

Design of the Jetty/Trestle and Warehouse New Port of Pointe Noire ROC

Project Design/Consultancy Contract

Contract No.: MPC-BIPR-SDP-2012-002

Owner Entity: Magindustries Corp

and/or MagMinerals Potasses Congo SA

Design Unit: China Shipbuilding NDRI Engineering Co., Ltd.

DATED: September 2012

ADDRESS: Changsha, China

pg

20

CONTENT

1. DEFINITIONS.....	1
2. APPOINTMENT OF DESIGN UNIT AND COMMENCEMENT.....	2
3. RESPONSIBILITIES AND OBLIGATIONS OF THE DESIGN UNIT.....	2
4. REPRESENTATIONS.....	5
5. NEGATION OF EMPLOYMENT AND AGENCY.....	6
6. SERVICES: COORDINATION WITH THE OWNER AND CHANGSHA INSTITUTE.....	7
7. ALTERATIONS.....	8
8. REPRESENTATIVES AND PERSONNEL.....	8
9. PROGRESS AND PROGRAM.....	10
10. RESPONSIBILITIES AND OBLIGATIONS OF THE OWNER ENTITY.....	11
11. INDEMNITY AND INSURANCE.....	12
12. DRAWINGS AND DOCUMENTS.....	13
13. REMUNERATION AND PAYMENT FOR THE DESIGN UNIT.....	14
14. TAX.....	14
15. SCHEDULE OF PAYMENT TO THE DESIGN UNIT.....	14
16. POSTPONEMENT OF THE PROJECT.....	15
17. TERMINATION.....	15
18. CONSEQUENCES OF TERMINATION.....	16
19. OWNERSHIP OF COPYRIGHT.....	17
20. NON-DISCLOSURE/ CONFLICT OF INTEREST/CORRUPTION AND FRAUD.....	18
21. ASSIGNMENT & SUBCONTRACTING.....	18
22. NOTICE AND REQUEST.....	19
23. MISCELLANEOUS.....	20
24. ARBITRATION.....	20
25. GOVERNING LAW.....	21

12

20

APPENDIX I : SCOPE OF SERVICES TO BE PROVIDED BY THE DESIGN UNIT.....	
APPENDIX II: STAGES OF PAYMENT AND ARRANGEMENT.....	
APPENDIX III : CONSTRUCTION SITE.....	
ANNEX IV : RFP.....	
APPENDIX V : KEY PERSONNEL LIST OF THE DESIGN UNIT.....	

179

11

THIS CONTRACT is made on September [24], 2012

BY and BETWEEN

A. **Magindustries Corp**, a company duly established and existed under the laws of Canada with its registered office at 820-33 Yonge Street, Toronto, ON M5E 1G4,

and/or **MagMinerals Potasses Congo SA**, a legal entity duly established and validly existed under the Law of ROC (hereinafter referred to as "ROC" with its registered office at Immeuble Atlantic Palace, Avenue Charles de Gaulle, BP 1128, Pointe Noire, Republic of Congo;

Which collectively referred to as "One Party" (hereinafter referred to as "**the Owner Entity**" which includes its legal representative, successor in title and permitted assigns) of the one part;

AND

B. **China Shipbuilding NDRI Engineering Co., Ltd.**, a company duly established and existed under the laws of the People's Republic of China with its registered office at No. 303, Wuning Road, Shanghai, China, (hereinafter referred to as "**the Design Unit**" which includes its legal representative, successor in title and permitted assigns) of the other part.

(Each a "**Party**", and collectively the "**Parties**")

WHEREAS:

1. The Owner Entity has decided to invest in building the MagMineral 1.2 mtpa potash project in ROC.
2. The Owner Entity has designated Changsha Design & Research Institute of Ministry of Chemical Industry ("Changsha Institute") as the main Design Institute for MagMinerals 1.2 mtpa potash project, and has authorized it to serve as the General Coordinator in technical design of MagMinerals 1.2 mtpa potash project on behalf of the Owner to collaborate, communicate and contact with the Design Unit, ensuring the conformity of the design and service thereof provided.
3. The Owner Entity intends to construct a proposed jetty, trestle and onshore warehouse project (hereinafter collectively referred to as "the Project") in ROC, 6.5km in straight-line away from Pointe-Noire port basin entrance.
4. The Project is described in more detail throughout this Contract and in the RFP which is attached in Appendix IV hereto.
5. The Design Unit has made various presentations to the Owner Entity of similar projects.
6. In reliance on the Design Unit' presentations, the Owner Entity has accepted a proposal by the Design Unit for the performance of the Services based on the terms and conditions set out in this Contract.
7. The Owner Entity is responsible for liaising with relevant government authorities, submitting qualified design drawings, following up or obtaining essential approvals and permissions of projects with the preparatory documents pertaining to the Owner Entity.



8. The Design Unit hereby acknowledges and fully understands that the design results shall be utilized and submitted by the Owner Entity for the purpose as described in the foresaid Item 7. The Design Unit shall ensure that design work referred to in the Contract be carried out following Chinese standards. If specially required by ROC laws, legislations, regulations, directives, statutes and guidelines, the Design Unit shall modify designs free of charge to assure that it can successfully obtain essential approvals or permissions from relevant administrative authorities in future and then carry out engineering construction.

NOW IT IS HEREBY AGREED as follows:

1. In this Contract words and expressions shall have the same meanings as are respectively assigned to them in the "Conditions of Contract" hereinafter referred to.
2. The following documents (hereinafter collectively referred to as "Contract Documents") shall be deemed to form and be read and construed as part of the Contract between the Parties, namely:
 - (a) this agreement;
 - (b) the Conditions of Contract, which is attached to this Contract;
 - (c) Appendix I (Scope of Services to be provided by the Design Unit);
 - (d) Conditions of Contract of RFP set in Appendix IV (Owner's requirements);
 - (e) Appendix II(Stages and Schedule of Payment), III (The Site); and
 - (f) Appendix V (Key Personnel List of the Design Unit).

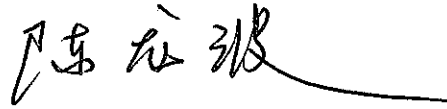
The Contract Documents are to be taken as mutually explanatory of one another.

For the purposes of interpretation, the priority of the Contract Documents shall be in accordance with the sequence listed above if there is ambiguity or inconsistency between the Contract Documents.

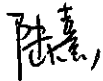
3. In consideration of the payment of the Services to be made by the Owner Entity to the Design Unit as hereinafter mentioned, the Design Unit hereby agrees with the Owner Entity to perform the Services in conformity with the provisions of the Contract based on the former's professional skills, personnel and other relevant resources.
4. The Owner Entity hereby agrees to pay the Design Unit for the performance of the Services as the Payment for Services with reference to the time and payment method prescribed by the Contract.

IN WITNESS WHEREOF the Parties hereto have caused this Contract to be executed on the date foresaid in writing in accordance with their respective laws.

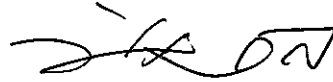
SIGNED by: Chen Longbo CEO



The Owner Entity: for and on behalf of the **Magindustries Corp. and /or MagMinerals Potasses Congo SA**

in the presence of: 

SIGNED by Zhuang Jianguo Deputy General Manager



The Design Unit: for and on behalf of the **China Shipbuilding NDRI Engineering Co., Ltd.**

in the presence of: 

THE CONDITIONS OF CONTRACT

(Hereinafter "**Conditions**")

1. DEFINITIONS

- 1.1 In the contract, including the Appendices hereto, the following words and phrases shall have the following meanings except where the context otherwise requires:

"Competent Authorities" means all governments, statutory, regulatory, planning, building, developments or other relevant authorities in ROC having jurisdiction over the Project.

"Completion of the Project" means the completion of the whole of the Project which is within the Scope of Service of Appendix I (including test and operation) to a state which is fit for handing over to the Owner Entity for its use and continuous commercial operation.

"Conditions" means these Conditions of Contract.

"Contract" means the contract between the Parties, as evidenced by or contained in the Contract Documents.

"Contract Documents" are as defined in the Contract.

"Design Documents" means drawings, designs, plans, reports, specifications, calculations and/or other documents produced or procured by the Design Unit in the course of carrying out the Services and/or in connection with this Project.

"Owner Entity's Representative" means the representative nominated by the Owner Entity under Clause 8.1.

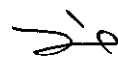
"Design Unit's Representative" means the representative nominated by the Design Unit under Clause 8.2.

"Owner Entity's Directives" means requirements, instructions and orders in writing related to Services issued to the Design Unit by the Owner Entity, Owner Entity's Representative or other authorized units for the purpose of the Project. Such Directives have described the purpose, scope, design and other technical standards of the Project Services.

"Remuneration" means the consideration of the services provided by the Design Unit, namely, Payment for Services which shall be paid by the Owner Entity to the Design Unit as approved in writing by the Owner Entity.

"Project" means the design for jetty, trestle and onshore warehouse project in ROC, 6.5km in straight-line away from Pointe-Noire port basin entrance.

"Relevant Requirements" means national (or state) legislations, statutes, laws, ordinances, all rules, regulations, directives, requirements and guidelines of the Competent Authorities of ROC as well as Chinese technical standards and codes applicable to the Project. Nevertheless, when Chinese technical standards and codes are inconsistent with those of the local Project, Relevant Requirements also include the technical codes of practice existing in ROC and applicable to the Services and/or the Project.

 
1

"Applicable Laws" means the Applicable Laws as agreed by the Contract and any applicable regulations of the law, government, state Competent Authorities or statutory law of the country where the Project locates (including the contents possibly revised or changed from time to time to the aforesaid regulations).

"Services" means all the services specified by the Design Unit in accordance with the Contract and *Appendix I* of the Contract.

"Site" means the offshore and onshore area demarcated in *Appendix III* of the Contract over which the Project is to be constructed.

"Stage" refers to the stages set out in 1.1 Table of *Appendix II* of the Contract..

"Stage Payment" means the installment of the Fee to be paid by the Owner Entity against the completion of each Stage, in accordance with Clause 13, Clause 15 and *Appendix II*.

"Design Defect Liability Period" refers to the period of one year from the completion of the Project.

"Day" refers to the natural continuous Calendar Day.

"Business Day" refers to the normal Business Day of the Local Bank in Beijing, Toronto and Brazzaville.

- 1.2 In the Contract, the words and expression aforementioned shall be understood as follows, except where the context otherwise requires.
 - 1.2.1 Words importing the singular shall include the plural and vice versa.
 - 1.2.2 Words indicating one gender include all genders.
 - 1.2.3 Provisions including the word "agree", "agreed", "approve", "permit" or "contract" require the agreement to be recorded in writing.
 - 1.2.4 "Written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.
 - 1.2.5 The terms "including" or "includes" shall mean "including without limitation" or "includes without limitation", and any words introduced by those words or any similar expression shall be construed as illustrative only.
- 1.3 Clause headings are inserted for convenience only and shall not affect the construction of this Contract.

2. APPOINTMENT OF DESIGN UNIT AND COMMENCEMENT

- 2.1 The Owner Entity hereby designates the Design Unit, and the Design Unit hereby accepts the designation thus the Design Unit is to provide professional design services and implement technical service for the Project on the terms and conditions hereinafter set forth.
- 2.2 The Design Unit shall commence the Services upon execution of this Contract and shall proceed with the Services schedule without delay.

3. RESPONSIBILITIES AND OBLIGATIONS OF THE DESIGN UNIT

- 3.1 In providing the Services, the Design Unit shall:



- 3.1.1 Exercise all reasonable skill, care and diligence as a competent design unit carrying out the design of a project similar in nature, size, and complexity and all other respects to the Project;
- 3.1.2 Appoint sufficient designers who are qualified with rich engineering design experience as required by the services, and fulfill the design responsibilities stipulated in the Contract with diligent, efficient and careful attitude as well as economic and practical techniques.
- 3.1.3 Comply with the instructions of the Owner Entity and/or its agents and shall always promote and protect the interests of the Owner Entity in accordance with the design standards as stipulated in the Contract;
- 3.1.4 Comply with all requirements as agreed by the Contract that are always applicable;
- 3.1.5 Closely cooperate and coordinate with the Owner and Changsha Institute to ensure the compliance to Relevant Requirements all the time;
- 3.1.6 Ensure that any Design Documents prepared by it under this Contract shall fit for the purposes of the Contract, the Requirements of the Owner Entity and/or the Project;
- 3.1.7 Assume full responsibility and liability for the applicability, sufficiency, integrity, durability and utility of the Project Design. Ensure that the design results are reliable, reasonable and economic in technique as well as convenient for construction;
- 3.1.8 Responsible for the earlier-stage technical work of the Project, including but not limited to the design data collection (such as hydrologic, atmospheric and geologic conditions. Refer to Clause 1.1 of Appendix I for detail). Give assistance to HUNAN FOUNDATION CONGO (In Chinese: 刚果湖南基础公司) to conduct onshore geo-technical exploration of the project, including but not limited to providing onshore exploration requirements for the project;
- 3.1.9 Adopt current standards, rules, procedures and codes specified in the Contract and acceptable by the Design Unit to complete the engineering design (design depth and codes shall follow Chinese relevant design standards. If there are special obligatory requirements of design by ROC local laws and regulations in Congo, the aforementioned obligatory requirements shall be followed). The design Unit is responsible for collecting technical regulations, codes and requirements applicable to laws including local ROC laws and shall guarantee that the engineering design meets the obligatory requirements of the applicable laws and regulations including ROC laws and regulations (codes and requirements including but not limited to environmental protection, security, firefighting, electric power and communication). The design results required to be submitted are:

The preliminary design and

Construction drawing design of the Project.

Type, form, specification, quantity and submit method of the design results to be submitted shall meet the definition of the technical and progress requirements as well as the interface of the Project by Changsha Institute, and cover letter and detailed documents/drawing list shall also be attached. Detailed design requirements of the Project are described in Appendix I .



- 3.1.10 Cooperate with the Owner Entity, Changsha Institute to communicate with ROC government and relevant authorities and make explanation to local companies;
- 3.1.11 Responsible for approval and permission of any preparatory documents which pertain to the Design Unit, with the expenses borne by the Design Unit; meanwhile, cooperate with the Owner Entity and Changsha Institute to conduct other submission approvals relating to the Project;
- 3.1.12 The Design Unit shall cooperate, communicate and liaise with Changsha Institute to ensure the coordination of the work with the overall project design of MagMinerals 1.2 mtpa Potash Project; follow the overall coordination of Changsha Institute, with the design schedule matching that of Changsha Institute.
- 3.2 Any approval, rejection, or comments made by the Owner Entity and/or its agents and/or the Competent Authorities of any proposal and Design Documents shall not release or discharge the Design Unit of its duties and obligations under this Contract or relevant laws;
- 3.3 The Design Unit acknowledges that the details of the Owner Entity's requirements for the Services, as set out in the RFP, are reasonable and attainable and the Design Unit undertakes to perform the Services in accordance with those requirements. Nothing in the RFP shall affect or exclude the exercise of independent professional skill and judgment by the Design Unit in the performance of the Services;
- 3.4 The Design Unit shall promptly issue written notices to the Owner Entity if the Design Unit becomes aware of the following situations:
 - 3.4.1 When any documents or other information provided by the Owner Entity is ambiguous or inaccurate or is otherwise insufficient to enable the Design Unit to carry out the Services; or
 - 3.4.2 Any matter or circumstance which may or has adversely affected the scope, timing or performance of the Services;
- 3.5 The Design Unit shall attend relevant meetings including instruction meetings reasonably required by the Owner Entity;
- 3.6 Under all circumstances, the Design Unit shall not be liable for any indirect losses incurred to the Owner Entity including profit losses;
- 3.7 Assure to appropriately keep the information ("**Confidential Information**") provided or to be provided which is related to the design of the Project and unknown to the public, and ensure that the Confidential Information is only for the purpose of the Project design. Disclose the Confidential Information only to senior management officers and employees (collectively referred to as "Associated Personnel") who are essential to know the information, unless otherwise specified in this Contract, it shall not disclose the Confidential Information to other personnel other than the Affiliated Personnel. The Design Unit shall notify the confidential nature and obligations of confidentiality of the information to the Affiliated Personnel before disclosing the information, and shall assure that the latter is to perform such obligation of confidentiality;



- 3.8 The Design Unit shall undertake to cover professional design liability insurance and renew the insurance concerning the losses (including expenses) caused by the defective design in accordance with Clause 11 of the Contract, and bear corresponding expenses;
- 3.9 Undertake all the responsibilities related to the disputes arising from the third party and damages to the third party due to the Design Unit during the performance of the Contract;
- 3.10 Provide conditions for ESIA (including relevant Chinese and English basic information and data, etc.) required by the Project environmental protection approval in accordance with the requirements of the ESIA company employed by the Owner Entity; give assistance to the Owner Entity and Changsha Institute for the environmental protection approval.
- 3.11 As the design service provider of the Owner Entity, in the negotiation with the third party concerning any matters related to the Project, it is obliged to support and safeguard legitimate interests of the Owner Entity;
- 3.12 The Design Unit shall bear the travelling expenses both at home and abroad, dining costs and insurance of its staffs produced at home and abroad as required by the design of the Project, and shall have the French translator to assist its work at its own expense; and
- 3.13 The Design Unit shall translate the Contract from Chinese into French, and register it at ROC relevant authorities and bear relevant expenses.

4. REPRESENTATIONS

- 4.1 The Design Unit represents and warrants to the Owner Entity that:
- 4.1.1 It is a skilled and competent professional in the particular fields relevant to the provision of such engineering design as are required in the performance of the Services;
- 4.1.2 It is experienced in the engineering design of projects comparable in all respects including nature, size and complexity to the Project, and in all ways competent and qualified to design, execute and otherwise perform and provide the Services in accordance with this Contract;
- 4.1.3 Design representative on site:
- (1) the Design Unit shall dispatch design representatives to the site as required for construction, including a plenipotentiary representative of the Design Unit to handle, determine and perform matters related to site technical service and specified in the Contract as authorized, and allocate a number of personnel on site (the detailed allocation number is subject to the Project which shall be confirmed by the Owner Entity in writing);
 - (2) personnel dispatched by the Design Unit to the Site shall be approved to be adaptable to his/her work via physical examination, and be approved in the qualification by the Owner;
 - (3) the Design Unit shall dispatch qualified personnel who are experienced in the Project to complete the site technical service as specified in the Contract;
 - (4) staffs of the Design Unit on site shall comply with various laws and regulations of the ROC and rules and regulations prepared by the Owner Entity and respect the ROC local customs;

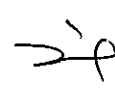
- (5) the Design Unit shall be responsible for the damages or adverse consequences caused by the adverse behaviors, carelessness, breach of contract or dereliction of duty of the Design Unit personnel during the performance of the Contract obligations;
- (6) To perform the Contract, the number of persons sent out to the site in ROC by the Design Unit during the construction shall not be less than 2. If it is due to the Owner that the working time of the permanent staff officially sent out by the Design Unit exceeds 3.5 years, the Parties agree to discuss the payment for additional site services caused by the exceeded part. If the working time of the permanent staff officially sent out by the Design Unit is less than 3 years, the Design Unit shall return the extra payment for site Services accordingly.
- (7) at the end of each year, the Owner Entity will evaluate on the design work and the work of the design representatives, and submit evaluation report to the Design Unit; the Design Unit promises to consider the aforementioned evaluation of the Owner as a reference for the annual appraisal and awards of the design representatives;
- (8) The Design Unit shall provide the on-site Personnel List to the Owner Entity (including but not limited to name, function, batch and estimated time for arrival) before the official commencement of the Project. And the List shall not be changed after being approved unless it is approved in writing by the Owner Entity; and
- (9) at the construction stage of the Project, personnel on site shall:
 - (9.1) participate site technical coordination meeting, design liaison meeting, review meeting and other relevant meetings of the Project organized by Owner Entity;
 - (9.2) promptly settle design problems occurred during the construction, installation, commissioning and start-up;
 - (9.3) engage in check acceptance of important stages such as installation and commissioning, and project acceptance of important units such as concealed Project and other projects; and
 - (9.4) for design technical problems or design errors occurred on site, general problem shall be disposed and settled within 48 hours, and opinion of disposal or settlement shall be given without affecting the normal construction progress for serious problems.

4.1.4 Personnel insurance;

The Design Unit shall provide corresponding personnel insurances for site staff at its own expenses (including accidental insurance).

5. NEGATION OF EMPLOYMENT AND AGENCY

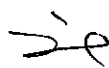
- 5.1 The Design Unit shall not be held as an employee or agent of the Owner Entity by virtue of this Contract, Neither shall it regard itself as the employee or agent of the Owner Entity nor allow others to deem it as the employee or agent of the Owner Entity .

 6 

- 5.2 Nothing in this Contract shall constitute a partnership between the Parties or constitute either Party as agent of the other Party for any purpose and neither Party shall have authority or power to bind the other Party or to contract in the name of or create liability against the other Party in any way or for any purpose other than expressly authorized in writing by the other Party.

6. SERVICES: COORDINATION WITH THE OWNER AND THE CHANGSHA INSTITUTE

- 6.1 The Services shall include:
- 6.1.1 the engineering design of all elements and disciplines of the Project;
 - 6.1.2 all earlier-stage services, follow-up and other services necessary to interpret and implement the Owner Entity's intention or purpose to achieve Completion of the Project; and
 - 6.1.3 all expert and technical advice and skills which are normally required from the Design Unit providing such Basic Services, and/or any other services which could reasonably be construed to be part of the requirements of a project of this scope and magnitude. Services that are expressly excluded in the Contract are needless to be provided;
- 6.2 As part of the Services, the Design Unit shall at all times co-ordinate and liaise with the Owner Entity and Changsha Institute to ensure that the designs produced by the Design Unit will be in compliance with the Relevant Requirements for the purpose of getting relevant approvals and/or permissions from the Competent Authorities. The Design Unit shall be fully responsible and liable to guarantee its design meets Chinese standards and also ROC obligatory standards, and shall be responsible for the compensations and losses, damages and /or expenditures and costs thus occurred or relevant to the Owner Entity due to inconformity to Chinese standards and ROC applicable obligatory standards of any design;
- 6.3 The Design Unit will submit all the design drawings which are initially finished (the drawings shall meet the standards specified in this Contract and be sufficient for the purpose of ROC Project construction and detailed enough to the Owner Entity). The Owner Entity will then check and exam the design drawings to ensure the conformity to Relevant Requirements, and finally submit them to the Competent Authorities. The Design Unit shall closely cooperate with the Owner Entity to modify the drawings according to the opinions of the Owner Entity in order to meet Relevant Requirements.
- 6.4 During the cooperation with the Owner Entity and Changsha Institute, the Design Unit shall communicate, consult, collaborate and discuss with them regularly, which is the necessary and effective way for satisfying opinions of the Owner Entity and Changsha Institute, understanding and clarifying all doubts possibly incurred. Besides the rendering of opinion for the purpose of meeting Relevant Requirements, the Owner Entity and Changsha Institute will also render opinion including but not limited to the detailed degree of the Design Documents, for meeting Relevant Requirements or requirements of the Competent Authorities; and
- 6.5 The Design Unit shall provide reasonable support to the Owner Entity and assist them to promptly submit the drawings to the Competent Authorities; under possible circumstances, it shall facilitate the progress and promptly complete the design for the Project.

 7 

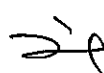
7. ALTERATIONS

- 7.1 The Design Unit shall not make any alteration, supplement or omission to any Design Documents which have been approved by the Owner Entity, without the Owner Entity's written consent except for complying with the Relevant Requirements.
- 7.2 For the avoidance of doubt, the Design Unit shall be deemed to be in breach of this Contract and shall not be entitled to any additional payment for providing Services arising out of such alterations, additions or omissions if such Relevant Requirements had existed or were effective at the date when such Design Documents were approved by the Owner Entity.
- 7.3 The Owner Entity shall have the discretion to instruct any alteration, supplement or omission to any part of the Design Documents in terms of nature, scope and timing before the Completion of the Project. The Design Unit shall comply with such instructions expeditiously and be entitled to negotiate with the Owner over any Additional Fee for completing any Services arising out of such instruction, only if such instruction falls outside the design service scope of the Project (as defined in Appendix I for contract conditions) and the Contract. Whether legally or contractually, no payment shall be made or given to the Design Unit for Additional Services except for that the Design Unit has received the confirmation letter concerning the payment of Additional Fees and amount which is consented in writing by the Owner Entity before the execution of Additional Services.
- 7.4 For the avoidance of doubt, changes requested by the Owner Entity which arises as a result of a need to amplify or to clarify any part of the design specification, reports, or other information produced by the Design Unit, or to rectify any deficiencies in the same, shall not be considered to be Additional Services and shall act as part of normal Services.
- 7.5 The change procedures of design scope will be executed as per those specified by the project management outlines which will be subsequently confirmed in writing.

8. REPRESENTATIVES AND PERSONNEL

- 8.1 The Owner Entity shall nominate an authorized representative (hereinafter referred to as the "Owner Entity's Representative") to act on its behalf in all respects concerning this Contract including the issuing of instructions or directions to the Design Unit and approving and signing all Design Documents which are required for the Project and/or to be filed with the Competent Authorities. Any direction or instruction given to the Design Unit by the Owner Entity's Representative shall be deemed to have been given by the Owner Entity.
- 8.2 The Design Unit shall nominate an authorized representative (hereinafter referred to as the "Design Unit's Representative") to act on its behalf in all respects concerning this Contract. The Design Unit shall employ full and sufficient numbers of competent staff having relevant qualifications and experience to perform the Services at its own expense. Any site staff employed shall be under the supervision, direction and control of the Design Unit.
- 8.3 Without prejudice to the application of Clause 8.2 and other foresaid clauses, the Design Unit shall provide at a minimum the following key personnel to provide Services in relation to the Project (in addition to such





other personnel as may be necessary to perform the Services). These key personnel shall not be changed or substituted without the Owner Entity's prior written approval. However, the Owner entity shall not unreasonably rejected if the key personnel cease to be in the employment of the Design Unit.

- 8.3.1 Project director;
- 8.3.2 Project manager;
- 8.3.3 Chief engineer; and
- 8.3.4 Key personnel of various specialties.

Individuals nominated with the aforementioned positions shall be qualified, well-experienced and competent as well as be approved by the Owner Entity. The Design Unit shall provide the list of project key personnel (designers), including their CV copies and other information required by the Owner Entity. The list of key personnel (including but not limited to their names, titles, etc.) will be defined as Appendix V to this Contract.

- 8.4 The Design Unit shall ensure that its personnel involved in the Project:
 - 8.4.1 shall be reasonably competent, properly qualified and shall possess the necessary experience and have record in successfully implementing projects of a similar nature, size and complexity to the Project.
 - 8.4.2 shall (if the personnel are sent by the Design Unit to work on site) have been physically examined and fit for their assignment.
 - 8.4.3 shall be notified to the Owner Entity and approved by the Owner Entity prior to their involvement in the Project. Approval by the Owner Entity shall not prejudice the efficacy of Clause 8.5 in relation to the removal and/or replacement of any personnel previously approved by the Owner Entity.
- 8.5 The key personnel implementing Services for the Design Unit shall be kept as steady as possible. The replacement and change of such personnel require the prior written consent and approval by the Owner Entity. Under the precondition of specifying reasons, the Owner Entity shall be entitled to require the Design Unit to remove and/or replace any member of the Design Unit's team if the Owner Entity is of the view that the continued employment of any member of the Design Unit's team may reasonably be regarded as prejudicial to the satisfactory, expeditious and timely completion of the Services or the Project or due to misconduct, or inability to perform satisfactorily, whereupon the Design Unit shall at its own cost immediately arrange for replacement by a person of comparable competence and experience.
- 8.6 The Design Unit shall ensure that its personnel strictly comply with all restrictions, security measures, Relevant Requirements, guidelines and applicable codes of conduct in connection with the Project.
- 8.7 The Design Unit shall guarantee that its design results will not infringe the intellectual properties by any third party (wherein including the patent rights, copyright and non-patent technical secrets). In the event that any claim, lawsuits or arbitration by any third party is undergone by the Owner Entity for its using such design results and infringing on the intellectual properties, the Design Unit shall warrant that the Owner Entity will be exempted from any losses incurred or caused thereby and give reasonable indemnifications to the Owner Entity. Such indemnifications shall include legal costs, arbitration fees, attorney fees, compensations given to

PG

Se

the third party by the Owner Entity and losses suffered to the Owner Entity directly incurred due to the claim or lawsuit by such third party. For the lawsuit or arbitration caused by the aforementioned reasons, whether the lawsuit is responded in the name of the Owner Entity or Design Unit, the legal costs, arbitration fees, attorney fees and other relevant fees shall be paid by the Design Unit.

9 PROGRESS AND PROGRAM

- 9.1 The Design Unit shall at all times perform the Services with due expedition and without delay, and take all possible steps to avoid or minimize any delay in the performance and completion of the Services.
- 9.2 The Design Unit shall as soon as possible and in any event within seven (7) days of execution of this Contract, submit to the Owner Entity for approving a program for the performance of the Services, which is consistent with the RFP, this Contract and other reasonable requirements of the Owner Entity. The project design shall be consistent with the deadlines for the key milestones or events set out below. The Design Unit shall obtain the Owner Entity's approval before proceeding to any new milestone or to any new Stage (as defined in Paragraph 1.1 Stage Payment of *Appendix II*).

Description	Deadline
Preliminary Design	Please see Clause 4 of <i>Appendix IV</i> for details
Construction Drawing Design	Please see Clause 4 of <i>Appendix IV</i> for details

In the event that the delivery time of Design Documents pursuant to Clause 9.2 is delayed for the reason of the Design Unit itself, 1% of the Design charges receivable in the Service Stage of the project design shall be deducted for each delaying day. Such deduction will not cease until qualified Design Documents as specified by the Contract are delivered by the Design Unit to the Owner Entity.

- 9.3 The Design Unit shall update and adjust the project design program on the first working day of each month, submitting the updated program to the Owner Entity and obtaining the Owner Entity's approval. Where a program is rejected by the Owner Entity for any reason, the Design Unit shall be informed in writing within seven (7) days upon its receipt of such program and shall submit a corrected and revised program within seven (7) days of being notified that such program is unacceptable.
- 9.4 The Design Unit shall carry out the Services in accordance with the program (as updated from time to time). The program is submitted to the Owner Entity purely for the Owner Entity's information only, and shall not be construed as imposing any obligations on the Owner Entity in respect of any matters contained in the Program, nor shall it be construed as the giving of notice by the Design Unit to the Owner Entity of any approvals or consents or assistance required by the Design Unit.
- 9.5 The Design Unit shall give notice to the Owner Entity whenever the Services are likely to be delayed or disrupted if any necessary drawing or instruction by the Owner Entity is not issued to the Design Unit within a particular time, which shall be reasonable. And in any event the notice shall be given at a time that is neither

unreasonably distant from or unreasonably close to the date the drawing or instruction requested for is required by the Design Unit, having regard to his progress and Program.

The notice shall state expressly that it is given pursuant to the relative Clause, and shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and details of the nature and amount of the delay or disruption likely to be suffered if it is late.

9.6 If the Design Unit believes a delay has or may occur as a result of:

9.6.1 an act or omission of the Owner Entity; or

9.6.2 an act or reason of representatives, other agents or authorizers for Changsha Institute or the Owner Entity.

And for which the Design Unit believes will require an extension to the project design program, it must notify the Owner Entity in writing immediately of any circumstance arising from occurrence of such delay. The fact that the Owner Entity may be aware of the occurrence of the delay through other means shall not excuse the Design Unit from giving the notice. The Owner Entity shall, within five (5) days upon its receipt of the written notice made by the Design Unit, issue the written instructions on approval or disapproval of the extension of Service periods and explicate reasons thereof. The Design Unit shall assume no liability for breach of contract in respect of the extension of the project design that is not incurred by the Design Unit.

9.6.3 Provided that the accumulative working time of the permanent workers who are officially dispatched by the Design Unit to the Project Site exceeds 3.5 years by reason of the Owner Entity, both parties will otherwise negotiate over the fees arising from the Site Services in excess of 3.5 years rendered by such Site workers. If the working time of the permanent workers who are officially dispatched by the Design Unit to the Project Site is less than 3 years, the Design Unit shall return the Site Service charges corresponding to the reduced time.

9.7 If, at any time:

9.7.1 actual progress is too slow for the Design Unit to complete within any deadline set out in the program;

9.7.2 the Design Unit's progress has fallen (or will) behind the current program; or

9.7.3 The Owner Entity directs in writing as follow:

Upon Owner Entity's approval, the Design Unit shall submit a revised program and other report describing the revised methods which the Design Unit proposes to adopt in order to expedite progress and accelerate its performance so as to complete on time.

Unless the Owner Entity notifies in writing otherwise, the Design Unit shall adopt such revised methods, which may require increases in the working hours and/or in the numbers of personnel, at the risk and cost of the Design Unit. The Design Unit can also adopt such other methods as may be instructed by the Owner Entity.

10 RESPONSIBILITIES AND OBLIGATIONS OF THE Owner Entity

10.1 The Owner Entity shall:



- 10.1.1 Provide full information regarding its requirements for the Project as shall be reasonably required by the Design Unit for the carrying out of the Services;
- 10.1.2 Consider all documents submitted and/or questions raised to the Owner Entity in connection with the Project and shall render decisions pertaining thereto as soon as practicable so as not to unreasonably delay the progress of the Services and/or the Project;
- 10.1.3 Supporting Design Unit for tendering and bidding specialized companies;
- 10.1.4 Pay remunerations to the Design Unit subject to Clause 13 & 15 herein;
- 10.1.5 Communicate with ROC Government as well as authorities and local companies concerned;
- 10.1.7 If necessary, assisting the Design Unit in collecting policies, laws & regulations, taxation information at the Project location, and the expenses will be borne by the Design Unit;
- 10.1.8 In the event that issues occurred during communication between the Design Unit and Changsha Institute in terms of the Project design, the Owner Entity shall be responsible for the coordination work between the Design Unit and Changsha Institute;
- 10.1.9 In the event that the project proposal subject shall pertain to the Owner Entity, the Owner Entity will be responsible for relevant approval letters, authorization and licenses as well as bearing expenses incurred there from. If necessary, assist Design Unit in applying for the proposal subject pertaining to the Design Unit for the approval letter, authorization and license;
- 10.1.10 Reasonable efforts by Owner Entity shall be made with respect to assisting the Design Unit in purchasing texts required which might be difficult to be obtained in the public by the Design Unit. Expenses incurred there from will be borne by the Design Unit;
- 10.1.11 Reasonable efforts shall be made with regard to assisting the Design Unit in providing any necessary support document, so that the Design Unit can acquire the visas and work licenses for their personnel who can enter, stay at and work at ROC. The expenses incurred there from will be borne by the Design Unit;
- 10.1.12 Assist the Design Unit employees entering the site, the expenses will be borne by the Design Unit;
- 10.1.13 Responsible for arranging the local accommodation and transportation in ROC for the personnel who are dispatched by the Design Unit to the Project Site and bear relevant expenses;
- 10.1.14 Responsible for arranging the office at the Project location for staff of the Design Unit and sub-contractors. The expenses arising from the permanent staff for the Design Unit at the Project Site shall be borne by the Owner Entity, and the Design Unit shall bear costs incurred by the subcontractor; and
- 10.2 The Owner Entity shall not in any event be liable to the Design Unit for any consequential loss including for loss of profits.

11. Indemnity and Insurance

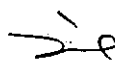
- 11.1 The Design Unit shall be liable for all liabilities, damages, losses, costs, expenses, claims, demands, proceedings, suits or any other consequences whatsoever by reason of any negligence, omission, breach of contract or default of the Design Unit in providing the Services under the Contract or relevant law.



- 11.2 Within 5 years (hereinafter referred to as "Underwriting Period") as from and after the receipt of written consent for the preliminary design of the Project made by the Owner Entity, the Design Unit will undertake responsibility for taking out and renewing the professional design liability insurance against the losses (including costs) incurred by the design defects. The minimum underwriting limit is not less than USD five million (US\$5,000,000) for each claim. Upon the written approval by the Owner Entity, the Design Unit shall take out the professional design liability insurance with the reputable insurance company or insurer who possesses relevant insurance certificates and shall not set uncommon limitations and exclusive conditions. In the event that the completion time of the project engineering construction is later than one year after the Underwriting Period not due to the Design Unit, the Owner Entity and Design Unit will discuss the best method for taking out insurance against damages payable by the Design Unit to the Owner Entity during the delay period for the Project. And the Design Unit shall execute in earnest suitable replacement and/or supplementary compensation measures.
- 11.3 The Design Unit is liable for making modifications or supplements to omissions or errors arising from the Design Documents. As for the losses arising from Project quality accidents on account of the design errors by the Design Unit, apart from being liable for taking remedies, the Design Unit shall not get Design charges for the damaged part and indemnify the Owner Entity against the latter's direct losses as per the degree of losses. The maximum indemnification is the total amount of the professional design liability insurance taken out by the Design Unit plus the Services Fees (RMB 39 million) under the Contract. In addition, the Design Unit shall undertake other responsibilities arising from the stipulations specified by relevant laws.
- 11.4 As regards the losses and rework arising from the delay in the Project period which is incurred by the design omission, error or defect or the failure to deliver the Design Documents by the Design Unit, the Design Unit shall indemnify the Owner Entity against direct losses as a result of such breach of contract. The maximum indemnification is the total amount of the professional design liability insurance taken out by the Design Unit plus the Services Fees (RMB 39 million) under the Contract. Moreover, the contract price applicable to related part of the design shall be properly diminished so as to reflect the devaluation of the Services related to such part of the design. While the Design Unit assumes the indemnification responsibility in accordance with this Clause, it shall continue improving the design as agreed by the Contract.
- 11.5 If necessary, the Design Unit shall provide the design insurance certificate that is satisfactory to the Owner Entity, effective pursuant to this Clause and falls within the valid period.

12. Drawings and Documents

- 12.1 The Design Unit shall print 10 sets of Design Documents both in Chinese and English which are free of charge and submit them to Owner Entity.
- 12.2 In relation to any Design Documents prepared by the Design Unit:
- 12.2.1 The languages shall be Chinese and English;
- 12.2.2 The measurement unit shall be in metric;
- 12.2.3 Delivery by express courier to the Owner Entity's Representative or personnel who are designated in writing by the Owner Entity;



- 12.2.4 Electronic formats shall be delivered in a CD; and
- 12.2.5 The cost of any necessary correction or amendment due to the Design Unit's default shall be borne by the Design Unit.

13. Remuneration and Payment for the Design Unit

- 13.1 In consideration of the Design Unit providing Services for the Project, the Owner Entity shall pay the Design Unit the remuneration, including the Service charges within the scope of services rendered by the Design Unit and Additional Service charges arising from the extra design scope requested in writing by the Owner Entity. See this Clause 7.3 for the confirmation of Additional Service charges.
- 13.2 Within 14 business days as of the execution of the Contract, the Design Unit shall provide the Owner Entity with a performance bond acceptable to the Owner Entity which amounts to 10% of the total Service charges within the service scope of the Contract. The format of the performance bond will be provided by the Owner Entity.
- 13.3 The Service charges within the service scope payable to the Design Unit is RMB 39 million. Payment of Service charges shall be made in US\$ into the Design Unit's account in PRC by T/T. The exchange rate shall adopt the central parity rate of RMB against the US dollar publicized by People's Bank of China on the day when the Design Unit issues the invoice.

Such Service charges are total valuable considerations under the Contract, including but not limited to:

- 1) Charges for technical work at earlier stages and management ;
- 2) Charges for Project design service and field service; and
- 3) Other expenses with the prior written consent by the Owner Entity.

Both parties further confirm that other than such Service charges, the Owner Entity shall not make any other payment to the Design Unit.

- 13.4 During the performance of the Contract, Additional Service charges arising from the changes of the design scope or Services requested by the Owner Entity and their term of payment shall be mutually addressed as per Clause 7.3 herein.

14. Tax

- 14.1 The Design Unit shall give all notices, and shall be responsible for all taxes, duties, levies, rates, charges and fees payable under the laws (including the laws of PRC and ROC) or which in relation to Services under the Contract are levied by the relevant competent tax authorities (including relevant authorities in PRC and ROC). If the taxes are paid on account or for the Design Unit by the Owner Entity, they will be deducted from actual Service charges. It shall be further defined that the Design Unit will at its expenses assume the fines or losses on account of its violation of local laws and regulations executed in ROC.

15 Schedule of Payment to the Design Unit

- 15.1 The Service charges shall be paid by the Owner Entity to the Design Unit in accordance with the schedule of payment set out in Appendix II. Any payments under the Contract shall not be regarded as the evaluation of each basic Service but shall rank solely as payments on account towards total Service charges ultimately payable under the Contract.
- 15.2 For the remaining Stage Payments, the Design Unit shall submit invoices for the proportion of the Service charges payable of that Stage. The Owner Entity shall consider and verify the Design Unit's entitlement to such payment under the invoice. If the invoice is not disputed by the Owner Entity, payment shall be released to the Design Unit within fifteen (15) business days upon receipt of the invoice. If the invoice is disputed or rejected by the Owner Entity, notice of the same shall be made to the Design Unit within 10 business days of receipt of the invoice. The Design Unit shall consider the Owner Entity's reasons for the dispute or rejection and submit a revised invoice to the Owner for approval, as soon as practicable.
- 15.3 If in the opinion of the Owner Entity, the Design Unit is in breach of this Contract, the Owner Entity shall be entitled to withhold any payment or part thereof that may be due or payable to the Design Unit, without prejudice to any right or remedy accrued to the Owner Entity and to the continuance of the appointment of the Design Unit under this Contract.

16. POSTPONEMENT OF THE PROJECT

- 16.1 The Owner Entity shall be entitled to postpone the Project in whole or in part at any time. The Owner Entity shall notify the Design Unit in writing of the postponement of the Project at least fourteen (14) days prior to the date of such postponement.
- 16.2 In the event the Project is postponed in whole or in part during any Stage, the Design Unit is entitled to be paid for the Services performed up to receipt of written notice from the Owner Entity of such postponement in accordance with the Contract. The Owner Entity shall make the payment in accordance with Clause 15 herein.
- 16.3 Provided that the accumulative working time of the permanent staff who are officially dispatched by the Design Unit to the Project Site exceeds 3.5 years by reason of the Owner Entity, both parties will otherwise negotiate over the fees arising from the Site Services in excess of 3.5 years rendered by such Site staff. If the working time of the permanent workers who are officially dispatched by the Design Unit to the Project site is less than 3 years, the Design Unit shall return the Site Service charges corresponding to the reduced time.
- 16.4 Upon the postponement of the Project or any part thereof, the appointment of the Design Unit shall be deemed to be suspended for the Project or any part thereof as the case may be. And the Design Unit shall have no further claim against the Owner Entity save for the payment of Service charges in accordance with Clause 16.2 herein.

17. TERMINATION

- 17.1 Termination without default



- 17.1.1 The Owner Entity may terminate the appointment of the Design Unit at any time and with any proper reason or ground whatsoever upon giving a thirty (30) day written notice to the Design Unit without prejudice to the Owner Entity's rights or remedies against the Design Unit.
- 17.1.2 Upon receipt of the aforesaid thirty (30) day written notice, the Design Unit shall not commence any new item of work unless expressly directed in writing by the Owner Entity but shall devote itself to completing as far as reasonably possible all items of work which had already been commenced as of the date of receipt of such notice. No expenses, fees or costs other than those which are necessary for the completion of such items of work which had already been commenced as of the date of receipt of such notice shall be incurred without the Owner Entity's written consent.

17.2 Termination for Insolvency

The Owner Entity may forthwith terminate the appointment of the Design Unit if any of the following events occur:

- 17.2.1 The Design Unit becomes insolvent or bankrupt or makes a composition with its creditors;
- 17.2.2 Any major lawsuit against the Design Unit occurs;
- 17.2.3 Any receiver or manager is howsoever appointed over the Design Unit (insolvent company);
- 17.2.4 Any execution is levied against the Design Unit and/or its property; or
- 17.2.5 If any act is done or event occurs (under any applicable laws) has a similar effect to any of the above-mentioned.

17.3 Termination for default of the Design Unit

If the Design Unit defaults in performing any material obligation under this Contract, or disregards or violates the Relevant Requirements, the Owner Entity may give written notice to Design Unit to terminate the appointment of the Design Unit under this Contract (which notice shall state the nature of the default).

If the Design Unit should fail to cure the default within fourteen (14) days after the receipt of the notice, the appointment of the Design Unit under this Contract shall forthwith be terminated upon the expiry of the aforesaid fourteen (14) day period, without prejudice to the Owner Entity's rights or remedies against the Design Unit.

18 CONSEQUENCES OF TERMINATION

- 18.1 In the event the appointment of the Design Unit is terminated pursuant to Clause 17 of this Contract, the Design Unit shall forward all its prepared design results to the Owner Entity, then the Design Unit shall be paid for all Services completed as up to and including the date of termination as follows:
- 18.1.1 For a completed Stage with acceptance by the Owner Entity - full Stage Payment entitlement in accordance with Appendix II hereto;
- 18.1.2 For a partially completed Stage with acceptance by the Owner Entity- the Stage Payment entitlement in accordance with Appendix II hereto calculated on a pro-rata basis.

Ph

Se

- 18.1.3 If the payment for Services reimbursed from the Design Unit that have already paid to the Design Unit by the Owner Entity excess the payment for Services that the Design Unit should obtain, the Design Unit shall reimburse the excess payment for Services.
- 18.1.4 Any other accompanied reasonable direct costs with the prior written approval of the Owner Entity that are arising from the termination and with supporting documents.
- 18.1.5 If the design unit doesn't start the design work, the deposit paid by the Owner Entity will not be refundable; if the design work is terminated as a result of the default of the Design Unit, the Design Unit shall refund the deposit paid by the Owner Entity.
- 18.2 Save as aforesaid, the Design Unit shall have no further claim whatsoever, including but not limited to any claim for fees, disbursements, expenses, charges, compensation, loss (including loss of profits) or damage against the Owner Entity upon the termination of the appointment of the Design Unit under this Contract.
- 18.3 Termination of the Contract shall not prejudice or affect the accrued rights or claims and liabilities of the Parties.
- 18.2 Upon the termination of the appointment of the Design Unit under this Contract or upon receipt of notice of termination and confirming that payment for Services are obtained pursuant to Clauses 17.1 and 17.2 herein, the Design Unit shall forthwith deliver to the Owner Entity all original or certified true copies of Design Documents prepared by the Design Unit for the Project and which are required by the Owner Entity for the Completion of the Project notwithstanding any dispute whatsoever between the Owner Entity and the Design Unit arising out of or in connection with this Contract.
- 18.3 If the Owner Entity suffers losses arising from the Design Unit prior to the official termination of the employment relationship, apart from being liable for taking remedies, the Design Unit shall not get the Design charges for the damaged part and indemnify the Owner Entity against the latter's direct losses as per the degree of losses. The maximum indemnification is the total amount of the professional design liability insurance taken out by the Design Unit plus the Services Fees (RMB 39 million) under the Contract. In addition, the Design Unit shall undertake other responsibilities arising from the stipulations specified by relevant laws.

19 OWNERSHIP OF COPYRIGHT

- 19.1 The copyright in all Design Documents developed by the Design Unit in connection with the Project shall remain vested in the Design Unit. The Design Unit undertakes to the Owner Entity that any or all of the copyright subsisting in all the aforementioned documents owned by the Design Unit shall not be used in any other projects or for any other purpose without the prior written approval of the Owner Entity.
- 19.2 The Design Unit hereby, free of any charges, grants to the Owner Entity, a royalty free, exclusive and irrevocable license to use, reproduce, adapt, amend and/or modify (on its own or through any other Design Unit which the Owner may employ) any of the Design Documents for any purpose in connection with the

139

20

Project, including construction, completion, maintenance, letting, selling, promotion, advertisement, marketing, publicity, reporting and/ or disclosure by the Owner Entity or its shareholders and reinstatement, repair or extension of the Project, and generally, in respect of any other dealings of or concerning the Project or any part thereof.

19.3 The Design Unit hereby warrants that it is the sole and unencumbered owner of the Design Documents and that none of the same or the use thereof as contemplated under this Contract infringes the copyright or other intellectual property rights of any third party. The Design Unit shall protect the Owner Entity and keep the Owner Entity harmless from and against any liabilities, damages, losses, costs, expenses, proceedings, suits or other consequences arising from any allegation or claim that a third party's intellectual property or other rights has been infringed by the Design Documents and/or any other part or use thereof pursuant to this Contract. The specific implementation measures are in accordance with Clauses 8.7 of this Contract.

19.4 The copyright and intellectual property of the documents provided by the Owner Entity shall remain vested in the Owner Entity. During the valid term of this Contract, the Design Unit has the right to copy, use and transfer such documents internally (including their modifications and using modified files) at its own cost only for the purpose of the engineering design. The Design Unit shall not use the above mentioned documents for purposes other than the engineering design. Without the consent of the Owner Entity, the Design Unit shall not disclose them to the third party that is non-related to the engineering design. Upon termination of the Contract, the Design Unit should return the above-mentioned documents.

20 NON-DISCLOSURE/CONFLICT OF INTERESTS/CORRUPTION AND FRAUD

20.1 The Design Unit shall not divulge during or after the termination or completion of its appointment and shall treat as confidential any material or document or information obtained from the Owner Entity or relating to the Project without the written approval of the Owner Entity. Such confidentiality shall continue notwithstanding any material or document relating to the Project is released into the public domain.

20.2 The Design Unit hereby declares that at the time of entering into this Contract, there is no conflict of interest on the part of the Design Unit arising from accepting this appointment and/or providing the Services set out in this Contract.

20.3 The Design Unit further undertakes to declare to the Owner Entity, after appointment, any possible conflict of interest arising from providing the Services as set out in this Contract.

20.4 The Design Unit (or Design Unit personnel) shall not accept any bribery from any Units or personnel relevant to this Contract during implementation of this Contract, whether in written commitment or verbal hint, upon verification, the Owner Entity is entitled to fine twice the amount of bribes from the Design Unit and refuse the concerned personnel involving in this Project again.

21 ASSIGNMENT & SUBCONTRACTING

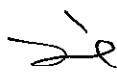
21.1 The Owner Entity shall not be entitled to assign or otherwise transfer this Contract and/or any of his rights under this Contract (whether or not accrued) to any company or related company of the Group after giving written notice to the Design Unit.



- 21.2 The Design Unit shall not sub-contract all of the Services. It shall not subcontract part of the Services to the Sub-Design Unit unless obtaining the prior written consent of the Owner Entity.
- 21.3 The Design Unit shall undertake to be fully responsible and liable for the performance of its Sub-Design Unit, agents or employees as fully as if they were the acts or defaults of the Design Unit. The Design Unit shall replace the original Sub-Design Unit with a new Sub-Design Unit as soon as practicable if the Owner Entity so directs in writing on grounds that the Sub-Design Unit is or is unlikely to be able to perform the Services in compliance to the Contract.
- 21.4 The appointment of any Sub-Design Unit shall not legally vary, release or discharge the Design Unit from any of his duties and obligations under this Contractor. The parties confirm that the Owner Entity does not need to pay any payment for Services to the Sub-Design Unit, subcontractor or the other third party.

22 NOTICE AND REQUEST

- 22.1 Notices under this Contract shall be in writing and shall be delivered:
- (a) by hand,
 - (b) by facsimile message against a written confirmation of receipt or
 - (c) by registered letter, to the addresses or numbers set out below.
- 22.2 Such notices shall be deemed to be received :
- (a) at the time of delivery if delivered by hand,
 - (b) at the time of receipt if sent by fax, or
 - (c) within two (2) business days after the date of mailing if sent by registered mail.
- 22.3 Email transmission may be used for informal and day to day communications but shall not be valid for formal notices sent by email or notices required under this Contract. Where emails are used, they shall be deemed to be effective when the recipient has by return email or otherwise in writing communicated acknowledgement of receipt of the email.
- 22.4 Communication mode of representatives from both parties:
- | | |
|---------------------------------------|-------------------------|
| Ms. Kong Ying | Mr. Cen Deqian. |
| 604, C, Global Finance & News Centre, | 303Wuning Road Shanghai |
| A1, Xuanwumenwai Street, Xicheng | |
| District, Beijing | |
| 100052 | 200063 |
| P.R. of China | P.R.of China |
| ky@eghg.com | cendeqian@163.com |
| Tel: +86(10)59336599-6202 | Tel: +86(21)62549700 |



Fax: +86(10)59336590

Fax: +86(21)62573715

(The Owner Entity)

(The Design Unit)

23 MISCELLANEOUS

- 23.1 This Contract is signed by the Owner Entity and the Design Unit. It takes effect after signed and sealed by the Design Unit.
- 23.2 This Contract is written in Chinese and English languages. If there is any inconsistency between the two versions, the Chinese version shall prevail.
- 23.3 This Contract is made out in ten copies each in Chinese and English, and each Party shall hold five copies for each version.
- 23.4 Non Waiver
- No waiver by either Party of any breach or default hereunder of the other Party or the giving of time for performance shall be deemed to be a waiver of any subsequent breach or default.
- 23.5 Entire Contract
- This Contract and its Appendix constitute the entire contract between the Parties in relation to its subject matter and supersedes all previous contracts, arrangements and memorandum of understanding relating to the subject matter of this Contract.
- 23.6 Alteration of Contract
- Any party may propose application for alteration of this Contract, it may be changed with mutual written consent.

24 ARBITRATION

- 24.1 The Parties shall seek to resolve in good faith any dispute or difference arising between them in respect of any matter connected with this Contract. If the Parties cannot resolve any such dispute or difference within 45 days, or such a period as the Parties may subsequently agree, such matters shall immediately be referred to arbitration in accordance with this Clause.
- 24.2 Any disputes or differences arising out of or in connection with this Contract, including any question regarding its existence, validity or termination, shall be referred to and finally resolved by arbitration in Hong Kong Special Administrative Region before Hong Kong International Arbitration Centre in accordance with the Arbitration Rules of the Hong Kong International Arbitration Centre ("HKIAC Rules") for the time being in force which rules are deemed to be incorporated by reference into this Clause.
- 24.3 The seat or legal place of the arbitration is Hong Kong. The number of arbitrators is three. The Owner Entity and the Design Unit each appoints an arbitrator, the third arbitrator is specified in accordance with the "HKIAC Rules" for the time being in force. The arbitration proceedings are conducted in Chinese. The Arbitration Award made by the above Arbitration Institution in accordance with the above Arbitration Rules is final and binding on both parties. The arbitration fees are conducted in accordance with the

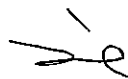
Vg

Se

Arbitration Award. Within the maximum feasible range, in addition to matters of dispute, the Parties shall continue to fulfill the responsibilities and obligations under the Contract.

25 GOVERNING LAW

25.1 This Contract shall be governed by the laws of Hong Kong Special Administrative Region



APPENDIX I: Scope of Services to Be Provided by the Design Unit

1. Scope of services to be provided by the Design Unit

1.1 Preliminary technical work

The Owner Entity entrusts the Design unit to carry out the bidding work for the earlier stage technique work of the Project, including the engineering position natural conditions and the waters geological survey, and collecting the basic technical data through the selected successful unit to provide the basis for the engineering design.

The engineering basic technical data includes but is not limited to the following:

- (1) Local meteorological data, the heavy rain's annual average number of days with rainfall of $\geq 25\text{mm}$ and the continued days during the rainy season, the annual average number of days with fog horizontal visibility of $<1\text{km}$;
- (2) The wind conditions in the meteorological data: during observations take statistics for the maximum wind speed (m/s) and wind direction, the maximum wind speed for each direction (16 azimuth) and its frequency of occurrences, the average wind speed for each direction (16 azimuth) and its frequency of occurrence, the number of days and date of occurrence of the wind of higher than Beaufort-scale 6 (including Beaufort-scale 6). Calculate the average maximum wind speed in 10 minutes that is 10m from the ground during the reconstruction period of 50 years based on the weather station data provided by the Owner Entity.
- (3) Tide level eigenvalue, such as the highest water level over the years, mean high water level over the years, average water level, mean low water level over the years, the lowest water level over the years, design high and low water level, the extreme high and low water level (which happens every 50 years), tidal range, average high and low tidal level, average high of the spring tide, low tidal level, local lowest astronomical tidal level, different tide rising period (1-6 hours), different tide rising guaranteed rate (60 % to 95% , rising in accordance with one grade of 5 %) , tide rising tidal level and other information, analysis of abnormal sea-level in the storm tide.
- (4) Data such as statistics wave elements obtained based on the measured data and calculation. The wave elements during the different return periods (2 years, 5 years, 10 years, 20 years, 25 years, 50 years and 100 years) with the different wave direction and different cumulative frequency (average wave height, $H1/3$, $H4$, $H1\%$). In addition to the position of the water depth for the front edge, the possible wave statistics eigenvalue at the water break and at the bridge approach is also included for the wave elements.
- (5) Water flow data: including the ebb and flow's average velocity, flow direction, the maximum flow rate, the stratified flow rate, the occurrence frequency of the flow rate, tidal flow, tidal velocity and other data, and carry out analytical calculation of the two-dimensional flow field before and after the engineering construction;
- (6) Sediment: sediment concentration space, time changes, relation with the flow rate, the analysis and discussion of the far period, recent period and historical evolution of the sea bed in the engineering area.

The analysis of sediment erosion and deposition before and after engineering construction.

- (7) The survey analysis of coast estuary runoff and the sediment into sea.
- (8) The underwater terrain Figure of this engineering position to meet the design requirements of this Contract
- (9) To collect the operation standard for 50,000-ton open-bulk terminal, and analyze the working days of the pier at the engineering position.
- (10) The calculation basis and process shall be included in the report;
- (11) Engineering geological investigation (water area)

1.2 Project design scope

Projects of building 50,000t-level jetty of shipment, trestle, and bulk material storage for 150,000t potash fertilizer.

See details of the program components in the following table:

General drawing	Project name	Floor area	Building area	Remarks
	Facilities of hydraulic works			
101	50,000t-level jetty for potash			25mx290m
102	Trestle			Length:2000m
103	Water break			Length:460m
104	BC1 transport corridor			Length:2,330m
105	BC2 transport corridor			Length:334m
106	Belt machine tension device station	56		8mx7m
107	Terminal transfer station	104		8mx13m
108	Terminal service building	335	691	
	Facilities for land area			
201	1# Transfer station	240		10mx24m
202	2# Transfer station	84		12mx7m
203	Bulk material storage	23328	23328	243mx96m
204	Storage and transportation substation	203	203	27mx7.5m
205	Duty room	20	20	

- 1.2.1 Changsha Institute has two interfaces for the product traveling belt with Design Unit, namely the product belt and transfer station interface, and product belt and bulk material storage interface. The transfer station is designed by the Changsha Institute, while the Design Unit provides interface conditions for it.

- 1.2.2 The power supply is connected from the main sub-station of a compaction plant designed as the boundary for the feeder cables, and the Design Unit provides electrical load, utilization voltage, capacitance and such relevant conditions.
- 1.2.3 The feed piping is split from the border of the compaction plant. And the Design Unit provides water consumption, water gage, water quality and such relevant conditions to the Changsha Institute.
- 1.2.4 DCS system provided by the Design Unit should be designed according to the requirements of the Changsha Institute. The Design Unit is in charge of designing the terminal automatic system in accordance with the requirements for DCS configuration interface provided by Changsha Institute (DCS configuration for the master-control room is excluded) . The Design Unit is in charge of the primary instrument of the automatic control system within its design scope.
- 1.2.5 The Design Unit shall assist Changsha Institute to determine the elevation of vertical design in port land area, the minimum distance for the constructions of the compaction plant to water front and requirements for the locations and distance of the pipelines leading to the sea and the jetty.
- 1.2.6 The Design Unit provides the quota of staff and the production operation system, which will help the Changsha Institute consider facilities, such as the office, accommodation, and canteen for the staff on the jetty.
- 1.2.7 The environmental protection, security and sanitary fitting within the scope of engineering design are designed by the Design Unit; if articles with special description are needed, Changsha Institute will provide a summary of them.
- 1.2.8 The preparation depth of the engineering design documents for stages

The Design Unit draws up documents about the preliminary design and detail (construction drawing) design according to requirements of the applicable law, the document *Construction Quality* [2008] No.216 writes: Notice about issuing *the preparation depth provisions of the design document for the construction engineering* (2008 version), issued by the Ministry of Construction of the People's Republic of China, and document *the preparation provisions of preliminary design documents for the port engineering* issued by the Ministry of Communications of the People's Republic of China.

Description to the details of various expertise for Preliminary design & Detail design

2 Preliminary design

2.1 General requirements

2.1.1 Preliminary design documents

- 1) Design instruction, including the general design description, the design descriptions for all disciplines
- 2) Design drawings of relevant disciplines
- 3) Project estimate

Note: The preliminary design documents should contain main equipment or material lists, which may be attached in the instruction or in the design drawings, or taken as a individual manual.

2.1.2 Preparation sequence of the preliminary design documents

- 1) Cover: be marked with the names of project and preparation unit, and the date of preparation
- 2) . Title page: be marked with legal person, chief principals of process and project, names of all discipline chiefs of the preparation unit, which should be signed or sealed by the personnel above-mentioned
- 3) Contents of design documents
- 4) Design instruction
- 5) Design drawings (individual manual allowed)
- 6) Book of estimates(individual manual allowed)

Note: 1) Design instruction and design drawings may be taken as an individual manual by disciplines as a project with large scale and large documents.

- 2) As the design drawings taken as an individual manual should be bound with a cover and the contents.
- 3) The names and signatures of discipline chiefs may be marked on the first page of the design instruction of the respective discipline.

2.2 General design description

2.2.1 Primary basis of the engineering design

- 1) State policies, laws and regulations implemented in the design
- 2) File numbers or names of the official documents, feasibility study report, project approval book, scheme files etc. that have been approved by the government authorities
- 3) Meteorology, geology and geo-technical conditions of the construction site where the project is implemented
- 4) Utilities and transportation conditions
- 5) Requirements and materials followed for the aspects of planning, land use, environment protection, health, green belt, fire control, civil air defence, and seismic resistance, etc.
- 6) Materials on use requirements and production process etc. provided by the construction unit

2.2.2 Scale and design scope of the project

- 1) Engineering scale and project composition
- 2) Information of the construction by phases (with recent and long-dated engineering)
- 3) Scope and division of the design undertaken

2.2.3 Guideline and features of the design

- 1) Information on new technology, materials, equipment and structures employed
- 2) Major design principles for environment, fire safety, transportation, land allotment, energy saving, security, arrangement of civil air defense, and seismic resistance etc.
- 3) General description for overall layout and selection criteria according to the functional requirements of the use

2.2.4 Overall index

- 1) indexes of total land area used, total building area etc.
- 2) Other related technological and economic indexes

2.2.5 Main issues to be solved or determined at the submission for design approval

- 1) Coordination for city planning, red line setting, residential removal, and the energy supply such as water, electricity, steam, fuel
- 2) Issues on total building area, general estimates(investment)
- 3) Issues on standard selection for design
- 4) Factors that affect the design progression and the design documents approval, such as primary basis materials for design, settlement of the construction conditions

2.2.6 Details that have been described in the general description may be omitted in the discipline description.

2.3 General layout

2.3.1 In the preliminary design stage, design documents of the general layout discipline should include design instruction, design drawings, aerial views or models arranged in the contract.

2.3.2 Design instruction

A Design basis and primary materials

- 1) Main parts related with the respective specialty in the design basis of the summary scheme and the approval comments.
- 2) Technical conditions (red lines of road and building, land demarcation, limit height of building, plot ratio, building density, greening rate, berth number for cars etc.) of planning permission, as well as the special requirements for the overall layout, surroundings, space arrangement, traffic control, environment protection, preservation of cultural relics, multiphase construction and so on that are approved by the authorities for this project
- 3) Coordinates and elevation system adopted in the topographical map of this project
- 4) Parts that have been described in the design general description can be omitted.

B Site summary

- 1) Regional name of the site and location of the site in the city(brief of the surrounding natural and cultural environment, infrastructure of roads and municipal administration, public service supporting and supply, important original and planning buildings and structures around)
- 2) Summary of the site topography and relief (hill, location, flow direction, depth of water area, max. and min. elevation, overall aspect, max. gradient and general gradient)
- 3) Description of the original buildings and structures and their reservation (including famous trees, historic sites etc.) and dismantling in the site
- 4) Description of the natural elements related with general layout design such as earthquake, land crevice of collapsibility and swell-shrink, karsts, landslide and other geological disasters.

C General layout

- 1) Description of the measures to local conditions based on topography, geology, sunlight, ventilation, fire control, health, transportation and environment protection for the arrangement of the buildings and structures on the purpose of use functions, city planning and technical and economic rationality
- 2) Description of the principle of function division, the intention of the combination of long term and short term, and the consideration of land use for development.
- 3) Description of the arrangement of the outdoor space and its relation with the surroundings.
- 4) Description of the landscape design and green belt arrangement

D Vertical design

- 1) Description of the grounds for vertical design (e.g. elevation, topography, drainage, flood stage, earthwork equilibrium for the urban roads and pipelines)
- 2) Description of the vertical layout pattern (level or step style), drainage type of the ground surface rainwater (open ditch or hidden conduit), etc.; if open ditches are employed, additional information on the terrain, elevation and so on of the drainage spot are needed
- 3) Marking of the earthwork volume for the initial leveling depending on the requirement

E Transportation control

- 1) Description of the control of pedestrian and vehicle flows, arrangement of entries, exits and parking lot or garage, and the determination of the parking lot number
- 2) Arrangement of fire engine lane and firefighting site for high-rising buildings
- 3) Description of the main technical conditions of the road design (e.g. width and type, max. and min. longitudinal gradients for the primary and secondary trunk roads)

F List of major technical and economic indexes (Table 2.3.2)**Table 2.3.2 Major technical and Economic Indexes for Civil Buildings**

No.	Name	Unit	Quantity	Remarks
1	Total land area used	hm ²		
2	Total construction area	m ²		Parts above or underground separable
3	Total area of the building base			
4	Total area of the road			Including the area of parking lot and berth number
5	Total green belt area	hm ²		Additional marking allowable for public greening
6	Plot ratio		(2) / (1)	
7	Building density	%	(3) / (1)	
8	Green belt rate	%	(5) / (1)	

9	Berth number for cars	pc		Listed separately by indoors and outdoors
10	Number for bicycle parking lot	pc		

Note: 1. If there is a respective planning design specification for the project (e.g. in urban residential area), the contents of the technical and economic indexes should be executed by the specification.

2. Generally, the underground building area below ± 0.00 is not considered for a calculation for the plot ratio.

3. Major issues to be settled or determined at the submission for design approval. For the particular issues to be settled on indexes and standards related with the general layout, description and handling resolutions for them should be done.

2.3.3 Design drawings

A. Area location (drawn by demand)

B. General layout

1) Reserved terrain and ground objects;

2) Coordinate net and values for measuring, measuring coordinates (or location dimensions) for the site scope, red lines for roads or buildings, or land demarcation;

3) Locations (main coordinates or location dimensions) of original and planning roads, and the locations, names, stories and building intervals of the main buildings or structures around the site;

4) Locations of the buildings, structures (civil air defense, underground garage, oil depot, reservoir etc. indicated by dotted lines), and additional coordinates (location dimensions), names (or serial numbers) and stories should be marked for the main buildings or structures;

5) Principal coordinates (or location dimensions) of the roads and squares, arrangement of the parking lots and spaces, fire engine lanes and the fire control sites of the high-rise buildings, additional drawings for schematic map of traffic flow routes if necessary;

6) Arrangement schematics for green belt, landscape and recreational facilities;

7) Compass or wind rose drawing;

8) List of major technical and economic indexes (Table 2.3.2), which may also be used in the design description;

9) Notes in the explanation column: dimension unit, ratio, mapping unit and date of the topographical map, names of the coordinate system and elevation system (e.g. for a coordinate net of site building, conversion description added for this net and the measuring one), supplementary legends and other essential notes.

C Vertical arrangement drawing

1) Measuring coordinates (or dimensions) of the site scope;

2) Roads, grounds, and waters around the site and their critical elevations;

3) Reserved terrain and ground objects;

- 4) Names (or serial numbers) of buildings, structures and indoor and outdoor design elevations of the main buildings and structures;
- 5) Design elevations of the major roads, starting points, grade change points, turning points and final points of the squares, and the limit elevations of the yards;
- 6) The ground aspects, and the slope protections, retaining wall etc. expressed by arrows or contour lines;
- 7) Compass;
- 8) Marking: dimension unit, ratio, and supplementary legend;
- 9) The drawing may be combined with the general layout depending on the actual project;
- 10) Earthwork drawing and earthwork calculation of the preliminary leveling according to the vertical arrangement drawing if needed.

2.4 Building

2.4.1 The design documents of architecture specialty for the preliminary design stage should include design instruction and design drawings.

2.4.2 Design instruction

A Design basis and design requirements

- 1) Abstract of contents related with building in design specification and other basis materials;
- 2) Expression of the building category and fire resistance grade, seismic fortification intensity, civil air defense grade, and the applicable specifications and technical standards;
- 3) Summary of the requirements of the building energy efficiency and building intellectualization and so on.

B Specification

- 1) Generalization of the functions and technological requirements of the building, stories, story height and overall height of the building, structure selection, cause and content for the adjustment of the design scheme;
- 2) Summary of the building function division, plan layout and composition of the building, as well as the building elevation form, and the relation of the architectural complex with the surroundings;
- 3) Summary of the traffic control, layout of the vertical transportation means (stairs, elevator, escalator), and parameters such as function, quantity, tonnage, velocity for the elevator or escalator used;
- 4) Summary of building category, fire resistance grade, division of the fire and smoke controls, safety evacuation, and designs of the barrier free, energy saving, intellectualization, civil air defense etc. and the special technical measures taken for them;
- 5) Major technical and economic indexes, including total building area reflecting the building scale, dwelling size and number of houses, rooms and beds of the hotel, outpatients of the hospital, and beds of the inpatient department, parking spaces of the garage etc.

C Simple subprojects in a project with many ones may be summarized with Table of Major Features of the Construction Project (Table 2.4.2).

D For a project to be constructed by phases, a description on the content of the phases, conception and relevant measures of the continuation and extension of the construction should be made.

Table 2.4.2 Table of Major Features of the Construction Project

Project name	Remarks
No.	
Building category	
Fire resistance grade	
Seismic fortification intensity	
Protection grade of civil air defense	
Major structures selection	
Stories and total height of building	Shown separately by ground above and under
Area of the building base	
Total construction area	
Structure and decoration of the building	Wall
Structure and decoration of the building	Wall
Ground surface	
Floor	
Roofing	
Dormant window	
Doors	
Windows	
Ceiling	
Internal wall surface	
Outer wall surface	

Note: Build structures and decoration items are flexible depending on the engineering.

F Essential notes for works such like curtain wall, special roofing and contents which need additional design and manufacture entrustment

E Issues to be solved, determined or explained at submission for approval.

G Necessary brief illustrations for calculations.

2.4.3 Design drawings

A Plan

- 1) Marking of axis, axis number, position dimensions and overall dimensions of the bearing structures;
- 2) Drawing of the primary structures and building components such as nonbearing wall, pilaster, doors and windows (curtain wall), dormant window, stairs, elevator, escalator, atrium(and above), interlayer, platform, veranda, awning, footstep, rampway, open ditch, and the marking of the positioning for the curtain wall to the main structures if envelop closure is curtain wall;
- 3) Location of the major building equipment: pools or sanitary wares etc. related with equipment specialty;
- 4) Marking of the fire control divisions of the building plan or space, as well as their locations and areas till a single drawing;
- 5) Marking of the design elevations of the indoor and outdoor ground, and the floor elevations of the building stories above and under the ground;
- 6) Marking of the compass (on bottom plane);
- 7) Marking of the section lines and serial numbers;
- 8) Drawing of indoor arrangement, e.g. for furniture, of the hall or room that has a special requirement, or alternative drawing of a magnified plan and indoor arrangement of a standard story, a standard unit or a standard room;
- 9) List of technological and economic indexes for the calculation by the design specification of a variety of buildings (or listed in a description);
- 10) Marking of the name and ratio of the drawing.

B Elevation

Major elevations should be drawn with the marking of:

- 1) Axis and numbers of both ends;
- 2) Visible parts such as door and window (curtain wall), awning, cornice (parapet), roof, platform, balustrade, rampway, footstep and primary surbases of outer contour, major structures and building components of the elevation;
- 3) Elevations or heights of the roof, roof towering, cornice (parapet), outdoor ground etc. that is unavailable in the plans and sections;
- 4) Name and ratio of the drawing

C Section

Sectioning should be done at a location which has different story heights or story numbers and complex internal and external spaces (e.g. portion of atrium to a adjacent or staggered floor), section should accurately and clearly indicate the relevant parts sectioned or visible with the expression of:

- 1) Axes and axis numbers of the major internal and external bearing walls, pillars;

- 2) Major structures and building construction components such as ground, floor, roof, cornice parapet, suspended ceiling, beam, column, inside and outside door and window, dormant window, stairs, elevator, platform, awning, veranda, trench, pit, footstep, rampway;
- 3) Floor and outdoor elevations of stories, and the total height from the outdoor ground to building cornice or parapet, dimensions between stories and other dimensions necessary;
- 4) Name and ratio of drawing.

D For an original building adjacent, plans, elevations and sections for its local parts should be drawn.

2.5 Structure

2.5.1 In the preliminary design stage, a design instruction shall be included in structure design documents, and structural layout should be provided if necessary.

2.5.2 Design instruction

1 Design basis

- 1) Main standards, laws and regulations employed for this structure design of the project;
- 2) Related reports on engineering geological investigation and its main content, including:
Basic seismic intensity, construction site category, judgment of foundation liquefaction in the project area; summary of engineering geology and hydrogeology, frost heaving and thaw collapsibility of the foundation earth which are separately described with a focus on special geologic settings of the site; and a survey or a supplementary one should be clearly proposed if no survey reports are available or the current survey reports can't meet the design requirements;
- 3) Design loads include wind load, snow load, service load in buildings or houses, and other special loads;
- 4) Written requests for the design on structural standards and laws suggested by the construction party;
- 5) Scheme design documents approved.

2 Design descriptions

- 1) Safety grade of the building structures, design service life, seismic fortification intensity and category of the buildings;
- 2) Design level, processing scheme, form, and base burial depth and bearing stratum name of the foundation; description of pile type, bearing layer of pile end, and depth into bearing stratum if pile foundation adopted;
- 3) Selection of upper structure
- 4) Setting of expansion joint, settlement joint and seismic joint;
- 5) Structure making and waterproof level of basement, description of resistance grade of the civil air defence if there are related basements in it;
- 6) Structure treatment for special usage;
- 7) Selection of materials for major structural components;

- 8) Major structural feature parameters of the high-rise building and large public buildings, and programs and models used for the computation;
- 9) Employment of new technologies, new structures, and new materials;
- 10) Standard collective drawings used;
- 11) Special requirements of the construction;
- 12) Other details needed to be described.

3 Major issues to be solved or determined at the submission for design approval.

2.5.3 Design drawings (for a complex project)

1 Positioning dimensions, sectional dimensions of the major components should be marked in the plane structure layouts of the standard story, special story and structural transfer story; foundation plan sketch can be provided if possible.

2 Structural sketch of a special part

2.5.4 Internal operation

- 1 Determining styles and layouts of the structure in line with building and other specialties.
- 2 Providing structural sketches and the attached written descriptions for a preparation of budget estimate and.
- 3 Conducting essential calculations for the high-rise buildings, large public buildings and complex buildings (structures), and preserving the calculation sheets after their correction and approval.

2.6 Building electrics

2.6.1 At the preliminary design stage, the professional design documents for building electrics should comprise design instruction, design drawings, list of major electric equipment, calculation sheets (for internal use and filing).

2.6.2 Design instruction

1 Design basis

- 1) Overview of building: description of the category, nature, area, stories, height etc. of the building;
- 2) Engineering design materials from relevant specialties;
- 3) Both engineering design materials confirmed by functional departments (departments of power supply, fire control, communication, public security etc.) and design requirements from the construction party;
- 4) Main standards and laws and regulations adopted in this project.

2. Scope of Design

- 1) The work contents and division of labor concerning design in the major are explicated, based on the design specification and corresponding design materials;
- 2) The electrical system planned to be installed in the project.
3. Power Transformation and Distribution System

- 1) Determination of load grades and various load capacities;
 - 2) Determination of the electrical power supply and voltage grade, the source of power supply, the quantity of power supplies and circuits as well as dedicated or non-dedicated lines. Description of embedded and aerial cables as well as their short-term and long-term development situation;
 - 3) Principles of confirming the capacity of standby power supply and emergency power supply as well as the requirements of their performance. The relationship between start-up modes and the municipal electrical network can be described where there are house generators;
 - 4) Wiring forms and operation modes for high- and low-voltage power supply systems: the relationship between normal power supply and standby power supply; operation and switching modes for bus-tie switches; tie modes at the low-voltage side among transformers; power supply modes for important loads;
 - 5) The position, quantity, capacity (including the installation capacity for equipment, calculated active power, reactive power, apparent capacity as well as the quantity and capacity of transformers) and form (indoor, outdoor or mixed) of power transformation and distribution stations; technical conditions for equipment and model requirements;
 - 6) Set-up of relaying protection devices;
 - 7) Electrical energy metering devices: High or low voltage applied; dedicated or non-dedicated cabinet (meeting the demand for internal accounting by the power supply department as well as the construction unit); the situation of configuration of monitoring instruments;
 - 8) Power factor compensation modes: Interpreting whether the power factors conform to the required regulations of power supply and consumption, and explaining the compensation capacity needed and the compensation modes adopted as well as the results of post- and pre-compensation;
 - 9) Operational power supply and signals: Describing the situation of operational power supply and the configuration of running signaling devices for high-voltage equipment;
 - 10) Engineering Power supply: The models and laying modes for inlet and outlet lines of high and low voltage.
4. Power Distribution System
 - 1) The source of power supply, voltage grades and power distribution; measures to supply power for important loads and particularly important loads and the like;
 - 2) Selection of the material, models and laying modes of wires, cables, bus bars and main lines;
 - 3) Models and installation modes for power distribution equipment such as switches, sockets, power distribution boxes and control boxes, etc.;
 - 4) Selection of start-up and control modes for motors.
 5. Illumination System
 - 1) Types and standards of illumination;

- 2) Selection of illuminating sources and lighting fittings as well as the installation and control modes for lighting fittings;
- 3) Types (such as road lamps, courtyard lamps, lawn lamps, floor lamps, flood lighting, underwater illumination, etc.), voltage grades, illumination source selection and control methods for outdoor illumination;
- 4) Selection of illumination circuits and their laying modes.(including the selection and grounding modes for outdoor illumination circuits).

6. Thermal Detection and Automatic Regulating System

- 1) Based on the process requirements, it accounts for the composition of the thermal detection and automatic regulating system;
- 2) Selection of automatic instruments;
- 3) Selection of models and installation of instrument control boards and panels;
- 4) Selection and laying of circuits;
- 5) Grounding of instrument control boards and panels.

7. Automatic Fire Alarm System

- 1) The protection grades and composition of systems can be specified according to the nature of construction;
- 2) Confirmation and requirements of the position for fire protection control rooms;
- 3) Selection of equipment such as fire detectors, fire alarm controllers, manual alarm buttons, control panels (cabinets) and etc.;
- 4) Requirements for the interaction control between fire alarms and firefighting as well as requests for logical relations of control and control display;
- 5) Overview of the emergency fire broadcasting and firefighting communication;
- 6) Supply modes for main and standby power supplies of firefighting and requirements of grounding and grounding resistance;
- 7) Circuit models and laying modes;
- 8) The interface modes and interaction relationship between the automatic fire alarm system and their sub-systems should be illustrated when there is a demand for intelligent system integration.
- 9) The types of power supply for emergency illumination as well as configuration of lighting fittings, selection of circuits and their laying & control modes, etc.

8. Communication System

- 1) Count-up of the quantity of telephone subscribers and dedicated lines with diverse natures in the project;

- 2) Selection and confirmation of main distributing equipment and the capacity for telephone stations;
 - 3) Scenarios of power supply for direct and alternating currents in the telephone station;
 - 4) Confirmation of the site of telephone stations and requirements for civil engineering;
 - 5) Confirmation of the communication line capacity as well as the composition and laying of line network.
 - 6) Design and division of labor for the junction lines among local exchanges, and confirmation of line laying and the introduction position;
 - 7) Requirements for indoor wiring and laying;
 - 8) Requirements for the grounding of anti-electromagnetic pulse, working grounding modes and grounding resistance.
9. Cable Television System
- 1) Confirmation of the system scale, network composition and pin values of the subscriber outlet;
 - 2) Selection of program source;
 - 3) Positions of premises and configuration of front-end equipment;
 - 4) Confirmation of the subscriber distribution network, conductor selection and laying modes as well as the quantity of subscriber terminals.
10. Closed Circuit Television System
- 1) Composition of the system;
 - 2) Selection of the position of control rooms and equipment;
 - 3) Transmission modes, selection of conductors and modes of laying;
 - 4) Composition of the television production system and selection of major equipment.
11. Public Address System
- 1) Composition of the system;
 - 2) Confirmation of output power, feeding modes and laying of subscriber lines;
 - 3) Selection of broadcast equipment and confirmation of the position of the broadcast studio;
 - 4) Selection of conductors and modes of laying.
12. Sound Reinforcement and Simultaneous Interpretation System
- 1) Composition of the system;
 - 2) Requirements for selection of the equipment and sound source allocation;
 - 3) Confirmation of the position of premises;
 - 4) Simultaneous interpretation methods;
 - 5) Selection of conductors and modes of laying.

13. Call Signal System
 - 1) Composition of the system and functional requirements (including wire and wireless);
 - 2) Selection of conductors and modes of laying;
 - 3) Equipment models.
14. Public Display System
 - 1) Composition of the system and functional requirements;
 - 2) Display of the installation position and type for equipment as well as conductor selection of conductors and modes of laying;
 - 3) Display of equipment specifications.
15. Clock System
 - 1) Composition of the system, installation positions, selection of conductors and modes of laying;
 - 2) Equipment models.
16. Security Protection System
 - 1) Protection grades, composition and functional requirements for the system;
 - 2) The partitioning, control and display of security monitoring and detection areas as well as alarm requirements;
 - 3) Confirmation of the installation position for video cameras and detectors;
 - 4) Configuration and installation for sub-systems such as visitor intercom, night patrol and access control and the like;
 - 5) Confirmation of the position of premises;
 - 6) Equipment models, selection of conductors and modes of laying.
17. Premises Distributed System
 - 1) Types and configuration standards of the premises distribution system can be determined according to the nature, function and environmental condition of the engineering project as well as the requirement of short- and long-term subscribers;
 - 2) Composition of the system and equipment models;
 - 3) Configuration of main distributing frames, floor distributing frames and information terminals;
 - 4) Selection of conductors and modes of laying.
18. Building Automation System and System Integration
 - 1) System composition, the number of monitoring points and functional requirements;
 - 2) Equipment models;

- 3) Selection of conductors and modes of laying.
19. Exchange System for Information Network
 - 1) System composition and functions as well as requirements for subscriber terminal interfaces;
 - 2) Selection of conductors and modes of laying.
20. Garage Management System
 - 1) System composition and functional requirements;
 - 2) Set-up of monitoring rooms;
 - 3) Selection of conductors and modes of laying.
21. Intelligent System Integration
 - 1) Integration forms and requirements;
 - 2) Selection of equipments.
22. Building Lightning Protection
 - 1) Confirmation of the types of lightning protection;
 - 2) Measures to protect against direct stroke, side stroke, lightning electromagnetic pulse and intrusion of high potentials;
 - 3) Measures and requirements adopted should be explained when steel bars in the concrete of buildings (structures) are used as arresters, down leads and ground devices.
23. Grounding and Safety
 - 1) The types of grounding required by various systems of the project and grounding resistance needs;
 - 2) Requirements for the set-up of main and local equal potentials;
 - 3) Requirements for the ground devices, as well as measures, methods and other details utilized should be explicated when ground devices need to be specially treated;
 - 4) Measures for safety and special grounding.
24. It is demanded that major problems to be resolved or determined should be expressly dwelled on during the examination and approval of the design.

2.6.3 Design Drawings

1. Master electrical plan (it can be deleted in case there is a single design only)

- 1) The name and capacity of sign buildings (structures), high- and low-voltage lines and line orientations for other systems, circuit numbers, the models & specifications of wires and cables, the pole position of overhead lines, the pole position of road & courtyard lamps (the lines for road & courtyard lamps do not necessarily be drawn), repeatedly grounding places and so on;

- 2) The positions and numbers of power transformation and distribution stations as well as the transformer capacity;
- 3) The ratio and compass.

2. Power Transformation and Distribution Systems

- 1) Plan for high-and low-voltage power supply systems: Specifications include the number and models of switch cabinets, the number of circuits, as well as the equipment model, equipment capacity, calculated current, compensation capacity, model & specifications of conductors, name of subscribers for the primary circuit, along with the scenario number for the secondary circuit ;
- 2) Layout plan: It should be inclusive of the layout and major dimensions for equipments such as high-and low-voltage switch cabinets, transformers, bus bars & main lines, generators, control panels, power supplies and signal panels. The ratios should also be included in the drawing;
- 3) The floor height for the sign rooms, position of trench and elevation (relative elevation);
- 3) Power distribution system (Generally, the internal operation sketches are drawn for private use only)

Layout plans for main lines and plans for vertical main-stem system (including power distribution and illumination main lines, the outlet distribution circuit for power transformation and distribution stations as well as the number of circuits).

4. Illumination System

For special buildings such as major sports stadiums and theaters, it is advisable to draw the illumination plan if conditions permit. The plan should consist of the light position (emergency illuminators included), the specifications of lighting fittings, and the position of power distribution boxes (or control boxes). It is not necessary to connect lines.

5. Thermal Detection and Automatic Regulating System

- 1) Both the automatic system professionally designed and the preparation of the schematics for thermal detection and automatic regulating are needed;
- 2) Layout for the control room equipments.

6. Automatic Fire Alarm System

- 1) Drawing for automatic fire alarm system;
- 2) Layout for equipment of firefighting rooms.

7. Communication System

- 1) Drawing for telephone system;
- 2) Layout for the station room equipment.

8. Lightning Arresting System and Grounding System

Generally no drawings are needed. Site plans and grounding plans are only prepared for special projects.

9. Other Systems

- 1) Drawings of systems to which various systems belong;
- 2) Layout plans for various control room equipments (if it has been expressly stated in corresponding system plans, this plan can be omitted)

2.6.4 Table for Major Equipments

Stated in it are the name, model, specifications, unit and quantity for equipment.

2.6.5 Design Calculation (for internal use and filing)

1. Calculation of the load for electrical equipments.
2. Calculation of the transformer models.
3. Calculation of the cable models.
4. Calculation of the short-circuit current for systems.
5. Calculation of the type of lightning protection as well as the calculation of the protection scope for lightning arresters.
6. The calculating results for various systems should be marked in the design description or related drawings.
7. For contents which are not legible for calculation, they should be explicated in the preliminary design and made up during the design of execution drawing.

2.7 Water Supply and Drainage

2.7.1 At the preliminary design phase, the professional design documents for water supply and drainage should comprise design instructions, design drawing, major equipments, calculations (for internal use and filing).

2.7.2 Design Instructions.

1 Design Basis

- 1) The contents with respect to the major design that are explicated by excerpt design in the listed approved documents and fundamental materials;
- 2) Major regulations and standards applied in the project;
- 3) The design materials concerning the project provided by other majors as well as the municipal conditions available to the project.

2. Scope of Design

The contents and division of labor (when there are other units co-designing the project) are accounted for in accordance with the design specification and relevant design materials.

3. Design for Outdoor Water Supply

- 1) Water source: the position of water mains, joint pipe diameters as well as water volume and water pressure available should be specified if the water is supplied by the pipe network in municipal or residential districts. Quality & temperature of water, hydrology and water supply capacity for the water source as well as water intake modes, purification processes, equipment models and the like should be dwelled on during the construction of self-contained water source.

- 2) Water consumption: Domestic water quota and water consumption, water consumption for production, water quota and consumption for other items (including water supplement for the circulating cooling water system, swimming pools and reclaimed water system; water consumption for laundry rooms, boiler rooms and waterscapes; water volume for roads and greening and unpredictable water volumes, etc.); standards and consumption for firefighting water; gross water volume (maximum daily water consumption and maximal hourly water consumption) need to be interpreted or listed in a table.
- 3) Water supply system: The partitioning and combination situation of domestic, production and firefighting systems, along with the water supply status in terms of diverse quality, pressure and area need to be stated. Measures should be taken due to the lack of water volume and pressure; the description of capacity, material, position and model of supercharging devices should be provided. If it is extensive construction, a brief account should be given to the currently existing water supply system.
- 4) Firefighting system: Instruction of the design basis, design parameters, water supply modes, equipment models and control methods for firefighting facilities with diversified forms.
- 5) Reclaimed water system: Explanation of the design basis, water quality requirements, process, design parameters and equipment model for reclaimed water system and work-out of water balance chart.
- 6) Circulating cooling water system: Dwelling on the pick-up and obtaining of the composition of circulating cooling water system, cooled structures, the models of circulating pump and measures taken to stabilize water quality in accordance with the requirements by water equipments for water volume, quality, temperature and pressure, as well as the local relevant meteorological parameters (such as dry and wet bulb temperature for outdoor air and air pressure, etc.).
- 7) In case the system for repeated water consumption is large, an overview should be given to the system flow and purification process, and a water balance chart should be depicted.
- 8) Pipeline, interface and laying modes.

4. Design for Outdoor Water Drainage

- 1) Brief account of the currently existing conditions: Description of the size and slope of pipes and open trenches, together with the elevation and position of discharge point or inspection & numbering should be given when water flows in the urban pipes or other external open trenches. The drainage requirements should be given out when water is poured into the water bodies (rivers, waters, lakes and oceans).
- 2) Explain the water drainage system and egress utilized in the design. If there is a need for hoisting, the position and scale for hoisting, model of hoisting equipment, structure forms, floor area and emergency drainage measures will be described.
- 3) Describing or listing in tabular form the water displacement for the production and domestic water drainage systems. The discharge amount, water quality, treatment modes, processes, equipment models, structure overview and treatment effects should be respectively set forth when the waste water is demanded to be treated.
- 4) Statement of the rainstorm intensity formulas used (or rainstorm intensity utilized), return period, water displacement for rain water and to name more.
- 5) Pipeline, interface and modes of laying.

5. Design on Water Supply and Drainage for Buildings

1) Explication or listing in tabular form of various water consumption standards, the quantity of water consumption units, working hours, hour variation coefficients, maximum daily water consumption and maximal hourly water consumption.

Note: If the contents above is specified in the Item 2.7.2 2) 3), the item is free from demonstration.

2) Water supply system: Stating the partitioning for water supply system and water supply modes, water supply requirements and measures taken in the sub-areas, measuring modes, capacity of water tanks and reservoirs, set-up position, material, equipment models, and measures such as heat preservation, dew retardation and corrosion prevention, etc.

3) Firefighting system: Following the provisions stipulated in diversified specifications concerning firefighting designs, respectively narrated are the design principle and basis, calculating standards, system composition and control modes for all sorts of firefighting systems (such as hydrants, firefighting systems using automatic sprinklers, water curtains, deluge, water sprays, foams and gases), along with the capacity of water reservoirs and tanks for firefighting, set-up position and major equipment selection.

4) Hot water system: Depiction of supply modes and selection of system adopted for hot water, water temperature & quality, heat source, heating modes and maximal hourly water consumption and heat consumption and so on. Instruction of equipment models, technical measures for heat preservation and prevention of corrosion and the like. Basis, supply capacity, system form, operation conditions and technical measures employed should be illustrated when waste heat or solar energy is exploited.

5) For those who make special requirements for water quality, temperature and pressure or who set up the drinking water and boiling water system, it is necessary to explicate the special technical measures taken and list the design data, process, equipment models and so forth.

6) Reclaimed water system: Explanation of the design basis, water quality requirements, process, design parameters and equipment models for reclaimed water system and work-out of water balance chart.

7) Water drainage system: Presentation of the selection of water drainage systems, water discharge amount for domestic and production sewage (waste water) and outdoor discharge conditions. Description of the local disposal processes and design data for toxic and hazardous sewage. Selection of water drainage system for roof rain water and outdoor discharge conditions, rainfall intensity and return period employed.

8) Pipeline, interface and laying modes.

6. Measures for water conservation and energy saving: Depiction of the technical measures taken in high-effective water conservation, energy-saving facilities and system design.

7. For the buildings (structures) required for vibration isolation and noise reduction, it is advisable to describe the technical measures taken for water drainage facilities.

8. As far as the water supply and drainage facilities for special areas (earthquake zones, collapsible soil areas or swelling and shrinking soil areas, frozen soil areas and soft foundation) is concerned, it is advisable to specify the relevant technical measures taken.

9. It is demanded that major problems resolved or determined should be expressly dwelled on during the examination and approval of the design.

2.7.3 Design Drawings

1. Master Plan for Water Supply and Drainage Systems

- 1) Plane positions for all buildings and structures, roads, etc., and the marking of major position dimensions or coordinates, elevation, compass (or wind rose map) and so on;
- 2) Plane positions for water supply and drainage pipes, and the marking of main diameters, water flow directions, gate well, hydrant well, water meter well, inspection well, septic tanks as well as the position of other water supply and drainage structures;
- 3) The control elevation and position for the point connecting water supply and drainage pipes in the internal field with urban pipe systems;
- 4) Plane positions for firefighting system, reclaimed water system, circulating cooling water system, circulating water system, and the marking of main diameters.

2. Master Plan for Part of Water Supply and Drainage

- 1) Layout for water intake structures. Provided that the water intake structures of self-built water source are distant, the water intake structure plane which includes water intake head (water intake), water intake pump rooms, switching gate well, as well as plane position, coordinate, elevation and orientation for roads should be independently depicted; if necessary, the flow drawing and elevation relationship among all structures should be made.
- 2) Master Layout for Water Disposal Plant (Station) and Process Flow Chart. If there exists the water purification plant (station) in the items for engineering design (including water supplied, sewage, and reclaimed water), it is suggestible to independently work out the master layout for water disposal structures, and the flow and elevation. It depends on the complexity of the project whether the preparation of one-line plan and section for all structures is needed. Listed in the aforesaid plan should be the schedule of buildings (structures) consisting of the plane dimensions and structure forms for buildings (structures), etc..

3. Plan on the Water Supply and Drainage for Buildings

- 1) Depiction of the layout on the bottom, typical floors and pipes for water supply and drainage and complicated floors devices for equipment; and the marking of the position of indoor and outdoor joint pipes as well as pipe diameters and the like.
- 2) Drawing the layout plan for premises (water reservoirs, water pump rooms, heat exchange rooms, water tank rooms, water disposal rooms, waterscapes, cooling towers, etc.)(if it is expressly stated in the item above, no additional drawing is acceptable).
- 3) Drawing the system principle drawings for the water supply and drainage system, all sorts of firefighting systems, circulating water system, hot water system and reclaimed water system, and marking the main diameter, elevation of the position of equipment, the number of building floors and floor elevation.
- 4) Drawing the water disposal flow chart (or block chart).

Note: For simple engineering projects, drawing output at the preliminary stage is generally not necessary.

2.7.4 Table for Major Equipment

The name, model, specifications (parameters) and quantity of major equipments are listed respectively as per sub-items.

2.7.5 Calculations (for internal use)

1. Calculation of all kinds of water consumption and drainage;
2. Calculation of relevant hydro-power and electric power;
3. Calculation of equipment models and structure dimensions.

2.8 Heating, Ventilation and Air Conditioning

2.8.1 There should be design instructions for the preliminary design of heating, ventilation and air conditioning; apart from the small-sized and simple projects, the preliminary design should include design drawings, equipment lists and calculation sheet.

2.8.2 Design Description

1. Design Basis

- 1) Approved documents related to the major and requirements of the construction unit;
- 2) Major regulations and standards adopted in the project;
- 3) Project design materials provided by other majors.

2. Scope of Design

The contents and division of labor concerning the major design is dwelled on according to the design specification and relevant design materials.

3. Designing Calculation Parameters

- 1) Calculation parameters for outdoor air.
- 2) Design parameters for indoor air (see Table 2.8.2)

Table 2.8.2 Design parameters for indoor air

Name of the room	Summer		Winter		Ventilation rate standard m ³ /h· per person	Noise standard dB (A)
	Temperature °C	Relative humidity °C	Temperature °C	Relative humidity °C		

Note: Temperature and relative humidity are calculated using benchmark values; $\pm^{\circ}\text{C}$ and % can used to indicate range in case of the demand for design precision.

4. Heating

- 1) Load of heating system;

- 2) Narration of the situation of heat source, heating medium parameters, outdoor pipelines as well as water supplement and constant pressure of the system;
- 3) Heating system form and laying modes for pipes;
- 4) Individual Household heating metering and control;
- 5) Selection of heating devices, type of heat radiators, pipe materials and heat preservation materials.

5. Air Conditioners

- 1) Heating and cooling load of air conditioners;
- 2) Selection of code sources and code mediums for the air-conditioning system, and parameters for cold and cooling water;
- 3) Supply modes and parameters for heat source of the air-conditioning system;
- 4) Brief introduction of the wind and water system for air conditioners, and necessary description of airflow organization;
- 5) Brief account of monitoring and control;
- 6) Technical measures with regard to the fire fighting for the air-conditioning system;
- 7) Selection of pipe materials and heat preservation materials;
- 8) Selection of major equipment.

6. Ventilation

- 1) Rooms or parts needing ventilation;
- 2) The form and air change rates for the ventilation system;
- 3) Selection of equipments for the ventilation system as well as air balance;
- 4) Technical measures with regard to the fire fighting for the ventilation system.

7. Smoke Prevention and Discharge

- 1) Brief introduction of smoke prevention and discharge;
- 2) Selection of equipment and facilities concerning smoke prevention for smoke prevention staircases and their antechambers, antechambers and common antechambers of fire lifts as well as the closed refugee storey (room);
- 3) Selection of equipment and facilities concerning smoke prevention for courtyards, inside aisles and basements;
- 4) Statement of the air volume for the smoke prevention and discharge system, and the control programs needed to be explicated.

8. It is demanded that major problems resolved or determined should be expressly dwelled on during the examination and approval of the design.

2.8.3 Equipment table: Listing of the name, model, specifications, quantity and other items for major equipment (see Table 2.8.3).

Table 2.8.3 Equipment table

Equipment number	Name	Model and specifications	Unit	Quantity	Remarks

Note: Major technical data should be specified in the column "Model and specifications".

2.8.4 Design Drawings

1. The preliminary design drawings for heating, ventilation and air conditioning in general terms comprise legends, system flow charts and major plans. Apart from the fairly complicated air-conditioning premises, drawing of one-line drawings for various pipes is acceptable.
2. The system flow chart shall demonstrate the flow of systems such as the thermodynamic system, cooling system, air conditioning waterway system, necessary air conditioning wind path system, smoke prevention and discharge system, ventilation and air compensation as well as their control modes.

Note: Necessary air conditioning wind path systems refer to a system that is equipped with fairly strict demand for purification, temperature and humidity. Drawing of plans alone without the work-out of system flow charts is permit table when systems such as the air conditioning wind path system, smoke prevention and discharge system, ventilation and air compensation covers a small number of floors, and meanwhile the plan can provides a fairly complete presentation of the system.

3. Heating Plan

Drawing of the position of heating radiators, inlet and orientation of heating mains and system number.

4. Plan for Ventilation, Air-conditioning and Cold & Heat Source Premises

Preparation of the position of equipment, pipe orientation, the position of airport, equipment number and major pipes connecting equipment premises; for large and complicated project, the major elevation and diameter for large wind pipes shall be marked expressly; drawing of local sections are required for the complicated cross-points of pipes.

2.8.5 Calculations (for internal use)

Preliminary calculations shall be made for the selection of the heat & cold load, wind rates, the volume of hot and cold water in air-conditioners, cooling water volume, pipe diameters, dimensions for major air ducts and major equipment in the project with respect to heating, ventilation and air conditioning.

2.9 Thermal Power

2.9.1 At the preliminary phase, included in the design documents on the major of thermal power are design instructions, design drawings, table for major equipment and calculations

2.9.2 Design Instructions

1. Design Basis

- 1) Approved documents and fundamental materials in relation to the major arising out of the master description of the extracted design (analysis on water quality, fuel types, geological situation, permafrost depth and underground water level);
- 2) Design materials for the project supplied by other majors (such as master layout, heat supply sub-areas and medium parameters, heat load and development needs, etc.);
- 3) Major regulations and standards employed in the project.

2. Scope and Contents of Design

- 1) The contents and division of labor concerning the major design is dwelled on according to the design specification and relevant design materials.
- 2) The coordinating relationship between the heat supply and gas supply as well as their calculation modes; consideration of future development or extensive construction.
- 3) For reconstruction and extension projects, it is imperative to explain the utilization situation of original buildings, structures and equipment.
- 4) Measures for energy saving, environmental protection, firefighting and safety.

3. Boiler Room

- 1) The determination of heat load and selection of boiler type Determine the calculation of heat load and list heat load tables for the heat supply facilities inside various buildings; determine heat supply medium and parameters; determine the boiler types, specifications, numbers, and describe the standby conditions as well as operation numbers in winter and summer.
- 2) The selection of thermodynamic system and auxiliary machinery Describe the water treatment system, water supply system, steam and condensed water system, hot water circulation system and its regulation, the make-up water pressurization method, sewerage system, numbers and standby conditions of various water pumps and heating equipments, and shall describe the measures of dust removing and desulfuration of coal burning boiler.
- 3) Control measure of noise pollution
- 4) Fuel system Describe the consumptions and source of fuel. When the fuel is coal, determine the process equipment of the fuel as well as measure and convey equipments; when the fuel is oil, describe the source of oil, the size of oil tank, quantities and positions, storage time and transportation pattern, and; when the fuel is gas, describe the source of gas, position of the regulator station as well as safety measures, etc.
- 5) Briefly describe the composition of boiler room and affiliated rooms, considerations on the extension and development and so on.

- 6) Technical indicators: list major equipment names as well as technical specifications, construction areas, heating loads, fuel consumptions, fly ash and bottom ash discharges, consumptions of softened water, consumptions of tap water and electric capacities, etc. A sense of urgency,

4. Other motive power station rooms,

- 1) Heat exchange stations

Describe the heating media and its parameter, Describe heating loads, heating media and its parameter, and briefly describe thermodynamic system. Describe water treatment system and the make-up water pressurization method, and determine heat exchanger as well as fitting auxiliary equipments.

- 2) Gas station rooms

Describe the purposes, usages and parameters of various gases, gas supply systems, and selection of major equipments. If it is combustible gas station room, relevant safety measures shall be made clear.

- 3) Diesel engine generator rooms

Describe oil supply systems and way of smoke discharge.

- 4) Gas regulator station

Describe the usage of gas, parameters before and after pressure regulation, selection of pressure regulators and relevant safety measures.

- 5) Gas bottle group station

Describe the usages and parameters of various gases, way of pressure regulation and gas supply, and quantities of bottle groups. If it is combustible gas station, relevant safety measures shall be made clear.

5 Indoor pipelines

Determine the loads and parameters of various medium, describe the selection and use of the pipeline and its accessories, way of pipelining as well as the selection of heat insulating materials and safety measures of gas pipelines.

6 Outdoor pipeline network

Determine loads and parameters of various medium, describe pipeline routes and way of pipelining, confirm the selection and use of major pipeline materials and its accessories and mark the mode of temperature protection and preservative treatment as well as the selection of heat insulation materials.

7 Major problems which shall be submitted to be settled or determined at the time of designing and approval

2.9.3 Designing paper 1 Boiler room

- 1) General layout of the equipments

Mark the general layout of equipments, draw the position of doors, windows, staircases, platforms and pits of the boiler room, mark the name of the room, the size and elevation of the construction axis; and equipment layout, positioning and dimensions and numbers.

- 2) Thermodynamic schematics

Present the technological processes of the equipments, gas pipelines and water pipelines (include pipeline accessories); mark the signs, pipe diameters, corresponding serial numbers of equipments (which shall be in line with that of the equipment table) of the legends; and install the positions of measuring instruments, etc. on the spot.

2 Other motive power station rooms

Refer to the depth of design of the boiler room of the comparatively larger heat exchanger. Other motive power station rooms can be free from the drawing output at the preliminary design phase.

3 Indoor and outdoor power pipeline

Indoor power pipeline can be from drawing output, and the drawing of plane trend drawing outdoor power pipeline shall be designed according to the requirements.

2.9.4 Table of major equipment

List names, specifications, technical parameters, units and quantities of major equipments. The table can also be attached to the design instructions.

2.9.5 Calculation sheet (for internal use only)

Calculation of load, major equipment' selection, calculation of consumptions of water and electricity as well as fuels and calculation of hydraulic computation of major pipelines. Meanwhile, list the major calculation results into the relevant parts of designing instructions.

2.10 Budget estimate

2.10.1 Design budget estimate is an important composition part for the preliminary designing documents. Documents of design budget estimate shall completely reflect the preliminary designing contents of the projects, strictly execute state relevant guidelines, policies and systems, and be prepared by seeking truth from facts according to the construction conditions (include various factors such as natural conditions, construction conditions and so on which can affect the cost of construction) of the project location and relevant materials based.

2.10.2 Basis of preparation of budget estimate

1 National laws, regulations, policies and guidelines which are related to the management of construction and cost of construction

2 Design specifications of the approved construction projects (or approved feasibility study documents approved) and relevant provisions of the departments of charge.

3 List of preliminary designing projects

4 Design papers (or internal assignment sketches), textual descriptions and major equipments tables which can satisfy the preparation design budget estimate and have been checked and signed by various majors, among which

1) In civil engineering, architecture major submits plan, elevation, section views and textual descriptions of preliminary design (shall illustrate or mark the decoration standard and the sizes of doors and windows); structure major submits structural layout plan drawing, sectional dimensions of component parts and special components reinforcement ratio;

- 2) Layout plan drawing or word illustration and tables for major equipments from majors of Water Supply and Drainage, Electrical, Heating and Ventilation, Air Conditioning and Motive Power, etc.;
- 3) Various majors relevant to outdoor engineering shall submit layout plan drawings; and general drawing major shall submit topographical map of the construction site and site design elevation as well as cross section sizes of road, drainage ditch, retaining wall and enclosing wall structures and so on.

5 Materials of documents of budget estimate quota (or quota of budget, comprehensive budget quota, similarly hereinafter of this section), unit's schedule prices, budget prices of materials and component parts, engineering cost quote and relevant cost provisions of the local and local authorities' current construction engineering and professional installation work, etc.

6 Current relevant original prices of equipments and freight and miscellaneous charges' rate

7 Current other relevant expenses' quota, indicators and prices

8 Natural conditions and construction conditions of the construction site

9 Budget estimate, budgeting and technical and economic indicators of similar engineering

10 Other materials provided by construction units about construction costs

2.10.3 There are three types of design budget estimate documents: book of estimates of the unit construction; integrated budgetary estimate book for single construction; and general budgetary estimate book of construction project.

General budgetary estimate is prepared by the unit which is responsible for undertaking of overall design of construction project. The units which only undertake single project design and don't undertake general design shall only prepare the integrated budgetary estimate book for single construction.

If the construction project is an independent single construction, the preparation of general budgetary estimate book for construction project and integrated budgetary estimate book for single project shall be combined.

2.10.4 Budgetary estimate book for unit construction Budgetary estimate book for unit construction is the document to calculate the required engineering cost of each professional project in an independent construction or structure (i.e. single construction), which shall be divided into two classes as the following:

1 Budgetary estimate book for construction engineering

2 Budgetary estimate book for equipment and installation engineering

Budgetary documents for unit construction shall include: direct charges computation table for construction (installation) engineering, manpower, material and price differentiate table for per machine per team of construction (installation) engineering and cost composition table of construction (installation) engineering.

2.10.5 Integrated budgetary estimate book for dingle construction

Integrated budgetary estimate book is the integrated document to calculate the required construction cost of a single construction (independent construction or structure).

Integrated budgetary estimate book is prepared by budgetary estimate books summarization for unit construction of various majors in single construction.

Integrated estimate documents shall include: preparation introductions (see item 2.10.8), integrated estimate table and budgetary estimate book for unit construction of relevant majors (see item 2.10).

2.10.6 General budgetary estimate book for construction project

1 The general budgetary estimate book is prepared by the summarization of integrated budgetary estimate book of various single construction in the construction project and other cost budgetary estimate table.

2 General budgetary estimate documents shall include: preparation instructions (see item 2.10.8), general budgetary estimate table, general budgetary estimate book for single construction (see item 2.10.4), other cost budgetary estimate tables for engineering construction and summary sheet for major building and installation materials. General budgetary estimate documents which have been bound into book form independently shall add covers, signature leaf (flyleaf) and table of contents directly.

3 Items of general budgetary estimate table shall be divided into six parts as follows according to costs:

1) Engineering costs (construction installation engineering and equipment purchase costs)

a) Major construction projects;

b) Auxiliary and construction projects of service;

c) Outdoor construction projects (within the red line) including structures such as cubic meters of earth and stones, roads, enclosing walls, retaining walls, drainage ditches, etc., and projects such as water supply and drainage pipelines, motive power pipe networks, power supply routes and garden greenings, etc.

d) Offsite construction projects (outside the red line) including projects such as roads, railway special lines, optimization of road traffic organization abstracts, water supplies and drainages, heat supplies, power supplies, and communications, etc. (only projects which have been approved to be constructed along with the major construction projects be listed)

2) Other costs

Other necessary expenditures which don't belong to construction installation costs and equipments purchasing costs, such as land use fees, construction units' management fees, research trial fees, survey and design charges, personnel training fees, office and living furniture purchasing fees and united test running costs, etc. (The specific contents shall be executed according to the provisions of project locations and departments of charge.).

3) Reserve fund

a) Basic reserve fund refers to unpredictable projects and fees at the preliminary design stage and within the budgetary estimate;

b) Price spread reserve fund refers to forecasting reservation fund of construction costs changes which results from the floating factors such as the price of labor, equipments, materials, construction machinery as well as rate, interest rate and exchange rate, etc., during the construction period. Fees belong to the dynamic factors of the construction costs and shall be listed independently in the general reserve funds.

4) Investments orientation regulation taxes of the fixed assets

5) Loan interests of the construction period

6) Initial working capital (only the production or business construction projects listed)

2.10.7 Consumptions of main construction and installation materials

Generally, steel products, cements (or commercial concretes), timbers and other materials shall be provided.

2.10.8 Description contents of budget estimate preparation

1 Project overview

2 Preparation foundation

3 Preparation methods

4 Other necessary instructions

2.10.9 Methods for the preparation of budget estimate

1 Budgetary estimate for construction engineering of major construction projects shall calculate major work amounts according to the preliminary design paper, be prepared according to the quota and charging standards of the provisions of project locations or departments in charge; budget estimate of unit construction of majors including Water Supply and Drainage, Electric, HVAC and Air Conditioning and Thermal Energy and Power Professional, etc. may also be prepared according to pricing basis of similar engineering budget estimate and budgeting, budget estimates indicators and technical and economic indicators, etc.; and 2) Budget estimates for construction engineering of auxiliary, affiliated or small sized single projects may be prepared by various indicators.

2 Budget estimate for equipment and installation work

1) The purchasing costs for major equipments shall be prepared according to the equipment items of major equipments, equipment original prices and freight and miscellaneous charge rate. Its installation engineering costs shall calculate major work amount according to preliminary design paper and prepared in line with the quota and expenses standards of the provisions of departments of charge;

2) Purchasing and installation engineering fees of other equipments may be prepared according to the pricing basis of similar project budgeting and budget estimate, budget estimate indicators and technical economic indicators, etc. as well as major material table.

3 Budget estimate of engineering construction and other costs

Prepare according to the indicators specified by local and departments in charge, and materials provided by construction units.

4 Reservation fund

1) Basic reservation fund: Calculate with the sum of construction installation engineering fees, equipment purchasing fees, engineering construction fees and other fees as the base, multiply the rate specified by various districts or departments in charge.

2) Price spread reservation funds: price reservation funds are calculated according to construction projects annual investment amounts, and annual investment price indicators released and regularly determined by state or district administrative authorities of construction

5 Investments orientation regulation taxes of fixed assets are calculated according to relevant provisions of state various periods.

6 Loan interests of the construction period: According to the capital use plan of the construction project investment, it shall be calculated according to the loan interest rate provided by construction units or specified by the People's Bank of China. Interest accrual loan amount shall be calculated according to 50% of the year, and be calculated by full amount of other years.

7 Initial working capital: Plan according to 30% of the working capital requirements and the working capital can be estimated according to the following methods:

1) Calculate according to the expanded indicators: Generally, the conduct of calculation may refer to the similar manufacturing enterprises' occupied working capital in sales revenue, operating cost, and ratio of the fixed assets investment as well as the occupied rate of yield per unit in the working capital ;

2) Sub-item detailed estimate

Notes: When it is difficult to estimate according to the above two methods, value numbers can be offered by the construction unit or counted according to the estimated numbers of original feasibility study report.

3 Design of construction drawing

3.1 General requirements

3.1.1 Documents for construction drawing design

1 All the professional designing drawings involved required by the contract (drawing catalogues, instructions and necessary equipments, material tables involved, see section 3.2-3.8) and cover of the drawing

2 Project budget statement required by the contract

Note: Concerning projects which directly enter the construction drawing design after the designing of the proposal, if no project budget statement from the contract is required, the designing documents of the construction drawing shall include budgetary estimate.

3.1.2 Cover shall be marked with the following contents:

1 Project names;

2 Names of project units;

3 Designing serial numbers of the project;

4 Designing stages;

5 Names, as well as the signatures and seals of the legal representatives, technical chief principals, and project principals of the preparation units

6 Date and year of preparation (i.e. drawing output year and month).

3.2 General layout

3.2.1 At the design stage of the construction drawing, the professional design documents of the general layout shall include drawing catalogues, design specifications, design papers and calculation sheets.

3.2.2 Drawing catalogue

The newly drawn paper shall be listed first and then list the selected and to be used standard drawings and the reusable drawings.

3.2.3 Design descriptions

General projects shall be written on relevant drawings respectively.

reusing the construction drawings and instructions of certain project, mark the preparation unit, project name, design sequence number and preparation date; and list major technical economic indicators table .

3.2.4 General layout

1 The reserved topography and ground objects

2 Measure coordinate grids and coordinate values.

3 Site four corners measuring coordinate (or location dimension), positions of road red lines and construction red lines or land demarcations.

4 Positions of the original and planning roads around (major coordinate values or location dimensions), and positions, names and layers of key buildings and structures.

5 Building. Names, layers and positions (coordination or correlated dimensions) of structures (concealed constructions such as air-raid shelters, underground garages, oil depots, water reservoirs shall be indicated in dotted lines).

6 Plazas, parking lots, sports areas, roads, barrier free facilities, drainage ditch and retaining walls. Positioning dimensions of slope protections (coordinate or correlations)

7 Compass or wind rose drawings

8 When sequence numbers are adopted for buildings and structures, name table of buildings and structures shall be listed.

9 Mark the construction drawing designing basis, measurement units, scales, coordinate and elevation systems (If it is site construction network, correlations with the measurement coordinate grids shall be marked).Supplementary legends, etc.

3.2.5 Vertical arrangement

1 Site measurement of coordinate grids and coordinate values

2 Sit around roads, water surfaces, and ground key elevations

3 Names or sequence numbers of buildings and structures and indoor and outdoor ground design elevations

4 Design elevations of plazas, parking lots and sports areas.

5 Design elevations (road surface centers, drainage ditches and bottom), variable slope, turning points and terminals, longitudinal grades, longitudinal slopes and key coordinates of the starting points of road and drainage ditches, and two-sided slopes and single faced slopes of the road surface. If necessary, indicate the factors of road horizontal curves and vertical curves.

6 Major design elevations and slope protection grades of retaining walls, protection slopes, of the top and bottom of the mounts.

7 Indicate the slope direction of the ground with slope direction arrow. When leveling is highly required for the site or topographic relief comparatively large, it can be indicated by the contour.

8 Compass or wind rose drawings

9 Indicate the dimension units, scales and complementary legends, etc.

3.2.6 Earthwork drawing

1 Site around construction coordinates

2 Positions of the designing buildings and structures (indicated by fine dotted lines)

3 20m×20m or 40m×40m grids and their positioning, original ground elevations, design elevations, height of filling and excavation of various grid points, boundaries of spoil grounds and controlled areas, earth volume and general earth volume of various grids.

4 Earthwork Balance Sheet (Table 3.2.6)

Table 3.2.6 Earthwork Balance Sheet

No.	Item		Earth volume	Explanation:
	Filling of earth	Excavation		
1	Field engineering			
2	Indoor terrace filling of earth, underground buildings, structures excavation, buildings and structures foundation		Refer to the loss quantity of soil after filling and excavation	
3	Road, piping trench and drainage ditch	Include embankment filling and excavation of cutting and road trough		
4	Loss of earthwork			
5	Total			

Note: The listed items on the table may be increased or decreased with the project contents.

3.2.7 Synthesis chart of pipelines

1 General layout

2 Positions of construction coordinate (or marked size), road red line / building red line or land demarcation

3 The layout of all pipelines, indicating the distance between pipeline and buildings/structures, as well as space between pipelines.

4 Positions of access points of off-site pipelines

5 In the sections where pipelines are highly concentrated, it is necessary to add section views, indicating the distance between pipeline and buildings/green belt, as well as space between pipelines, besides it is also necessary to indicate the elevation or space of upper/lower pipelines at the major cross points.

6 Compass

3.2.8 Layout of green belts and architecture articles

1 Draw the general layout

2 Positioning of greenbelts (including water surfaces), pedestrian paths and hard paving

3 Positions of architecture articles (coordinate or location dimensions) , design elevations and detail indexes

4 Compass

5 Mark the dimension units, scales, legends, and construction requirements, etc.

3.2.9 Details

Details such as road cross sections, road structures, retaining walls, protection slopes, drainage ditches, pool walls, plazas, sports areas, playing grounds and parking lots, etc.

3.2.10 Increases and decreases of engineering drawings

1 When the engineering design contents are simple, vertical layout and general plan layout can be combined.

2 When the road network is complicated, the drawing of road plan drawing can be increased.

3 Whether earthwork drawing and comprehensive layout of pipelines develop or not, determine according to design requirements.

4 When the design of greenings and landscapes are entrusted to be designed otherwise, draw the schematic and control layout according to the requirements.

3.2.11 Calculation sheet (for internal use only)

Design basis, schematics, computation formulas, computation processes and results materials shall be filed as technical documents.

3.3 Buildings

3.3.1 At the design stage of construction drawing, building professional design documents shall include drawing catalogue, design specifications for construction drawings, design papers and calculation sheets.

3.3.2 Drawing catalogue

First list the newly drawn paper, then list the selected and to be used standard drawing or reused drawing.

3.3.3 Design description of construction drawings

1 Basis documents, official documents and related specification of the design of sub-project construction drawings.

2 Project general description

The contents shall generally include building names, construction sites, construction units, construction area, building basement area, building structure classes, design lives, building stories as well as building heights, building classifications according to fireproof design and fire resistance rating, civil-air protection rating, roof waterproof rating and basement waterproof rating, seismic fortification density, etc., and major technical economic indicators which can reflect architectural scales such as dwelling sizes and suit quantities (include construction area, usable floor area and balcony construction area. The usable floor area of rooms can be marked on the plan layout.), guest room quantities and number of beds of the hotel, hospital outpatient person- amount and number of beds of the inpatient department, and berth number for parking in the garage, etc.

3 Design elevation

The relationship of relative elevations of the sub-item with absolute elevations of the general drawing

4 Material description and interior and exterior decoration

- 1) Wall bodies, wall body damp-proof layers, underground waterproofs, roof structures, external walls, plinths, apron, steps and ramps. Materials and working method of paintings and coatings can be described in words or part of words, and part of which can be marked or be added with index numbers on the drawing;
- 2) For interior decoration, apart from textual descriptions, it can also be expressed in table form by filling corresponding working methods or codes on the table; for relatively complicated or advanced civil architectures, entrust interior designers otherwise; parts which belong to second decoration are not necessary to list the method of working and conduct indoor construction drawing design; but to comparatively large changes of the design of original architectural designs, structures and equipments, agreement from the original design organization and designers shall be obtained.

5 Description to adopted working methods of new technologies and new materials as well as descriptions to special building modeling and necessary building constructions.

6 Design requirements of the table of doors and windows (see table 3.3.3) and performance to doors and windows (fireproofing, sound insulation, anti-wind pressure, heat preservation, air penetration and water penetration, etc.), materials, colors, glasses and hardware, etc.

7 Performance and production requirements of curtain wall projects (include glasses, metals, and stones, etc) and special roof works (include metals, glasses and membrane structures, etc.), plan drawing, embedded part installation drawings, etc. as well as fireproofing, safety and acoustic insulation structures.

8 Choose and performance description (functions, load capacities, number of stops and lifting heights, etc.) of elevators (escalators)

9 Description of plugging way when it is required to plug the reserved openings of the wall body and floor slab.

10 Other issues which required to be described

Table 3.3.3 Table of doors and windows

Classification	Design numbers	Opening dimensions		Frame atlas code of doors and windows	Standard atlas and serial numbers are adopted	Remarks
		Width	Height			
Doors						
Windows						

Note: Elevation views of doors and windows and ways of opening shall be drawn concerning doors and windows which adopt nonstandard atlas

3.3.4 Design drawing

3.3.4.1 Plan

1) Mark room names and numbers of bearing walls, pillars and location axis as well as serial numbers of axis, positions, serial numbers and location dimensions of inside and outside doors and windows and opening orientation of doors;

2) General dimension of axis (or overall general dimensions) , dimensions between axis (pillar distances and spacing), opening dimensions of doors and windows, and axis relevant dimensions;

3) Thickness of wall bodies (include bearing walls and nonbearing walls) , dimensions of widths and depths of pillars and pilasters (if necessary), and its related dimensions with the axis;

4) Positions, dimensions and working method indexes of deformation joints;

5) Positions and indexes of related working methods of major construction equipments and fixed furniture such as sanitary wares, rain pipes, pools, platforms, kitchens, wardrobes, and partition walls, etc.;

6) Positions of elevators, escalators and foot paths (mark specifications), positions of staircases (ladders) and upper and lower direction schematics and index serial numbers of staircases;

7) Positions, dimensions and indexes of working methods of main structures and building construction components such as the positions and dimensions of courtyards, scuttles, trenches, melt pits, important equipments or equipment engine bases, various platforms, interlayer, manholes, balconies, rain shelters, steps, ramps, apron and open trenches, etc.;

- 8) Positions, dimensions, and working method indexes of flooring reserved openings aeration conduits, pipeline silos, chimneys, and waste pipes, etc., and positions, dimensions and elevations or heights, etc. of wall body reserved openings (mainly about infilled wall and bearing brickwork walls) ;
- 9) Parking spaces and traffic routs of garages;
- 10) Cooperated dimensions of civil engineering required by special technological requirements;
- 11) Outdoor ground elevations, bottom layer ground elevations, elevations of various floors and elevations of various floors of the underground;
- 12) Positions and serial numbers of section lines (generally only plan position approach of ground floor or required sectioning be marked);
- 13) About detail drawings of the plan nodes or index numbers of the detail drawings;
- 14) Compass (drawn at bottom layer of plane);
- 15) Areas and schematics of separated position of fire compartments of building plane of each layer (directly form a drawing alone If it is a fire compartment alone, fire compartment area may not be marked.);
- 16) There shall be parapet walls, cornices, gutters, slopes, slope directions, gutter inlets, roof ridges (watersheds), deformation joints, staircases, water tank rooms, elevator rooms, scuttles and wind screens, accessible roof holes, overhaul stairs, outdoor fire protection staircases and other structures, necessary detail drawing index numbers and elevations, and; Proportion of the drawing of roofs of simplex presented contents may reduced;
- 17) draw partial amplifying views according to engineering properties and complexity levels; If necessary
- 18) Building planes of large bays which can be separated freely can be drawn with plane separation schematic serials directly. The separation plan shall conform to related standards and provisions (The proportion for the drawing of separation schematic plane can be reduced);
- 19) When the building plane is relatively too long and too large, the drawing can be conducted according to partitions, but the assembly schematic drawing of partitions shall be drawn at the proper positions of various partition planes and mark the partition section serial numbers clearly;
- 20) Names and scales of drawings;
- 21) Omission of the drawings: If it is symmetrical plane, the internal dimensions of the symmetrical parts can be omitted, with symmetry axis part be marked with symmetry symbols, and the number of axis shall not be omitted; apart from main dimensions and serial numbers of axis of the floor planes, dimensions which are the same with ground floor can be omitted; the same plane may be shared concerning storey typical floors, but the scope of layers and elevations of various layers shall be marked.

2 Elevation

- 1) When the elevation bending is comparatively complicated, serial numbers of axis at both ends can be presented by unfolding elevation view, axis serial numbers of the corners shall be marked accurately;
- 2) Positions of the elevation outlines as well as main structures and building construction components such as parapet wall tops, cornices, pillars, deformation joints, external stairways, vertical ladders, outdoor air conditioner

shelves, balconies, rails, steps, ramps, flower stands, rain shelters, chimneys, plinths, doors and windows, curtain walls, openings, door heads, rain pipes as well as other decoration components, architraves and whitewash grid lines, etc., and labels of critical controlled elevations such as elevations of roofs and parapet walls, etc.; reserved openings of exterior walls shall be marked with dimensions, elevations or dimensions of height (width × height × depth and location related dimensions);

- 3) Elevations or heights of roofs, cornices, parapet walls, windows as well as other decoration components and architraves, etc., of which the plane and sectional drawings haven't been presented;
- 4) Serial numbers which can't been stated clearly on the plane drawings;
- 5) Decoration material names or codes of various parts and detail drawing indexes of structural joints;
- 6) Drawing names and scales;
- 7) Elevations of various directions shall be drawn completely. But elevations with little differences and are symmetrical or part of elevations which are not difficult to presume may be drawn briefly; internal courtyards or partial elevations which are invisible can be presented on relevant sectional drawings. If the section view hasn't been presented completely, it shall be drawn alone.

3 Section

1) Locations of section views shall be selected at the parts of different floor heights, different number of floors, relatively complicated interior and exterior spaces which are representative; Partial sections may be drawn at the places which partial differences of architectural spaces occur and parts of planes and elevations which can't been expressed clearly.

2) Walls, pillars, axis, and serial numbers of axis;

3) Sectioning to main structures and architectural construction parts which are visible such as outdoor grounds, ground (constructions) floors, melt pits, trenches, floor slabs of various floors, interlayer, platforms, ceilings, roof trusses, roofs, chimneys above roofs, scuttles, wind screens, cornices, parapet walls, ladders, doors, windows, stairs, steps, ramps, patios, platforms, balconies, rain shelters, openings and other contents which are visible in decorations;

4) Height dimension

Exterior dimensions: height of doors, windows and openings, height of interlayer, differentiates of indoor and outdoor elevations, height of parapet walls and general heights; Interior dimensions: depth of melt pits (ditches), partition walls, interior windows, openings, platforms and ceilings , etc.;

5) Elevation

Elevations of main structures and building construction parts such as elevations of grounds, floors (include basements), platforms, ceilings, roof panels, roof cornices, parapet wall tops, buildings tower above the roofs, structures and elevations of other roof special components and outdoor grounds;

6) Index numbers of construction detail drawings nodes;

7) Names and scales of drawings

4 Details

- 1) Partial amplifying views and details of construction of interior wall and exterior wall nodes, stairs, elevators, kitchens and washrooms;
 - 2) Constructions, architraves, and patterns related to interior and exterior decorations;
 - 3) There shall be details of construction about special or nonstandard doors, windows and curtain walls, etc. If details are otherwise entrusted to the designers and processors, elevation grid drawings shall be drawn and make provisions for the sizes of the opening areas, opening methods, connection modes with major structures, embedded parts, production materials, and colors, etc.;
 - 4) Other architectural components and building structures which can't be illustrated or clearly illustrated in the plane, elevation and sectional drawings or word illustrations
- 5 Draw partial view, elevation, and section of the original proximate buildings, and index the detail numbers of the combination parts between new buildings and original buildings.

3.3.5 Calculation sheet (for internal use only)

Conduct calculations on thermal engineering, viewing, safeguard, fireproofing and safety evacuation, etc., according to engineering properties and characteristics. Calculation sheet shall be filed as technical documents.

3.4 Structure

3.4.1 During process of construction drawing design, professional design papers should include drawing catalogue, design description, design drawing and calculation sheet (for internal filing)

3.4.2 Drawing catalogue

List the newly prepared drawing and then the selected repetition usage drawing and standard drawing according to drawing order.

3.4.3 General specification of structure design

General specification of structure design should be formulated to each single project, and unified general specification of structure construction drawing to multiple subprojects. In the event of a simple and small project, the contents of general design specification can be written on the foundation plan and various structure plans.

The general specification of structure design should include the following:

1. Main basis of the project structure design ;
2. Design of absolute altitude of 0.000 elevation
3. Units of elevation and dimension in the drawing;
4. Safety level and service life of architectural structure, durability requirements for concrete structure and quality control level of construction quality of brickwork;
5. Classification of construction site, liquefaction level of groundwork, classification for earthquake-resistant buildings, seismic fortification intensity (design basic earthquake acceleration and classification of design earthquake) and earthquake-resistant level of reinforced concrete structure;
6. Earthquake-resistant level of defence construction;
7. Brief description of relevant groundwork overview, solution to poor groundwork, technical requirements, anti-liquefaction measures, freezing depth of groundwork, design level of groundwork;
8. Adopted design load, including wind load, snow load, allowable load of building roof, maximum load standard

value of special parts;

9. Selected structure material type, specification, property and corresponding product standards, protective layers' thickness of principle bar, anchorage length, splicing length and extending method in the event of reinforced concrete structure, anchorage device types of pre-stressed member, hole reservation methods, construction requirements and corrosion-proof measures of anchorage. Special requirements should be put forward to some members or parts;

10. Building concrete for pool and basement with osmotic-resistant requirements, osmotic-resistant level and specific requirements in the case of leakage testing should be described. When floating is possible during construction, floating-resistant measures should be set forth;

11. General practice and collective drawings of standard members; inspection methods and requirements should be described if special members should undergo structure property test; construction specification and matters needing attention.

3.4.4 Foundation plan

1. Draw the positioning axis, position of foundation member (including bearing platform and foundation beam), dimensions, bottom elevation, and member number. The schematic drawing should be available in case of different foundation bottom elevations.

2. Mark the position, dimensions and number of structure bearing wall, pier and column. Separate plan can be drawn in the event of concrete structure, accompanied by the dimensions of section change.

3. Mark the plan position, dimensions and elevation of trench, pit and confirmed equipment, as well as the position, dimensions and elevation of reserved holes and embedded parts in the case of 0.000 elevation without basement.

4. Requirements of settlement observation and stations' layout (It will be preferable that detailed drawing of station structure is attached.)

5. The specification should include bearing stratum for foundation, depth of foundation's bearing stratum, bearing capacity eigenvalue for foundation, measures and requirements for foundation trench backfill and relevant construction requirements, etc.

6. As for pile foundation, pile plan position and positioning dimensions should be stated, as well as the description of pile type, top elevation and embedded depth. Pile ends' bearing stratum, bearing stratum depth, construction requirements, requirements of piles' tests and inspection for pile foundation (Separate positioning plan should be prepared if test pile is carried out beforehand), mark allowable limit bearing value of a single pile.

7 When compositing foundation artificially, it is necessary to draw the treatment scope and depth of composite foundation and the plane layout of the replacement stake as well as its material, performance requirement and constructional detail; mark out the relevant parameters and examination requirements such as the characteristic value of composite foundation bearing capacity and compression modulus.

When composite foundation is designed by other qualified designing units, the main designers should clearly put forward control requirements for characteristic value and deformation value of composite foundation bearing capacity

3.4.5 Details of foundation

1 For unreinforced spread foundation, it is necessary to draw the profile, foundation beam and damp course location; and meanwhile label the overall dimension, dimension, elevation and location dimension.

2 For spread foundation, it is necessary to draw the plane, profile, reinforcement and foundation pad; and meanwhile label the overall dimension, dimension, elevation and location dimension.

3 For pile foundation, it is necessary to draw the profile of apron piece or the plane, profile, cushion and equipments of pile cap; label the overall dimension, dimension, elevation and location dimension; draw constructional detail(drawing another charter is permitted) and connection constructional detail between pile and pile cap.

4 You can refer to the beam and plank drawings of cast-in-site floor to present raft foundation and box foundation, but the position of bearing wall and pillar should be drawn. When late poured band is required to arrange, plane position should be shown as well as constructional drawing. For raft foundation and basement foundation, it is necessary to draw the plane and profile of reinforced concrete wall as well as its reinforcement; and when there exist too many or a bit complicated reserved holes and embedded parts, you can make the wall's template drawing anew.

5 You can refer to the beam drawing of cast-in-site floor to present foundation beam.

6 Add explanations about the variety, specification and performance of basic material, the seepage resistance grade, cushion material, filling material at the mouth of the cup, thickness of concrete cover as well as its requirements for construction.

Notice: for unreinforced spread foundation, spread foundation, foundation beam and pile cap which have simple shapes and are regular, you can show them with tabulation method.

3.4.6 Structure plan

1 The structure plan of general constructions should include the structure plan of each floor and the roof. The concrete content is as follows

1) Draw locating axis as well as location dimension of beam, pillar, bearing wall and constructional column resisting to earthquake; and meanwhile mark out the number and floor elevation

2) Mark out the spanning direction and number of precast slabs, amounts and elevation of slab-bottom; Scale out the size and location of reserved holes, position and type of precast beam and of hole passing through beam, and elevation of beam-bottom.

3) For cast-in-site pole, it is necessary to mark out boards' thickness, boards' height and reinforcement (you can also offer proportion-amplified reinforcement graph, if necessary, make template and quota drawing of cast-in-site floor respectively.); It is necessary to draw local section in the place of elevation or where poles' thickness changes. When there are reserved holes, embedded parts and decided equipment foundation, it is necessary to show the specification and position. You also should strengthen measures at the edge of the hole. When reserved holes, embedded parts and equipment foundation are complicated, you can draw anew in an amplified way.

4) When there are circle beams, it is necessary to mark out position, number and elevation. You can draw single-track plane diagram with small scale.

5) You can draw oblique lines to mark out the number and the detail drawing number between staircases.

6) Draw generator room structure layout plan (between floor and top) among elevators; Mark out the number of beam slabs, thickness and reinforcement of slabs, size and position of reserved holes, board elevation as well as hooks' plane position and detail drawing.

7) The content of roof structure layout plan is similar to that of floor surface. When the structure falls, it is

necessary to mark out roof plate slope, slope aspect and board elevation at the beginning and end of slope aspect. When the roof has reserved holes and other facilities, it is necessary to draw their position, size and detail. Draw the position, number and detail of parapet or parapet constructional column.

8) When you choose the joint in standard drawing or offer another joint constructional drawing, the index number of drawing should be marked out in the plane graph.

2 For monolayer spacious buildings, it is necessary to draw component layout and roof structure layout. The content is as follows:

1) Component arrangement should show locating axis, wall and pillar. The arrangement, number, component elevation and drawing index number of overpass, lintel, gate tower, awning, column bracing and coupling beam should be shown. And meanwhile add relevant explanations.

2) Roof structure layout should represent locating axis(wall and pillar cannot be drawn), the position and number of roof structure component, arrangement and number of support system, position of reserved holes, size, index number of joint drawing and the relevant explanations.

3.4.7 Reinforced concrete component drawings

1 For cast-in-site component(the drawing of cast-in- site beam, board, pillar and wall), it is necessary to draw the following:

1) Draw the longitudinal profile, length, location dimension, elevation and support of reinforcement, beam and board. For the cast-in-site pre-stressed concrete component, it is necessary to draw pre-stressed reinforcement positioning map and put forward anchorage requirements.

2) Transverse section, locations dimension, cross-sectional dimension, reinforcement.

3) If necessary, you can additionally draw wall facade.

4) If the steel bar is too complicated and not easy to show clearly, it should be drawn separately.

5) For reserved holes and embedded parts which have an effect on the component force, it is necessary to mark out their position, size, elevation, reinforcement at the edge of holes and embedded part number.

6) For curved beam and plane folding beam, it is proper to draw additional plane graph. If necessary, you can make spreading drawing.

7) The beam, pillar and wall of general cast-in-site constructions can be drawn with the integrated method of plane expression; mark out when the characters are dense; longitudinal and cross beams should be drawn with two kinds of plane

8) Apart from the narrated general instructions, the special explanations should be added

2 For prefabricated components, it is necessary to offer the following content:

1) Component template drawing should show template size, axes relations, position of needed reserved holes and embedded parts, size, embedded part number and necessary elevation; the extensive pesters component should indicate location dimension of reserved channels, spread pull end and anchor zone.

2) Component reinforcement drawing: Longitudinal profile indicates steel bar form and diameter and interval of stirrup. When reinforcement is complicated, non-pesters reinforcement should be drawn separately. For transverse section, it is necessary to mark out cross-section dimension, the specification of steel bar, position and amounts.

3) Content requiring supplementary explanations

Attention: the cast-in-site or precast elements which have simple shapes and are regular, when satisfying above-mentioned regulations, can be presented with tabulation method.

3.4.8 Joint configuration details

1 For cast-in-site reinforced concrete structure, it is necessary to draw joint constructional drawing (you can adopt the universal atlas of standard design).

2 For the joint of prefabricated construction as well as the detailed drawings of beam, pillar and wall anchor, it is necessary to draw plane and profile and mark out mutual location relation, component code, interconnector and specification, type, performance and amounts of additional reinforcement (or embedded parts), as well as method of connection and relevant requirements for construction installation and post-cast concrete.

3 Content requiring supplementary explanations

3.4.9 Other drawing

1 Staircase drawings: It is necessary to draw structural plan layout and sections of each stair and mark out size, component code, and elevation. Drawings of ladder beam and board can be made with tabulation method.

2 Embedded parts: it is necessary to draw their plan and profile and mark out size as well as the specification, type, performance and requirements for welting of steel bar and anchoring bar.

3 Special structure and building structures: such as pool, water box, flue, pipe support, trench, retaining wall, storehouse, large scale or specially required equipment foundation and working platform, all these should be drawn individually; it is necessary to draw plane, profile of characteristic sites and reinforcement and meanwhile mark out location relation, size, elevation as well as the variety, specification, type and performance of material.

3.4.10 Structure design document of architectural curtain wall

1 According to relevant standard regulations, there should be the design calculation sheet of curtain wall under the vertical and level load action.

2 Construction drawing includes:

- 1) Cover and contents (the single one should form another volume).
- 2) Curtain wall component elevation layout. Within it, it is necessary to mark out external wall coating and verticality as well as the variety, specification, type and performance of level keel material(or steel cable).
- 3) Wall material and keel, connection of keel of various directions and constructional drawing.
- 4) Constructional drawing of connection between primary keel and main structure and the variety, specification, type and performance of connectors

Notice: when the structural design of architectural curtain wall is designed by qualified curtain wall company under the requirements of architectural design, the main structural designers should examine the safety of curtain wall and the connected main structure.

3.4.11 Steel structure

1 Steel structure design and construction drawing can be divided into two stages: steel structure design drawing and steel structure construction drawing.

2 Steel structure design drawing should be completed by the design-qualified design organizations and the content and depth of design drawing should satisfy the requirements of organized steel structure design drawing. Steel structure construction drawing (namely process and manufacture drawing) should be generally completed

by organizations which possess qualification of special steel structure design or by other units that have this aptitude.

Notice: if the design contract doesn't require to design steel structure construction drawing, the content of steel structure design then only includes steel structure design drawing.

3 Steel structure design drawing

1) Design instructions: design basis, load material, project category, project situation, type and quality grade of steel to be used (if necessary, it is necessary to put forward the physical and mechanical property and the requirements for chemical composition), type and specification of connectors, quality grade of welding seam, anticorrosion and fire prevention measures.

2) Basis plane and its drawing should show the constructional drawing of connection between steel column and under part concrete components.

3) In structural plane layout plan(including each floor and roof), it is necessary to mark out location relation, elevation, position and number of components(you can arrange single-track drawing), and joint drawing index number. If necessary, it is necessary to draw layout of purlin and wall beam and key profile chart. For space truss, it is necessary to draw upper and lower chords as well as the key profile chart.

4) Drawings of components and joints

a) Simple steel beam and column can be represented with universal drawing and tabulation method. Please mark out type, size, specification and stiffener practice of steel at the bought year, connection joint drawing, as well as requirements for construction and installation.

b) For lattice beam, pillar and support, it is necessary to draw plane, profile(if necessary, add facade), location dimension, overall dimension and dimension; meanwhile mark out type and specification of each single component, assembly member and other components' connection drawing.

4 Steel structure construction drawing

According to steel structure design drawing, you can work out the enlarged drawing of each part constituting structural component; mark out part dimension, requirements for materials, machining accuracy, requirements for process and quality grade of welding seam; number the parts; and consider the subsections and assembly joints of transport and installation capacity decided components.

3.4.12 Structure calculation sheet(for internal filing)

1 For structure calculation sheet by way of hand-calculation, components' layout diagram and calculating diagram should be offered; the content of structure calculation sheet should be complete and clear, its calculation steps should be logical and the quoted data should have reliable evidences. When adopting calculation chart and less frequently used calculation formula, it is necessary to mark out their sources and component number. The calculation results should be consistent with the drawing.

2 After calculating with computer program, it is necessary to mark out the name, code, version and organization unit of the adopted computer program; calculation program must be effectively examined and approved (or identified); computer calculation results must be analyzed and accepted. The total input information, calculation models, geometry diagram, load diagram and result output should be finished into a volume.

3 When you adopt structural standard chart or recycle, it is proper to do some necessary checking work on the basis of atlas illustration and in combination with the project.

4 All the calculation sheets should be proofread, signed at their covers by the designer, proofreader and auditor and finally filed as technical documents.

3.5 Architectural electricity

3.5.1 At the design stage of construction drawing, the architectural electricity professional design document should include list of drawings, construction design instructions, the main device-table of design drawing and calculation sheets (for internal usage and filing).

3.5.2 List of drawings: first list new designed drawings and then reuse charts.

3.5.3 Construction design instructions

1 General situation of project design: it is needed to input the main indexes of preliminary design instruction(or project) after being examined, approved and decided.

2 Requirements for construction and points for attention of various systems(including wiring and equipment installation).

3 Requirements for equipment ordering(you can also enclose them to the corresponding chart).

4 The relevant content of lighting protection, ground protection and other systems(you can also enclose it to the corresponding chart).

5 This project chooses atlas number and page of standard drawing.

3.5.4 Design drawing

1 Construction design instructions, additional graphic symbols and the main device-table can constitute the front sheet. When the content is too much, you can set up another page separately.

2 General layout of electricity (when it is single design, this content can be omitted).

1) Mark out the name or number of buildings, layer or elevation, road, topographic contour and installation capacitance of users.

2) Mark out position and number of invariant and distribution substation; sets and capacity of transformers and generators; number and type of outdoor distribution box; as well as specification, type and capacity of outdoor lamps and lanterns.

3) For overhead line, it is necessary to mark out specification and trend of the line, circuit number, pole number, file number, file distance, pole height, cable, repetitive ground and arrester(add option list of standard drawing

4)For cable line, it is necessary to mark out line trend, circuit number, type and specification of cable, laying mode (add option list of standard drawing) and manhole(handhold) position.

5) Scale and compass

6) For the content that is not expressed clearly in the chart, you can add another chart to give a general explanation.

3. Distribution substation

1) High-low voltage distribution schematics (primary circuit diagram)

In the diagram, it is requested to indicate the type and specification of the bus bar; the type and specification of the transformer and generator; the type, specification and setting of the switch, circuit breaker, mutual inductor, relay and electro technical instruments (including metering devices).

Indication below the diagram: code of the switch cabinet, type of the switch cabinet, code of the circuit, plant

capacity, calculated current, the type, specification and laying way of the conductor, the users' name, and the secondary principle scheme number (if the cellular switch cabinet is used, we can increase the height of the cell or the number of modules).

2) Layout and section

Draw the layout and section and installation dimension of the transfer, generator, switch cabinet, control cabinet, direct current and signal cabinet, compensating box, outrigger, trench and earthed system in proportion. If the standard drawing is selected, the indication is required of the drawing number, page, the code of the circuit of coil in and outlet and its laying and installation and the drawing shall include the proportion.

3) Relay protection and signal schematics

relay protection and the secondary schematics of the signal shall use the standard drawing or general drawing. If it is necessary to revise the selected drawing, it is only requested to draw the revised part and indicate the revision requirement.

As to the control cabinet, direct current power supply, signal cabinet and operation power supply, it is requested to use standard products and indicate the type, specification and requirement of the relevant products.

4) Vertical distribution schematics

The schematics shall be drawn according to the floor where the equipments are installed, from the power supply to the terminal power distribution box, taking the construction as the unit. It should include the number, capacity of the transfer in the distribution station, the number and capacity of generator, the code of the terminal power distribution boxes, the code of the circuit from the power supply (in conformity with the system scheme) and the specification of the grounding main line.

5) Relevant drawing explanation

As to those not expressed clearly, the explanation is requested.

4. Power distribution and illumination

1) Distribution box (or control cabinet) system scheme should include the indication of the code and type of the distribution box and the code of the circuit of the coil in; the indication of the type, specification and setting of every switch (or fuse); the indication of the code of power distribution circuit and the type and specification of guide lines (the phase is requested as to single-phase load) and the principle scheme is requested as to the circuit with certain requirement; the users' names are requested as to important load power supply circuit. In case the above mentioned distribution box (control cabinet) system is complete in the layout plan, it's not necessary to provide a distribution (or control cabinet) system drawing.

2) The distribution plan drawing should include the doors and windows of the construction, the walls, axes, main measurements and the code and capacity of the processing equipment; distribution box and control cabinet and their codes and type and specifications; drawing the starting and terminal point of the circuit (including the control lines) together with the scale, code, and laying way of the circuit and the drawing shall indicate the portion.

3) Illumination plan shall include the doors and windows of the construction, the walls, axes, the main measurements, the indication of the name of each room; drawing the layout of the distribution box, lamps, switches, plugs and circuits; the indication of the code of the distribution box, the code, phase, type, specification, and laying way of the main line and branches; if the secondary decoration is required, the illumination plan shall be designed accordingly. However, the distribution or illumination plan shall indicate the reserved illumination

distribution box and the reserved capacity; the drawing shall indicate the proportion.

4) Relevant explanation is requested if there is some content not expressed clearly

5. Thermal testing and automatic regulatory systems

1) As for general projects, approved product is a better option only with the processing requirements.

2) For the automatic regulatory system requiring special design, the following drawings are essential: the

principle system scheme of thermal testing and automatic regulatory systems, the block diagram of the automatic regulating, the layout of the instruments panel, wiring layout of the terminal strip, distribution system diagram instruments panel, for the instruments pipeline system diagram, the layout of instruments in the boiler room, stock list for the main equipments and design illustration.

6. The monitoring system of buildings and equipments and the system integration

1) Block chart of the monitoring system, drawn till the terminal of DDC.

2) The chart shall indicate the requirements, number of spots and location of relevant equipment monitoring.

3) Cooperating with the contractor to know about the status of the construction and requirement and inspecting the deepen design drawing provided by the contractor.

7. lightning protecting, grounding and safety

1) Drawing the layout of the top of the construction shall include main axes, measurements, elevation and the indication of the location of the lightning rod, lightning-protection, and down leads; the indication of the type and specification of the materials and the code and page of the standard drawing involved; the drawing shall indicate the proportion.

2) Drawing the ground layout (which can be coincided with the layout of lightning protection top layer), draw the location of the grounding wires, grounding electrode, and breaking of contact; indicating the type, specification and relative measurements as well as the code and page of the standard drawing (this drawing is not necessary when using natural grounding system); the drawing shall indicate the proportion.

3) If the rebar in the reinforced concrete in the construction is used for the lightning protection lightning receiver, down lead and grounding system, the indication is requested of point of junction, test point of grounding resistance, the location and laying of the embedded part and the indication of code and page of the drawing involved.

4) The illustration shall include the following content: the type of lightning protection and relevant measures

(including preventing from side flash, lightning electromagnetic impulse and high voltage introduction); the type of grounding system and the requirements for the grounding electrode materials, laying and grounding resistance; the measures adopted if the pile foundation and the internal steel bar is used as the grounding electrode.

5) As for other requirements for the electrical system and safe grounding in addition to lightning protection grounding (i.e. power supply grounding, direct current grounding, local potential grounding and general is potential grounding), if the shared grounding system is adopted, it should be illustrated in the grounding layout, otherwise the relevant drawings are requested (such as the layout of the partial potential).

8. Automatic fire alarm system

1) Automatic fire alarm system, fire linkage control schematics, illustration of construction and design, the requirement for alarming and linkage control;

2) The layout of each floor shall include the location and wiring connection of equipments and devices; the type and specification of circuits and their laying.

9. Other systems

1) The schematics of each system

2) Specification of the location and installation of each equipments and the type and specification and laying of the wires.

3) Coordinate the system contractor to learn about the situation and requirements of the corresponding systems; and review the deepened design drawings provided by the system contractor.

3.5.5 Main equipment list

Indicating the name, type, specifications, unit and quantity of main equipments.

3.5.6 Calculation sheet (for internal usage and filing)

The calculation sheet in the phase of construction drawing designing only needs the part that should have been calculated in the preliminary design phase and revise those parts that needs a new calculation due to the changes in the preliminary design phase.

3.6 Water supply and drainage

3.6.1 In the phase of designing construction drawing, the professional design documents of water supply and drainage should include the drawing content, design specification of the drawing, design paper, main equipment list and calculation sheet.

3.6.2 Drawing content: new drawing is at first followed by the selected standard drawing and recycled drawings.

3.6.3. General design specification

1. General design specification

1) Brief introduction about the design basis

2) General introduction about the water supply and drainage system, main technical data (such as the maximum daily water consumption, the maximum hourly water consumption, the maximum daily drain discharge, the maximum hourly hot water consumption, heat consumption, recirculation cooling water and the design parameter of every fire extinguishing system and the total water consumption), control methods; the running and operation specification is needed if there is large purification processing plant or complicated processing.

3) Any construction requirements that cannot be expressed with drawings should be illustrated with the design.

4) If there are special specifications, they can be listed on relevant drawings.

2. Diagram

3.6.4 The general layout of water supply and drainage

1. Draw the outline, name, location, elevation and north arrow of the construction
2. Draw the location of all water supply and drainage network and construction, the distance, inspection well, and the type and detailed index number of the septic-tank.
3. As for relatively completed projects, the separate drawing of water supply and drainage (rain water and sewage water) is requested for the convenience of construction (one drawing is enough for simple projects).
4. Indicating the diameter of the pipe, its buried depth and elevation; indicating the length of the pipe and drawing the node diagram; indicating the node structure, sluice station shaft measurements and its code and involved detailed drawings (as for general projects, the nodding diagram is not necessary)
5. The drain pipe shall be indicated with the code of inspection well and the flow direction of water, and the location, elevation, diameter and flow direction of the municipal pipe network in the juncture of the pipes.

3.6.5 Table of elevation and longitudinal section of the drainage pipeline

1. Draw the table of elevation of the drainage pipeline including the code of the inspection well, distance, diameters, slope, elevation of the ground design and the bottoms elevation inside the pipeline. As for simple projects, the above mentioned contents can be indicated in the layout plan instead on the table.
2. As for the drainage pipeline in complex landform and that of many junctures, the pipeline sectional plan is needed. The plan should indicate the elevation of the ground design, the elevation of the pipeline (injection center of the water supply pipe and the inside bottom of the pipe), diameter, slope, shaft space, shaft number, depth together with the diameter, location and elevation of the cross pipe; the sectional plan shall be drawn in the proportion as follows: vertical proportion: 1: 1000 (or 1: 50, 1: 200; horizontal proportion: 1: 500 (or in consistency with the general layout plan) .

3.6.6 Water intake project general layout

Indicating the topographic contour of the territory of the water intake projects, the water intake head, intake line (natural flow line), collecting well, pumping house, trestle bridge, refueling slot gate and the location, measurements, coordinate of the corresponding additional buildings, the diameter, length, orientation of the pipeline and the building list is requested.

3.6.7 Intake project flow schematics(or section)

The general project can be drawn on the same paper with the general layout while relatively large and complicated one should be drawn separately. The drawings should indicate the elevation's relation between each building, the highest, lowest and permanent water level and elevation of the water source.

3.6.8 The plan / section and detail of the water intake head (water intake)

1. Draw the location of the water intake head and the terrain layout of relevant rivers and banks; indicating the coordinate, elevation and orientation of the rivers, banks and general construction.
2. The details should indicate the measurements, structure, diameter and involved detail of each part.

3.6.9 The plan / section and detail of the pumping house

Indicating the basic dimension of the equipments (including the location of the foundation bolt and the measurements), the relevant location, measurements and elevation of relevant pipeline, valves, accessories, instruments, distribution and sling-equipment; it is required to list the equipments and materials and indicate the type and specifications of all equipments and the specifications of the accessories and the specifications of pipelines, valves.

3.6.10 The plan / section and detail of other buildings

Including the collecting well, metering equipments and transfer gate well.

3.6.11 Water pipeline

Indicating the plane location and measurements of the pipeline, accessory equipments and gate on the strip relief map; indicating the diameter, length, elevation, coordinate and orientation; it depends on the complexity of the terrain of the project whether it is necessary to draw a separate profile of pipeline.

3.6.12 The general layout and elevation schematics of the water treatment plant (station)

1. Indicating the plane location, road, elevation and coordinate of each building; the pipeline connecting the buildings, diameter, gate well, inspection well; the plane location and measurements of field for chemicals and filter materials.

2. The elevation schematics shall indicate the elevation and flow relations between various buildings.

3.6.13 The plan / section and detail of various water purification buildings

Drawing separately the plan, section and detail of various buildings; indicating the detailed measurements, elevation, structure, diameter and diameter of the embedded pipe of the pool walls as well as the measurements, location, structure and referred detail of jacketed pipes.

3.6.14 Plan and section of pump room

Note: it generally refers to the booster pump room designed for the situation when the water supply pressure of the urban supply network is not sufficient, the secondary booster pump room after purification of water or underground water intake pump room.

1. Plan

The outer frame and pipe location of water pump should be indicated; the main equipment materials should be listed; the location and size of the equipment model, specifications, pipe diameter, valves, lifting equipments, metering equipments etc. should be marked. If the vacuum pump or other water diversion equipment is required, relevant pipe system, plan location and drain equipment should be drawn.

2. Section

The following should be drawn: the section size, elevation of pump foundation; the installation elevation of pump axial pipe and valve; the location and elevation of waterproof sleeve. For the simple structure pump room, sectional drawing is not required if it is clear enough with the axonometric drawing of system.

3.6.15 Piping and detail of water tower (tank) and water pool

The plan/section or axonometric drawings of system and detail of the inlet, outlet, drain, overflow, ventilation pipes of water tower (tank) and water pool should be respectively prepared; indicating the pipe diameter, elevation, max. water level, min. water level, fireproof reserved water level etc. and the water storage capacity.

3.6.16 The plan, section and schematics of the structures of circulating water

In case of the system with circulating water, the structures of circulating and cooling water system (including water consumption equipments, cooling tower etc.) should be drawn; the plan, section and schematics of the circulating water pump room and various circulating pipelines should be drawn (if the axonometric drawing is prepared, there is no need to prepare the section drawing).

3.6.17 Sewage treatment

For centralized sewage treatment or local sewage treatment, the plan and elevation flow chart of the sewage treatment station (room) should be prepared; and the plan, section and detail of various structures should be also prepared. For depth of their content, please refer to the drawings of the water supply part (Article 3.6.12, Article 3.6.13).

3.6.18 Water supply and drainage drawings of the buildings

1. Plan

- 1) Draw the plans of various levels related to the arrangement of water supply, drainage and fire water supply pipes, including the main axis No., room name, location of water consumption point, while indicating the various pipe system No. (or legend).
- 2) Draw the layout of water supply, drainage and fire water supply pipelines, the position and No. of risers.
- 3) When the unfolded schematics is adopted, the pipe diameter and elevation should be marked (signs should be marked clearly where the installation height of water supply water is changed, and the elevation should be marked) (the elevation of pipe end should be marked for the horizontal drainage pipes). Section drawing should be drawn in the plan for the places with concentrated pipes, indicating clearly the layout position of the pipes.
- 4) In the plan of the first floor, the inlet channel, drainage pipe, pump coupling etc. should be indicated; the positioning size of buildings, the elevation of pipes passing through the external wall of the buildings and the waterproof sleeves etc. should be marked, together with the north orientation.
- 5) The elevation of various floors of the buildings should be marked (if the elevation of equipments in the toilet is different, it should be marked otherwise); the location of extinguishers should be also marked.
- 6) If there are various kinds of pipes, and it is not enough clear within one drawing, the drainage plans and firewater supply plans can be separately drawn.
- 7) For the places with many drainage equipments and pipes, for example, pump room, water pool, water tank room, heat exchange station, drink water room, toilet, water treatment room, alarm valve door, fireproof gas bottle storage room etc., partial magnified plans should be drawn if the plans mentioned above are not enough to make them clear.

2. Schematics

1) Axonometric drawing of system

For water supply and drainage system as well as the fire water supply system, generally the axonometric drawings of various pipe systems should be drawn in proportion. In the drawings, the followings should be marked: pipe direction, pipe diameter, instrument and valve, elevation of control point and pipe slope (the pipe slope is not required to be indicated if it is already informed in the design notes), various system No., connection positions of hygienic equipments and process water equipment at various floors. If the hygienic equipments and connection pipes (branch pipes) of various floors (or certain floors) are totally the same, the connection pipe drawing of one representative floor is enough on the axonometric drawing of system, and indicate the other floors are same as this floor. The complicated edges and nodes should be drawn with partial magnification. On the axonometric drawing of system, the elevation, floor number of the building floors and the elevation difference between the indoor and outdoor architectural plane should be marked. Axonometric drawing should be drawn for the pipes of toilet.

2) Unfolded schematics

If the design content can be explained clearly with the unfolded schematics, then unfolded schematics can be prepared. On the schematics, the followings should be marked: diameter of riser and horizontal pipe, rise No., floor elevation, floor number, instrument and brake, various systems No., connection of hygienic equipment and process water equipments of various floors, height away from the ground (floor) of inspection point of riser of drainage pipe, ventilation cap etc. If the hygienic equipments and connection pipes (branch pipes) of various floors (or certain floors) are totally the same, the connection pipe drawing of one representative floor is enough on the unfolded system drawing, and indicate the other floors are same as this floor.

3) If in the plan of automatic water spray extinguishing system, the pipe diameter, elevation, distance between spray heads and positions are indicated clear, the pipes and spray heads between the water flow indicator and the water test device (test valve) at the end can be indicated in a simplified way.

4) For the simple pipe sections, it is enough to indicate the pipe diameter, slope, direction, inlet and outlet water pipe position and elevation on the plans, with no need to draw schematics.

3. Local facilities

When there are lifting, adjusting or small local supply and drainage water treatment facilities in the buildings, the plans, section (or axonometric drawings) can be prepared, or the cited detailed drawing and standard drawing No. can be indicated.

4. Detailed drawings

Detailed drawings should be prepared for the special pipes, if there are neither definite product models nor standard drawings available.

3.6.19 Main equipment material list

The main equipments, instruments, appliances and pipe auxiliaries, accessories can be listed in the front page or relevant drawings.

3.6.20 Calculation sheet (for internal use)

The design calculation of construction drawings stage can be carried out as per the approval comments of preliminary design.

3.6.21 In case of joint design, the design of construction drawing should be made as per the concrete works based on the preliminary design documents approved by the main design party.

3.7 HVAC and air adjustment

3.7.1 At the design stage of construction drawing, the design documents of HVAC and air adjustment should include the drawings preparation, design and construction instructions, equipment list, design drawings, and calculation sheets.

3.7.2 List of drawings

The newly prepared drawings should be listed, then followed by the selective standard drawings or drawings for repeated use.

3.7.3 Design instructions and construction instructions

1. Design instructions

The design overview and HVAC indoor and outdoor design parameters should be introduced: heat source, cold source situation; heat media, cold media parameters; heating load, heat consumption index and total system resistance; cold and heat load, cold and heat energy index of air conditioner; system form and control method. If necessary, the operation key points of the system should be indicated, for example, the season transformation of air conditioning system, wind route transformation of smoke discharge proof system.

2. Explanation on the construction.

The materials and accessories to be used, system's working pressure and pressure test requirements, construction and installation requirements and points for attention should be explained in the design. The radiator model should be indicated in the heating system.

3. Legend

4. When the design content of the specialty is undertaken by two or more units, the design division should be defined.

3.7.4 The equipment list, construction drawing stage, model, specification columns, the detailed technical data should be provided.

3.7.5 Plan

1. Draw the building outline, main axes Number, axes size, indoor and outdoor floor elevation and room name. A compass should be drawn in the plan of the first floor.
2. In the heating plan drawing, the position of radiator should be marked, indicating the pieces or length, heating main pipe and riser position, No.; the places of pipe valve, exhaust, water leakage, fixed stand, retractor, inlet device, pressure relief device, steam trap, pipe duct and inspection hole; indicating the main pipe diameter and elevation.

3. For the buildings with more than 2 stories, if their construction plan is the same, one same drawing can be shared from the second storey to the top storey for heating plan. While the number of radiators should be marked independently.
- 4 The wind pipes should be drawn with double lines for ventilation and air conditioning plan, and single line for cold and hot water, condensed water pipes of air conditioners. Indicate the size and elevation of wind pipes, size of tuyeres (pipe diameter for round wind pipes, and WXH for rectangular wind pipes); indicate the water pipe diameter and elevation; indicate the installation positioning size and of various equipments and tuyeres; indicate the position of various parts such as silencer, regulating valve, fireproof valve etc. and the air flow direction of wind pipe and tuyeres.
- 5 When the architectural decoration is not defined, the single line diagram can be prepared for wind pipe and water pipe, indicating the air supply and return volume of room, or the quantity and specifications of fan coil. After the building decoration is defined, the plan should be drawn as requested.

3.7.6 Section of ventilation and air conditioner

1. For the connection crossing and complicated parts of wind pipes or pipes with equipments, the section drawing or local section drawing should be prepared.
2. Draw the size relationship between the wind pipe, water pipe, tuyere, equipment etc. and building beams, slabs, columns and the ground.
3. Indicate the size and elevation of wind pipe, tuyere, water pipe etc., air flow direction and index number. of detailed index.

3.7.7 Plans of ventilation, air condition, and refrigeration machine room.

1. The machine room picture should be enlarged as per the actual need. Indicate the outline position and number. of ventilation, air conditioning, refrigeration equipments (for example, chilled water unit, fresh air unit, air conditioner, cold and heat water pump, cooling water pump, ventilator, silencer, water tank etc.); indicate the distance of equipment and foundation away from the wall or the axis.
2. Draw the position and route of wind pipe and water pipe of connecting equipment, and indicate the size, pipe diameter and elevation.
3. Indicate the position of all equipments and pipe accessories in the machine room (including various instruments, valves, flexible short pipes and filters etc.).

3.7.8 Section of ventilation, air condition, and refrigeration machine room.

1. When other drawings cannot express the relative relationship and vertical position of complex pipes, section should be prepared.
2. In the section, the vertical position, vertical size and elevation corresponding to the equipments, equipment foundation, pipes and accessories should be drawn. Indicate the pipe position size of connecting equipments; and indicate the equipment and accessories No. and index No. of detailed drawings.

3.7.9 System drawing and three-dimensional pipe drawing

- 1 In case of a household heat measuring of indoor heating system or a small heating system, when the ichnography can't show clear, then the perspective picture should be drawn, the ratio should be consistent with the ichnography, by 45 ° or 30 ° axis side of the projection view; Regarding multi-layer and high-rise building's central heating systems, three-dimensional pipe drawing should be drawn and numbered. The drawings should indicate the pipe diameter, gradient direction, elevation, radiator type and quantity.
- 2 Heat, refrigeration, air conditioning hot and cold water systems and complex wind system should draw system flow chart. System flow chart should draw the equipment, valves, control instruments, accessories, label media flow, pipe diameter and device number. Flow chart can be drawn without following the scale ratio, but the branch pipes should be consistent with the plans.
- 3 When heating, heating branch waterway of air-conditioner adopt vertical transmission, three-dimensional pipe drawing should be drawn and numbered, also pipe diameter, gradient direction, elevation and air conditioner type should be indicated.
- 4 When there is monitoring and controlling in air-conditioning, refrigeration system, there should be control schematic drawing, indicating the devices, sensors and control components' location via legend on the drawings; give out the control requirements and the necessary control parameters.

3.7.10 Detail

- 1 All kinds of equipment and spare parts' installation for heating, ventilation, air conditioning, refrigeration system, should be marked with name and number of the standard drawing and general drawing adopted. . When there is no existing drawings available, and the design intent needs to be explained, all detail should be prepared.
- 2 Simple details can be introduced from the detail and partial detail view should be drawn; the production detail or detail with complex installation should be drawn separately.

3.7.11 Calculation manual (for internal use only)

1. Calculation manual's content is made as the difficulty of the engineering, and calculated according to the regulations, specifications of the state and technical measures of the unit.
- 2 When using a computer for calculation, the calculation manual shall indicate the name of the software, with the appropriate simple drawing and input data attached.
- 3 Heating engineering calculations should include the following:
 - 1) Calculation of building surrounding structure's heat loss;
 - 2) Electing calculation of radiators and heating equipment;
 - 3) Calculation of heating system's pipe diameter and hydraulics
 - 4) Electing calculation of heating system's component or device, such as water system and constant pressure system devices, expansion joints, drainage joints, etc..
- 4 Calculation of ventilation, smoke prevented, smoke emission should include the following:
 - 1) Electing calculation of ventilation amount, part exhaust ventilation amount and ventilation device ;
 - 2) Calculation of air balance amount and heat balance;

- 3) Calculation of the ventilation system equipment selection;
 - 4) Calculation of air system resistance;
 - 5) Calculation of the smoke amount;
 - 6) Calculation of the smoke prevented stairwell and front room positive pressure air supply;
 - 7) Electing calculation of anti- exhaust fan, and outlet.
- 5 Calculation of air-conditioning and refrigeration engineering should include the following:
- 1) Calculation of surrounding structure's air-conditioned room's cooling and heating load in summer and winter (cooling load calculated hourly);
 - 2) Calculation of the heat dispersing amount and wet dispersing amount from the human, lighting, equipment in the air-conditioned room, and as well as the fresh wind load;
 - 3) Model selection and calculation of air-conditioning, refrigeration system's water chillers, hot and cold water pumps, cooling pumps, cooling towers, water tanks, pool, air-conditioning unit, muffler and other equipment ;
 - 4) Necessary airflow design and calculation;
 - 5) Calculation of air system resistance;
 - 6) Hydraulic calculation of air-conditioning hot and cold water,

3.8 Thermal Power

3.8.1 During the construction design stage, the thermal power of professional design documents should include drawings directory, description of design specifications and construction, major equipment tables, design drawings, calculation manual.

3.8.2 Drawing Catalog

First list the new design drawings, then list the standard drawing, general drawing or re-use drawing.

3.8.3 Design Description and Application Instructions

1. When the design and preliminary construction plans (or programs) have a greater change, the reasons should be given and the content should be adjusted.
2. All kinds of heating load and heating requirements of this engineering.
3. All kinds of gas consumption and fuel usage.
4. The special requirements, maintenance management and special attention for design capacity, operating medium parameters (such as pressure, temperature, low heating value, density, etc.) and system operation.
5. Selection of pipes and accessories, pipe connections, pipe slope and aspect of the general work requirements.
6. Channel spacing hangers sliding table.
7. Requirements for equipment and pipeline corrosion, insulation and painting
8. Pipe compensator and the building entrance equipment.

9. Professional cooperation requirements for equipment and piping and civil engineering.
10. Requirements for construction and installation quality and safety procedures standards with equipment, pressure test piping system.
11. The cooperation of installation civil construction, and the check requirements for equipment foundation and arrival equipment size.
12. Description of symbol design adopted, followed by the construction acceptance norms.

3.8.4 Design drawings

1 Boiler room

1) Thermal power schematics

Equipment, various pipeline process should be drawn; draw the location of measuring instrumentation set.

Indicate the symbols, pipe diameter, and media flow according to this professional graphics standard, and indicate the device name or device number.

2) Draw the equipment layout, for the larger boiler room equipment, the main section should be drawn, indicating the equipment positioning size and equipment number.

3) Draw the steam, water, wind, smoke and other pipeline layout, when scale is large, pipeline systems is complex, pipeline layout should be drawn, indicating the installation location of pipeline valves, compensators joints, pipeline mounting bracket and location for site installation of primary measuring instrument. Indicate the various pipes' size and installation height, if necessary, the pipe slope and aspect should be indicated.

4) Other drawings, such as mechanized transport level, profile layout, equipment installation drawings or non-standard equipment manufacturing drawings or manufacturing conditions drawings (such as tanks, etc.) should be drawn based on the engineering situation.

2 Other power station house

1) Pipeline schematics (or perspective)

Draw schematics for heat exchange stations, gas stations and diesel generator room and other rooms; refer to boiler room for depth. Draw perspective for gas regulator stations and bottle station group, and indicate the elevation.

2) Equipment pipeline layout and sections

Draw equipment and pipeline layout, when the pipe system is much more complex, pipeline section should be drawn. For the content and depth, please refer to the relevant requirements of plan and section drawings of boiler room.

3 Indoor pipeline

1) The pipeline layout

Indicate the room name, the main axis number, elevation of various floors according to the building layout drawing, and draw the gas (steam) equipment contour size and number; draw all power pipe (by legend) attachments and trench layout, etc.; Indicate pipe diameter and building reserved hole position (width × height)

and the cave elevation; draw entry device, section squint, compensator and fixed support installation location (indicated by legend).

2) The pipeline schematics (or perspective)

According to the legend, indicate the pipe diameter, slope, gradient direction, and pipe elevation (perspective).

3) Installation detail (partial enlargement view)

If standard or general drawing is adopted for pipeline installation, should indicate the names and indexed drawing name and number, others installation detail drawing should be drawn.

4 Outdoor pipeline network

1) The pipeline layout

For general engineering, pipeline layout should be drawn; in case of more complex projects, trench, pipe rack layout and pipeline layout can be drawn separately, pipeline stent, compensator, manholes' dimensions or seat positioning should be indicated, indicating the number, pipeline length and specifications, media code.

2) Pipeline vertical section (proportion: Portrait of 1:500 or 1:1000, vertical 1:50)

Longitudinal pipeline expansion drawing (mainly applicable to more complex terrain areas) shall be marked with pipe numbers, pipe length graphic, design ground elevation, ditch elevation, pipe elevation, trench cross-section size, slope aspect, indicate sand ditch elevation when directly buried, indicate capitals elevation when overhead laying. At the same time should show the release valve, vent valve, installation of drainage devices and in-situ measurement instrumentation.

For simple project and at the flat areas, pipeline vertical section drawing cannot be drawn, but should mark directly at the main control points on the pipe layout drawing or explain the following with listed sheets: design ground elevation, pipe should laying height (or depth), pipe diameter, slope, gradient direction, trench cross-section dimensions, etc. .

3) Pipe cross-sections

Pipe cross-section (when it is simple, just use a manhole, pipeline layout, when pipeline system is more complex, cross-sections should be drawn) should show the pipe diameter, insulation thickness, two center distance, etc..

The buried pipelines shall be marked with filled sand layer thickness and depth and so on.

4) Detail of nodes

When necessary, inspection well (or pipe platform), pipe and the accessories node detail drawing should be dawn.

3.8.5 The main equipment table

List the major equipment names, specifications, the technical parameters, units and quantity

3.8.6 Calculation sheets (for internal use only)

Calculation sheets for construction drawing phase are adjusted according to the opinions of the preliminary design for approval.

1 Boiler room

The calculation after the adjustment of the system mainly process equipment, pipe hydraulic calculation, pipe bracket or fixation of a special thrust calculation, the calculation after the adjustment of steam, water, fuel consumption and storage space, calculation for small boiler room can be simplified.

2 Other power station house

Conduct adjustment calculation according to various media load, main equipment sizing calculation, major pipe hydraulic calculation.

3 Indoor plumbing

Calculation sketches and pipe hydraulic calculation (when system is simple, the data can be indicated on the sketch on the calculation manual, it's not necessary to make other calculation sheets); pipe diameter and accessories' calculation and selection; fixed bracket thrust calculation should be made on medium heat pipes.

4 Outdoor pipeline network

Calculation sketches and pipe hydraulic calculation sheet (pipe hydraulic calculation and heat pipe network hydraulic pressure drawing); the calculation of voltage regulation devices; the calculation of the stand of unbalanced bracket when overhead piping and trench laying branch; fixed buttress thrust calculation when buried directly, the selection of pipe thermal expansion and compensator and the confirmation of mounting bracket.

3.9 Modification for the estimated budget made during the preliminary design.

After the check and examination of the documents of the preliminary technical work, the design unit shall conduct specific calculation in accordance with the documents of the preliminary technical work approved by owner entity in writing. The Modification hereby is due to the change of design contents and depth compared with those in the preliminary technical work. Such Modification thus comes into being by adjusting estimated budget made during the preliminary design.

Appendix II: Ages of payment and arrangement

1. Service charge payment

1.1 Service charge should be paid in the form of installment payment in accordance with the process of the Project, referring to the table listed below.

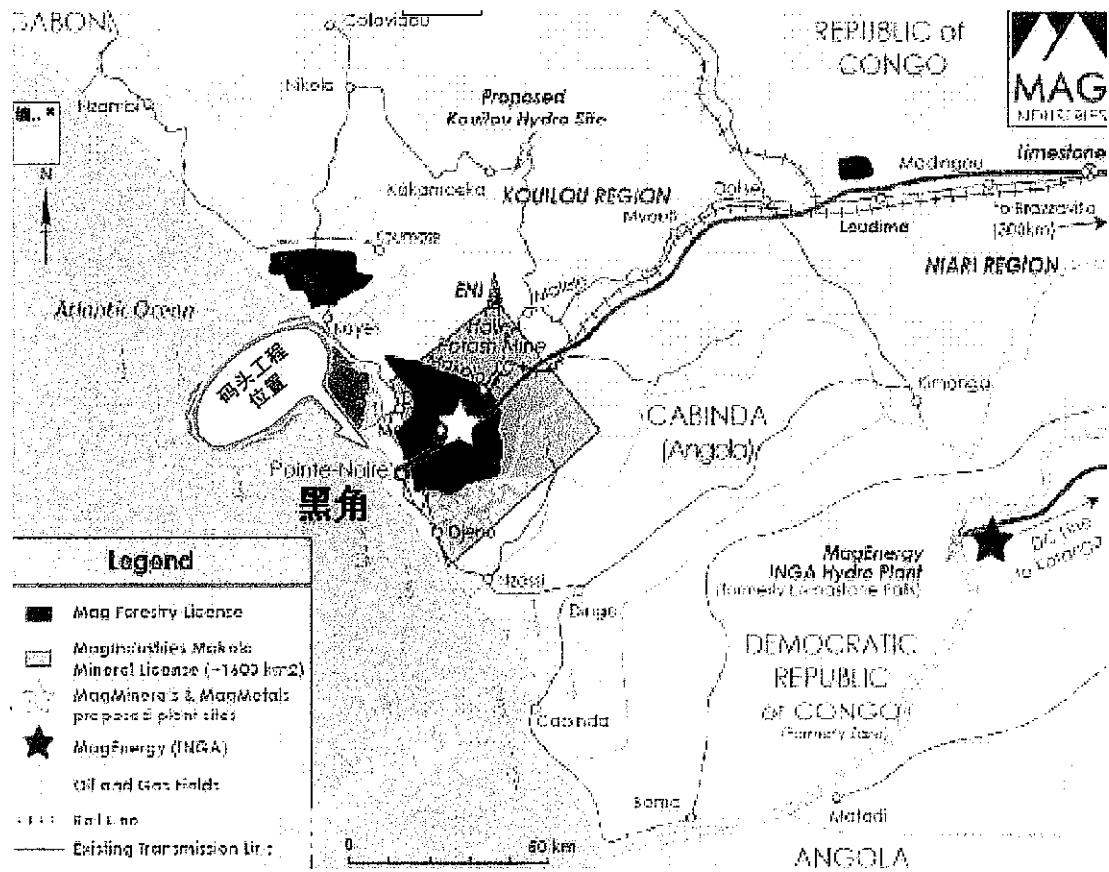
Stage	Estimated Stage Payment	Proportion of the Service charge
1	Within 15 business days, after the contract entered into effect and a performance bond which is satisfied by the Owner Entity has been provided;	20%, 7.8 million Yuan (¥7,800,000) (10% of that acts as down payment, which will be deemed as design charge after the contract comes into effect)
2	Within 15 business days after the hydrological observation of the site starts;	5%, 1.95 million Yuan (¥1,950,000)
3	within 15 business days after the preliminary design completed , being submitted to the Owner Entity for checking and finally accepted in written by Owner Entity.	25%, 9.75 million Yuan (¥9,750,000)
4	a. within 15 business days after the construction drawings completed, being submitted to the Owner Entity for checking and finally accepted in written by Owner Entity.(Owner Entity will organize experts to review and check the construction drawings within 21 days after submission by the Design Unit, if experts give out the approval report, it is regarded as a result of the acceptance by the Owner Entity); b. within 15 business days after the overall completion and acceptance of the whole project of the MagMineral 1.2 mtpa potash project in ROC;	35%, 13.65 million Yuan (¥13,650,000) 10%, 3.9 million Yuan (¥3,900,000)
5	Quality Assurance Within 15 business days after the contract defects liability period expires	5%, 1.95 million Yuan (¥1,950,000)
	Total	100%, 39 million Yuan (¥39,000,000)

- 1.2 The Design Unit confirms that the Owner Entity has paid the start-up capital US\$80,000, and it will be deducted from the down payment of the contract.
- 1.3 The Owner Entity should pay the design unit the design (consulting) service charge, (the amount is provided in Clause 1.1 of Annex II in the Contract) in the way provided in Clause 15 of the Contract, besides, if the payment delay exceeds 30 business days, pays one thousandth of the payable amount each day as the overdue penalty. If the delay exceeds 90 business days, the Design Unit is entitled to suspend works in the next phase after noticing the Owner Entity in writing. In case of various interpretations, if the Owner Entity question or refuse the invoice submitted by the Design Unit, the time for the Design Unit to modify the invoice according to the requirements of the Owner Entity should not be counted into the overdue period.
- 1.4 Unless other ways are agreed, otherwise for the service charge application, it is supposed to provide invoice to the Owner Entity within 5 business days after the estimated pay node arrived. The Owner Entity should pay in the way specified in Clause 15 of the Contract.
- 1.5 The Design Unit shall, in accordance with generally accepted accounting methods record service charge, and when required, provides the records to the Owner Entity for inspection at a time convenient to both.

Appendix III : Construction site

Geographic Position

Images in Figure 3-1 show the location of the project



Appendix IV : RFP

1. Description

The Owner Entity intends to establish a project that building a port terminal and storage which produces 1200kt potash fertilizer each year in ROC Mengo. The product nature determines that its production facilities need frontage and land area adjacent to water which can hold a certain depth for water as the port of shipment for its products. On the principle of minimizing the investment on the premise of satisfying the need for production and development, through total planning and plane layout of the plant area, taking full advantage of depth of the land area of the planned yard, vertically arranging the belt conveyor for shipping and the water front, build a 50,000t level jetty of shipment beyond the planed water front, and transport 1.2 million tons of potash fertilizer, 5 million at a specified future date, besides build a potash fertilizer compaction plant and certain warehousing facilities to fully satisfy the need of the shipment of potash fertilizer.

2. PROJECT

2.1 Preceding technical work

The Owner Entity entrusts the Design Unit to carry out the bidding work for the earlier stage technique work of the Project, including the engineering position natural conditions and the waters geological survey, and collect the basic data through the selected bid winner to provide the basis for engineering design.

2.2 Design scope of the Project

Projects of building 50,000t jetty of shipment, trestle, and bulk material storage for 150,000t potash fertilizer.

The service life of hydraulic engineering structure shall at list be (50) years.

The Design Unit shall submit the following documents:

- preliminary design, and detail (construction drawing) design as well as detailed descriptions, drawings and calculations;
- planning for the design of the whole project;
- method descriptions on different construction types and project installations; and
- Project Schedule for the Construction illustrating all important key parts and operation sequences.

2.2.1 Descriptions to hydraulic engineering

The Design Unit shall propose suggestions on the hydraulic engineering referred to and required in the aforesaid Clause 2.2. The minimum requirements on main parameter which the Design Unit shall comply with are listed as follows.

2.2.1.1 Jetty

2.2.1.2 Trestle

2.2.1.3 Warehousing facilities

3. Language and others

The Design Unit shall prepare and design the documents in Chinese and English. All the design results shall be provided in Chinese version and corresponding English version as required by Party A.

Before signing of the Contract, it shall be deemed that the Design Unit has fully investigated the Site and its surrounding environment as concerning the local construction conditions which shall include techniques and equipments. The Design Unit shall assure that design of the Project is satisfactory to the Owner, of high quality, high standard and buildable in ROC.

4. General Schedule of the project

Construction Schedule of Congo potash jetty Project

[illegible]

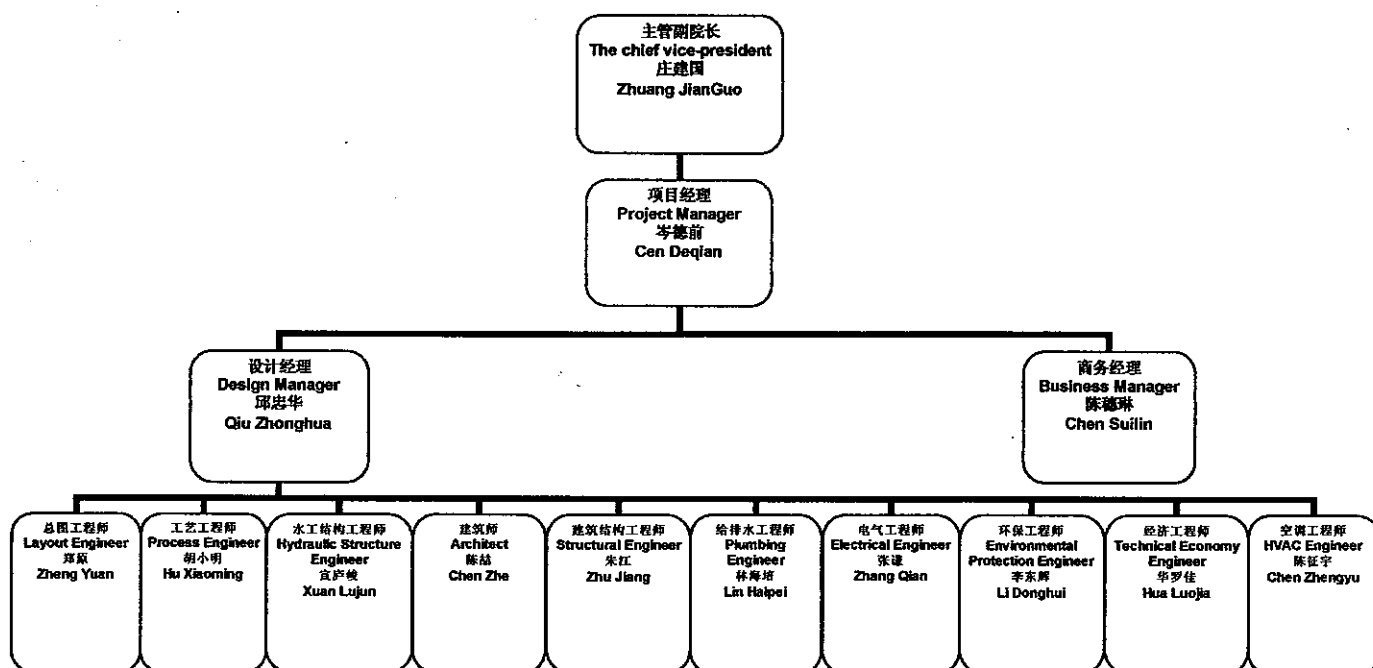
Notes:

1. The client shall provide the meteorological data at the port area of the proposed project before Sep. 30th, 2012. The meteorological data should be bought from the MPD company in advance which includes waves, tide and current information;
2. The client shall obtain the permission and authorization from the government before the Sep. 30th, 2012 including meteorological data, land survey of bathymetry, and soil investigation at the land and marine area of the proposed project. Our company will take charge of providing official qualification documents for the works mentioned above;
3. In order to meet the operation requirement of the whole project, our company worked out the jetty project construction schedule after negotiation with the client. Based on our engineering experience, we found that the time span assigned for the civil construction and set-up of the harbor handling equipment is a little harsh, and our company need to discuss the construction schedule with the constructor in addition to form the approved jetty project construction schedule;
4. This jetty project construction schedule was worked out based on the contract signed up by the client and our company in Sep. 2012.

Project: Congo potash jetty Project

Date: 12/19/2012

Appendix V : Key Personnel List of the Design Unit



Resume of Cen Deqian

Name	Cen Deqian	Gender	male	Age	38	
Position	Maritime and special engineering structure	Title	Senior Engineer		Degree	Bachelor
Work experience		15 years	Design experience			15 years
Design Certificate number						
Working Experience						
Construction Owner	Project name	Construction scale	Design period		Construction status	Design status
CSSC	Jiangnan Changxing Shipbuilding base of CSSC	Dry docks, Port basin, Jettys	12 months		In Operation	Finished
Evergreen Industries Holding Group	Dayang Shipbuilding Co. ltd	Dry dock ,Material and Outfitting Jettys	18 months		In Operation	Finished
Evergreen Industries Holding Group	Nantong Pacific Offshore Enginerring Co. ltd	Material and Outfitting Jettys	6 months		In Operation	Finished
Caofeidian Infrastructure Investment Co. ltd	Tangshan Delong Ship-repair base	Large docks , Material and Outfitting Jettys	6 months		Building	Finished

Resume of Qiu Zhonghua

Name	Qiu zhonghua	Gender	male	Age	63
Position	Project Manager	Title	professor	Degree	Bachelor
Work experience	40 years	Design experience	30 years		
Design Certificate number	JY-002				
Working Experience					
Construction Owner	Project name	Construction scale	Design period	Construction status	Design status
Dayang Shipbuilding Co.,Ltd	Shipbuilding base	~840000 square meters	Six months	Operated	Finished
Zhejiang Shipbuilding Co.,Ltd	Shipbuilding base	~500000 square meter	Six months	Operated	Finished
Zhejiang East Coast Shipping Industry Co.,Ltd	Shipbuilding base	900000 square meters,	Six months	Operated	Finished
Zhoushan zhongdianlvke Ship-repair Co.,Ltd	Ship-repair base	950000 square meters,	Six months	Operated	Finished

Resume of Chen Suilin

The MagMineral 1.2 mtpa potash project in ROC

Name	Chen Suilin	Sex	Female	Age	39
Title & discipline	Senior project manager	Title	Senior Engineer	Education	Postgraduate
Work from	1993	Years of work	19		
Certificate	PMP/ CIPS				
Projects have done or being done					
Project Name		Marketing period		Present situation	
South Africa Richard Bay Shipyard		2 years		Concept design	
Egypt Alexander shipyard		3 years		Being constructed	
Brazil Jurong Shipyard		1 year		Detail design	
Venezuela Astinave Shipyard		1 year		Marketing	
Australia Bradken Foundry shop		1 year		Nearly finish building	
Renovation of Block B3&B4 in Expo area		0.5 year		Concept design	
CSSC Pavilion for 2010 Expo		2year		Built in 2010	

Resume of Zhen Yuan

Name	Zheng Yuan	Gender	male	Age	47	
Position	General layout	Title	engineer		Degree	Bachelor
Work experience		24 years	Design experience			24 years
Design Certificate number		0633				
Working Experience						
Construction Owner	Project name	Construction scale	Design period		Construction status	Design status
Dayang Shipbuilding Co.,Ltd	Shipbuilding base	~840000 square meters	Six months		Operated	Finished
Zhejiang Shipbuilding Co.,Ltd	Shipbuilding base	~500000 square meter	Six months		Operated	Finished
Zhejiang East Coast Shipping Industry Co.,Ltd	Shipbuilding base	900000 square meters,	Six months		Operated	Finished

Resume of Hu Xiaoming

Name	HU Xiao-ming	Gender	Male	Age	42	
Position	Null	Title	Senior Engineer		Degree	Bachelor
Work experience		20 years	Design experience			19 years
Design Certificate number		0212682				
Working Experience						
Construction Owner	Project name	Construction scale	Design period		Construction status	Design status
Dayang Shipbuilding Co.,Ltd	Shipbuilding base	100,000 DWT dock & wharf	Six months		Operated	Finished
Haixin Shipping Ltd (dock & wharf engineering)	Shipbuilding base	Dock with 500m×130m×13.80m, wharf with 518m×26m	Six months		Operated	Finished
Guangxi Fangchenggang Nuclear Power Plant (heavy-parts wharf engineering)	Nuclear Power Plant	Port basin with 95m×25m	Six months		Operated	Finished
Guotai Port (bulk cargo wharf)	Fertilizer manufacture	50,000 DWT bulk cargo wharf with 6 million throughput	Six months		Under construction	In process

Resume of Xuan Lujun

Name	Xuan Lujun	Gender	male	Age	31	
Position	Maritime and special engineering structure	Title	<u>Engineer</u>		Degree	Bachelor
Work experience		8 years	Design experience			8 years
Design Certificate number		09173120101010111				
Working Experience						
Construction Owner	Project name	Construction scale	Design period		Construction status	Design status
CSSC	First stage of Jiangnan Changxing Shipbuilding base of CSSC	Five large docks, one port basin and more than 3km pier	Twelve months		Operated	Finished
HUDONG-ZHONGHUA SHIPBUILDING CO.,LTD.	Second stage of Jiangnan Changxing Shipbuilding base of CSSC	Two large docks and more than 2km pier	Six months		Building	Finished
QUANZHOU SHIPBUILDING CO.,LTD.	Quanzhou Ship-repair base	Four large docks and more than 2km pier	Six months		Operated	Finished

Resume of Chen Zhe

Name	Chen Zhe	Gender	male	Age	40		
Position	Architect	Title	Senior Architect	Degree	Bachelor		
Work experience		18 years	Design experience		18 years		
Design Certificate number		756					
Working Experience							
Construction Owner	Project name	Construction scale	Design period	Construction status	Design status		
Dayang Shipbuilding Co.,Ltd	Shipbuilding base	~840000 square meters	Six months	Operated	Finished		
Zhejiang Shipbuilding Co.,Ltd	Shipbuilding base	~500000 square meter	Six months	Operated	Finished		
Changxing Shipping Industry Co.,Ltd	Shipbuilding base	200000 square meters,	Six months	Operated	Finished		
Zhoushan zhongdianlvke Ship-repair Co.,Ltd	Ship-repair base	950000 square meters,	Six months	Operated	Finished		

Resume of Zhu Jiang

Name	Zhu Jiang	Gender	male	Age	47		
Position	Structural Engineer	Title	professor	Degree	Bachelor		
Work experience		24 years	Design experience		24 years		
Design Certificate number		973402254					
Working Experience							
Construction Owner	Project name	Construction scale	Design period	Construction status	Design status		
Fudan University	Guanghua Tower of Fudan University	110000 square meters	14 months	Operated	Finished		
China National Offshore Oil Co.,Ltd	Shipbuilding base	200000 square meter	9 months	Operated	Finished		
Jiangsu Haixin Shipbuilding Co.,Ltd	Shipbuilding base	100000 square meters,	6 months	Operating	Finished		
Zhoushan zhongdianlvke Ship-repair Co.,Ltd	Ship-repair base	950000 square meters,	Six months	Operated	Finished		

Resume of Lin Haibei

Name	Lin Haibei	Gender	female	Age	40		
Position	Water Supply&Drainage	Title	<u>Senior Engineer</u>	Degree	Master		
Work experience		17 years	Design experience		17 years		
Design Certificate number		0212671					
Working Experience							
Construction Owner	Project name	Construction scale	Design period	Construction status	Design status		
Taizhou base/shipbuilding &repairing engineering	Shipbuilding base	~300000 square meters	Six months	Operated	Finished		
Zhoushan zhongdianlvke shipbuilding &repairing Co.,Ltd	Ship-repair base	~950000 square meter	Six months	Operated	Finished		
Zhangjianggang Shipping Industry Co.,Ltd	Ship-repair base	130000 square meters,	Six months	Operated	Finished		

Resume of Zhang Qian

Name	Zhang Qian	Gender	male	Age	34
Position	Electric engineer	Title	Engineer	Degree	Bachelor
Work experience	10 years	Design experience	10 years		
Design Certificate number	2008-j-029				
Working Experience					
Construction Owner	Project name	Construction scale	Design period	Construction status	Design status
Dayang Shipbuilding Co.,Ltd	Shipbuilding base	~840000 square meters	Six months	Operated	Finished
Zhejiang Shipbuilding Co.,Ltd	Shipbuilding base	~500000 square meter	Six months	Operated	Finished
Zhejiang East Coast Shipping Industry Co.,Ltd	Shipbuilding base	900000 square meters,	Six months	Operated	Finished
CSSC ChangXing Construction Co.,Ltd	First stage of Shipbuilding base	3957600 square meters,	three years	Operated	Finished

Resume of Li Donghui

Name	Li Donghui	Gender	female	Age	46		
Position	Environmental Protection Engineer	Title	professor	Degree	Bachelor		
Work experience		24 years	Design experience		24 years		
Design Certificate number		0212129					
Working Experience							
Construction Owner	Project name	Construction scale	Design period	Construction status	Design status		
Shanghai Waigaoqiao Shipbuilding Co.,Ltd	Shipbuilding base	~1840000 square meters	Eight months	Operated	Finished		
Zhejiang Shipbuilding Co.,Ltd	Shipbuilding base	~500000 square meter	Six months	Operated	Finished		
Zhejiang East Coast Shipping Industry Co.,Ltd	Shipbuilding base	900000 square meters	Six months	Operated	Finished		
Zhoushan zhongdianlvke Ship-repair Co.,Ltd	Ship-repair base	950000 square meters	Six months	Operated	Finished		

Resume of Hua Luoia

Name	Hua Luoia	Gender	female	Age	27	
Position	Technical Economics	Title	Assistant Engineer		Degree	Bachelor
Work experience		4 years	Design experience			34 years
Design Certificate number		HU 1031A00009				
Working Experience						
Construction Owner	Project name	Construction scale	Design period		Construction status	Design status
Changxing Shipbuilding Co.,Ltd	Shipbuilding base	~eight billion	one year		Operated	Finished
New Port of Tianjin Shipbuilding Co.,Ltd	Shipbuilding base	~ seven billion	eight months		Operated	Finished
Zhoushan zhongdianlvke Ship-repair Co.,Ltd	Ship-repair base	950000 square meters	Six months		Operated	Finished

Resume of Chen Zhengyu

Name	Chen Zhengyu	Gender	male	Age	39	
Position	HVACe	Title	<u>Senior Engineer</u>		Degree	Bachelor
Work experience		16 years	Design experience			16 years
Design Certificate number						
Working Experience						
Construction Owner	Project name	Construction scale	Design period	Construction status	Design status	
Zhoushan zhongdianlvke shipbuilding & repairing Co.,Ltd	Ship-repair base	950,000 square meter	Six months	Operated	Finished	
Jiangsu Yangzijiang Shipping Industry Co.,Ltd	Boatyard	51,000 square meters	Two months	Building	Finished	
Jiangsu Haixin Shipping Industry Co.,Ltd	Ship-repair base	130,000 square meters	Three months	Operated	Finished	