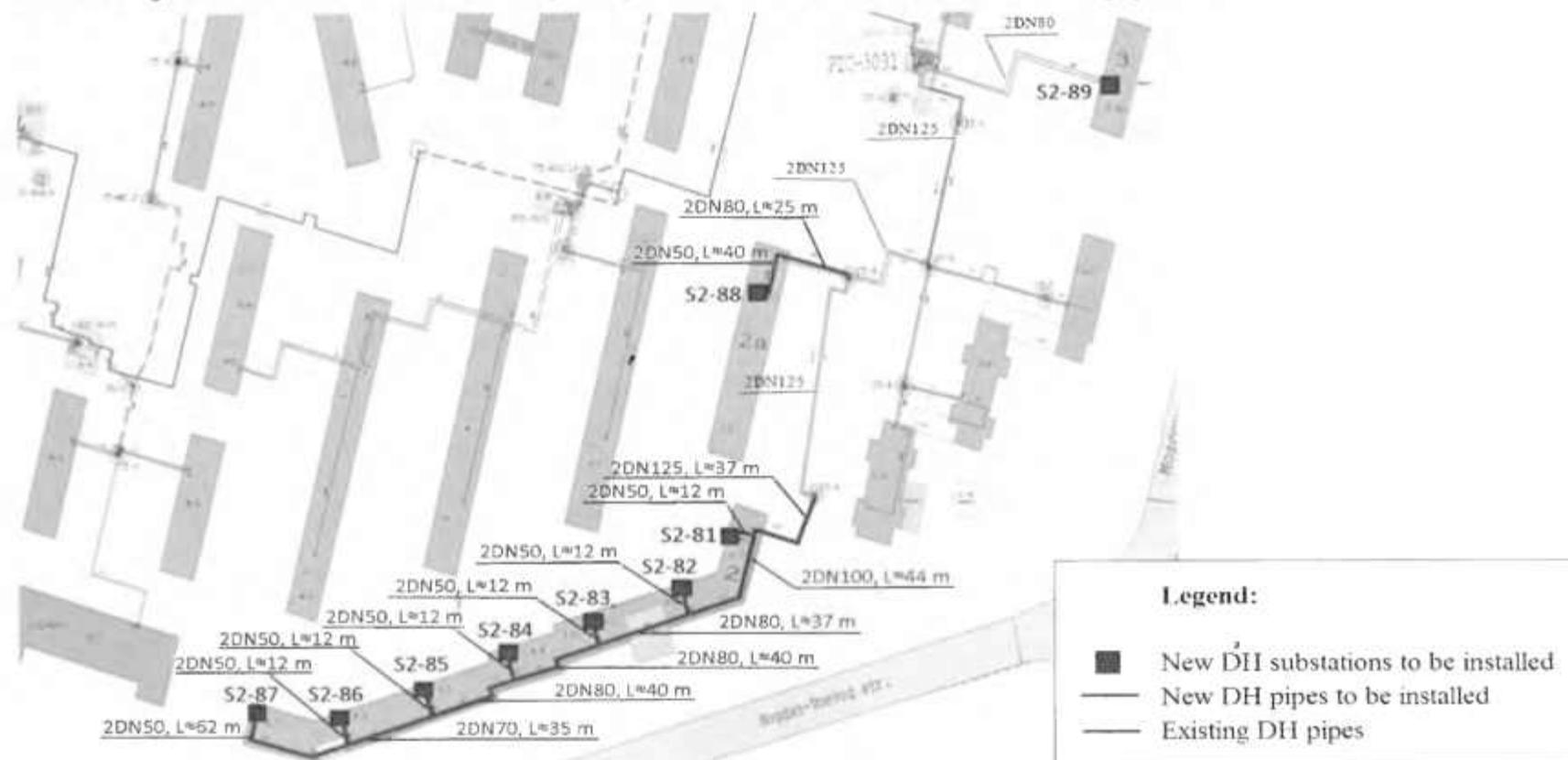
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-77	str. Podul Inalt, 8/1	2	5	45	215	106	58	1	77	10	76	6	2-stage	–
S2-78	str. Podul Inalt, 10/1	2	5	30	135	87	63	5	77	10	76	6	2-stage	–

8.2.27. Object no.2.27. DH substations (IHSs) S2-79 – S2-80 and associated DH pipes



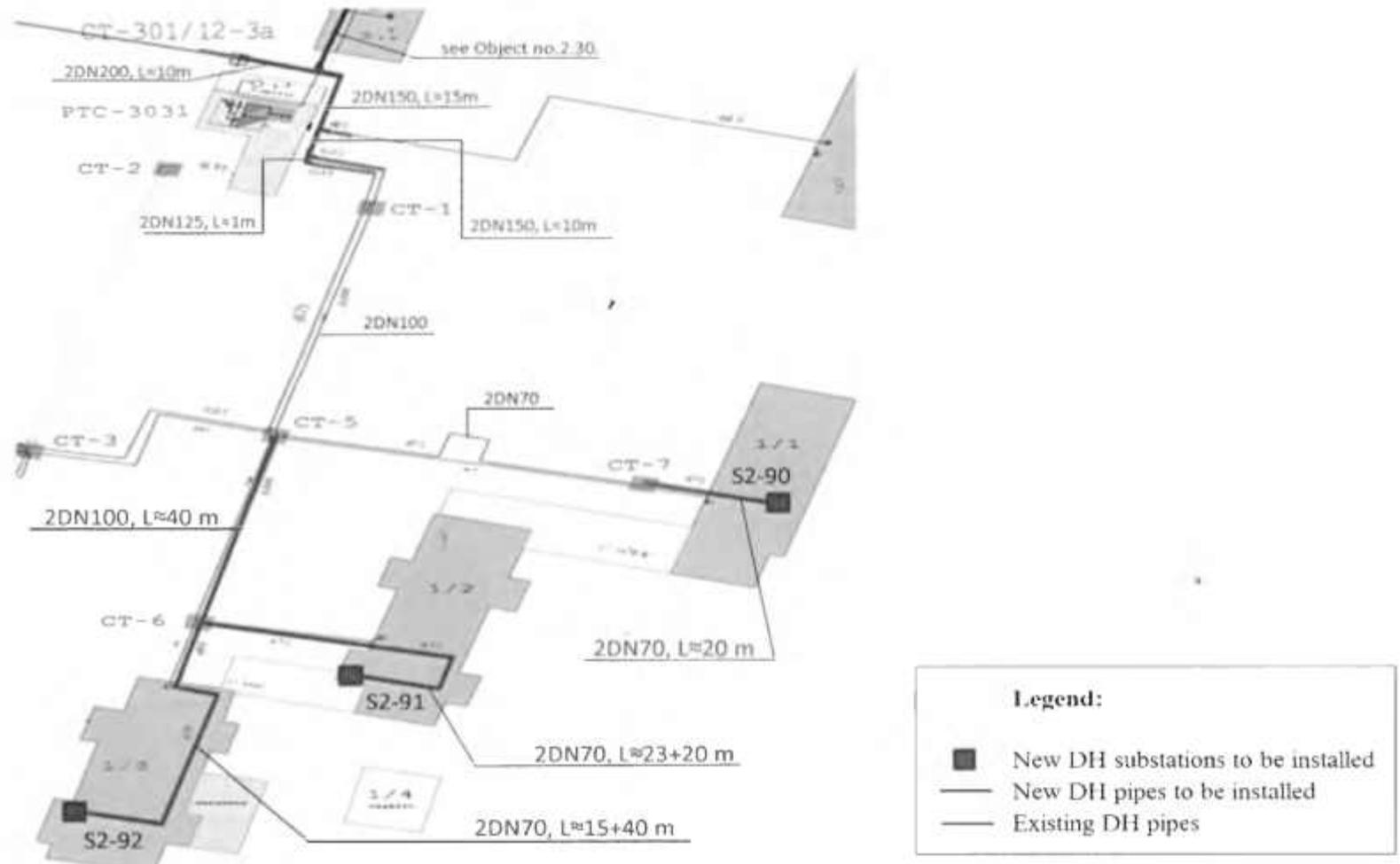
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-79	str. Moscova, 2 sec.1, including shop	5	9	120	609	185	111	52	107	45	103	20	2-stage	-
S2-80	str. Moscova, 2 sec.2	5	9	120	401	185	111	52	107	45	103	20	2-stage	-

8.2.28. Object no.2.28. DH substations (IHSs) S2-81 – S2-89 and associated DH pipes



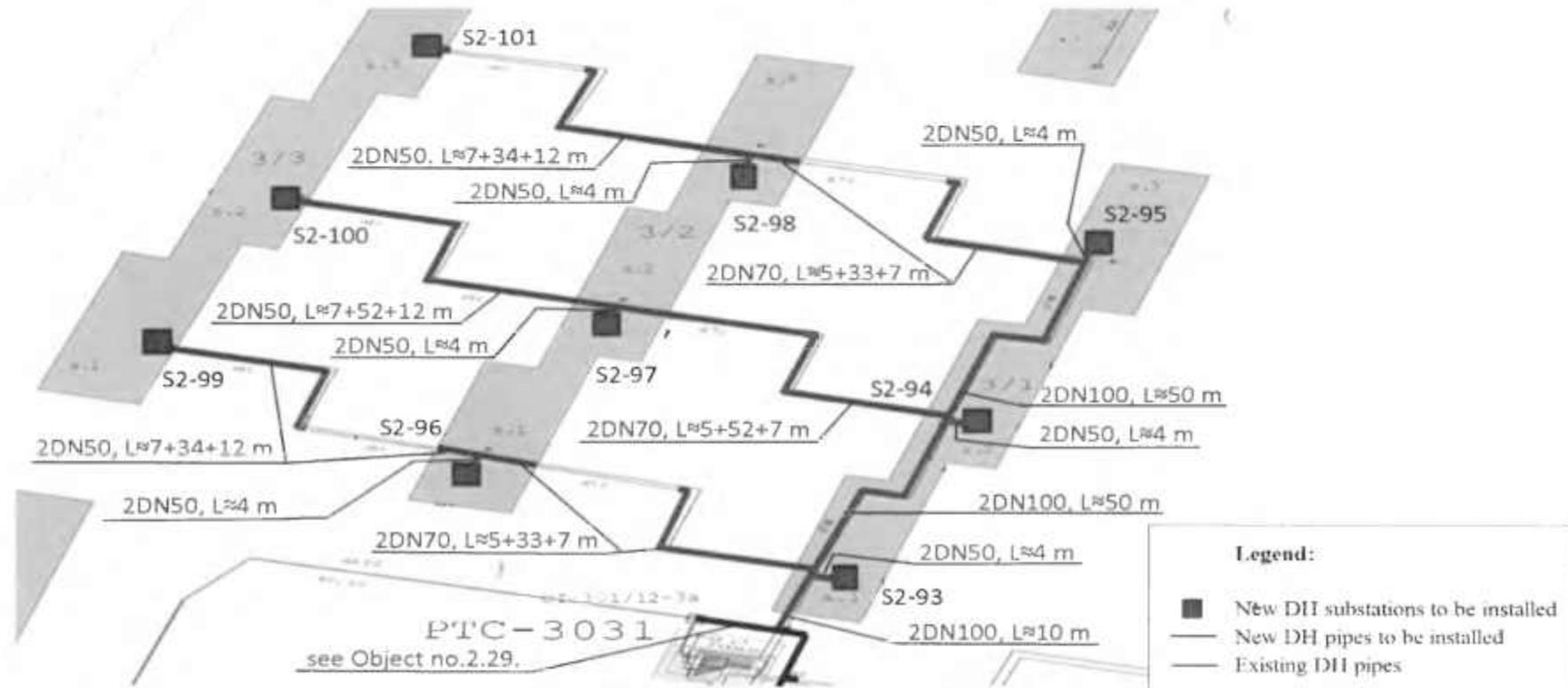
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
							SH+ventilation	DHW	H1	H2	H1	H2		
S2-81	str. B.Voievod, 2, sec. 1	1	9	36	187	98	92	64	104	42	99	18	2-stage	+
S2-82	str. B.Voievod, 2, sec. 2	1	9	36	187	98	92	65	104	42	99	18	2-stage	+
S2-83	str. B.Voievod, 2, sec. 3	1	9	36	171	98	90	67	104	42	99	18	2-stage	+
S2-84	str. B.Voievod, 2, sec. 4	1	9	36	171	98	90	69	105	43	100	19	2-stage	+
S2-85	str. B.Voievod, 2, sec. 5	1	9	36	171	98	89	70	105	43	100	19	2-stage	+
S2-86	str. B.Voievod, 2, sec. 6	1	9	36	184	98	89	71	106	44	101	20	2-stage	+
S2-87	str. B.Voievod, 2, sec. 7	1	9	36	184	98	88	73	106	44	101	20	2-stage	+
S2-88	str. B.Voievod, 2a	4	5	70	222	132	92	62	103	41	98	17	2-stage	+
S2-89	bd. Moscova, 3	2	9	51	254	112	97	63	105	44	101	20	2-stage	+

8.2.29. Object no.2.29. DH substations (IHSs) S2-90 – S2-92 and associated DH pipes



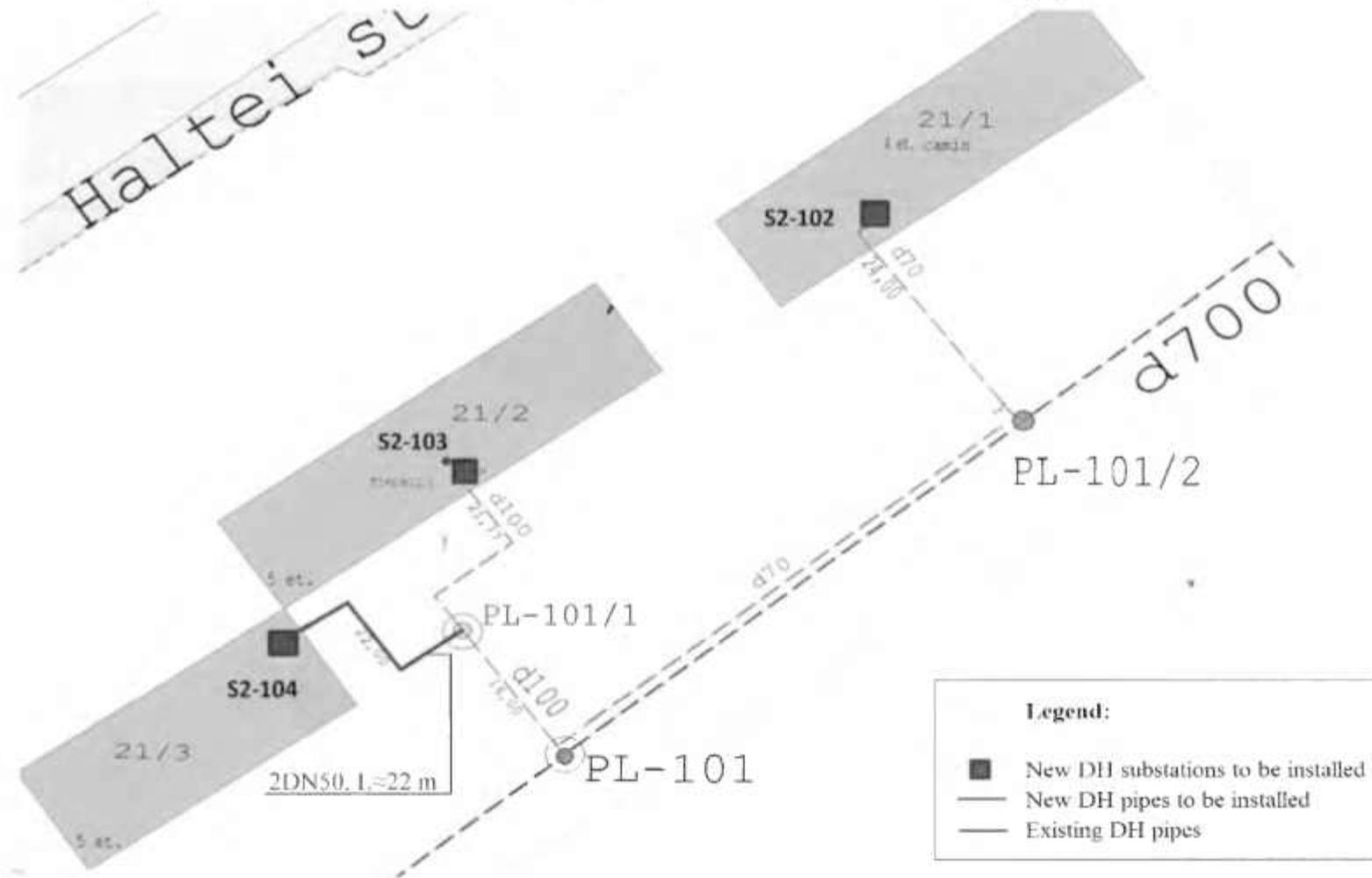
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH-ventilation	DHW	H1	H2	H1	H2	H1	H2		
S3-90	bd. Moscova, 1/1	2	9	60	220	120	98	66	105	44	101	20	2-stage	+
S2-91	bd. Moscova, 1/2	2	9	60	222	120	97	66					2-stage	+
S2-92	bd. Moscova, 1/3	2	9	60	197	120	97	66					2-stage	+

8.2.30. Object no.2.30. DH substations (IHSs) S2-93 – S2-101 and associated DH pipes



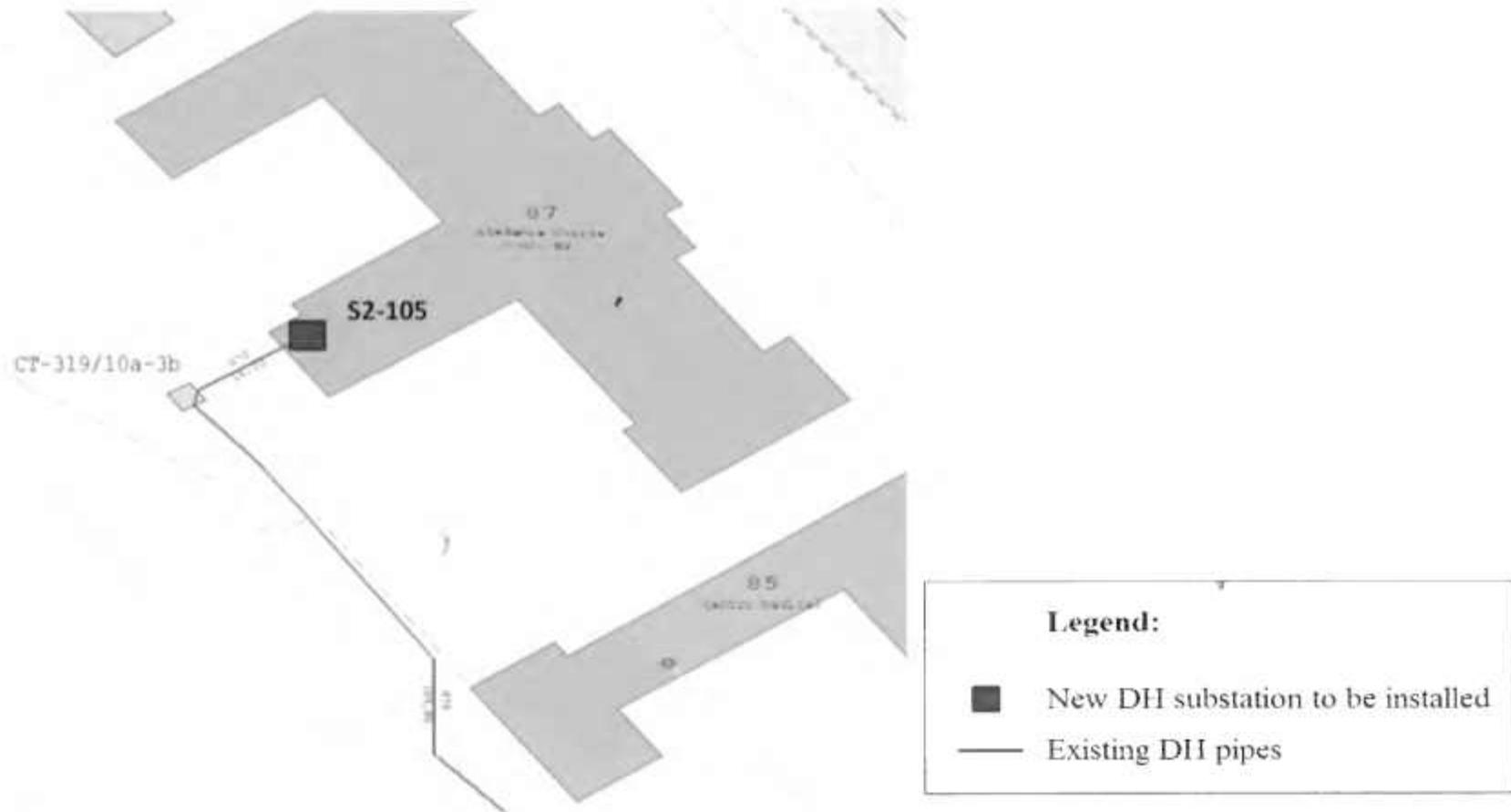
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
					SH+ventilation	DHW	H1	H2	H1	H2	H1	H2		
S2-93	bd. Moscova, 3/1, sec.1	2	5	35	120	96	96	62	105	43	100	19	2-stage	+
S2-94	bd. Moscova, 3/1, sec.2	2	5	35	120	96	94	61	103	41	98	17	2-stage	+
S2-95	bd. Moscova, 3/1, sec.3	2	5	35	120	96	93	60	102	40	97	16	2-stage	+
S2-96	bd. Moscova, 3/2, sec.1	2	5	35	120	96	92	59	101	39	96	15	2-stage	-
S2-97	bd. Moscova, 3/2, sec.2	2	5	35	120	96	90	59	100	39	95	14	2-stage	-
S2-98	bd. Moscova, 3/2, sec.3	2	5	35	120	96	89	59	99	38	95	13	2-stage	-
S2-99	bd. Moscova, 3/3, sec.1	2	5	35	120	96	88	58	98	37	94	12	2-stage	+
S2-100	bd. Moscova, 3/3, sec.2	2	5	35	120	96	86	58	98	36	93	12	2-stage	+
S2-101	bd. Moscova, 3/3, sec.3	2	5	35	120	96	86	57	97	35	92	11	2-stage	+

8.2.31. Object no.2.31. DH substations (IHSs) S2-102 – S2-104 and associated DH pipes



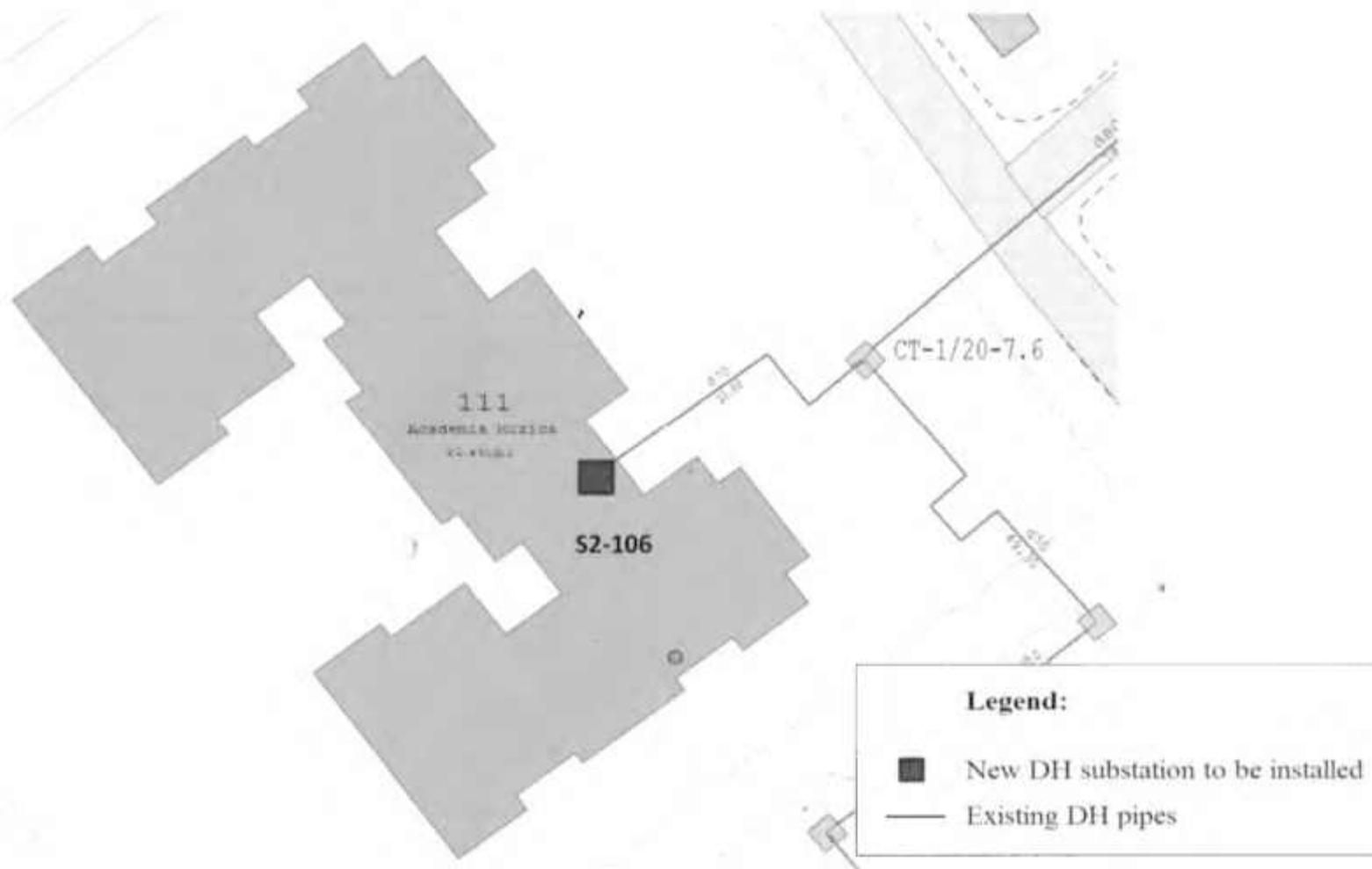
Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					SH	DHW	Heating season		Summer period		Transition periods			
							H1	H2	H1	H2	H1	H2		
S2-102	str. Haltei, 21/1	1	5	70	142	132	107	60	129	62	110	66	2-stage	-
S2-103	str. Haltei, 21/2	2	5+1	60+12	210	134	107	59					2-stage	+
S2-104	str. Haltei, 21/3	2	5	30	142	87	106	61					2-stage	-

8.2.32. Object no.2.32. DH substation (IHS) S2-105



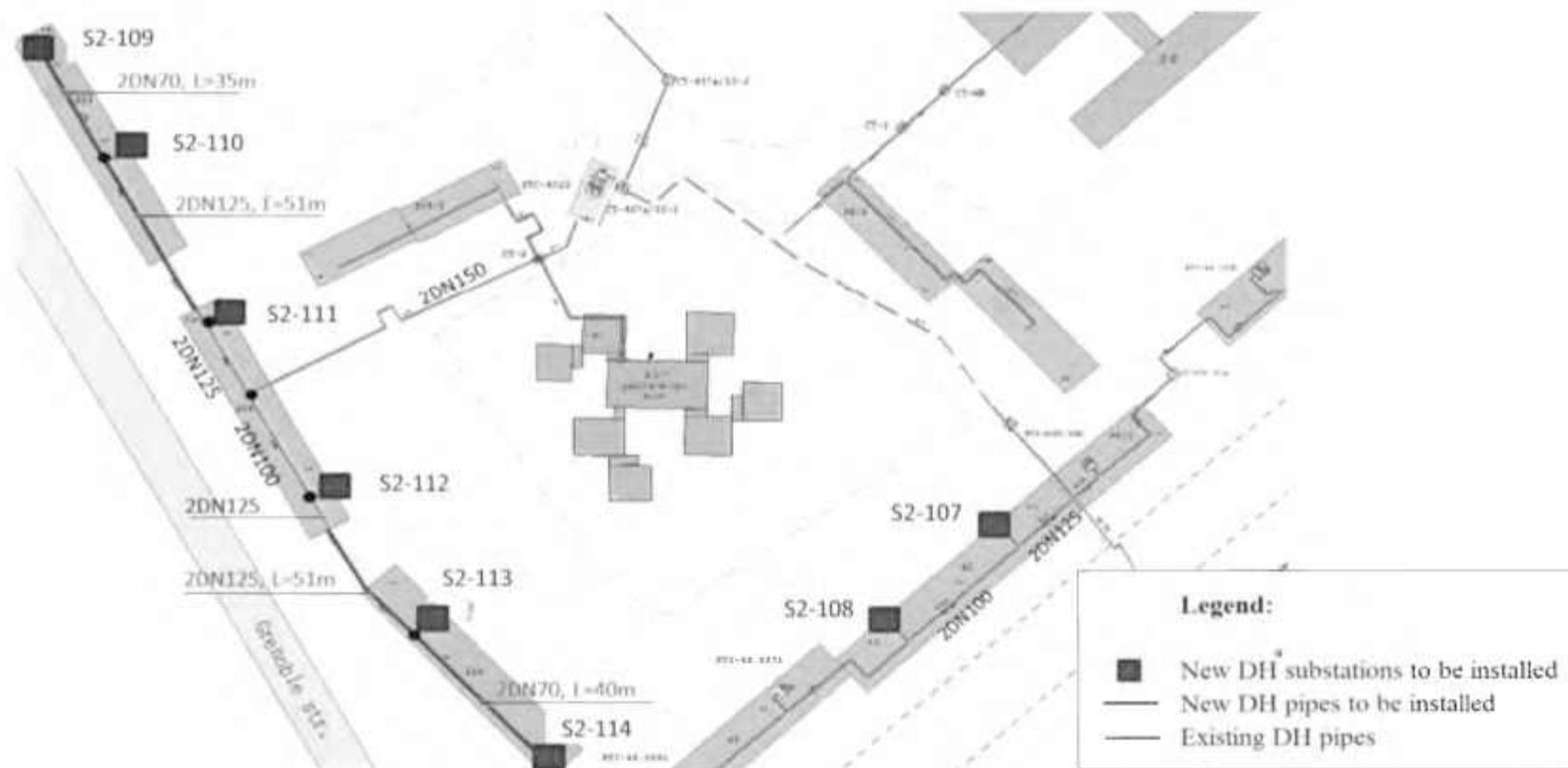
Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation	DHWRC pump to be included
			SH	DHW	Heating season		Summer period		Transition periods			
					H1	H2	H1	H2	H1	H2		
S2-105	str. Mateevici, 87	3	315	80	24	8	49	14	36	19	2-stage	—

8.2.33. Object no.2.33. DH substation (IHS) S2-106



Substation No.	Address	No. of floors	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
					Heating season		Summer period		Transition			
			SH	DHW	H1	H2	H1	H2	H1	H2		
S2-106	str. Mateevici, 111	3	380	80	40	0	54	11	46	11	2-stage	—

8.2.34. Object no.2.34. DH substations (IHSs) S2-107 – S2-114 and associated DH pipes



Substation No.	Address	No. of entrances	No. of floors	No. of apartments	Heat loads, kW		Piezometric pressure, m						DHW preparation schematic	DHWRC pump to be included
							Heating season		Summer period		Transition periods			
							H1	H2	H1	H2	H1	H2		
S2-107	str. Cuza Vodă, 40, s.1	2	9	54	350	118	62	18	43	3	47	9	2-stage	+
S2-108	str. Cuza Vodă, 40, s.2	2	9	54	350	118	62	18					2-stage	+
S2-109	str. Grenoble, 203 s.1	2	9	54	350	118	52	34	39	0	37	2	2-stage	–
S2-110	str. Grenoble, 203 s.2	2	9	54	350	118	52	34	39	0	37	2	2-stage	–
S2-111	str. Grenoble, 205 s.1	2	9	54	350	118	52	34	39	0	37	2	2-stage	–
S2-112	str. Grenoble, 205 s.2	2	9	54	350	118	52	34	39	0	37	2	2-stage	–
S2-113	str. Grenoble, 209 s.1	2	9	54	350	118	52	34	39	0	37	2	2-stage	–
S2-114	str. Grenoble, 209 s.2	2	9	54	350	118	51	35	39	0	37	2	2-stage	–

**Other documents: Employer's Notification of award,
Minutes of Contract signing**

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28.12 2016 nr. 04/4/6-819

To: JV Progress-92 LLC, Energoresurs-Invest Corporation and FCP SOLDI SRL

Subject: Notification of award – Letter of acceptance

This is to notify you that your Bid dated November 29, 2016 for execution of the **Plant Design, Supply and Installation of Individual Heating Substations and associated pipes in Chisinau District Heating System:**

- **Lot 1.** Supply and installation of 117 new Individual Heating Substations and associated pipes in the West circuit; and
- **Lot 2.** Supply and installation of 114 new Individual Heating Substations and associated pipes in the South circuit and in other locations,

for the Contract Price for **Lot 1: 1,453,283.00 Euro and 23,629,454.95 MDL** and for **Lot 2: 1,591,325.00 Euro and 22,998,648.00 MDL**, in the aggregate of **3,044,608 EURO and 46,628,102.95 MDL**, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our entity.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section IX. Contract Forms, of the Bidding Document.

Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

Director

Aurelia Samson

Attachment: Contract Agreement

**Procesul verbal al ședinței
de semnare a contractului 8451-C1.6**

Subiect: Semnarea contractului pentru Proiectarea, Furnizarea și Instalarea Punctelor Termice Individuale (PTI) și rețelelor termice aferente:

Lot 1. Furnizarea și instalarea a 117 PTI-uri noi și a rețelelor termice aferente în circuitul Vest, și

Lot 2: Furnizarea și instalarea a 114 PTI-uri noi și a rețelelor termice aferente în circuitul Sud și alte locații (în baza documentelor de licitație

și a ofertei Asocierii Progress-92 LLC, Energoresurs-Invest Corporation și FCP SOLDI SRL).

Locul: Chișinău, sediul UCIPE

Data: 30 decembrie 2016

Participanți:

Reprezentanții
Angajatorului:

DI. Valeriu Triboi
Viceministrul Economiei

Dna. Aurelia Samson
Director UCIPE

DI Veaceslav Hamitchi
Consultant tehnic

Dna I.Balan
Consultant financiar

Dna Olga Rusu
Consultant evaluare, monitorizare și raportare

Dna Natalia Cliuicova
Asistent procurări, financiar

DI Anatol Burlacu
Consultant pe aspecte de mediu, sănătate și securitate în muncă

Reprezentantul
Beneficiarului:

DI. Veaceslav Eni
Director general al SA "Termoelectrica"

Reprezentanții
Contractorului
(Asocierea Progress-92 LLC,
Energoresurs-Invest
Corporation și FCP SOLDI
SRL)

Reprezentanții Angajatorului au felicitat Contractorul cu ocazia atribuirii contractului și au propus discutarea următoarelor subiecte înainte de semnarea contractului și implementarea ulterioară a acestuia.

Agenda ședinței:

1. Termenii de începere și finalizare a lucrărilor;
2. Data intrării în vigoare a contractului;
3. Prezentarea programului de lucru;
4. Numirea Reprezentanților Contractorului;



5. Numirea Reprezentanților Angajatorului;
6. Emiterea garanțiilor (garanția pentru plata în avans, garanția de bună execuție);
7. Asigurări
8. Condițiile de plată;
9. Impozite și taxe;
10. Coordonarea activităților;
11. Aspecte tehnice;
12. Aspecte de mediu.

1. Termenii de începere și finalizare a lucrărilor

Contractorul va începe lucrul timp de șapte (7) zile calendaristice de la data intrării în vigoare a contractului.

Termenul de finalizare a instalațiilor este de unsprezece (11) luni calendaristice de la data intrării în vigoare a contractului.

2. Data intrării în vigoare a contractului

Data intrării în vigoare a contractului, de la care urmează să fie calculat termenul de finalizare a instalațiilor, este data când toate condițiile din lista de mai jos au fost îndeplinite:

- (a) Acordul contractual a fost semnat în modul corespunzător pentru și din numele Angajatorului și a Contractorului;
- (b) Contractorul a prezentat către Angajator garanția de bună execuție.

Fiecare parte va depune toate eforturile pentru a îndeplini condițiile de mai sus, pentru care este responsabilă, cit mai curând posibil.

3. Prezentarea programului de lucru

Contractorul urmează să prezinte un program detaliat de realizare a contractului folosind metoda căii critice (critical path method, CPM), schemă GANT, sau alte programe folosite la nivel internațional, timp de douăzeci și opt (28) de zile după data de intrare în vigoare a contractului.

4. Numirea Reprezentanților Contractorului

Reprezentantul Contractorului va fi dl Mihail Solcan. Adresa de comunicare: MD-2032, bd.Decebal 80, of.14, mun.Chisinau, Republica Moldova,

Timp de șapte (7) zile de la data intrării în vigoare a contractului, Contractorul va numi Managerul de Construcții/Reprezentantul Contractorului și va solicita în scris aprobarea Angajatorului pentru nominalizarea propusă.

5. Numirea Reprezentanților Angajatorului

Managerul de Proiect și Reprezentantul din partea Beneficiarului sunt numiți la semnarea Contractului.

6. Emiterea garanțiilor

6.1 Garanția pentru plata în avans

Contractorul a confirmat că nu dorește să primească plata în avans în conformitate cu condițiile contractului.

6.2 Garanția de bună execuție

Reprezentantul UCIPE a reamintit că timp de 28 zile de la semnarea Contractului, Contractorul trebuie să prezinte Angajatorului garanția de bună execuție în sumă de 10% din prețul contractului, în formă de garanție bancară emisă de o bancă cu reputație, folosind forma inclusă în documentele de tender.

7. Asigurări

Contractorul a fost informat despre necesitatea prezentării Asigurărilor necesare în conformitate cu prevederile Contractului (Clauza 34 a CG), pînă la inițierea lucrărilor de construcție.

8. Condițiile de plată

Contractorul a fost informat despre condițiile de plată prevăzute de contract.

9. Impozite și taxe

Scutirile de taxe și impozite prevăzute de contract vor fi aplicate în conformitate cu Hotărârea Guvernului nr.246 din 08.04.2010 „Cu privire la modul de aplicare a cotei zero a TVA la livrările de mărfuri, servicii efectuate pe teritoriul țării și de acordare a facilităților fiscale și vamale pentru proiectele de asistență tehnică și investițională în derulare, care cad sub incidența tratatelor internaționale la care Republica Moldova este parte”.

Contractorului i s-a amintit că pentru vămuire și pentru obținerea scutirilor necesare, vor fi prezentate copii ale facturilor (pentru furnizarea echipamentului de peste hotare, CIP) cu cel puțin o săptămână anterior intrării echipamentului pe teritoriul Republicii Moldova.

10. Coordonarea activităților

Coordonarea activităților în cadrul implementării contractului va fi efectuată de către UCIPE. Modificări la condițiile și prevederile Contractului se vor face prin operarea amendamentelor în scris, semnate eventual de către UCIPE. Asemenea amendamente vor fi examinate și aprobate în prealabil de către Beneficiar.

11. Aspecte tehnice

Contractorul a confirmat că noile sisteme și echipamente, lucrările de proiectare, demontare și instalare vor fi executate în conformitate cu normele și regulamentele în vigoare în Republica Moldova și cerințele documentelor de tender.

Contractorul va coordona cu UCIPE și SA “Termoelectrica” soluțiile tehnice și de proiectare la toate etapele implementării Contractului. Contractorul va prezenta către UCIPE și S.A. “Termoelectrica” proiectele elaborate spre coordonare înainte de a le prezenta pentru Expertiza de Stat. Contractorul va ține cont de comentariile și obiecțiile Angajatorului și Beneficiarului la elaborarea variantei finale ale Proiectelor.

3


12. Aspecte de mediu

Contractorul va respecta prevederile legislației de mediu, va elabora compartimentele relevante ale documentației de proiect privind aspectele de mediu, va obține aprobările și va întreprinde măsurile cerute în cazul defrișării unor arbori și arbuști, va asigura reamenajarea teritoriului. În timpul lucrărilor vor fi respectate cerințele față de zgomot și asigurate măsurile de siguranță pentru pietoni și mijloace de transport.

Impactele negative care ar putea eventual parveni pe parcursul executării lucrărilor de construcție, precum generarea zgomotului, impactul asupra solului sau apei, perturbarea traficului în timpul lucrărilor de construcție sau reabilitare, generarea prafului de construcție și a deșeurilor, siguranța lucrătorilor vor fi temporare și specifice doar șantierului de construcție, și urmează a fi minimizate/evitate prin implementarea măsurilor corespunzătoare de atenuare.

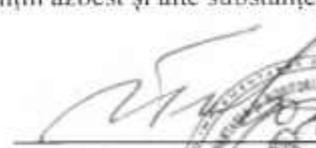
Echipamentul și materiale demontate vor fi gestionate/depozitate în conformitate cu exigențele legislației de mediu.

În timpul lucrărilor de demontare, în cazul depistării azbestului și altor substanțe periculoase, acestea vor fi gestionate conform legislației în vigoare.

Contractorul nu va utiliza echipament și materiale care conțin azbest și alte substanțe periculoase.

Angajator:

Valeriu Triboi



Aurelia Samson



Beneficiar:

Veaceslav Eni

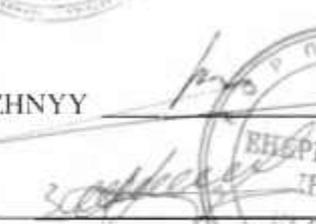


Contractorul (Asocierea
Progress-92 LLC,
Energoresurs-Invest Corporation
și FCP SOLDI SRL):



Україна
ТОВАРИСТВО
"ПРОГРЕС-92"
Сергій РУДРОЗХНЬКИЙ
код 19117928

Andriy RUDOMIR



ЕНЕРГОРЕСУРС-
ІНВЕСТ
30336890

Mihail SOLCAN



SOLDI